STAFF REPORT

PREPARED FOR

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"The goal here is not to be a prop trader. … I don't think that we will be in a risk-taking position, substantial enough to have it be the kind of thing that the rating agencies would say 'holy cow, these guys got a different business strategy' than what we told them we had."

-Jon Corzine, May 20, 2010

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Preface

On October 31, 2011, MF Global Holdings Ltd. (MF Global) filed for bankruptcy under Chapter 11 of the U.S. Bankruptcy Code. On the same day, the Securities Investor Protection Corporation began liquidation proceedings for MF Global's U.S.-based subsidiary, MF Global, Inc. (MFGI), and the U.S District Court appointed a trustee to handle the company's liquidation. Although initial reports estimated that $700 million in customer funds required to be housed in separate accounts for safekeeping were missing, it is now known that MF Global's collapse resulted in a $1.6 billion shortfall in customer funds.

At the time of MF Global's bankruptcy, the company served approximately 36,000 futures customers and 318 securities customers. While MF Global's customers numbered in the thousands, simply totaling up the number of customers significantly understates how many individuals were affected by the shortfall of customer funds: some of the individual futures customers were farm co-operatives representing up to 35,000 farmers.

MF Global had a 230-year lineage as a commodities broker. In addition to being a futures commission merchant, MFGI was also a securities broker-dealer. In its Fiscal Year 2011 10-K report, MF Global described itself as "one of the world's leading brokers in markets for commodities."

But, despite its long history, MF Global was a troubled company. In the four years before it went bankrupt, MF Global saw its credit rating downgraded repeatedly and it suffered chronic multi-million dollar losses. The company's final quarterly earnings statement filed October 25, 2011 reported a loss of $119 million. MF Global also experienced repeated

compliance failures. Beginning in 1997, the Commodity Futures Trading Commission (CFTC), the CME Group, and other exchanges through which the company traded took 80 regulatory actions against the company. On December 17, 2009, the CFTC fined MF Global $10 million for supervision failures in four separate instances between 2003 and 2008, which included unauthorized trading by an MF Global employee that led to a $141.5 million loss.

During the last 19 months of the company's operations, former U.S. senator and governor of New Jersey and one-time Chairman of Goldman Sachs, Jon Corzine, served as MF Global's Chairman and Chief Executive Officer. Shortly after arriving at the company in March 2010, Corzine announced his strategic plan to restore MF Global's profitability by turning the company into a global investment bank (a "mini-Goldman") and securing a primary dealer designation for MFGI from the Federal Reserve Bank of New York (New York Fed). MF Global also sought to generate revenue by purchasing European sovereign bonds and using them as collateral in repurchase-to-maturity (RTM) transactions, investments which were a prime focus of Corzine's attention.

Beginning in September 2010, MF Global significantly expanded its European RTM portfolio to support the company's new business model and to boost profits. Under Corzine's direction, MF Global's net position in European sovereign debt increased to $6.3 billion just weeks before the company's collapse. Ultimately, MF Global's belated disclosure of its extensive European RTM portfolio, its inability to meet increasing liquidity demands, and its lack of internal controls led to its collapse.

According to MFGI's bankruptcy trustee, nearly all of MFGI's securities customers have seen 60% or more of their account value returned and 194 securities claims have been satisfied in

total. The bankruptcy trustee and the administrators for MF Global's United Kingdom subsidiary, MF Global UK Limited (MFGUK) now dispute whether an additional $640 million of MFGI commodities customers' funds – which were deposited by MFGI in an MFGUK account to support trading on foreign exchanges – should be returned to MFGI customers or be used to satisfy claims of other MFGUK creditors. This dispute will be litigated at a trial scheduled to begin on April 9, 2013, in the United Kingdom.

The Subcommittee's Investigation

The Subcommittee on Oversight and Investigations of the House Committee on Financial Services Majority Staff (Subcommittee) undertook this investigation for three reasons: first, MF Global's customers deserve to know how and why their funds went missing; second, market participants deserve to know whether regulatory lapses have been identified and corrected; and third, taxpayers deserve to know that regulators have been held accountable so that similar losses may be prevented from occurring in the future.

Over the course of its yearlong investigation, the Subcommittee conducted over fifty interviews and held three hearings at which it considered the testimony of nineteen witnesses, including MF Global's former senior managers and its principal regulators. Additionally, the Subcommittee examined more than 243,000 documents produced by MF Global, the company's federal commodities and securities regulators, the company's independent auditor, credit rating agencies, the New York Fed, the self-regulatory organizations, exchanges, and clearing houses to which the company belonged. The findings and recommendations contained in this report rely primarily upon the information obtained from these interviews, hearings, and source documents.

This report addresses issues falling within the jurisdiction of the House Committee on Financial Services. Accordingly, the Subcommittee has not conducted a forensic examination of MF Global's accounting practices, nor has it assessed the potential civil or criminal liability of the company and its former employees. Such judgments are the proper province of the Trustee for the liquidation of MFGI and law enforcement and regulatory agencies.

MF Global Prior to Jon Corzine's Arrival

Company Origin and Growth

MF Global traces its origin back 229 years to a sugar brokerage business founded by James Man in London in 1783. In 1869, the business became known as E.D.&F. Man. It set up its first overseas operations in New York and Hong Kong in 1972, and began trading commodities futures. The company expanded its services in 1983 to include investment management, and by 1994, when it first listed on the London Stock Exchange, it had $1 billion in funds under management.[1]

In 2000, E.D.&F. Man spun off its agricultural commodities business and changed its name to Man Group plc.[2] Under the leadership of Kevin R. Davis, who joined the company in 1991 and rose to become the Chief Executive Officer (CEO) of Man Financial (Man Group's global brokerage businesses), the company sought to capitalize on the rapid growth in global derivatives markets by acquiring businesses offering new products, including futures, options, and other derivatives.[3] Man Group acquired 17 companies in 18 years, including GNI Holdings Ltd. in 2002 and Refco Inc. in 2005.[4] GNI was a leading European broker of futures and options, foreign exchange, and equity derivative products, and its acquisition established the Man Group, through Man Financial, as the world's largest independent futures broker.[5] Refco

[1] Man website, http://www.mangroupplc.com/about-man/heritage/index.jsf (last visited July 19, 2012).
[2] *Id.*
[3] From 2001-2007, the compound annual growth rates in contract volumes in exchange-traded and over-the-counter derivates were 22% and 32%, respectively. Form 10-K for MF Global Holdings Ltd. (fiscal year ended Mar. 31, 2008) at 12-13 (citing Bank for International Settlements Quarterly Review) [hereinafter FY08 10-K].
[4] MF Global IPO Prospectus [hereinafter IPO Prospectus], at 122 and 49.
[5] *Man Group Acquires Derivative Brokerage GNI*, INVESTORS OFFSHORE, Oct. 24, 2002, (http://www.tax-news.com/news/Man_Group_Acquires_Derivatives_Brokerage_GNI____9774.html) (last visited Nov. 14, 2012).

was a regulated futures brokerage with client accounts and assets in the U.S., Singapore, Canada, and India, and its acquisition further expanded Man Financial's global brokerage services.[6]

Following these acquisitions, and fueled by the growth of the derivatives industry, Man Financial became one of the leading brokers of exchange-listed futures and options in the world, providing execution and clearing services for exchange-traded and over-the-counter derivative products, as well as for non-derivative products and securities in the cash market.[7] The company served more than 130,000 active client accounts, and held leading market share on the biggest exchanges in North America and Europe, including the Chicago Mercantile Exchange (CME), CBOT, the New York Mercantile Exchange, and Eurex.[8] The company also had a global footprint, with 34 offices in cities such as New York, Chicago, London, Paris, Mumbai, Hong Kong, Singapore, and Sydney.[9] Man Financial more than doubled its exchange-traded brokerage volume between 2004 and 2007, increasing both revenues and operating margins, and reported net income of $188 million on revenue of $5.7 billion for the fiscal year ending March 31, 2007.[10]

The Man Group Spins Off MF Global

In 2007, Man Group decided to separate its brokerage businesses from its asset management businesses and announced that it would spin off Man Financial into an independent, Bermuda-incorporated company named MF Global.[11] In order to finance the spinoff, MF Global

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[6] IPO Prospectus, *supra* note 4, at 2 and 122; FY08 10-K, *supra* note 3, at 138, note 19; Standard & Poor's Rating Services [hereinafter S&P] Ratings Outlook for MF Global, July 13, 2007 [hereinafter S&P July 2007 Ratings], at 4.
[7] IPO Prospectus, *supra* note 4, at 1.
[8] *Id*. The Chicago Mercantile Exchange and the Chicago Board of Trade officially merged to form the CME Group Inc. on July 12, 2007. http://www.cmegroup.com/company/history/magazine/Summer2007/FromWaterStreetToTheWorld.html (last visited Sept. 25, 2012).
[9] IPO Prospectus, *supra* note 4, at 1; S&P July 2007 Ratings, *supra* note 6, at 3.
[10] Form 10-K for MF Global Holdings Ltd. (fiscal year ended Mar. 31, 2007).
[11] Jacob Bunge, *MF Global: History From IPO to Bankruptcy*, WALL ST. J., Oct. 31, 2011 (http://blogs.wsj.com/deals/2011/10/31/mf-global-history-from-ipo-to-bankruptcy/) (last visited Oct. 3, 2012).

entered into a $1.4 billion unsecured committed revolving credit facility (bridge loan) with several institutions, the net proceeds of which the new company would use to repay its obligations to Man Group and third parties.[12] On July 18, 2007, MF Global announced an initial public offering (IPO) of 97.38 million shares that would trade on the New York Stock Exchange (NYSE) under the ticker symbol "MF."[13] The offering, which was priced at $30 per share, generated $2.92 billion in capital, making it the second-largest NYSE-listed IPO of 2007.[14] Although share prices fell 15% in the first week of trading, they recovered by the end of the year to close at $31.47, with a corresponding market cap of nearly $3.8 billion.[15]

Unauthorized Trading Incident Shatters Investor Confidence

During the early morning hours of February 27, 2008, Evan Dooley, a registered trader in MF Global's Memphis office, began placing orders on wheat futures for his personal account through a home computer linked to the company's proprietary system.[16] Dooley accumulated a net short position in wheat futures totaling over 16,000 contracts, well in excess of his trading limits.[17] MF Global did not discover Dooley's trades until the price of wheat had increased,

[12] IPO Prospectus, *supra* note 4, at 51. Although MF Global planned to replace its bridge loan with debt offerings following its IPO, market conditions frustrated the company's efforts to do so. Instead, MF Global renegotiated its bridge loan with existing lenders to extend the loan maturity to Dec. 12, 2008 in exchange for paying higher interest rates on the $1.05 billion balance.
[13] IPO Prospectus, *supra* note 4.
[14] Form 10-Q for MF Global Holdings Ltd. (quarterly period ended Sept. 30, 2007) [hereinafter FY08 Q2 10-Q], at 13.
[15] MF Global Holdings Ltd. (MFGLQ) Stock Chart, Yahoo Finance, Mar. 23, 2010 – Mar. 24, 2010 [hereinafter Mar. 23-24, 2010 MFG Stock Chart] http://finance.yahoo.com/echarts?s=MFGLQ+Interactive (last visited July 20, 2012).
[16] Form 10-K for MF Global Holdings Ltd. (fiscal year ended Mar. 31, 2010) [hereinafter FY10 10-K], at 35; Press Release, U.S. Commodities Futures Trading Commission [hereinafter CFTC], CFTC Sanctions MF Global Inc. $10 Million for Significant Supervision Violations between 2003 and 2008 (Dec. 17, 2009), *available at* http://www.cftc.gov/PressRoom/PressReleases/pr5763-09 (last visited Oct. 15, 2012).
[17] Form 8-K for MF Global Ltd. (Feb. 27, 2008).

resulting in a loss of $141.5 million.[18] As a clearing member of the exchange through which Dooley had traded, MF Global was obligated to cover Dooley's losses.[19]

When the company announced the unauthorized trading the following day, share prices fell nearly 28% to close at $21.29.[20] On February 29, 2008, Fitch Ratings (Fitch) put MF Global on negative watch, citing deficiencies in its risk-management system, and Standard & Poor's (S&P) downgraded the company's credit rating to BBB with a "CreditWatch Negative" placement, indicating that it could lower the rating further based on its review of the company's risk management policies.[21] On March 17, rumors of a liquidity crisis at the company sent share prices as low as $3.64 a share, prompting the CFTC to issue a statement indicating that "MF Global is currently in compliance with the agency's regulatory financial requirements."[22] The CME Group also issued a statement reflecting that "all clearing members, including MF Global … remain in good standing and continue to meet all of their obligations to the clearing house."[23] Although these statements helped stabilize MF Global's share price that day, the company's stock closed at $6.05, marking a 79% decrease in value in just three weeks.[24] Dooley's rogue trading and the resulting loss had shattered investor confidence in the company.

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[18] *Id.*
[19] *Id.*
[20] Mar. 23-24, 2010 MFG Stock Chart, *supra* note 15.
[21] Letter from Craig Parmelee, Managing Dir. and Lead Analytical Manager for North American Fin. Institutions Ratings, S&P, to Randy Neugebauer, Chairman, Subcomm. on Oversight and Investigations [hereinafter O&I Subcomm.] (Jan. 17, 2012) at 3. [hereinafter S&P Jan. 17, 2012 letter]; Jennifer Yousfi, *Unauthorized Trades Cost MF Global $141.5 Million*, MONEY MORNING¸ Feb. 29. 2008 (http://moneymorning.com/2008/02/29/unauthorized-trades-cost-mf-global-1415-million/) (last visited Oct. 15, 2012).
[22] Press Release, CFTC, Statement on MF Global (Mar. 17, 2008) http://www.cftc.gov/PressRoom/PressReleases/cftcmfglobalstatement031708 (last visited Sept. 25, 2012).
[23] Press Release, CME Group, Statement on MF Global in Good Standing at CME Clearing (Mar. 17, 2008) http://cmegroup.mediaroom.com/index.php?s=43&item=708&pagetemplate=article (last visited Sept. 25, 2012).
[24] Mar. 23-24, 2010 MFG Stock Chart, *supra* note 15.

Efforts to Restore Investor Confidence Falter

In the aftermath of Dooley's unauthorized trading, MF Global was leveraged at almost 39-to-1, with $18.6 billion of its operating capital coming from short-term repurchase agreements, and would soon announce quarterly and fiscal year-end losses.[25] The company needed capital to repay the bridge loan maturing in December and sought ways to strengthen its capital structure. On May 20, 2008, MF Global announced that it entered into an agreement with a private equity fund controlled by J.C. Flowers & Co. LLC, in which the fund, J.C. Flowers II L.P., agreed to provide a backstop commitment of $300 million toward the sale of equity-linked securities.[26] MF Global planned to use the proceeds from the sale to repay a portion of its bridge loan.[27] Under the terms of the commitment, J.C. Flowers II L.P. would purchase a minimum of $150 million and a maximum of $300 million of perpetual convertible preferred shares.[28] Each preferred share paid a 6% annual dividend and was convertible at any time to common stock at an initial conversion price of $12.50 per share.[29] J.C. Flowers II L.P. also had the right to appoint up to two directors to MF Global's board of directors.[30]

At the time, M.F. Global's investors and its board welcomed the investment. J.C. Flowers & Co.'s managing director, J. Christopher Flowers, had a positive reputation on Wall Street.[31] Flowers had made partner at Goldman Sachs at the age of 30, and eventually headed

[25] FY08 10-K, *supra* note 3.
[26] Press Release, MF Global, MF Global Reports Record Fourth Quarter and Fiscal Year 2008 Results (May 20, 2008), at 2 http://www.sec.gov/Archives/edgar/data/1401106/000119312508118826/dex991.htm (last visited Sept. 25, 2012).
[27] *Id.*
[28] *Id.*
[29] *Id.* As a result of the issuance of additional convertible preferred shares on June 20, 2008, MF Global paid J.C. Flowers a make-whole payment of 26.7 million and increased the dividend rate on its existing preferred shares to 10.725%.
[30] *Id.*
[31] *Id.*

the investment bank's financial services deals business.[32] Leaving Goldman in 1998, Flowers went on to orchestrate the buy-out of Long-Term Credit Bank of Japan — the first time foreigners had bought a Japanese bank — and then founded and managed several private equity funds.[33]

The J.C. Flowers deal appeared to momentarily calm investors. In June 2008, MF Global was able to enter into a five-year, $1.5 billion committed unsecured revolving credit facility (liquidity facility) with a syndicate of banks.[34] The company used proceeds from this liquidity facility to pay down $350 million of its bridge loan.[35] On June 18, the company announced that it would issue $150 million of convertible preferred shares and $150 million of convertible senior notes in two private offerings and use the proceeds to further pay down its bridge loan.[36]

However, in the press release announcing the offering, MF Global also disclosed for the first time that "the narrowing of short term credit spreads has had a negative impact on net interest income and overall pre-tax margins."[37] This news, which pertained to a major source of the company's revenue, renewed panic among investors and prompted Moody's Investor Service (Moody's) to assign MF Global's credit rating a negative outlook.[38] On June 18, the day of the announcement, the company's stock fell more than 43%, to close at $7.83 a share, erasing nearly

[32] Ryan Dezember, *Private-Equity Investor J.C. Flowers Could Lose Nearly $48 million on MF*, WALL ST. J., Nov. 1, 2011 (http://online.wsj.com/article/SB10001424052970204394804577010181017063466.html).
[33] *Id.*
[34] Form 10-Q for MF Global Ltd. (quarterly period ended June 30, 2009), at 16-17. JP Morgan [hereinafter JPMC] and Bank of New York Mellon were the primary lenders.
[35] Form 10-K for MF Global Holdings Ltd. (fiscal year ended Mar. 31, 2009) at 78 [hereinafter FY09 10-K].
[36] Press Release, MF Global, MF Global to Offer $150 million of Convertible Preference Shares and $150 Million of Convertible Senior Notes (June 17, 2008) http://www.sec.gov/Archives/edgar/data/1401106/000119312508135379/dex991.htm (last visited Sept. 25, 2012).
[37] *Id.*
[38] Ratings Action, Moody's Investors Service [hereinafter Moody's] confirms MF Global's Baa1 rating; assigns negative outlook, June 18, 2008.

all of the previous three months' gains.[39] The Wall Street Journal noted that the announcement "left analysts and investors yearning for more information."[40]

MF Global continued to seek sources of capital and restore investor confidence throughout June and July 2008. It sold its previously-announced convertible preferred shares and senior notes on June 20, albeit with higher than anticipated annual dividend rates, reflecting the higher risk premium demanded by the market.[41] On July 18, the company sold an additional $150 million of convertible preferred shares to J.C. Flowers II L.P. paying an annual dividend of 9.75%, which it used to repay more of the bridge loan.[42] Also on July 18, the company entered into a credit agreement with several banks that provided for a two-year, $300 million unsecured term loan facility, which would enable it to repay the remaining balance on its bridge loan.[43] Finally, MF Global announced on July 29 that it had appointed David I. Schamis to its board and that he would serve on the company's audit committee.[44] J. Christopher Flowers had nominated Schamis, a managing director J.C. Flowers & Co. L.L.C., using the authority granted to J.C. Flowers II L.P. to appoint up to two directors under its investment agreement with MF Global.[45] Despite these efforts, the company's stock continued its precipitous fall, closing at just $4.34 on September 30, with a corresponding market cap of only $522.1 million.[46]

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[39] Mar. 23-24, 2010 MFG Stock Chart, *supra* note 15.
[40] *MF Global Tries to Temper Selloff*, WALL ST. J. (June 18, 2008).
[41] Form 8-K for MF Global Ltd. (June 20, 2008).
[42] Form 8-K for MF Global Ltd. (July 18, 2008).
[43] *Id.*
[44] Form 8-K for MF Global Ltd. (July 29, 2008).
[45] Investment Agreement between MF Global Ltd. and J.C. Flowers II L.P. (May 20, 2008), at 21, *available at* http://www.sec.gov/Archives/edgar/data/1401106/000119312508133184/dex1048.htm (last visited Oct. 15, 2012).
[46] O&I Subcomm. staff analysis of data obtained from MF Global's 10-K and 10-Q filings [hereinafter MF Global Fin. Performance]; O&I Subcomm. staff analysis of data obtained from historic share price data obtained from Yahoo Fin. [hereinafter MF Global Stock Prices].

A New Strategy Stalls

With the company's efforts to restore investor confidence faltering, MF Global's board of directors sought a change in the company's leadership. On October 28, 2008, the company announced that its board had appointed Bernard W. Dan, the former President and CEO of the Chicago Board of Trade (CBOT), as CEO to replace the long-serving Kevin Davis.[47] Investors reacted favorably to Dan's appointment; the company's stock rallied 80% in the week following the announcement.[48] Dan immediately sought to further boost investor confidence by embarking upon a new strategy: in December, MF Global contacted the New York Fed to express interest in its U.S.-based subsidiary, MFGI, being designated as a "primary dealer."[49]

Primary dealers act as counterparties to open market operations executed by the New York Fed in furtherance of U.S. monetary policy as determined by the Federal Open Market Committee.[50] To be eligible for consideration as a primary dealer, a company must meet minimum capital standards and have the capacity to make markets for the New York Fed, regularly participate in treasury auctions, and provide market commentary and information and analysis.[51] Because of these requirements, the New York Fed historically has tended to select larger, well-established, and well-known financial institutions.[52] Over time, market watchers

[47] Form 8-K for MF Global Ltd. (Oct. 28, 2008); Press Release, MF Global, MF Global Appoints Bernard W. Dan as Chief Executive Officer (Oct. 28, 2008).
[48] MF Global Stock Prices, *supra* note 46.
[49] E-mail from Donald Galante, Senior V.P., MF Global Inc., to Debby Perelmuter, Senior V.P., Markets Group, Federal Reserve Bank of N.Y. [hereinafter NYFRB] (Dec. 19, 2008, 03:34 p.m.).
[50] NYFRB Operating Policy Administration of Relationship with Primary Dealers Jan. 11, 2010 http://www.newyorkfed.org/markets/pridealers_policies.html (last visited Sept. 25, 2012) [hereinafter NYFRB New Primary Dealer Policy]; *Hearing on the Collapse of MF Global Before the Subcomm. on Oversight and Investigations of the House Comm. on Fin. Services*, 112th Cong. 93 (2011) [hereinafter Dec. 15, 2011 Hearing] (statement of Thomas C. Baxter, Jr., Gen. Counsel, NYFRB).
[51] *Id.*
[52] NYFRB Primary Dealers List http://www.newyorkfed.org/markets/pridealers_current.html (last visited Sept. 25, 2012).

have come to regard a primary dealer designation as a "Good Housekeeping' seal of approval," enhancing the company's standing in the marketplace.[53]

By securing a primary dealer designation from the New York Fed for MFGI, MF Global hoped to capitalize on what it believed that market watchers would perceive as its enhanced franchise value — a value that could translate into new business lines and new customers. However, the company's strategy immediately ran into three problems. Two of the issues involved the company's incorporation in Bermuda. First, the Primary Dealers Act of 1988 prohibited the New York Fed from designating a subsidiary of a foreign-owned company as a primary dealer unless the country in which the parent was domiciled provided the same opportunities to U.S. companies as it did to domestic firms in the underwriting and distribution of government debt.[54] Because the New York Fed had not previously determined whether Bermuda met this requirement, it would have to study the country before it could designate MF Global's subsidiary as a primary dealer. This process would take time and had an uncertain outcome. Secondly, there were reputational concerns associated with Bermuda's well-known

[53] The New York Fed took steps to eliminate this perception, specifically warning that primary dealer designation neither constitutes an endorsement of the company nor a replacement for prudent counterparty risk management and due diligence, NYFRB New Primary Dealer Policy, *supra* note 50, and going so far as to eliminate its surveillance activities over primary dealers in 1992, stating that the action "should be viewed merely as confirmation of the long-standing reality that the Bank does not have – nor has it ever had – formal regulatory authority over the Government securities market or authority over the primary dealers in their capacity as such." NYFRB Operating Policy Administration of Relationship with Primary Dealers, Jan. 22, 1992, http://www.newyorkfed.org/markets/pridealers_policies_920122.html (last visited September 25, 2012) ; Letter from Thomas C. Baxter, Jr. Gen. Counsel, NYFRB, to Randy Neugebauer, Chairman, O&I Subcomm. at 6 (June 22, 2012); Dec. 15, 2011 Hearing, *supra* note 50, at 3 (testimony of Thomas C. Baxter, Jr., Gen. Counsel, NYFRB). Nevertheless, the perception remained.

[54] *See* 22 U.S.C. §§5341-5342.

status as a tax haven.[55] When the New York Fed communicated this information to MF Global, the company indicated that it was considering switching jurisdictions.[56]

MF Global faced a third problem as well. In April 2009, the New York Fed contacted the CFTC and learned that MF Global was the subject of an investigation regarding the Dooley incident and one other matter.[57] In late April, the New York Fed informed MF Global that it had suspended consideration of MFGI's application pending resolution of the CFTC's investigation.[58] During this suspension period, MF Global executives tried to engage the New York Fed regarding the application, but were rebuffed and cautioned not to publicize its aspirations to be a primary dealer.[59] Concerned about, among other things, the public perception of designating any company as a primary dealer soon after regulatory action had been taken against the company, the New York Fed considered revising its primary dealer policy to institute a "cooling off" period beginning at the announcement of an enforcement action by a regulatory agency.[60]

On December 17, 2009, the CFTC issued its order against MF Global, citing the company for "risk supervision failures in four separate instances between 2003 and 2008,"

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[55] E-mail from Debby Perelmuter, Senior V.P., Markets Groups, FRBNY, to Jennifer Wolgemuth, Counsel & Ass't V.P., NYFRB, et al. (Apr. 1, 2009, 8:45 a.m.) [hereinafter Perelmuter E-mail]; *see also* Large U.S. Corporations and Federal Contractors with Subsidiaries in Jurisdictions Listed as Tax Havens or Financial Privacy Jurisdictions, GAO-09-157 (Dec. 18, 2008) http://www.gao.gov/assets/290/284522.pdf (last visited Sept. 25, 2012).

[56] Perelmuter E-mail, *supra* note 55. MF Global later confirmed that it would be switching jurisdictions, and reincorporated in Delaware on Jan. 4, 2010. E-mail from Perelmuter to Wolgemuth, et al. (June 11, 2009, 03:57 p.m.); E-mail from Perelmuter, to Wolgemuth, et al (June 30, 2009, 03:37 p.m.); FY10 10-K, supra note 16, at 1, 34, 44.

[57] E-mail from Wolgemuth, to Richard Dzina, Market Operations Monitoring and Analysis, Markets Group, NYFRB, et al. (Apr. 30, 2009, 02:42 p.m.).

[58] Dec. 15, 2011 Hearing, *supra* note 50, at 6 *(*testimony of Thomas C. Baxter, Jr., Gen. Counsel, NYFRB); E-mail from Wolgemuth, to Dzina, et al. (Apr. 30, 2009, 02:42 p.m.); E-mail from Perelmuter, to Wolgemuth, Dzina, et al. (Apr. 30, 2009, 02:57 p.m.).

[59] E-mail from Michael Silva, Chief of Staff, FRBNY, to Laurie Ferber, Gen. Counsel, MF Global (July 30, 2009, 05:38 p.m.); E-mail from Dzina, to Perelmuter (July 31, 2009, 07:04 p.m.); E-mail from Wolgemuth, to Dzina (Oct. 13, 2009, 06:17 p.m.).

[60] E-mail from Wolgemuth, to Thomas Baxter, Gen. Counsel, NYFRB (Sept. 1, 2009, 12:26 p.m.); E-mail from Joshua Frost, NYFRB, to Dzina (Oct. 12, 2009, 6:17 p.m.).

including the Dooley incident, and directing it to pay a $10 million fine and hire an outside consultant to review its risk management, supervision, and compliance programs.[61] The same day, MF Global contacted the New York Fed to express the company's eagerness to "re-engage" regarding MFGI's primary dealer application.[62] On January 11, 2010, the New York Fed released its revised primary dealer policy.[63] The revised policy required a two part application, established a formal application review procedure, and specified that the New York Fed would not designate as a primary dealer "any firm that is, or recently has been (within the last year) subject to litigation or regulatory action or investigation that [it] determines material or otherwise relevant to the potential primary dealer relationship."[64] MFGI formally submitted the first part of its primary dealer application on January 13, 2010, and submitted the second part on January 22.[65] In accordance with its new policy, the New York Fed determined that the CFTC order was material, and on January 26 informed MF Global that MFGI could not be named a primary dealer before December 17, 2010 (one year following the date of the CFTC order).[66]

The following day, Dan sent a letter to the New York Fed laying out MF Global's case for why a one-year delay would be unfair, asking the New York Fed to exercise its discretion to name MFGI a primary dealer before the expiration of the one-year period, and requesting a

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[61] Press Release, CFTC, CFTC Sanctions MF Global, Inc. $10 Million for Significant Supervision Violations between 2003 and 2008 (Dec. 17, 2009) http://www.cftc.gov/PressRoom/PressReleases/pr5763-09 (last visited Sept. 25, 2012); In the Matter of MF Global, Inc., CFTC Docket No. 10-03 http://www.cftc.gov/ucm/groups/public/@lrenforcementactions/documents/legalpleading/enfmfglobalorder12172009.pdf (last visited Sept. 25, 2012).

[62] E-mail from Peter McCarthy, Exec. V.P., Global Head of Fixed Income, MF Global, to Dzina (Dec. 17, 2009, 03:58 p.m.).

[63] Press Release, NYFRB, New York Fed Publishes Revised Policy for Administration of Primary Dealer Relationships (Jan. 11, 2010) http://www.newyorkfed.org/newsevents/news/markets/2010/ma100111.html (last visited Oct. 15, 2012).

[64] NYFRB New Primary Dealer Policy, *supra* note 50.

[65] NYFRB Memorandum, Chronology of FRBNY's Actions Relating to MF Global (Dec. 13, 2011), at 14, 15 [hereinafter NYFRB Chron].

[66] *Id*. at 15.

meeting to discuss the matter.[67] At the meeting on February 23, 2010, MF Global executives expressed concern about the length of time MFGI had been under consideration as a primary dealer and about the New York Fed's revised policy, which could further delay its designation.[68] New York Fed staff members reiterated that they had evaluated MFGI's application in accordance with the bank's revised primary dealer policy and that the company could not be designated as a primary dealer until after December 2010.[69] The New York Fed's decision thus stalled MF Global's primary dealer strategy — a strategy that the company had been pursuing since December 2008 — for at least another eleven months.

A Flawed Business Model Revealed

Unlike many of its competitors, MF Global was not affiliated with a larger financial institution, nor did it generally engage in non-brokerage businesses such as investment banking, asset management, or principal investment activity, including proprietary trading.[70] As an independent futures and options broker, MF Global generated most of its income from four sources: commissions from executing client orders on an agency basis; commissions from clearing services; mark-ups from client trades executed on a matched-principal basis; and interest income earned on cash and margin balances in client accounts as well as interest related to fixed income activities.[71] Accordingly, MF Global suffered from a fundamental flaw in its business model: because the company had not diversified its sources of revenue, it was vulnerable to a prolonged economic downturn affecting its areas of core profitability.

By the time MF Global learned that its primary dealer strategy had stalled, the financial crisis of 2008 had deepened into a global economic downturn which depressed both derivatives

[67] *Id.*
[68] E-mail from James P. Bergin, NYFRB, to Wolgemuth (Feb. 24, 2010, 04:41p.m.).
[69] *Id.*
[70] FY08 10-K, *supra* note 3, at 4, 10.
[71] *Id.*

trading volume and interest rates and choked off MF Global's income. At the CME, average trading volume fell 20 percent and the total notional value of contracts traded on its exchanges fell by a third.[72] Additionally, monetary actions taken by several countries also resulted in ultra-low interest rates around the world.[73] In the United States, for example, the Federal Reserve System's Federal Open Market Committee reduced the target federal funds rate from 4.75 percent in 2007 to 0 to .25 percent by the end of 2008.[74]

MF Global's revenues collapsed in response to these developments. For fiscal years 2009 and 2010, the total volume of exchange-traded futures and options transactions that MF Global executed and cleared fell by 20 percent.[75] With fewer derivatives orders to execute and clear, MF Global's annual net commission revenue fell by 32 percent over the same time period (from $796 million to $544 million).[76] Additionally, the interest rate spreads that MF Global could realize by reinvesting client cash and margin balances shrunk significantly, resulting in declining interest revenue.[77] Over the five fiscal quarters between October 1, 2007, and December 31, 2008, for instance, MF Global's gross interest revenue decreased by 87 percent, from $1.26 billion to just $154 million.[78]

Credit rating agencies took notice of MF Global's shrinking revenues. On December 4, 2008, S&P changed the company's BBB credit rating outlook to negative because of its lower

[72] Matt Koppenheffer, *J. Christopher Flowers: Corzine's Kingmaker*, THE MOTLEY FOOL, Dec. 16, 2011 (http://www.fool.com/investing/general/2011/12/16/j-christopher-flowers-corzines-kingmaker.aspx) (last visited Nov. 14, 2012) [hereinafter Koppenheffer article].
[73] Joellen Perry, *ECB Cuts Rates to 2%, Matching '05 Low*, WALL ST. J., Jan. 16, 2009 (http://online.wsj.com/article/SB123201496350385293.html) (last visited Nov. 14, 2012).
[74] FRBNY, Historical Changes of the Target Federal Funds and Discount Rates, http://www.newyorkfed.org/markets/statistics/dlyrates/fedrate.html (last visited Sept. 25, 2012).
[75] *See* FY09 10-K, *supra* note 35, at 50; FY10 10-K, *supra* note 16, at 44.
[76] *Cf.* FY09 10-K, *supra* note 35 to FY10 10-K, *supra* note 16.
[77] See FY10 10-K, *supra* note 16, at 18.
[78] FY08 Q2 10-Q, *supra* note 14; Form 10-Q for MF Global Ltd. (quarterly period ended Dec. 31, 2008).

cash flows and a decline in customer payables.[79] On January 16, 2009, Moody's downgraded MF Global's credit rating to Baa2 from Baa1, noting a "weakening in MF Global's earnings generation ability" and predicting that MF Global's "revenues [would] continue to come under pressure over the coming quarters."[80] On February 25, S&P affirmed its BBB rating and negative outlook, noting that it expected MF Global to continue to face "revenue challenges and elevated competitive pressures."[81] On September 24, S&P again affirmed its BBB rating and negative outlook, noting that it expected MF Global would continue to have lower trading volumes and reduced interest income, which would likely reduce its revenue over the coming quarters.[82] Finally, on November 6, 2009, Moody's noted a "sharp increase in MF Global's balance sheet leverage" and assigned a negative outlook to its Baa2 ratings.[83]

The End of an Era

By 2010, MF Global faced serious financial difficulties. The company's stock, which had once traded above $30 per share, now traded for under $10, representing a reduction in market capitalization of over $2 billion.[84] The Dooley trading incident shattered investor confidence in the company, and its efforts to restore confidence, including its application to become a primary dealer, had faltered and stalled. MF Global was highly leveraged at above 35-to-1, and it lacked diversified revenue streams with which to combat the effects of the global economic downturn.[85] Additionally, the company had lost money three years in a row, reporting

[79] S&P Jan. 17, 2012 letter, *supra* note 21, at 3.
[80] Letter from Steven R. Ross, Partner, Akin Gump Strauss Hauer & Feld, to Randy Neugebauer, Chairman, O&I Subcomm. (Jan. 17, 2012), at 2 [hereinafter Moody's Jan. 17, 2012 letter].
[81] Global Credit Portal: Ratings Direct, MF Global Ltd. research update, S&P, Feb. 25, 2009.
[82] S&P Jan. 17, 2012 letter, *supra* note 21, at 3.
[83] Moody's Jan. 17, 2012 letter, *supra* note 80, at 2.
[84] MF Global Fin. Performance, *supra* note 46. MF Global Stock Prices, *supra* note 46.
[85] MF Global Fin. Performance, *supra* note 46.

net losses of $69.54 million in fiscal year 2008, $48.61 million in fiscal year 2009, and $136.97 million in fiscal year 2010.[86]

On March 17, 2010, amid these financial difficulties, Bernard Dan resigned as CEO of MF Global, citing personal reasons.[87] His resignation came just 16 months into his term, and less than a month after the New York Fed delayed consideration of MFGI's primary dealer application. Dan's departure marked the end of an era for MF Global. The company's next Chairman and CEO would soon steer the company away from its roots as an independent futures and options broker and take the company in an entirely new direction.

[86] FY08 10-K, *supra* note 3; FY09 10-K *supra* note 35; FY10 10-K, *supra* note 16.
[87] Form 8-K for MF Global Ltd. (Mar. 23, 2010) [hereinafter Mar. 23, 2010 8-K]; Press Release, MF Global, MF Global Appoints Jon S. Corzine Chairman and Chief Executive Officer (Mar. 23, 2010) [hereinafter MF Global Mar. 23, 2010 Press Release] http://sec.gov/Archives/edgar/data/1401106/000119312510064637/dex991.htm (last visited Oct. 15, 2012).

The Jon Corzine Era

Corzine Appointed CEO of MF Global

MF Global's board moved quickly to replace Dan following his resignation. David Schamis immediately contacted J. Christopher Flowers to ask whether Jon Corzine would be interested in the position.[88] Securing an executive with Corzine's reputation and experience was viewed as a potential coup for MF Global. After a 23-year career at Goldman Sachs in which he rose from a bond trading desk to become the company's Chairman, Corzine served five years as a U.S. Senator and then four years as New Jersey's Governor.[89] The timing for approaching Corzine was opportune: Corzine had lost his gubernatorial reelection bid only months earlier. Additionally, Schamis knew that Flowers would be ideal to approach Corzine with MF Global's offer. In addition to Flowers' private equity fund investing in MF Global, Flowers and Corzine were good friends. Flowers and Corzine had worked together at Goldman Sachs, where Flowers had been instrumental in helping Corzine take Goldman Sachs public, and Flowers had later helped manage Corzine's blind trust after Corzine entered public service.[90] Additionally, Flowers had already been in contact with Corzine about the possibility of helping manage one of his company's private equity funds.[91]

Once Flowers approached Corzine with MF Global's offer, Corzine quickly accepted the position. On March 23, 2010, just six days after Dan's resignation, MF Global announced that Corzine would join the company as its Chairman and CEO. The company agreed to pay Corzine a $1.5 million salary and a $1.5 million signing bonus, and established a $3 million target

[88] Peter Elkind and Doris Burke, *The Last Days of MF Global*, CNN MONEY, June 4, 2012 (http://finance.fortune.cnn.com/2012/06/04/the-last-days-of-mf-global) (last visited Nov. 14, 2012) [hereinafter Elkind Burke article].
[89] Dec. 15, 2011 Hearing, *supra* note 50, at 127 (statement of Jon S. Corzine, CEO, MF Global).
[90] Koppenheffer article, *supra* note 72.
[91] *Id.*

performance bonus for the year.[92] At the same time, J.C. Flowers & Co. LLC announced that Corzine would become a partner in its third private equity fund in a lucrative deal that significantly enhanced the compensation package offered by MF Global.[93]

Investors reacted favorably to Corzine's appointment as MF Global's CEO. MF Global's stock price jumped more than 12 percent the day after the company announced his appointment, and continued to rise thereafter, increasing 33 percent within three weeks.[94] The credit rating agencies also viewed Corzine's appointment favorably. An S&P analyst wrote that the company "[was] more credible and [had] a better chance to get where it wants to go with Corizine [sic] as CEO."[95] Moody's discounted the abruptness of the transition between Corzine and Dan in light of "Mr. Corzine's decades of first-rate industry and leadership experience, as well as the reputational 'cache' [sic] and potential industry connections he would bring to MF Global."[96]

A New Environment for a Wall Street Veteran

MF Global was a new environment for Corzine. Although he had worked in the upper echelons of finance and politics, he had never worked in the futures industry, nor had he ever run a public company. The company's rapid expansion through acquisition had created nearly fifty direct or indirect subsidiaries located around the world, resulting in a disjointed corporate structure subject to supervision by multiple regulators with overlapping jurisdictions in multiple countries. As a holding company, MF Global derived 83 percent of its income from net revenue

[92] Mar. 23, 2010 8-K, *supra* note 87; MF Global Mar. 23, 2010 Press Release, *supra* note 87.
[93] J.C. Flowers & Co. offered Corzine a 3.5% carried interest in the fund's profits. *See* "Jon S. Corzine Contract with J.C. Flowers & Co. LLC" *and* "Jon S. Corzine Employment Agreement," accompanying Mar. 23, 2010 8-K, *supra* note 87.
[94] Mar. 23-24, 2010 MFG Stock Chart, *supra* note 15.
[95] S&P Rating Summary Record for MF Global Holdings Ltd. (Nov. 24, 2010), at 8.
[96] Press Release, Moody's, Moody's comments on MF Global's CEO change (Mar. 23, 2010) http://www.moodys.com/research/Moodys-comments-on-MF-Globals-CEO-change--PR_196823 (last visited Sept. 25, 2012).

generated by six regulated subsidiaries, five of which were located outside of the United States.[97] MFGUK, for instance, was authorized and regulated by the United Kingdom's Financial Services Authority, but also had branch offices in the Netherlands and France authorized under the European Union's "passport" system, as well as a representative office in Switzerland licensed by the Swiss Financial Market Supervisory Authority.[98] MF Global Canada Co. was registered with the Investment Industry Regulatory Organization of Canada as well as with each of the regional securities commissions in the Canadian provinces and territories in which it operated.[99] MF Global Singapore Pte. was licensed by the Monetary Authority of Singapore, but also had a branch office in Taiwan licensed by the Financial Supervisory Commission, Executive Yuan, Republic of China and registered with another Taiwanese authority, the Chinese National Futures Association.[100] MF Global Australia Limited was registered with the Australian Securities and Investment Commission and authorized by the New Zealand Securities Commission.[101] MF Global Hong Kong Limited was licensed by the Securities and Futures Commission.[102]

MF Global's sixth regulated subsidiary, MFGI, was based in the United States.[103] Unlike most other jurisdictions, the United States regulates the securities and futures industries separately.[104] Because MFGI had both securities and futures customers, it was registered as a

[97] MF Global, Presentation to the Securities and Exchange Commission [hereinafter SEC], at 17 (June 14, 2011) [hereinafter MF Global SEC Presentation]. The company derived 15 percent of its income from interest earned on held-to-maturity investments, with the remaining two percent coming from all other sources.
[98] *See* "Part II to the Application of MF Global Inc., a subsidiary of MF Global Holdings Ltd. to become a primary dealer," at 11 (Jan. 22, 2010) [hereinafter MFGI Primary Dealer App. Part II] http://www.newyorkfed.org/markets/MFG_part_II.PDF (last visited Sept. 25, 2012).
[99] *Id.*
[100] *Id.* at 12.
[101] *Id.*
[102] *Id.*
[103] Before Jan. 1, 2008, MF Global had conducted its U.S.-based securities and derivatives brokerage businesses through two separate legal entities. However, it merged these two entities on Dec. 31, 2007, and changed the name of the surviving entity to MF Global Inc. *See* MFGI Primary Dealer App. Part II, *supra* note 98, at 10.
[104] The Dept. of Treasury Blueprint for a Modernized Financial Regulatory Structure (Mar. 2008).

"broker-dealer" with the Securities and Exchange Commission (SEC) and as a "futures commission merchant" (FCM) with the CFTC.[105] As a registered broker-dealer, MFGI was also a member of the Financial Industry Regulatory Authority (FINRA), a self-regulatory organization (SRO) for the securities industry.[106] The Chicago Board Options Exchange (CBOE), another securities industry SRO, served as MFGI's "designated examining authority" for purposes of conducting yearly examinations of its finances and operations.[107] Similarly, as a registered FCM, the company was a member of the National Futures Association (NFA), a futures-industry SRO, and of all U.S. futures exchanges through which it cleared trades, including the CME Group, which served as its "designated self-regulatory organization." As such, the CME Group examined MFGI's records in accordance with protocols established by a group of futures-industry SROs, including examinations of MFGI's customer funds and its capital levels.

As a publicly-traded company, MF Global filed annual and quarterly reports with the SEC providing a comprehensive overview of the company's business and financial condition.[108] Because MFGI was also a broker-dealer and FCM, it was subject to the rules of the SEC and the CFTC that protect a registered company's customers, counterparties and creditors. Both the SEC and CFTC, for instance, have a "net capital" rule to ensure that registered companies have enough liquid assets on hand to pay off their liabilities quickly if they fail. Under both rules, a registered company must maintain a minimum level of "net capital," which, defined broadly, is the amount of current (liquid) assets the company holds in excess of its liabilities.[109] In

[105] Dec. 15, 2011 Hearing, *supra* note 50, at 107 (statement of Dan M. Berkovitz, Gen. Counsel, CFTC); *Id.* at 115 (statement of Robert Cook, Dir., Div. of Trading and Markets, SEC).
[106] *Id* at 52 (statement of Robert Cook, Dir., Div. of Trading and Markets, SEC).
[107] *Id.* at 56 (statement of Richard Ketchum, Pres., Chairman and CEO, FINRA).
[108] 17 C.F.R. §240.13a-1 (filing of annual report) *and* 17 C.F.R. §240.13a-13 (filing of quarterly report).
[109] 17 C.F.R. §240.15c3-1 (net capital requirements for broker dealers); 17 C.F.R. §1.17 (minimum financial requirements for futures commission merchants [hereinafter FCMs]).

calculating current assets, the rules impose "haircuts" on certain types of securities and futures, which are discounts from the present value of the assets to reflect the fact that they may have to be sold for less than market value in a rapid liquidation.[110]

Because MFGI was subject to oversight by both regulators, the company calculated its capital requirements according to both regimes, and complied with the higher capital requirement.[111] MFGI complied with the SEC's rule because, during the period in question, that rule provided a higher requirement than the CFTC's.[112] To ensure that it was properly capitalized, MFGI determined its level of net capital on a monthly basis and reported the amount to the SEC, the CFTC, and its SROs in a monthly report, known as the Financial and Operational Combined Uniform Single Report (FOCUS report).[113]

The SEC and CFTC each have separate rules governing the protection of customer property.[114] For securities customers, the SEC's "customer protection" rule requires a broker-dealer to maintain physical custody or control of all fully paid and excess margin customer securities and to segregate cash held on deposit in customer accounts to ensure that customer funds are not used as a source of capital for the company's operations.[115] To help ensure that a broker-dealer can readily return all customer property quickly in the event of failure, the broker-dealer must maintain a special reserve bank account holding an amount of cash or cash-

[110] *Id.* The haircut percentage to apply is set by rule and depends on the type of asset and its maturity date.
[111] *See, e.g.*, 17 C.F.R. §1.17(a)(1) (requiring FCMs to maintain capital equal to or in excess of the greatest of one of four measures, including the amount of net capital specified by SEC rule).
[112] Dec. 15, 2011 Hearing, *supra* note 50, at 118 (Statement of Robert Cook, Dir., Div. of Trading and Markets, SEC).
[113] 17 C.F.R. §240.17a-5 (requiring broker dealers to submit monthly reports); 17 C.F.R. §1.18 (allowing FCMs to submit FOCUS report in lieu of CFTC Form 1-FR in certain circumstances).
[114] 17 CFR 1.20 (establishing protections for customers trading on domestic futures exchanges), 30.7 (protections for customers trading on foreign futures exchanges), and 240.15c3-3 (protections for securities customers).
[115] 17 CFR §240.15c3-3.

equivalent securities greater than or equal to the amount of net obligations owed to customers as a result of daily trading activities.[116]

For futures customers, the CFTC had different "customer protection" rules for property held by an FCM for trading by customers on U.S. exchanges and property held for trading on foreign exchanges.[117] For customer property held for use on U.S. exchanges, an FCM must maintain a "segregated" account into which it deposits the property.[118] The balance of the segregated account must at all times be greater than or equal to the net liquidated value of all customer property.[119] An FCM may deposit its own funds into the segregated account as a cushion to prevent a shortfall of customer funds, but if it subsequently withdraws its funds from the account, the amount withdrawn cannot exceed the amount of this cushion.[120] For customer property held for use on foreign exchanges, an FCM must maintain a "secured" account that holds an amount that is greater than or equal to the "secured amount," which is defined as the aggregate amount of funds required to support each customer's open foreign futures and options positions, plus or minus gains or losses on those positions (the "Alternative Method").[121] Because the "secured amount" represents an FCM's minimum obligation under the rule, an

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[116] *Id.*

[117] *Cf.* Rule 1.20 and 30.7. Although the Commodity Exchange Act requires that FCMs segregate customer funds used for trading on U.S. exchanges, the Act does not expressly require FCMs to segregate funds used for trading on foreign exchanges. *See, e.g.*, 76 FR 78776, 78777 (2011). Instead, the Act grants the CFTC the discretion to write rules governing trading on foreign exchanges. *Id.* When it published the rules, the CFTC recognized that there were "inherent limitations on its ability to provide U.S. residents trading on foreign exchanges [with] identical protections available to U.S. contract markets" because those funds may become subject to foreign law governing the disposition of customer funds upon the insolvency of the customer's broker. *Id.*; *see also* Foreign Futures and Foreign Options Transactions, 52 Fed. Reg. 28,980, at 28,984-85 (Aug. 5, 1987) (to be codified at 17 C.F.R. pts. 1, 30, 32, and 166) [hereinafter Foreign Futures and Options Rulemaking]; Interview by O&I Subcomm. staff with CFTC personnel, in Wash., D.C. (July 2, 2012) [hereinafter Interview with CFTC].

[118] 17 C.F.R. §1.20.

[119] *Id.*

[120] 17 C.F.R. §1.23.

[121] 17 C.F.R. §30.7; 17 C.F.R. §1.3(rr) (setting forth definition of "Foreign Futures and Options Secured Amount"). In addition, when a foreign futures or options customer opens an account, an FCM must give written warning of the risks inherent in trading on a foreign exchange. 17 C.F.R. §30.6; *see also* 17 C.F.R. §1.55 (providing that disclosure must state, in part, that "funds received from customers to margin foreign futures transactions may not be provided the same protections as funds received to margin futures transactions on domestic exchanges").

FCM, if it chooses, may set aside funds equal to the net liquidated value of all customer property (the "Net Liquidation Method").[122] The difference between these two methods is that the Alternative Method does not require customer ledger or cash balance amounts to be included in the secured account, whereas the net liquidation method does.[123] The Alternative Method thus permits an FCM to maintain a lower minimum secured account balance than would be required under the Net Liquidation Method.[124]

On a daily basis, an FCM must determine (1) the account balances of its segregated and secured accounts, (2) the amounts required to be deposited by rule, and (3) the amounts of any excess it has deposited therein.[125] MFGI used the Alternative Method to calculate the amount required to be set aside in secured accounts, one of only five companies out of 55 FCMs that carried foreign customer funds to do so.[126] MF Global referred to the amount of its own funds maintained in MFGI's segregated and secured accounts as "Firm Invested in Excess."[127] Additionally, MF Global calculated the difference between the amount MFGI would be required to hold in its secured accounts under the Net Liquidation and Alternative Methods, and referred to the difference internally as "Regulatory Excess."[128]

Beginning in 2005, the CME Group required MFGI to report regulatory balances in the company's segregated and secured accounts on a daily basis; MFGI filed these statements with

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[122] Foreign Futures and Foreign Options Rulemaking, *supra* note 117 at 28, 984.
[123] Rep. of the Trustee's Investigation and Recommendations, *In re MF Global Inc.*., No. 11-2790 (MG) SIPA, at 38 (Bankr. S.D. N.Y. June 4, 2012) [hereinafter MFGI Trustee Report].
[124] MFGI Trustee Report, *supra* note 123, at 38, fn. 23. ("For example, if a customer deposits $100,000 in cash into her "30.7" Foreign Secured account on Day 1, in order to start trading on UK exchanges, but has no open positions, there is no maintenance margin requirement, and therefore, under the Alternate Method, there would be a $0 requirement for MFGI to set aside her deposited funds. Conversely, under the Net Liquidating Method, there would be a $100,000 requirement.")
[125] Rule 1.32 (requiring computation of balances by noon on the next business day).
[126] Following MF Global's collapse, one firm changed to the net liquidation method in Nov. 2011, and the remaining three changed in Jan. and Feb. 2012, after discussions with CFTC staff. Interview with CFTC, *supra* note 117. Further, FCMs were prohibited from using the alternative method as of Sept. 1, 2012, under rules proposed by the National Futures Association [hereinafter NFA] and approved by the CFTC.
[127] MFGI Trustee Report, *supra* note 123, at 11.
[128] *Id.*

the CFTC, the CME Group, and the NFA.[129] Because MFGI used the Alternative Method to determine the minimum required balances in its secured accounts, MFGI did not report the amount of Regulatory Excess on its daily secured statements.[130]

Corzine Creates Strategic Plan for MF Global

When Corzine became CEO of MF Global, he initiated a comprehensive review to assess the company's challenges and opportunities.[131] Corzine quickly learned that MF Global had two options for returning to profitability. One option would be to cut costs and wait for the global economy to improve. Corzine rejected this option, telling colleagues: "By doing nothing, you're making one of the biggest bets, ever. You're betting on interest rates."[132] The second option would be to seek new sources of revenue by branching out into new business lines.[133] Corzine pursued this option.

Over the course of 2010, Corzine, along with his senior management, crafted a strategic plan to transform MF Global into a full-service global investment bank within three to five years.[134] This plan, which was described by financial journalists as creating a "mini-Goldman," contained several elements.[135] First, MF Global would reorganize its business lines to expand into new services.[136] Second, in tandem with its reorganization, the company would also recreate its employee base and compensation structure to better support its planned new

[129] Dec. 15, 2011 Hearing, *supra* note 50, at 82 (Testimony of Terrence A. Duffy, Executive Chairman, CME Group Inc.); MFGI Trustee report, *supra* note 123, at 41.
[130] MFGI Trustee Report, *supra* note 123, at 39, 108; Interview by O&I Subcomm. staff with CME Group personnel, in Wash., D.C. (June 18, 2012) [hereinafter Interview with CME Group].
[131] Elkind Burke article, *supra* note 88; Form 10-K for MF Global Holdings Ltd. (fiscal year ended Mar. 31, 2011) [hereinafter FY11 10-K]
[132] Elkind Burke article, *supra* note 88.
[133] *Id.*
[134] FY11 10-K, *supra* note at 131.
[135] *See, e.g.*, Andrew Ross Sorkin, *It's Lonely Without the Goldman Net*, N.Y. TIMES, Oct. 31, 2011 (http://dealbook.nytimes.com/2011/10/31/its-lonely-without-the-goldman-net/) (last visited July 20, 2012).
[136] FY11 10-K, *supra* note 131, at 6-7.

activities.[137] Third, MF Global would finally secure MFGI's designation as a New York Fed primary dealer.[138] Fourth, the company would begin trading with its own funds as a means of generating profits to satisfy investors and avert further ratings downgrades while completing its transformation into an investment bank.[139]

Corzine Begins Implementing His Strategic Plan

Corzine lost no time in implementing his ambitious new strategic plan. He immediately began reorganizing MF Global's business lines by expanding its role in client facilitation, market-making, and principal activities; centralizing its retail services under a global brand; and consolidating its clearing and financing activities under one business group.[140] Additionally, he laid the groundwork for providing asset management, underwriting, structured finance, and advisory opinion services with a specialized focus on commodities and natural resources markets.[141]

To support these changes, Corzine also began to overhaul MF Global's employee base. The company laid off 10-15 percent of its 3,200 employees and began hiring new employees to undertake the company's planned services.[142] For these new hires, the company restructured compensation agreements by eliminating lockup provisions and tying bonuses to business unit profitability rather than broker performance alone.[143] Corzine also made significant changes to

[137] MF Global Ltd. F4Q10 (Qtr End 03/31/10) Earnings Call Transcript (May 20, 2010) [hereinafter FY10 Q4 MF Global Earnings Call].
[138] Corzine describe this as "one of his top priorities." See Terrence Dopp and Matthew Leising, *Corzine Returns to Wall Street as CEO of MF Global*, BLOOMBERG, Mar. 23, 2010 [hereinafter Dopp Leising article] (http://www.bloomberg.com/apps/news?pid=newsarchive&sid=akA2OHOzoQ2M&pos=4) (last visited Oct. 16, 2012).
[139] FY11 10-K, *supra* note 131, at 16.
[140] *Id.*, at 6-7.
[141] *Id.*
[142] FY10 Q4 MF Global Earnings Call, *supra* note 137. MF Global turned over nearly 46% of its workforce during Corzine's tenure, releasing 1,400 of its 3,200 workers and hiring 1,100 new employees. See Elkind Burke article, *supra* note 88.
[143] FY10 Q4 MF Global Earnings Call, *supra* note 137.

MF Global's senior management. On September 13, 2010, he hired Bradley Abelow as the company's Chief Operating Officer (COO).[144] Abelow had previously worked with Corzine at Goldman Sachs and later served as Corzine's Chief of Staff while he was governor of New Jersey.[145] Corzine also promoted Henri J. Steenkamp, the company's Chief Accounting Officer, to Chief Financial Officer (CFO), displacing the company's former-CFO, J. Randy MacDonald.[146]

Corzine also redoubled efforts to secure MFGI's primary dealer designation from the New York Fed, telling reporters that the designation was a "major part of his strategy to increase [company] revenue."[147] In April 2010, Corzine requested an opportunity to visit to the New York Fed's offices to discuss MFGI's candidacy.[148] New York Fed staff members had followed Corzine's appointment as MF Global's Chairman and CEO with interest, noting that his hiring was an indication that the company had "turned the corner on many fronts."[149] Even though officials at the New York Fed had found MF Global's Dan-era efforts to secure primary dealer designation "very aggressive (borderline obnoxious)" and had recently postponed approval of MFGI's application in response to the CFTC's regulatory action, the New York Fed agreed to Corzine's meeting request.[150]

Corzine visited with the New York Fed on June 1, 2010.[151] Following that visit, the New York Fed acted quickly on MFGI's application. Staff members discussed the company's candidacy with the CFTC on June 3, met internally for formal review sessions on August 5 and

[144] MF Global Holdings Ltd. Schedule 14A Proxy Statement (July 7, 2011), at 32.
[145] FY11 10-K, *supra* note 131, at 13.
[146] *Id.* at 13-14.
[147] Dopp Leising article, *supra* note 138.
[148] E-mail from Dzina, NYFRB, to Wolgemuth, NYFRB (Apr. 16, 2010, 03:01 p.m.).
[149] *Id.*; E-mail from Joshua Frost, NYFRB, to Dzina, NYFRB (Mar. 23, 2010, 05:46 p.m.); E-mail from David G. Sewell, NYFRB, to Dzina, NYFRB (Mar. 24, 2010, 09:00 a.m.).
[150] E-mail from Dzina, NYFRB, to Wolgemuth, NYFRB (Apr. 16, 2010, 03:01 p.m.); E-mail from Dzina, NYFRB, to Michael Schetzel, NYFRB (Apr. 22, 2010, 08:24 p.m.).
[151] NYFRB Chron, *supra* note 65, at 23.

September 23, and visited the company's headquarters on November 4.[152] Following the visit, New York Fed staff members indicated that they "[d]o not see any showstoppers and expect we will escalate for more formal approval sometime in Dec [sic] with operationalization [sic] early in new year."[153] The New York Fed proceeded to approve MFGI's application soon thereafter, securing final approvals in January 2011 — just after the company's one-year waiting period had expired — and publicly announcing the company's designation as a primary dealer on February 2, 2011.[154]

While MF Global pursued the primary dealer designation for MFGI, the company also began using its own funds in an effort to generate additional revenues. In some cases, MF Global used its money to facilitate client transactions by taking the other side of a trade entered into by a client.[155] The company also used its funds to "make markets" in particular securities.[156] Although these principal transactions helped MF Global post a modest profit of $8.8 million for its fiscal quarter ending June 30, 2010, they did not produce the levels of revenue necessary to sustain long-term profitability and fund the company's transformation into an investment bank.[157] Increasingly, Corzine looked to proprietary trading — using MF Global's own funds to take positions from which the company hoped to profit, if the market moved as it expected — as a way to further boost revenues.

To achieve the kinds of gains that Corzine sought, new employees with trading experience would be needed. To that end, in June 2010, Corzine formed a new division known as the Principal Strategies Group and hired new employees tasked with identifying trading

[152] *Id.* at 23-25.
[153] E-mail from Dzina, NYFRB, to Brian P. Sack, Fed. Reserve System (Nov. 12, 2010, 09:12 p.m.).
[154] Press Release, NYFRB, Primary Dealers List (Feb. 2, 2011) http://newyorkfed.org/newsevents/news/markets/2011/an110202p.html (last visited Oct. 23, 2012).
[155] FY11 10-K, *supra* note 131, at 16.
[156] *Id.* at 6-7.
[157] Form 10-Q for MF Global Holdings Ltd. (quarterly period ended June 30, 2010) at 41 (noting $8.8 million profit).

strategies for the company.[158] Corzine also maintained a portfolio within the Principal Strategies Group in order to personally execute proprietary trades.[159] MF Global's policies provided that an officer could make trades only if a more senior officer reviewed and approved the trades.[160] Because Corzine was the highest ranking officer at MF Global, he technically could not trade under this policy; however he reached a compromise whereby a subcommittee of the board of directors reviewed his trades, as well as any he directed others to place.[161]

The Principal Strategies Group soon identified what it thought was a promising trading opportunity. During the European debt crisis, sovereign bonds issued by several countries were trading at heavily discounted prices out of fear that these financially-troubled countries would default on their obligations.[162] On May 9, 2010, twenty-seven European nations created the European Financial Stability Facility (EFSF), a bailout fund meant to preserve financial stability in Europe by providing financial assistance to Eurozone countries experiencing acute economic difficulty.[163] Corzine and the Principal Strategies Group believed that this fund, which would not expire for several years, would protect the holders of short-maturity sovereign bonds against the risk of default.[164] They also believed that the bond markets had not fully incorporated this decreased risk into the price of the bonds, which created an opportunity to exploit the price

[158] FY11 10-K, *supra* note 131, at 7.
[159] *See, e.g.*, MF Global Capital Markets Weekly Management Meeting (week ending Oct. 19. 2011), page 12; E-mail from Spencer Salovaara, MF Global, to Jon Corzine, CEO, MF Global (Oct. 25, 2011, 09:46 p.m.); Elkind Burke article, *supra* note 88 (noting that Corzine "wasn't just trading RTMs…He was also trading oil futures and T-bills and foreign currencies" and that "Corzine tracked his positions…on his Bloomberg terminal, on his Blackberry, on his iPad")
[160] MFGI Trustee report, *supra* note 123, at 68, Footnote 61.
[161] *Id.*
[162] David Cottle, *Euro Sovereign Woes Bubble Back Up*, WALL ST. J., July 19, 2010 (http://blogs.wsj.com/source/2010/07/19/euro-sovereign-woes-bubble-back-up/) (last visited Oct. 23, 2012); Dec. 15, 2011 Hearing, *supra* note 50, at 132 (testimony of Jon Corzine, CEO, MF Global) (noting that spread in European sovereign debt securities appeared to be favorable).
[163] Press Release, Council of The European Union, European Stabilisation Mechanism to Preserve Fin. Stability (May 9, 2010).
[164] Dec. 15, 2011 Hearing, *supra* note 50, at 133 (testimony of Jon Corzine, CEO, MF Global).

dislocation and realize an unusually high return by acquiring the underpriced bonds and holding them to maturity.[165]

Despite Corzine's confidence in the profitability of an investment in the bonds, the investment — were MF Global to buy the bonds outright — would expose MF Global to volatility in its financial statements until the bonds reached maturity. Most of the bonds matured in either 2011 or 2012, which meant that MF Global would have to hold the bonds for a year or more before it realized profits on its investment.[166] Under the Generally Accepted Accounting Principles (GAAP) promulgated by the Financial Accounting Standards Board (FASB), the value of the bonds would have to be marked to market as assets daily and changes in value would have to be accounted for in the company's profits and losses.[167] If the bonds lost value before maturity, for instance, MF Global would have to report a loss until the company could redeem the bonds for par value at maturity.[168]

Because of this risk to the company's income statement and the time it would take to realize gains, a direct investment in the bonds themselves would not achieve Corzine's objectives. However, the company discovered that it could book quick profits by purchasing the bonds and then using them as collateral in a transaction known as a repurchase-to-maturity (RTM) agreement.[169]

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[165] *Id.* at 131-132.
[166] MF Global, Board of Directors European Sovereign Portfolio (Aug. 11, 2011) [hereinafter MF Global Euro Sovereign Portfolio].
[167] *See* MFGI Trustee Report, *supra* note 123, at 66 (noting that MFGI classified European bonds as "securities owned subject to MtM" before entering into intercompany repos with MFGUK). FASB is "the designated organization in the private sector for establishing standards of financial accounting that govern the preparation of financial reports by nongovernmental entities." *See* "Facts about FASB," available at http://www.fasb.org/jsp/FASB/Page/SectionPage&cid=1176154526495. While the SEC has authority to establish accounting standards for publicly held companies pursuant to the Securities and Exchange Act of 1934, *see* Exchange Act, Section 13b, the SEC generally has deferred to the private sector with respect to the formulation of accounting standards. *See* "Facts about FASB."
[168] *See* MFGI Trustee Report, *supra* note 123, at 66.
[169] Dec. 15, 2011 Hearing, *supra* note 50, at 132 (testimony of Jon Corzine, CEO, MF Global).

Traditional repurchase agreements are frequently used by companies to secure short-term financing.[170] A company, for instance, might sign an agreement with a counterparty in which the company agrees to sell securities or other assets to the counterparty and to repurchase the same or similar assets from the counterparty at a future date for an agreed-upon price.[171] Usually, the amount of cash the counterparty gives to the company is less than the fair market value of the securities or other assets.[172] This difference is known as the initial margin or "haircut" and protects the buyer against a decrease in the value of the assets prior to their resale to the company, illiquidity of the assets, and counterparty credit risk.[173] The initial margin level varies depending upon the credit rating of the security sold.[174] The counterparty to a repurchase agreement also usually has the right to demand additional margin (in other words, make a "margin call") during the term of the agreement to maintain the value of the collateral in cases where the value of the underlying assets falls during the term of the agreement.[175] The counterparty can also require a company to post additional margin if it questions the company's creditworthiness.[176] These additional types of margin are known as "variation margin," and can expose a company that is a party to a repurchase agreement to liquidity risk if margin calls

[170] The Repurchase Agreement Refined: GCF Repo, Current Issues in Economics and Finance, New York Fed, at 1 (June 2003), available at http://www.newyorkfed.org/research/current_issues/ci9-6.pdf (last visited Nov. 14, 2012).
[171] For example, a securities dealer may borrow $100 from its client for a week in exchange for a security worth $100. A week later, the securities dealer will return $105 to the client, and the client returns the security to the dealer. *See Regulating Wall Street: The Dodd-Frank Act and the New Architecture of Global Finance* at 321 (Viral V. Acharya et al., eds. 2011). Repos are functionally similar to a secured loan. Thus, the five dollars paid by the securities dealer in the foregoing example is interest on the $100 loan principal. *Id.*
[172] *Id.* at 321.
[173] *See* Richard Comotto, Haircuts and Initial Margins in the Repo Market, European Repo Council, at 5-6 (Feb. 8, 2012), available at: http://www.icmagroup.org/assets/documents/Maket-Practice/Regulatory-Policy/Repo-Markets/Haircuts%20and%20initial%20margins%20in%20the%20repo%20market_8%20Feb%202012.pdf; *see also* CFTC Glossary, "Haircut," available at: http://www.cftc.gov/consumerprotection/educationcenter/cftcglossary/glossary_h (last visited Oct. 24, 2012).
[174] *Id.*
[175] Dec. 15, 2011 Hearing, *supra* note 50, at 132 (Statement of Jon Corzine, CEO, MF Global).
[176] *Id.*; *see also* MFGI Trustee Report *supra* note 123, at 89 (noting that if MF Global were downgraded below investment grade, "that event would trigger a margin call as high as 200% under LCHC rules and higher margin at other exchanges like Euroex").

require the company to post cash and sell securities to cover its obligations.[177] Under FASB's accounting standards, traditional repurchase agreements are accounted for as a secured borrowing in which the company recognizes cash as proceeds from the transaction, together with a liability for the repurchase price specified in the agreement.[178] The collateral remains on the company's balance sheet as an asset, and any impairment to the collateral would be recognized in earnings over time.[179]

An RTM differs from a traditional repurchase agreement in one important respect. In a traditional repurchase agreement, the securities held by a counterparty are returned to the borrowing company before the securities collateralizing the borrowing reach maturity.[180] By contrast, in an RTM transaction, the counterparty keeps the pledged securities as collateral until they mature, whereupon the counterparty may either return the securities to the borrowing company or redeem them from their issuer at par value.[181] Under FASB's accounting standards, because a counterparty may redeem securities from an issuer at maturity rather than return them to the borrowing company, the borrowing company surrenders effective control of the securities when it transfers them as collateral to the counterparty.[182] Accordingly, FASB accounting standards require that the borrowing company account for the transaction as a "sale" of the securities coupled with a forward repurchase commitment, rather than a secured borrowing.[183] The forward repurchase commitment must be accounted for as a derivative at fair market value

[177] Memorandum from Andrea Kennedy, Mike Bolan, Pallavi Rayan, MF Global to MF Global files (Mar. 31, 2011) [hereinafter MF Global RTM Memo].
[178] FASB, Transfers and Servicing, Topic 860 [hereinafter FASB Topic 860].
[179] *Hearing on The Collapse of MF Global: Part 3 Before the Subcomm. on O&I of the House Comm. on Fin. Services*, 112th Cong. 10 (2012) [hereinafter Mar. 28, 2012 Hearing] (testimony of Susan M. Cosper, Technical Dir., Chairman, Emerging Issues Task Force, FASB).
[180] *Id.*
[181] *Id.*
[182] FASB Topic 860, *supra* note 178, 860-10-40-5.
[183] *Id.*

on the company's balance sheet, with changes in value recognized concurrently in income.[184] While the borrowing company retains the default and liquidity risks associated with the securities serving as collateral, the securities are "derecognized" from the company's balance sheet because they are deemed to be sold by the borrowing company at the time it enters into the RTM transaction with the counterparty.[185]

MF Global learned that by entering into RTM transactions collateralized with European sovereign bonds (European RTM trades) it could realize an immediate profit on the difference between the interest the issuer of the bonds paid to MF Global and the rate the company paid to its counterparty to repurchase the bonds, and that it could derecognize the bonds from its balance sheet.[186] Armed with an investment strategy that he believed could book instant profits for MF Global without affecting its balance sheet and a belief that the EFSF mitigated against sovereign default risk, Corzine ordered the company to place its first European RTM trades.[187]

In the late summer of 2010, MFGUK, on MFGI's behalf, bought approximately $1 billion of bonds issued by Ireland, Italy, Portugal, and Spain.[188] MFGUK then sold the bonds to MFGI, which used them as collateral in intercompany RTM transactions with MFGUK. MFGUK then entered into further RTM transactions, which cleared through LCH.Clearnet (LCHC).[189] This arrangement was necessary because only MFGUK maintained a trading relationship with LCHC.[190] At the time, all of the bonds serving as collateral were considered

[184] FASB, Derivatives and Hedging, Topic 815 [hereinafter FASB Topic 815]; *see also* FASB, Fair Value Measurement, Topic 820 [hereinafter FASB Topic 820].
[185] FASB Topic 860, *supra* note 178.
[186] Dec. 15, 2011 Hearing, *supra* note 50, at 131 (Statement of Jon Corzine, CEO, MF Global).
[187] *Id.* at 133.
[188] Elkind Burke article, *supra* note 88.
[189] MFGI Trustee Report, *supra* note 123, at 124. The London Clearing House Ltd. merged with Banque Centrale de Compensation SA (then trading as Clearnet) in Dec. 2003 to form the LCH.Clearnet Group Ltd. See LCH.Clearnet Annual Report 2003, at 4, available at: http://www.lchclearnet.com/Images/RA%202003_tcm6-44282.pdf (last visited Oct. 23, 2012).
[190] MF Global RTM Memo, *supra* note 177.

investment grade, so LCHC required margin as low as 3% to support the trades.[191] Once MF Global entered into the European RTM trades, it booked a profit on the difference between the interest paid by the issuer of the bonds and the repurchase rate specified in the RTM transactions that it cleared through LCHC, and then derecognized the bonds from its balance sheet.

Corzine Expands European Sovereign Debt Portfolio

Under MF Global's internal policies and procedures, the company's trades were normally subject to review by internal risk managers and multiple layers of management.[192] While MF Global's European RTM trades continued to be reviewed by the risk management department, the board of directors made decisions about the firm's risk appetite and whether the positions exceeded that risk appetite beginning after September 2010.[193] Staff from the Principal Strategies Group regularly updated Corzine on movements in the prices of trades supporting the company's European RTM trades.[194] Corzine, who had taken personal responsibility for the trades, communicated directly with MF Global personnel about the trades, and sometimes instructed them when to enter and exit various positions.[195] In setting the company's risk

[191] Dec. 15, 2011 Hearing, *supra* note 50, at 133 (Statement of Jon Corzine, CEO, MF Global); MFGI Trustee Report, *supra* note 123, at 67; First Rep. of Louis J. Freeh, Chapter 11 Trustee of MF Global Holdings Ltd., et al., for the Period Oct. 31, 2011 through June 4, 2012, at 35, *In re MF Global Holdings Ltd*., Case No. 11-15059 (MG) (June 4, 2012) [hereinafter Freeh Report].
[192] MF Global Holdings Ltd., Board of Directors Delegations of Authority for Risk (Sept. 27, 2007), at 2, 9-10.
[193] Dec. 15, 2011 Hearing, *supra* note 50, at 133-134 (Statement of Jon Corzine, CEO, MF Global).
[194] *Id.*, at 37, 41-42, 132, 134. Corzine characterized the trades as "my personal responsibility and a prime focus of my attention." Matthew Leising, *MF Global Drops by Most Since 2008 on Biggest Quarterly Loss*, BLOOMBERG BUSINESSWEEK, Oct. 25, 2011 (http://www.businessweek.com/news/2011-10-25/mf-global-drops-by-most-since-2008-on-biggest-quarterly-loss.html#p2) (last visited July 21, 2012); E-mails from Lauren Cantor, MF Global, to Jon Corzine, CEO, MF Global (Oct. 24, 2011). In Jan. 2011, Corzine began acting, on an "interim" basis, as the head of the company's institutional capital markets division, in which the Principal Strategies Group was housed. MF Global Holdings Ltd. Board of Directors Meeting Minutes, at 3 (Jan. 28, 2011). Shortly after the Jan. board meeting, Munir Javeri was hired as MF Global's Global Head of Trading; Elkind Burke article, *supra* note 88. Javeri left MF Global in June 2011, however, reportedly "after expressing discomfort with the RTMs." *Id.*
[195] *See, e.g.*, E-mail from Jon Corzine, CEO, MF Global, to Lauren Cantor, MF Global (Mar. 9, 2011, 10:30 a.m.) (instructing Ms. Cantor to "work" Italian RTM trades); MFGI Trustee Report, *supra* note 124, at 68.

appetite regarding the European RTM trading strategy, the board normally relied upon the input of Corzine and the firm's chief risk officer, Michael Roseman.[196]

By September 2010, MF Global had increased its European RTM portfolio to between $1.5 billion and $2.0 billion.[197] As Corzine pushed for even more trades, Roseman began to question them based on liquidity risk concerns relative to the company's approved risk appetite.[198] Roseman met with Corzine to express his concerns, and the two agreed to consult MF Global's board of directors at its mid-September board meeting.[199] At the meeting, Corzine pushed for an overall exposure of $4 billion, which the board approved.[200] The same month, Corzine retained a search firm to find a new chief risk officer for the company.[201]

As MF Global's portfolio approached its $4 billion limit in late October of 2010, Roseman became further concerned about the liquidity risks and potential capital at risk of the European RTM trades, and again met with Corzine to express his views.[202] MF Global's board of directors met shortly thereafter, on November 8, 2010.[203] At the board meeting, Corzine sought, and the board approved, an increase in the company's European RTM portfolio limit to $4.75 billion.[204] Also in November, Corzine informed Roseman that he would no longer report directly to the board, but would report instead to Abelow, the company's COO and Corzine's long-time colleague.[205]

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[196] Michael Roseman timeline provided to O&I Subcomm. (July 17, 2012) [hereinafter Roseman timeline].
[197] *Id.*
[198] *Id.*
[199] *Id.*
[200] *Id.*
[201] Elkind Burke article, *supra* note 88.
[202] Roseman timeline, *supra* note 196.
[203] MF Global Holdings, Ltd. Board of Directors Meeting Minutes (Nov. 8, 2010).
[204] *Id.* at 2.
[205] Letter from Samuel F. Abernethy, attorney for Michael K. Roseman, to Randy Neugebauer, Chairman, Subcomm. on O&I, at 1 (Feb. 24, 2012).

On November 5, 2010, MF Global announced a $38.7 million loss for the fiscal quarter ending on September 30.[206] That same month, LCHC imposed a 15% haircut on certain Irish bonds owned by MFGI, forcing the company to meet a margin call.[207] Later that month, S&P downgraded MF Global's rating to BBB-, just one notch above junk status.[208] S&P attributed MF Global's continued weak performance to lower volumes, low interest rates, and changes in the company's operating strategy.[209] S&P also noted that it expected Corzine's strategic plan to increase the company's risk profile and delay its return to profitability over the near- to medium-term.[210]

In January 2011, Corzine dismissed Roseman and replaced him with a new chief risk officer, Michael Stockman.[211] Like Roseman, Stockman reported to Abelow, the COO.[212] In preparing for his new position, Stockman met with Roseman, at which time the two discussed the European RTM trades as an item of interest to MF Global.[213] Stockman also reviewed minutes of board meetings from November and December at which risks associated with the European RTM trades were discussed.[214]

On February 3, 2011, MF Global reported another loss of $4.7 million for the fiscal quarter ending December 31, 2010.[215] The same day, Moody's noted MF Global's "weak" credit metrics and stated that it would evaluate "[o]ver the next four to six quarters…whether MF

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[206] Form 10-Q for MF Global Ltd. (quarterly period ended Sept. 30, 2010), at 1 [hereinafter FY11 Q2 10-Q]
[207] MF Global RTM Memo, *supra* note 177, at 4.
[208] S&P, *Research Update: MF Global Holdings' Rating is Lowered to 'BBB-'; Outlook Stable*, Nov. 24, 2010.
[209] *Id.*
[210] *Id.*
[211] Letter to Michael Roseman from Thomas F. Connolly, Global Head of Human Resources, MF Global (Feb. 24, 201), at 1; Michael Stockman timeline provided to O&I Subcomm. (June 21, 2012), at 4,6 [hereinafter Stockman timeline]. Stockman had been contacted about applying for the position on Sept. 16, 2010.
[212] Stockman Timeline, *supra* note 211, at 5.
[213] *Hearing on The Collapse of MF Global: Part 2 Before the Subcomm. on O&I of the House Comm. on Fin. Services*, 112th Cong. 37 (testimony of Michael Stockman, Global CRO, MF Global Holdings Ltd.) [hereinafter Feb. 2, 2012 Hearing].
[214] *Id.*
[215] Form 10-Q for MF Global Ltd. (quarterly period ended Dec. 31, 2010) [hereinafter FY11 Q3 10-Q].

Global can 1) reengineer the franchise to generate annual pre-tax earnings in the $200M-$300M range, 2) keep balance sheet leverage in the 20x range, and 3) maintain the necessary liquidity and risk management discipline as it executes its…strategy."[216] At the end of February, Stockman met with Martin Glynn, a member of MF Global's board of directors, in part to discuss Glynn's background and visions for MF Global.[217] Before the meeting, Glynn informed Stockman that one of his concerns was the level of risk associated with MF Global's European RTM portfolio.[218] Glynn told Stockman that he would "be under tremendous pressure…to approve higher risk limits in non core areas to support earnings weaknesses elsewhere."[219]

Corzine continued to push forward with his European RTM trading strategy. In early March, MF Global's board of directors approved — with the newly-hired Stockman's support — a further increase in the company's portfolio limit to $5.8 billion until March 31, 2011, for the bonds of Ireland, Italy, Portugal, and Spain, at which time the limit for those countries would decrease to $5 billion.[220] In late March, the board of directors extended the temporary limit of $5.8 billion to September 30, 2011, including a separate $1 billion limit for Belgium.[221]

On May 20, MF Global reported its fiscal 2011 year-end results.[222] The company lost $81.2 million, $46.5 million of which came in the fiscal quarter ended March 31, 2011.[223] At the

[216] Press Release, Moody's, Moody's affirms MF Global's Baa2 rating, maintains negative outlook (Feb. 3, 2011).
[217] E-mail from Michael Stockman, CRO, MF Global, to Martin Glynn (Feb. 24, 2011, 07:44 p.m.).
[218] *See* E-mail from Martin Glynn, to Michael Stockman, CRO, MF Global (Feb. 25, 2011, 03:00 p.m.).
[219] *Id.*
[220] Memorandum from Michael Stockman, CRO, MF Global, to MF Global Board of Directors (Mar. 2, 2011). In the memo, Stockman wrote that the "European sovereign trade is a unique opportunity in the capital markets to earn reasonable to high reward to risk returns relative to other available strategies." Despite the fact that the "transactions [had] default or restructuring risk," those risks were "not the focus" of Stockman's "current market risk analysis" because, "[b]ased on current spreads, the market is pricing in a very small probability of this scenario." In the memo, however, Stockman estimated that the RTM positions could subject the company to margin calls and haircuts of between $297 million and $761 million. *Id*.
[221] MF Global Holdings Ltd., Executive Committee of the Board of Directors, Meeting Minutes, at 2 (Mar. 23, 2011); Stockman timeline, *supra* note 211, at 1.
[222] FY11 10-K, *supra* note 131.
[223] *Id.*

time, the value of MF Global's net European RTM portfolio was approximately $6 billion.[224] At a board meeting two weeks later, in early June, Corzine requested another portfolio limit increase to $8.4 billion.[225] When the board asked to meet without management present, Corzine said, outside the board's presence, that if the board didn't think he was the "right guy," maybe they "should find someone else [to run the company]."[226] After a discussion in which board members expressed concern about the company's European sovereign debt exposure, the board approved limits of $6.6 billion for Belgium, Italy, and Spain, and of $1.9 billion for Ireland and Portugal, for a total limit equaling $8.5 billion.[227] Stockman offered conditional support for the increase, provided that Henri Steenkamp, MF Global's CFO, ensured that the firm had adequate liquidity to meet stress scenarios.[228] MF Global's net exposure on its European RTM portfolio reached $6.4 billion at the end of June.[229]

By July 2011, as market conditions in Europe deteriorated, Stockman became concerned about an increasing risk of margin calls and bond default, and met twice with Corzine, Steenkamp, the company's sovereign debt and finance desk traders, and members of the company's Risk Department to discuss the European RTM portfolio.[230] During the meetings, Stockman provided detailed information about MF Global's daily sovereign risk report and liquidity stress scenarios and recommended that the company enter into "hedging" RTMs as a means of reducing the firm's net exposure.[231] Stockman advised that "Europe could get worse before it gets better," and recommended that the company develop a contingency plan to reduce

[224] Stockman timeline, *supra* note 211, at 1.
[225] *Id.*
[226] *Id.*
[227] *Id.*
[228] *Id.*
[229] Form 10-Q for MF Global Ltd. (quarterly period ended June 30, 2011), at 90.
[230] Stockman timeline, *supra* note 211, at 1-2.
[231] *Id.* at 2.

MF Global's European sovereign debt exposure.[232] On July 30, 2011, Stockman memorialized his concerns and recommendations in an e-mail to Corzine, explaining that he did not support further increasing MF Global's European sovereign debt position, and recommended entering into more hedges to reduce the company's net exposure.[233]

By August 2011, the company's net European RTM position had reached approximately $7.4 billion.[234] This amount represented almost 14% of MF Global's assets and four-and-a-half times its total equity, and when measured as a percentage of equity or assets, the amount was significantly greater than its far larger competitors.[235] At the board's August 11 meeting, Corzine stated — this time in the presence of directors — that the board should consider replacing him as CEO if it no longer had confidence in his ability to run the company.[236] Stockman spoke about the continued risks to MF Global from its European sovereign debt positions and revealed that the company could need between $246 million and $930 million in additional funding to support margin calls and haircuts, if the value of the bonds further decreased.[237] Rather than using hedges as the primary means to reduce the company's exposure, which the board and Corzine deemed too costly, the board decided to cap MF Global's portfolio and allow the European RTM trades to "roll off" as the underlying bonds reached maturity, which would allow the company's net position to decrease over time.[238] The board also ordered management to prepare a "break the glass" plan, which outlined how the MF Global would

[232] *Id.*
[233] E-mail from Michael Stockman, CRO, MF Global, to Jon Corzine, CEO, MF Global (July 30, 2011, 02:33 p.m.); Stockman timeline, *supra* note 211, at 3.
[234] MF Global Euro Sovereign Portfolio, *supra* note 166, at 6.
[235] Memorandum from MF Global Investor Relations to MF Global Board of Directors (Oct. 2011).
[236] Stockman timeline, *supra* note 211, at 4. Stockman informed O&I Subcomm. staff that his recollection of Corzine's statement to the board of directors is based on a conversation that Stockman had with another MF Global employee after the Aug. 2011 board meeting.
[237] Stockman timeline, *supra* note 211, at 3; MF Global Euro Sovereign Portfolio, *supra* note 166, at 2.
[238] Telephone Interview by O&I Subcomm. staff with Michael Stockman, in Wash., D.C. (June 13, 2012); Feb. 2, 2012 Hearing, *supra* note 213, at 3 (statement of Michael Stockman, Global CRO, MF Global Holdings Ltd.).

respond to a credit downgrade and the liquidity demands arising from consequent margin calls.[239] The plan, which was distributed to the board in mid-October, noted that the European RTM trades were "the biggest draw on cash today" and that the company "need[ed] a clear strategy" for how to manage the trades in the event of a downgrade.[240] The plan estimated that MF Global had sufficient liquidity to "manage through one month under a severe stress event."[241]

MF Global's Independent Auditor Advises the Company to Enhance Disclosures about its European RTM Trades

When MF Global began entering into European RTM trades in September 2010, it accounted for the transactions as sales of the collateralized European sovereign bonds, which the company derecognized from its balance sheet, coupled with forward commitments to repurchase the bonds, which the company accounted for as derivatives. Because FASB's accounting standards require companies to mark-to-market the value of derivatives, MF Global sought to determine the fair value of the derivatives associated with the forward commitment.[242] The company used a valuation model that considered changes in value of the European bonds that collateralized the European RTM trades and changes in value of the forward repurchase commitments.[243] MF Global stated that in addition to these two factors, it further estimated the probability that the sovereign issuer would default on the bonds collateralizing the European RTM trades and then used the probability as a factor discounting the valuation of the

[239] Mar. 28, 2012 Hearing, *supra* note 179, at 92 (testimony of Henri Steenkamp, CFO, MF Global Holdings Ltd.); Feb. 2, 2012 Hearing, *supra* note 213, at 76 (testimony of Mr. Michael Stockman, Global CRO, MF Global Holdings Ltd.); MF Global, Stress Scenario Analysis—Downgrade Potential Impact on MF Global (Oct. 13, 2011).
[240] MF Global, Stress Scenario Analysis—Downgrade Potential Impact on MF Global (Oct. 13, 2011).
[241] *Id.*
[242] FASB Topic 820, *supra* note 184.
[243] Telephone Interview by O&I Subcomm. staff with PricewaterhouseCoopers [hereinafter PwC] personnel, in Wash., D.C. (Oct. 10, 2012) [hereinafter Telephone Interview with PwC].

derivatives.[244] The company determined that gains or losses attributable to the changing values of derivative were so small that they were immaterial for reporting purposes as of the end of September.[245]

On November 5, 2010, MF Global filed its unaudited quarterly 10-Q report with the SEC for the fiscal quarter ending on September 30, 2010.[246] The report did not specifically state that the company had entered into RTM transactions collateralized with European sovereign debt, but stated generally that "we also enter into certain resale and repurchase agreements that are accounted for as sales and purchases and accordingly de-recognize the related assets and liabilities from the unaudited consolidated balance sheet."[247]

Beginning in December 2010, PwC pressed MF Global to disclose more information about the European RTM trades in the company's regulatory disclosures.[248] In light of the requirement that companies value derivatives at fair value, PwC additionally advised MF Global that it should revise the methodology by which it valued the derivatives associated with the European RTM trades.[249] According to MF Global executives, PwC counseled that the company

[244] Telephone Interview by O&I Subcomm. staff with MF Global executive, in Wash., D.C. (Oct. 4, 2012) [hereinafter Telephone Interview with MF Global Exec.]. PwC, MF Global's independent auditor, described the model differently; in their view, the model did not incorporate a separate probability-of-default input, and it did not independently consider the value of the repurchase agreement. Telephone Interview with PwC, *supra* note 243.
[245] In addition, when MF Global revised its valuation methodology in Jan. 2011, the company reassessed the value of the derivative as of Sept. 30, 2010 and determined that, under the revised method, the value of the derivative was immaterial. Telephone Interview with MF Global Exec., *supra* note 244.
[246] FY11 Q2 10-Q, *supra* note 206.
[247] *Id.*
[248] PwC Two-Legged Repo to Maturity Audit Memorandum (Dec. 31, 2010), at 3 [hereinafter PwC Dec. 31, 2010 Audit Memo].
[249] Telephone Interview with PwC, *supra* note 243.

should not consider the probability of a default as a separate component in valuing the derivative, specifically, a change that could cause the company to recognize gains or losses.[250]

On December 23, PwC partners met with Corzine and other senior management at MF Global to discuss, among other things, the company's accounting of the European RTM trades, including its valuation of the derivatives.[251] In PwC's view, the meeting went poorly.[252] Corzine did not want to discuss accounting specifics and complained that he would not have entered into the European RTM trades if he had understood that marking the derivatives to market could result in volatility in the company's profits and losses.[253] PwC staff's impression of the meeting was that Corzine characterized the accounting and valuation requirements as a "PwC issue, and not [MF Global's]."[254] Additionally, PwC's staff described Corzine as feeling "ambushed," "bushwhacked," and extremely unhappy by PwC's advice.[255]

In January 2011, MF Global adopted a revised valuation methodology to better capture changes in the value of the derivative due to changes in the market value of the European bonds

[250] Telephone Interview with MF Global Exec., *supra* note 244. According to PwC staff, PwC counseled that MF Global adopt a methodology that incorporated additional market factors and that independently considered the bond and repurchase agreement values. Telephone Interview with PwC, *supra* note 243.
[251] *Id.*
[252] E-mail from George C. Gallagher, Partner, Banking and Capital Markets, PwC, to Peter M. Messana, PwC (Jan. 3, 2011, 06:34 a.m.).
[253] *Id.*
[254] *Id.*
[255] PwC Memorandum (Dec. 23, 2010). In an interview with O&I Subcomm. staff, one of MF Global's executives recounted his belief that PwC was aware of, and did not object to, MF Global's use of the "probability-of-default" valuation approach. The executive further recounted that PwC was present at a meeting of the audit committee of MF Global's board of directors during the fall of 2010, at which the audit committee discussed the probability-of-default approach. As a result, the executive indicated, MF Global's management did not anticipate that PwC would advise the company in Dec. 2010 that it should change the way it valued the derivative associated with the forward repurchase commitment. Telephone Interview with MF Global Exec., *supra* note 244. On the other hand, PwC stated in an interview with O&I Subcomm. staff that it never approved or otherwise opined on a valuation method that incorporated an explicit "probability-of-default" input. Telephone Interview with PwC, *supra* note 243. Further, PwC stated that it did not recall being present at an audit committee meeting at which the committee discussed such a valuation methodology. *Id*.

and repurchase agreement rates.[256] Pursuant to the revised valuation methodology, the company valued the derivative resulting from its European RTM trades at $60,000 for the quarter ended December 31, 2010, an amount that the company deemed immaterial for reporting purposes.[257] PwC tested the new methodology, which did not incorporate any discrete probability-of-default factor, and determined that it was appropriate given readily available information.[258] At the same time, MF Global told PwC that it was "in the process of enhancing their disclosures given the increased trading activity in the RTMs."[259]

On February 3, 2011, MF Global filed its 10-Q report for the quarter ended December 31, 2011.[260] In the report, MF Global disclosed that it "enters into securities financing transactions that mature on the same date as the underlying collateral" and that it "accounts for these transactions in accordance with the accounting standard for transfers and servicing and recognizes a gain or loss on the sale…of the collateral assets, and records a forward commitment [to repurchase the collateral]."[261] While the company did not state whether it accounted for the forward commitment as a derivative at fair value, it disclosed that it had "exposure to the risk of default of the issuer of the underlying collateral assets, such as U.S. government securities or European sovereign debt."[262] Finally, MF Global disclosed the total value of all of the securities it had sold under agreements to repurchase during the quarter, but did not specifically disclose the amount that had been collateralized by European bonds.[263]

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[256] PwC Test Forward Repurchase Commitment Audit Memorandum (Dec. 31, 2010), at 2.
[257] *Id.*
[258] *Id.*
[259] PwC FY11 Q3 MF Global Update Meeting Minutes (Jan. 25, 2011); *see also* PwC Dec. 31, 2010 Audit Memo, *supra* note 248, at 3 (noting "Management has added additional disclosures beginning in the 3rd quarter 10Q").
[260] FY11 Q3 10-Q, *supra* note 215.
[261] FY11 Q3 10-Q, *supra* note 215, at 14, 80.
[262] *Id.* at 14.
[263] *Id.*

MF Global discussed its European RTM trades in detail in the fiscal year 2011 10-K report it filed with the SEC on May 20, 2011.[264] In a section of the 10-K report entitled "Off-Balance Sheet Arrangements and Risk," MF Global explained that it entered into "[c]ertain resale and repurchase transactions involv[ing] the sale and repurchase of the underlying collateral[,] which generally mature on the same date as the underlying collateral," and that some of these transactions were collateralized by the obligations of European sovereign issuers.[265] The company further disclosed that it retained exposure not only to the risk of default of the issuer, but also to the risk of margin calls to the extent the value of the collateral decreased.[266] MF Global also noted that market risks associated with the European RTM trades included, but were not limited to, "interest rate, credit spread, rating downgrade and issuer default risks."[267] Finally, the company reported that it had invested in the bonds of Belgium, Ireland, Italy, Portugal, and Spain, that these bonds matured not later than December 2012, and that its net position in European RTM trades was $6.3 billion.[268]

Elsewhere, in the fiscal year 2011 10-K, MF Global stated that it accounted for forward repurchase commitments as derivatives that are marked-to-market, and that changes in the value of the derivatives "may cause volatility" in its financial results.[269] In separate statements filed by MFGI with the SEC, FINRA, and CBOE, the company disclosed that losses associated with

[264] FY11 10-K, *supra* note 131.
[265] *Id.* at 71. In 2003, pursuant to a mandate contained in the Sarbanes-Oxley Act of 2002, the SEC adopted rules requiring the disclosure of a company's off-balance sheet arrangements. *See* Sarbanes Oxley Act of 2002, Pub. L. No. 107-204 (July 30, 2002), §401. As a result, MF Global was required to explain its off-balance sheet arrangements in a specially captioned part of its regulatory filings. Disclosure in Management's Discussion and Analysis About Off-Balance Sheet Arrangements and Aggregate Contractual Obligations, 2003 WL 175446 (SEC Jan. 28, 2003).
[266] *Id.* at 49.
[267] *Id.* at 76.
[268] *Id.* at 77-78.
[269] *Id.* at 71.

these derivatives were immaterial as of March 31, 2011.[270] As a result, MF Global neither recorded the derivatives as assets or liabilities on its consolidated balance sheet, nor did it reflect any losses or gains attributable to the derivatives on its income statement.[271]

Mounting Liquidity Strain

By the summer of 2011, it had become clear to MF Global that Corzine's strategic plan had increased the company's liquidity demands.[272] In June, MF Global's internal auditors assessed the processes and controls in place to manage the company's liquidity.[273] The auditors found numerous and significant gaps between the company's liquidity policies and existing practices. Among other problems, the internal auditors found that "existing liquidity reporting is manual in nature," that MF Global had never established a "formal liquidity management framework," and that "existing performance of formal stress testing and scenario analysis is not adequate to fully assess liquidity and capital needs."[274]

After observing MF Global's continuous losses and business changes, SEC staff requested a meeting with MFGI executives on June 14, 2011.[275] At the meeting, MF Global staff, including Corzine, discussed the company's organizational and managerial changes, its progress implementing its strategic plan, and its liquidity, market, and credit risk management

[270] MFGI, Annual Audited Financial Statement, Note 4 (March 31, 2011).
[271] *See, e.g.*, PwC Partner notes, meeting with Jon Corzine (Apr. 27, 2011) (noting that RTM volatility was as yet "not material" but that Corzine "understood the fwd was at fair value and could *introduce* volatility into the P&L") (emphasis added).
[272] MF Global, Global Liquidity and Capital Management, Internal Audit Report, at 2 (June 2011).
[273] *Id.*
[274] *Id.*
[275] E-mail from Kari Jin, Broker Dealer Risk Office, SEC, to Bob Larson, CBOE, and Jeffrey Fortune, Fin. Industry Regulatory Authority [hereinafter FINRA] (June 7, 2011, 10:56 a.m.). The meeting was part of the SEC's 17-H program, which authorizes regulators to analyze "financial dependencies and unregulated business activities which could potentially affect the net capital, liquidity, financing or profitability of [MFGI]." SEC Risk Assessment Program. http://www.sec.gov/divisions/marketreg/bdriskoffice.htm (last visited July 19, 2012). MF Global's losses and changing business model had caused "concerns" at the SEC, prompting SEC staff members to request the June meeting. E-mail from Melanie Chan, SEC, to Jeffrey Fortune, FINRA (June 14, 2011, 12:29 p.m.). The SEC previously met with MF Global executives in Jan. 2010 and held a conference call on Apr. 6, 2011 pursuant to the 17-H program. See E-mail from Matt McGarvey, Branch Chief, 17-H Broker Dealer Operations, Div. of Trading and Markets, SEC, to Robert W. Cook, Dir., Div. of Trading and Markets, SEC (Dec. 9, 2011, 05:05 p.m.).

practices.[276] MFGI also provided a presentation that depicted its financial health relative to that of MF Global's.[277]

As liquidity demands increased, MF Global looked to additional sources of capital to support its operations. The company could draw from its $1.5 billion liquidity facility and could secure short-term financing through traditional repurchase agreements. Increasingly, however, the company began to turn to excess funds on deposit with its FCM accounts as a source of liquidity. In July, Henri Steenkamp discussed with Christine Serwinski, MF Global's North American CFO, whether the company's "Regulatory Excess" — the amount of futures customer funds deposited in secured accounts in excess of the regulatory requirement under the Alternative Method — could be loaned to the company to help meet its liquidity needs.[278] At the time, the amount of "Regulatory Excess" maintained by the company averaged about $1 billion.[279] After consulting with colleagues and the company's attorneys, Serwinski determined that the CFTC's rules did not prohibit MF Global from using the Regulatory Excess.[280] She advised Steenkamp, however, that she did not agree with using customer funds from the FCM to provide liquidity to the broker-dealer.[281] Serwinski advised Steenkamp that MF Global should consider only "Firm Invested In Excess" funds to satisfy its liquidity needs, which were the

[276] MF Global 17-H Meeting Agenda (June 14, 2011).
[277] MF Global SEC Presentation, *supra* note 97.
[278] *See* E-mail from Edith O'Brien, Ass't Treasurer, MF Global, to Christine Serwinski, North American CFO, MF Global (July 19, 2011, 2:37 p.m.) (asking about Serwinski's call with Steenkamp regarding use of excess funds). In an interview with O&I Subcomm. staff, Christine Serwinski stated that, to her belief, Jon Corzine initiated the request that Steenkamp discuss with Serwinski whether the Regulatory Excess could be used for this purpose. Telephone Interview by O&I Subcomm. staff, with Christine Serwinski, North American CFO, MF Global, in Wash., D.C. (July 23, 2012) [hereinafter Telephone Interview with Serwinski].
[279] MFGI Trustee Report, *supra* note 123, at 38.
[280] E-mail from Christine Serwinski, North American CFO, MF Global, to Henri Steenkamp, CFO, MF Global (July 27, 2011, 04:25 p.m.).
[281] E-mail from Christine Serwinski, North American CFO, MF Global, to Edith O'Brien, Ass't Treasurer, MF Global (July 19, 2011, 02:46 p.m.).

company's own funds deposited in the segregated and secured accounts.[282] From time to time, the company used this cushion for overnight and intraday transfers to help meet liquidity demands.[283] According to the trustee for MFGI's liquidation, however, the company also used a part of the Regulatory Excess at times for intraday funding during its last week of operation.[284]

By September, LCHC required MF Global to post more than $400 million in margin to cover its positions.[285] In early October, Steenkamp informed Corzine that the company needed to address its sustained liquidity stress.[286] Steenkamp cautioned that reliance on excess funds on deposit in the FCM should be temporary, but was becoming permanent.[287] He noted that MFGI's broker-dealer business was unable to fund itself, in part, because of the "permanent pool of liquidity" needed for MF Global's European RTM trades.[288] Steenkamp tasked two MF Global employees with presenting options that MF Global could immediately take to alleviate the company's liquidity pressure.[289]

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[282] In the event that the aggregate assets on deposit in customer segregated and secured accounts were less than MF Global's liabilities to customers under the Net Liquidation Method, Serwinski and her colleagues determined that MFGI would have to "lock up" funds equal to the difference in the *securities* customer reserve account that the company maintained pursuant to Rule 15c3-3. MFGI Trustee Report, *supra* note 123, at 77. MF Global's employees made this determination after consulting guidance issued by FINRA interpreting Rule 15c3-3. E-mail from Matthew Hughey, Controller, Fin. Regulatory Group, MF Global, to Christine Serwinski, North American CFO, MF Global (July 28, 2011, 12:47 p.m.). Under the rule, MF Global determined the amounts to set aside in the 15c3-3 account as of the close of business each Fri. and at the end of the month.

[283] *See, e.g.*, MFGI Trustee Report, *supra* note 123, at 77-78. Because MF Global was transferring funds within the same legal entity, the "loans" that MF Global referred to were not loans in any legal sense, but rather were merely transfers of funds.

[284] *Id.* at 103 (noting transfers exceeding firm invested in excess on Wed., Oct. 26, 2011).

[285] MFGI Trustee Report, *supra* note 123, at 88, Annex F, at 7.

[286] E-mail from Henri Steenkamp, CFO, MF Global, to Jon Corzine, CEO, MF Global (Oct. 6, 2011, 9:05 p.m.) [hereinafter Steenkamp E-mail].

[287] *Id.*

[288] *Id.*

[289] *Id.*

Dispute with FINRA

In light of the Eurozone debt crisis, FINRA adopted a heightened focus on the European sovereign debt exposure for firms it supervised.[290] In September 2010, FINRA contacted MF Global to determine whether the company had sovereign debt in its inventory.[291] MF Global answered that it did not, even though it had begun to enter into the European RTM trades.[292] FINRA first learned of the RTM trades shortly after reviewing MFGI's March 2011 FOCUS report.[293] In particular, FINRA observed that MFGI reported a $38 million loss for the month of March, which was considerably larger than the company reported in prior months.[294] When FINRA contacted MFGI to ascertain the reason for the large loss, it learned that the company had reallocated a portion of the revenue it earned from the European RTM trades to MFGUK in order to better reflect the market value of the services that MFGUK performed in managing the trades.[295] FINRA then reviewed MFGI's Annual Audited Financial Statements, filed in May 2011.[296] These statements contained written descriptions of the trades.[297]

After reviewing MFGI's disclosures, FINRA, in consultation with staff from the SEC and CBOE, concluded that the SEC's net capital rule required MFGI to take "capital charges" against its European sovereign bond positions as if they were on the company's balance sheet,

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[290] Dec. 15, 2011 Hearing, *supra* note 50, at 155 (statement of Richard G. Ketchum, Chairman and CEO, FINRA).
[291] Interview by O&I Subcomm. staff with FINRA personnel, in Wash., D.C. (June 27, 2012) [hereinafter Interview with FINRA].
[292] *Id.*; Dec. 15, 2011 Hearing, *supra* note 50, at 155 (statement of Richard G. Ketchum, Chairman and CEO, FINRA).
[293] Interview with FINRA, *supra* note 291.
[294] *Id.* MF Global reported $6.7 million and $2.9 million losses in Jan. and Feb. respectively.
[295] *Id.* MFGI did not record the expense associated with allocating RTM revenue to MFGUK as a discrete, expressly captioned line-item on the income statement in the company's March 2011 FOCUS report. Rather, after performing a "variance analysis" at line 14145 of the report, FINRA determined that MFGI incurred over $59 million in increased expenses for "Commissions and Clearance Paid to All Other Brokers" in Mar. as compared to Feb. This increase represented the majority of the overall increase in the expenses that MFGI incurred in Mar.
[296] PwC, Annual Audited Financial Statement, at 9 (quarter ended Mar. 31, 2011).
[297] Annual Audited Financial Statements are filed by broker-dealers pursuant to SEC Rule 17a-5, though they are similar in many respects to 10-K annual reports, which are filed by all public companies. Interview with FINRA, *supra* note 291.

notwithstanding that the bonds had been accounted for as "sold," in accordance with GAAP.[298] FINRA believed that for purposes of determining whether the company possessed sufficient liquid assets to satisfy its obligations in the event of liquidation, the SEC's net capital rule required the bonds collateralizing the European RTM trades to be considered in the calculation of MF Global's level of net capital, regardless of how they were treated for accounting purposes.[299] While recognizing the bonds as assets would not affect the company's equity, MF Global would have to treat the bonds as non-convertible debt securities for purposes of deducting haircuts in the company's net capital computation.[300]

MF Global pressed FINRA to demonstrate why the net capital rule required the company to take a capital charge on the European bonds that collateralized the RTMs.[301] In meetings with FINRA staff members, MF Global argued that the capital treatment of its European RTM trades should be governed by previous guidance issued by the SEC, which did not require companies to take haircuts or capital charges on U.S. Government securities used to collateralize RTMs, given that they present no risk of default and are highly liquid.[302] MF Global believed that this guidance should also govern the capital treatment of the European bonds that collateralized its RTMs because the risk that European nations would default on the bonds the company held was virtually non-existent.[303] MF Global additionally argued that it should not have to record a capital charge because GAAP rules allowed it to derecognize the bonds from its balance sheet.[304]

[298] Dec. 15, 2011 Hearing, *supra* note 50, at 155 (statement of Robert Cook, Dir., Div. of Trading and Markets, SEC).
[299] Interview with FINRA, *supra* note 291.
[300] *Id.*
[301] *Id.*
[302] See SEC Staff Guidance to NYSE, Repurchase Transactions to Maturity (No. 97-6, Oct. 1997).
[303] Interview with FINRA, *supra* note 291; Dec. 15, 2011 Hearing, *supra* note 50, at 155 (statement of Richard G. Ketchum, Chairman and CEO, FINRA).
[304] Interview with FINRA, *supra* note 291.

FINRA staff members responded by noting that MF Global had indicated in its regulatory filings that the company retained the default risk on its European bonds and that this risk was non-trivial.[305] FINRA pointed to the fact that LCHC, through which MF Global cleared its European RTM trades, required MF Global to post significant margin to support the positions.[306] In FINRA's view, the SEC's guidance for RTMs backed by U.S. Treasuries was inapplicable in determining the capital treatment of the European bonds.[307]

When FINRA refused to change its position, Corzine and other MF Global representatives took their case to the SEC, arguing that FINRA was re-interpreting the rule and that a capital charge was not required.[308] In MF Global's view, the extended discussions about the RTMs' capital treatment reflected the uncertainty surrounding a complex issue.[309] SEC staff members, however, were surprised to learn that MF Global had not taken haircuts on its European bonds, and found the company's representatives to be unfamiliar with published SEC guidance interpreting the net capital rule.[310] SEC staff believed that the capital charge was "cut and dry" and that there was never any doubt about what the net capital rule required.[311] In the SEC's view, MF Global should have, at a minimum, asked the agency about the regulatory net capital treatment of the European bonds before entering into the European RTM trades.[312]

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[305] *Id.*
[306] *Id.*
[307] *Id.*
[308] Because it was unusual for the CEO to personally present his company's position on such a matter, SEC staff were "surprised" that Corzine personally attended the meeting. Interview by Subcomm. on O&I staff with SEC personnel, in Wash., D.C. (June 29, 2012) [hereinafter June 2012 Interview with SEC]; *see also* E-mail from Neil Hatton, MFGUK, to Henri Steenkamp, CFO, MF Global (Sept. 1, 2011, 01:00 p.m.) (characterizing MF Global's position that regulators were reinterpreting the net capital rule).
[309] E-mail from Laurie Ferber, Gen. Counsel, MF Global, to Laurie Ferber (Sept. 6, 2011, 09:32 a.m.).
[310] June 2012 Interview with SEC, *supra* note 308.
[311] *Id.*
[312] *Id.* News of the exposure, without haircuts on the bonds, "raised [the] eyebrows" of some SEC staff members.

Accordingly, the SEC agreed with FINRA that MF Global was required to take a capital charge against its European RTM positions.[313]

[313] *Id.*

the bonds collateralizing MFGI's European RTM portfolio as nonconvertible debt securities and calculated regulatory haircuts of approximately $257 million.[319]

In discussions with FINRA, Steenkamp indicated that infusing capital into MFGI could impede MF Global's growth opportunities, which FINRA understood to be a reference to the company's strategic plan.[320] Nevertheless, in anticipation of the charge, MFGI took steps to ensure that it would have net capital sufficient to exceed both the required minimum level and FINRA's early warning notification level.[321] MF Global increased MFGI's net capital by $183 million to $287 million as of August 24, 2011, which ensured that the subsidiary had adequate capital after accounting for the effect of FINRA's capital charge.[322] However, because FINRA applied the capital charge retroactively, FINRA rules required MFGI to amend its most recent FOCUS report to reflect a $150 million deficiency in net capital for the month of July.[323] As a result, the company was also required to file notices of net capital deficiency with the SEC and CFTC, and MF Global was required to amend its quarterly 10-Q filing for the quarter ended June 30, 2011.[324] In the amended 10-Q filed on September 1, MF Global disclosed that FINRA had required the company to "modify its capital treatment of certain repurchase transactions to maturity collateralized with European sovereign debt and thus increase its required net capital pursuant to SEC Rule 15c3-1" but that it had "net capital sufficient to exceed both the required minimum level and FINRA's early-warning notification level."[325] MF Global further stated that

[319] E-mail from Edith O'Brien, Ass't. Treasurer, MF Global, to David Dunne, MF Global (Aug. 25, 2011, 06:34 a.m.).
[320] Interview with FINRA, *supra* note 291.
[321] Letter from Michael Bolan, Global Product Controller, MF Global Inc., to Michael Macchiaroli, Assoc. Dir., Div. of Trading and Markets, SEC, at 1 (Aug. 25, 2011) [hereinafter MFGI letter to SEC].
[322] *Id*.
[323] Interview with FINRA, *supra* note 291.
[324] MFGI letter to SEC, *supra* note 321 *and* Dec. 15, 2011 Hearing, *supra* note 50, at 156 (statement of Richard G. Ketchum, Chairman and CEO, FINRA).
[325] MF Global Holdings Ltd., Amendment No. 1, Form 10-Q/A for the Quarter Ended June 30, 2011 at 1 (Sept. 1, 2011).

it did not believe that the increase in net capital would have a "material adverse impact on its business, liquidity or strategic plans" and that it expected that "its regulatory capital requirements will continue to decrease as the portfolio of these investments matures."[326]

The CFTC first learned of FINRA's capital charge on August 25, 2011 when MF Global sent its notice of net capital deficiency to the agency.[327]

Media Reports Capital Charge

Although FINRA's capital charge against MFGI became public on September 1, 2011, when MF Global filed its amended 10-Q, news of the charge did not become widely known until seven weeks later. On the morning of October 17, the Wall Street Journal published an article detailing the capital charge and noted that "the move underscores regulators' growing concerns about the exposure of financial firms to sovereign debt" and "highlights the potential perils surrounding the aggressive strategy employed by Mr. Corzine, the firm's chief executive."[328] Investors reacted to the news: MF Global's share prices fell 6 percent to close the day's trading at just $3.71.[329]

The news came at an especially bad time for MF Global. The company was set to release its quarterly earnings report on October 27, which would announce a net loss of $191.6 million, the company's worst performance ever, and had scheduled meetings with the ratings agencies that week to discuss its performance.[330] After meeting with Moody's on Friday, October 21, MF

[326] *Id.*
[327] Interview with CFTC, *supra* note 117; E-mail from Jill Sommers, Commissioner, CFTC, to O&I Subcomm. staff (Sept. 7, 2012, 11:32 a.m.).
[328] Aaron Lucchetti, *MF Global Told to Boost Capital*, WALL ST. J., Oct. 17, 2011 (http://online.wsj.com/article/SB10001424052970203658804576635361082548304.html) (last visited Oct. 24, 2012) [hereinafter Lucchetti Article].
[329] MF Global Stock Prices, *supra* note 46.
[330] *See* Lucchetti Article, *supra* note 328; MF Global Fin. Performance, *supra* note 46.

Global anticipated that Moody's would likely downgrade the company's credit rating.[331] Over the weekend, Steenkamp pleaded with Moody's not to downgrade the company, insisting that its "capital and liquidity has never been stronger" and that it "is in its strongest position ever as [a] public company."[332]

MF Global's Final Days

Monday, October 24, 2011

Steenkamp's weekend plea went unanswered. On October 24, 2011, Moody's downgraded MF Global's credit rating to "Baa3," one notch above junk status, explaining that "[t]he rating action reflects Moody's view that the current low interest rate environment and volatile capital markets conditions make it unlikely that MF Global, in the near term, will be able to achieve the financial targets that Moody's had previously specified were required for it to maintain its Baa2 rating."[333] Moody's also noted that MF Global's exposure to "European sovereign debt in peripheral countries and its need to inject capital into its broker-dealer subsidiary to rectify a regulatory capital shortfall highlights the firm's increased risk appetite and raises questions about the firm's risk governance."[334] Moody's analysts had recently discovered MF Global's position in European RTM trades when Moody's downgraded the company.[335] Moody's also placed MF Global's rating under review for possible further downgrade.[336]

Later that day, Corzine addressed MF Global employees in an e-mail stating: "While I am disappointed by this action, it bears no implications for our clients or the strategic direction

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[331] E-mail from Henri Steenkamp, CFO, MF Global, to Al Bush, Moody's (Oct. 22, 2011, 11:33 p.m.).
[332] *Id.*
[333] Press Release, Moody's, Moody's Rating Action: Moody's downgrades MF Global to Baa3; reviews for further downgrade (Oct. 24, 2011).
[334] *Id.*
[335] Moody's Compliance – Rating Committee Addendum (Oct. 27, 2011).
[336] Press Release, Moody's, Moody's Rating Action: Moody's downgrades MF Global to Baa3; reviews for further downgrade (Oct. 24, 2011).

of MF Global…Many of our peers are experiencing similar changes to their counterparty credit ratings…I believe in our strategy, our employees and our path ahead."[337] To calm worried investors, Corzine announced that the company would be moving up Thursday's planned earnings announcement to Tuesday morning at 7:30 a.m.[338]

Tuesday, October 25, 2011

During the earnings call on Tuesday morning, Corzine and Steenkamp disclosed the company's quarterly loss and sought to reassure analysts about MF Global's prospects. Corzine said that although there were "no excuses" for the company's performance, he remained committed to his strategic plan, and that "the long-term return profile of an investment bank is attractive."[339] Additionally, he minimized the significance of FINRA's capital charge, stating that the action was not specific to MF Global in relation to capital and that the company was "dealing with an actual regulatory reinterpretation of the haircuts [the regulators] apply" to European sovereign debt holdings.[340] Corzine also sought to clear up "clouded perceptions" about the company's European RTM portfolio, asserting that the trades had "relatively little underlying principal risk" and had realized "zero" loss.[341] "On a personal note," Corzine added, "our positions and the judgment about risk mitigation steps are my personal responsibility and a prime focus of my attention."[342] Regarding the Moody's credit downgrade, Corzine stated that "we are disappointed with the action quite obviously" but that "we think we can grow our earnings" and that MF Global was continuing to work with Moody's in its credit assessment by

[337] E-mail from Jon S. Corzine, CEO, MF Global, to MF Global staff (Oct. 24, 2011, 06:26 p.m.).
[338] Shannon D. Harrington and Matthew Leising, *MF Global May Be Lowered to Junk by Moody's as Corzine Adds Trading Risk*, BLOOMBERG, Oct. 24, 2011 (http://www.bloomberg.com/news/2011-10-24/mf-global-may-be-lowered-to-junk-by-moody-s-as-corzine-adds-trading-risk.html) (last visited Oct. 24, 2012); MF Global Holdings Earning Call FY12 Q2 (Oct. 25, 2011).
[339] MF Global Holdings Earning Call FY12 Q2 (Oct. 25, 2011).
[340] *Id.*
[341] *Id.*
[342] *Id.*

"walking through with them…some of the strategic actions we're thinking about," including increasing capital through "asset sales of non-core holdings."[343] Steenkamp closed his explanation of the company's financial condition by stating, "I'm proud to say that our capital structure has never been stronger," and that "despite these uncertain and volatile times, we feel good about…our liquidity position as well as the strategic direction and progress against the plan."[344]

Corzine's and Steenkamp's assurances to analysts, however, did little to quell investor panic. When the NYSE opened for trading that morning, the trading volume for MF Global's stock surged to more than eleven times the volume of the day before. The stock, which opened at $3.31, traded as low as $1.75 during the day and closed at just $1.86, marking a decline of approximately 44 percent.[345]

MF Global's customers and counterparties also reacted to the earnings news, and as the crisis deepened, MF Global faced a liquidity drain of crisis proportions.[346] Several of the company's biggest securities and futures customers closed their accounts or withdrew funds.[347] MF Global's counterparties to its European RTM trades began to demand additional margin and deeper haircuts on bonds posted as collateral.[348] One counterparty, HSBC pulled MF Global's line of credit and ordered the company to wind up its business with the bank by the end of the year.[349]

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[343] *Id.*
[344] *Id.*
[345] MF Global Holdings, Ltd. stock prices for Oct. 25, 2011. http://finance.yahoo.com/q/hp?s=MFGLQ&a=09&b=25&c=2011&d=09&e=25&f=2011&g=d (last visited Oct. 24, 2012).
[346] MFGI Trustee Report, *supra* note 123, at 90.
[347] MFGI Trustee Report, *supra* note 123, at 145-46, 153.
[348] Dec. 15, 2011 Hearing, *supra* note 50, at 141 (testimony of Jon S. Corzine, CEO, MF Global).
[349] E-mail from Victoria Foster, European Head of Equity Finance, MFGUK, to Mark Whitehead, MFGUK, et al. (Oct. 25, 2011, 03:51 p.m.).

Wednesday, October 26, 2011

On October 26, 2011, S&P placed MF Global's BBB- credit rating on "CreditWatch Negative," noting that "continued volatility in the capital markets and low interest rates could further harm MF Global's ability to generate capital."[350] S&P also noted that the company's exposure to European RTM trades was "very high compared to the company's loss absorbing capital base," though S&P mistakenly asserted that the European RTM trades were "entered…as a means to facilitate client trades," rather than proprietary investments.[351] S&P believed that MF Global's future business plans "could entail increased risk taking as it transforms itself into a full-service investment bank."[352]

That day, consistent with the Alternative Method, MFGI reported excess funds of approximately $1 billion in segregated and secured accounts as of the close of business on Tuesday, though the company's internal records showed that it had only $21.5 million of its own funds in the accounts. Edith O'Brien, the company's assistant treasurer, authorized $615 million in intraday transfers from the company's FCM customer accounts.[353] Because these transfers exceeded the amount of MFGI's "Firm Invested in Excess" funds, the difference came from customer funds.[354]

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[350] S&P, Research Update: MF Global Holdings Ltd. Rating Placed on CreditWatch Negative (Oct. 26, 2011) [hereinafter S&P Research Update].
[351] S&P Jan. 17, 2012 letter, *supra* note 21, at 6; S&P Research Update, *supra* note 350, at 2. The CreditWatch action signaled to the market that S&P believed there was a substantial likelihood of a rating action for MF Global within 90 days. *See* S&P, General Criteria: Use of CreditWatch and Outlooks, at 3 (Sept. 14, 2009).
[352] S&P Research Update, *supra* note 350, at 2.
[353] MFGI Trustee Report, *supra* note 123, at 102-03.
[354] *Id.* In addition, an MF Global employee gave three computer discs to a CFTC employee at 5:30 p.m. on Fri., Oct. 28, which contained information relevant to the computation of balances in MFGI's segregated accounts. While the CFTC did not comprehensively review the disks when it received them, it later examined MFGI's records, including the data on the disks, and determined there was a deficiency in customer funds in segregated accounts as of Wed., Oct. 26. "Implementing Derivatives Reform: Reducing Systemic Risk and Improving Market Oversight," Senate Committee on Banking, Housing and Urban Affairs, 112th Congress, 2d Session, May 22, 2012 (CFTC Responses for the Record to Senator Shelby).

The SEC advised MFGI that it wanted to meet with the company's managers the next day to discuss liquidity, funding, financial statement condition, and regulatory computations, and that the CFTC would also participate in the meeting.[355] MF Global also held a conference call with FINRA and CBOE to discuss similar issues.[356]

Thursday, October 27, 2011

On Thursday, Moody's and Fitch both downgraded MF Global's credit rating to junk status.[357] Moody's cited "weak core profitability" that had "contributed to [MF Global] taking substantial risk in the form of its exposure to European sovereign debt in peripheral countries."[358] Fitch cited continued challenges in reducing the company's leverage and achieving sustained profitability, especially because low interest rates reduced the revenue generated by MF Global's commodity business.[359] Fitch also stated that "significant headwinds" made it more difficult for the company to complete its "strategic transformation from a pure broker to a broker-dealer and, longer term, to a full investment bank without [taking on] outsized incremental risk."[360] Additionally, Fitch said that "increased risk taking activities" had left the company "vulnerable to potential credit deterioration and/or significant margin calls."[361]

These downgrades sparked increasing margin calls and further contributed to an exodus of customers. MF Global had to draw $805 million from its liquidity facility, leaving the credit

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[355] Mar. 28, 2012 Hearing, *supra* note 179, at 6-7 (statement of Laurie Ferber, Gen. Counsel, MF Global); Interview by O&I Subcomm. staff with SEC personnel, in Wash., D.C. (Mar. 15, 2012) [hereinafter Mar. 2012 Interview with SEC].
[356] Mar. 28, 2012 Hearing, *supra* note 179, at 6-7 (statement of Laurie Ferber, Gen. Counsel, MF Global); E-mail from Matt McGarvey, Branch Chief, 17H Broker Dealer Operations, Trading and Markets Div., SEC, to Robert Cook, Dir. Trading and Markets Div., SEC (Dec. 9, 2011, 02:21 p.m.).
[357] Press Release, Moody's, Ratings Action: Moody's downgrades MF Global to Ba2; reviews for further downgrade (Oct. 27, 2011); William Spain, *Fitch Ratings Downgrades MF Global*, WALL ST. J. MARKET WATCH, Oct. 27, 2011 (http://articles.marketwatch.com/2011-10-27/news/30903166_1_fitch-ratings-downgrades-issuer-default-ratings) (last visited July 21, 2012) [hereinafter Spain Article].
[358] Spain Article, *supra* note 357.
[359] *Id.*
[360] *Id.*
[361] *Id.*

line totally depleted.[362] LCHC demanded an additional $211 million in margin to cover the company's European RTM trades.[363] The Depository Trust & Clearing Corporation, another clearing house used by MFGI, reduced the amount of credit it extended to the company to settle trades by $234 million.[364] Similarly, the Fixed Income Clearing Corporation increased MFGI's margin requirement and withheld cumulative excess margin of approximately $108.9 million.[365] Counterparties also increased haircut demands, and some counterparties stopped trading with MFGI altogether, leaving $606 million of the company's securities "in the box," meaning that the company could not find a counterparty to lend it money against these securities in a repo transaction.[366] Customers began withdrawing funds from the company's customer accounts.[367]

On Thursday, the SEC and the CFTC met with MF Global executives to conduct a risk review.[368] The CME Group also sent members of its audit department to review the segregated and secured account balance statements that MFGI had filed as of close of business on Wednesday.[369] The CME Group sent a letter to Serwinski, instructing her that "effective immediately," any equity withdrawals "must be approved in writing by CME Group's Audit Department."[370]

Late on Thursday evening, JPMorgan Chase bank (JPMC) began putting all of MF Global's accounts on "debit alert."[371] Once on debit alert, JPMC would execute funds transfers

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[362] MFGI Trustee Report, *supra* note 123, at 94.
[363] *Id.* at 96.
[364] *Id.*
[365] *Id.*
[366] *Id.*
[367] Elkind Burke article, *supra* note 88. By the end of the week, customers had withdrawn $1 billion in funds from the company's customer accounts.
[368] Dec. 15, 2011 Hearing, *supra* note 50, at 67 (testimony of Dan M. Berkovitz, Gen. Counsel, CFTC); *Id*, at 119 (statement of Robert Cook, Dir., Div. of Trading and Markets, SEC).
[369] *Id.*
[370] Letter from Michael A. Procajlo, Director, Audits, CME Group, to Christine Serwinski, CFO, MFGI (Oct. 27, 2011).
[371] Mar. 28, 2012 Hearing, *supra* note 179, at 4 (statement Diane M. Genova, Deputy Gen. Counsel, JP Morgan Chase [hereinafter JPMC]).

as instructed by MF Global only after determining funds present in the account to be debited were adequate to support the requested transfer.[372] As part of the debit alert process, JPMC terminated its uncommitted intraday credit lines to MF Global.[373] The bank's intraday credit lines to MF Global were similar to overdraft protection, and provided unsecured liquidity to the company in support of different types of funds transfers from MF Global's cash accounts at JPMC.[374] The debit alert "caused significant delay in the settlement of [certain cash] transactions" instructed by MF Global, "even when [JPMC] ultimately determined that MFGI had 'good funds' on deposit to permit the transaction to settle."[375] JPMC also sent a team to MF Global's New York headquarters to aid the company's efforts to unwind its securities lending arrangements in order to generate liquidity.[376]

Friday, October 28, 2011

In the prior day's confusion, MFGUK overdrew several of its accounts with JPMC by approximately $175 million.[377] MF Global was trying to sell roughly $5 billion in bonds with the help of JPMC to shrink the company's balance sheet and generate liquidity, but JPMC informed Corzine that "they would not engage in those transactions until the overdrafts in

[372] *Id.*
[373] *Id.*
[374] Interview by O&I Subcomm. staff with JPMC representatives, in Wash., D.C. (Mar. 9, 2012) [hereinafter Interview with JPMC]; *see also* MFGI Trustee Report, *supra* note 123, at 128.
[375] MFGI Trustee Report, *supra* note 123, at 128.
[376] Mar. 28, 2012 Hearing, *supra* note 179, at 4 (statement Diane M. Genova, Deputy Gen. Counsel, JPMC).
[377] E-mail from Vinay Mahajan, Global Treasurer, MF Global, to Russell Haley, MF Global, Edith O'Brien, Ass't. Treasurer, MF Global, cc: Jon Corzine, CEO, MF Global (Oct. 28, 2011, 08:27 a.m.).

London were cleaned up."[378] Corzine therefore contacted MF Global's Chicago office and asked them to resolve the overdrafts.[379]

To cover the overdrafts, O'Brien approved and processed a $200 million wire transfer from one of MFGI's customer segregated accounts to one of the company's "house" accounts.[380] O'Brien then authorized a $175 million transfer from the same "house" account to an MFGUK account at JPMC in London.[381] O'Brien noted in an e-mail that the $175 million transfer to pay the JPMC overdraft was "per [Jon Corzine's] direct instructions."[382] When O'Brien authorized the $200 million wire transfer, she had not yet received the segregation statement detailing customer fund balances for the previous day because Matthew Hughey, MF Global's Regulatory Capital Controller, was still preparing them.[383]

Because JPMC was the depository bank for certain of MF Global's customer funds, it subsequently observed that MF Global had moved $200 million from one of the company's customer accounts to its "house" account just before MF Global transferred $175 million from

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[378] Dec. 15, 2011 Hearing, *supra* note 50, at 11 (testimony of the Hon. Jon Corzine, CEO, MF Global). In an e-mail to two MF Global employees, Vinay Mahajan explained that JPMC was "holding up vital business in the U.S. as a result" of the overdrawn UK account. E-mail from Vinay Mahajan, Global Treasurer, MF Global, to Jon Ferber, MF Global, Russell Haley, MF Global (Oct. 28, 2011, 01:35 p.m.). The employees were to confirm that the overdraft had been covered. *Id*.

[379] Dec. 15, 2011 Hearing, *supra* note 50, at 11 (testimony of the Hon. Jon Corzine, CEO, MF Global).

[380] E-mail from Edith O'Brien, Ass't. Treasurer, MF Global, to Laurie Ferber, Gen. Counsel, MF Global (Oct. 28, 2011, 05:37 p.m.) [hereinafter O'Brien E-mail Oct. 28, 2011, 05:37 p.m.]. A company's house account is an account designated for a company's own funds.

[381] E-mail from Edith O'Brien, Ass't Treasurer, MF Global, to Laurie Ferber, Gen. Counsel, MF Global (Oct. 28, 2011, 09:43 p.m.).

[382] E-mail from Edith O'Brien, Ass't Treasurer, MF Global, to Russell Haley, MF Global (Oct. 28. 2011, 01:34 p.m.).

[383] O'Brien E-mail Oct. 28, 2011, 05:37 p.m., *supra* note 380; Interview by O&I Subcomm. staff with Matthew Hughey, Controller, Fin. Regulatory Group, MF Global, in Wash., D.C. (May 29, 2012) [hereinafter Interview with Hughey]. The most recent statement reported excess funds of approximately $116 million in segregated accounts as of Wednesday and, on Thursday, the company had returned a total net amount of approximately $375 million to the accounts. *See* MFGI Trustee Report, *supra* note 123, at 107, fn. 117, at 109, fn. 79. In fact, balances in the company's segregated accounts were not as O'Brien may have understood; subsequent analysis by the MFGI trustee determined there was a deficiency in customer funds on deposit in segregated accounts as of the close of business on Wednesday and Thursday. *Id.* at Annex D (detailing $298 million deficiency as of Wednesday and $413 million deficiency as of Thursday).

that "house" account to cover the overdraft.[384] JPMC's Chief Risk Officer, Barry Zubrow, called Corzine to seek an assurance that the money transferred from the customer segregated account did not represent customer funds.[385] The bank then sent Corzine a letter, to be signed by O'Brien, that sought an assurance that all transfers from MF Global's segregated customer accounts complied with the CFTC's customer protection rules.[386] In response to requests from MF Global, JPMC revised the letter twice to narrow its focus to the transfers in question.[387] However, despite MF Global staff's oral assurances to JPMC that O'Brien would sign the narrowed version of the letter, neither O'Brien nor any other representative of MF Global ever did so.[388]

Hughey completed his preliminary review of the segregated and secured calculations as of the close of business on Thursday. He was surprised to find that the company was deficient in its segregated accounts by over $300 million. Hughey initially believed the apparent deficiency resulted from a failure to account for several wire transfers. He contacted representatives of MF Global's Treasury department to reconcile the numbers, but found them to be atypically unresponsive. Given the fast-approaching noon deadline for submitting the MFGI's segregated and secured statements to regulators and the concern surrounding the large deficiency in segregated accounts, Hughey and his colleague, Philip Cooley, approached O'Brien to discuss

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[384] Mar. 28, 2012 Hearing, *supra* note 179, at 7 (statement of Diane Genova, Deputy Gen. Counsel, JPMC).
[385] Interview with JPMC, *supra* note 374.; *see also* Mar. 28, 2012 Hearing, *supra* note 179, at 7 (statement of Diane Genova, Deputy Gen. Counsel, JPMC).
[386] E-mail from Donna Dellosso, Managing Dir., TSS Risk Management, JPMC, to Jon Corzine, CEO, MF Global (Oct. 28, 2011, 02:28 p.m.).
[387] *Id.*
[388] Mar. 28, 2012 Hearing, *supra* note 182, at 139 (testimony of Dianne Genova, Deputy Gen. Counsel, JPMC). *See Id.* at 51 (testimony of Laurie Ferber, Gen. Counsel, MF Global) ("My understanding was JPMorgan confirmed that they were interested in two transfers…and on inquiry, [I] thought it would be better if [the letter] was limited to that. We would be able to make that [representation]. I…asked them to…limit the letter to what they needed and we would get it signed"); *Id.* at 139 (testimony of Dianne Genova, Deputy Gen. Counsel, JPMC) ("I personally had conversations with both Ms. Ferber and her deputy…who gave me oral assurances that they knew the rules, they were in compliance with the rules, and that—and when we finally revised the letter to only refer to the two transfers that I…really had some concerns about, that in fact the letter would be signed"); E-mail from Dennis Klejna, MF Global, to Laurie Ferber, Gen. Counsel, MF Global (Oct. 28, 2011, 08:08 p.m.).

the problem. When Hughey and Cooley arrived at O'Brien's office to discuss the matter, she said that she was very busy. The two men found O'Brien to be aloof and non-responsive to their concerns about the deficiency in the segregated customer accounts. O'Brien asked Jason Chenoweth, an accountant who worked for her, to handle the matter.[389]

Chenoweth ushered Hughey and Cooley into a separate room where they worked to reconcile the deficiency. After reviewing the wire transfers, Chenoweth determined the deficiency was a result of five transactions – totaling $540 million – that were booked incorrectly. Hughey and Cooley manually adjusted the segregated statement by $540 million, which resulted in a reported excess of $200 million in the segregated statement.[390]

Shortly after Hughey made the manual adjustment, he contacted Serwinski, who was on vacation, to inform her that Chenoweth had reconciled the deficiency in the segregated account, but stated that he had not yet received backup documents to support Chenoweth's conclusions.[391] After speaking with Serwinski, Hughey filed the company's segregated and secured statements showing the excess balance of roughly $200 million.[392] Serwinski then told Hughey that he and his team must report to the office early Saturday morning to get a head-start on preparing the Friday close of business segregated and secured statements.[393]

At approximately 6:00 p.m. on Friday night, the New York Fed suspended MF Global from conducting new business as a primary dealer.[394]

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[389] Interview with Hughey, *supra* note 383.
[390] *Id.* Chenoweth's determination that the five transactions were incorrectly booked later turned out to be erroneous. MFGI Trustee Report, *supra* note 50, at 112.
[391] *Id.*
[392] Telephone Interview with Serwinski, *supra* note 278.
[393] Interview with Hughey, *supra* note 383.
[394] Dec. 15, 2011 Hearing, *supra* note 50, at 13 (testimony of Thomas C. Baxter, Jr., Gen. Counsel, NYFRB).

Saturday, October 29, 2011

On Saturday morning, Hughey and his team prepared initial drafts of the segregated and secured statements for Friday that showed a deficit in segregated customer funds of over $900 million.[395] MF Global's Treasury Department assured Serwinski's staff that the shortfall must have resulted from reconciliation errors and that the customer accounts were not undersegregated.[396] The company did not inform its regulators about the apparent shortfall in segregated customer funds and its efforts to reconcile the shortfall.[397]

Meanwhile, MF Global's senior management was attempting to sell all or part of the company and to unwind its proprietary investments, including the European RTM trades.[398] At 5:30 p.m., Corzine updated regulators about the company's negotiations with potential purchasers and the company's asset sales.[399] Corzine had identified Interactive Brokers, LLC as a potential buyer, and executives for both companies worked through the weekend to negotiate the terms of a deal.[400]

Sunday, October 30, 2011

Throughout the weekend, CFTC Chairman Gary Gensler and CFTC staff expressed concern that the amounts on deposit in MF Global's foreign secured accounts were less than what the company owed to commodity customers who traded on foreign exchanges.[401] Because MF Global used the "Alternative Method" of calculating funds to set aside in those accounts, it

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[395] Mar. 28, 2012 Hearing, *supra* note 179, at 48 *(*testimony of Christine Serwinski, North American CFO, MF Global).
[396] *Id.* at 3 (statement of Christine Serwinski, North American CFO, MF Global).
[397] *See id.* at 48-49 (testimony of Christine Serwinski, North American CFO, MF Global); Mar. 28, 2012 Hearing, *supra* note 179, at 7 (testimony of Laurie Ferber, Gen. Counsel, MF Global).
[398] Dec. 15, 2011 Hearing, *supra* note 50, at 141-142 (testimony of Jon Corzine, CEO, MF Global, Inc.).
[399] E-mail from Grace Vogel, FINRA, to Richard Ketchum, FINRA, et al (Oct. 29, 2011, 07:10 p.m.).
[400] *Id.* JPMC told MF Global's financial advisor that it was not interested in purchasing the company, but might be interested in particular assets or securities portfolios.
[401] *See* E-mail from Gary Gensler, Chairman, CFTC, to Bart Chilton, Commissioner, CFTC (Oct. 30, 2011, 08:05 p.m.); E-mail from Gary Gensler, Chairman, CFTC, to Mark Metjen, CFTC (Oct. 30, 2011, 08:13 p.m.) [hereinafter Gensler E-mail].

did not have to deposit all customer money in the accounts. As a consequence, officials from the CME Group encouraged the company to move more funds into the accounts.[402]

The concern that there would be a shortfall in amounts owed to customers, despite the fact that MF Global was technically in compliance with the rules, prompted Chairman Gensler to remark that the CFTC should consider whether to abandon the Alternative Method.[403] On Sunday, Chairman Gensler wrote to a colleague that he had spent too much of the weekend focused on gaps in part thirty customer funds.[404] He stated MF Global gave him "more reasons…to consider proposals to modify part 30 rules," which governed the safekeeping of funds deposited by customers for trading abroad.[405]

Also on Sunday, CFTC staff recognized that most funds that were held in foreign secured accounts were located with MFGUK and other foreign entities.[406] Of the funds held by MFGUK, CFTC staff wanted to know the amount of the funds, how they were being held by the UK affiliate, if the funds were safe and secure, and the issues with getting the funds back to U.S. customers.[407]

CFTC staff set a 1:00 p.m. deadline on Sunday afternoon for MF Global to provide information on its customer-segregated funds statement for Friday.[408] As of 2:57 p.m., MF Global staff was working to determine the balances and liabilities for the accounts.[409] The CFTC

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[402] *See* E-mail from Michael Procajlo, CME Group, to Thomas Smith, CFTC, et al (Oct. 28, 2011, 12:01 p.m.).
[403] *See* Gensler E-mail, *supra* note 401.
[404] *Id.*
[405] *Id.*
[406] E-mail from Robert Wasserman, Chief Counsel, Div. of Clearing and Risk, CFTC, to Gary Gensler, Chairman, CFTC (Oct. 30, 2011, 02:19 p.m.).
[407] *Id.*
[408] E-mail from Gary Gensler, Chairman, CFTC, to Ananda Radhakrishnan, CFTC, Gary Barnett, CFTC (Oct. 30, 09:56 a.m.); E-mail from Melissa Hendrickson, CFTC, to Thelma Diaz, CFTC, Robert Wasserman, CFTC (Oct. 30, 2011 at 02:54 p.m.).
[409] E-mail from Melissa Hendrickson, CFTC, to Thelma Diaz, CFTC, Robert Wasserman, CFTC (Oct. 30, 2011, 02:57 p.m.).

insisted that MF Global submit information on the segregated statement by 3:00 p.m.[410] The CFTC's Chief Counsel for Clearing and Risk e-mailed MF Global's offices of Treasury and General Counsel stating that the lack of data and supporting documentation was driving adverse inferences.[411] Separately, the CFTC's Chief Counsel wrote to colleagues, "This is NOT good."[412] In an e-mail to the director of the SEC's Division of Trading and Markets, SEC Chairman Mary Schapiro related Chairman Gensler's view that MF Global had not been forthcoming with the CFTC and that, as a result, "they face enforcement."[413]

Around 3:00 p.m., CFTC staff in MF Global's Chicago office saw a draft of the company's customer-segregated funds statements for Friday showing that there was a deficiency in customer accounts.[414] The CFTC staff informed CME Group staff of the apparent shortfall.[415] Throughout the afternoon and evening, MF Global staff and MF Global's regulators worked to obtain more information on the shortfall.[416]

Around 7:00 p.m., MF Global staff spoke with the CFTC and the CME Group.[417] During that discussion, the company attributed the deficiency in the segregated account to an accounting error.[418] Serwinski arrived at the company's Chicago office around 9:00 p.m.[419] As late as 10:00 or 11:00 p.m., Serwinski and O'Brien continued to convey their belief to regulators that

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[410] *Id.*
[411] E-mail from Robert Wasserman, Chief Counsel, Div. of Clearing and Risk, CFTC, to Edith O'Brien, Ass't Treasurer, MF Global, Matthew Hughey, Controller, Fin. Regulatory Group, MF Global, et al (Oct. 30, 2011, 03:40 p.m.).
[412] E-mail from Robert Wasserman, Chief Counsel, Div. of Clearing and Risk, CFTC, to Melissa Hendrickson, CFTC, et al. (Oct. 30, 2011, 02:59 p.m.).
[413] E-mail from Mary Schapiro, Chairman, SEC, to Robert W. Cook, Dir., Div. of Trading and Markets SEC (Oct. 30, 2011, 02:12 p.m.).
[414] *See* CME MF Global Chronology, Week of Oct. 24-31, 2011 [hereinafter CME Chron], at Oct. 30, 2011(stating that at approximately 2:00 p.m. U.S. Central Time CFTC staff member Melissa Hendrickson called Michael Procajlo and told him she had seen a draft of 10/28 segregated statement and that it showed a deficiency in segregated customer funds.).
[415] *Id*.
[416] *See id.* at 5-8.
[417] *Id.* at 6-7, 6:00 p.m.
[418] *Id.*
[419] *Id.* at 7, 8:00 p.m. to 9:00 p.m.

the shortfall was due to an accounting error.[420] By midnight, however, neither the CME Group's auditors nor MF Global staff had been able to identify any error that could explain the deficiency.[421]

Monday, October 31, 2011 and Tuesday, November 1, 2011

At 12:40 a.m. on Monday, October 31, 2011, a CME Group audit-team member e-mailed his colleagues to inform them that Serwinski would "look into coming up with additional funds to transfer into segregation as a contingency" if the accounting error was not identified.[422] Soon thereafter, O'Brien informed Serwinski that she believed that the shortfall in customer segregated funds calculated by the company was not the result of an accounting error and that customer funds were in fact missing from the segregated accounts.[423] O'Brien provided a document that showed the deficiency to be the result of three types of transactions: (1) intra-day loans between MF Global's FCM and its broker-dealer; (2) the funding of client withdrawals from the broker-dealer; and (3) the $175 million transfer to cover MFGUK's overdrawn JPMC account on October 28.[424] Together, these transactions totaled $909 million.[425]

At approximately 2:00 a.m. on Monday morning, O'Brien and Serwinski informed the CME Group that customer funds were missing from segregated accounts.[426] During a

[420] *Id.*
[421] *Id.* at 8, 9 p.m. to 10 p.m.
[422] *Id.*
[423] Mar. 28, 2012 Hearing, *supra* note 179, at 4 (statement of Christine Serwinski, CFO for North America, MF Global).
[424] Telephone Interview by O&I Subcomm. staff with Christine Serwinski, North American CFO, MF Global, in Wash., D.C. (Jan. 5, 2012).
[425] *Id.*
[426] CME Chron, *supra* note 414, at 8, approximately 1 a.m. – 2 a.m.

conference call at approximately the same time, MF Global's senior management also informed the company's regulators of the deficiency.[427]

Before the markets opened on Monday morning, Serwinski sought to identify assets that MFGI could deposit in the company's customer segregated accounts in order to mitigate any shortfall.[428] Among other assets, Serwinski identified approximately $220 million in excess company funds deposited in a reserve account, which the company maintained for its securities customers.[429] Though the SEC had expressed concern to MF Global about the calculation of excess funds in the reserve account and cautioned the company against transferring these funds, MFGI transferred the full amount of the perceived excess to its segregated FCM customer accounts.[430]

On Monday, Matthew Hughey considered whether the $175 million transfer from MFGI to MFGUK affected MFGI's net capital levels.[431] MF Global staff had not consulted with staff from the company's Finance Department, including Serwinski and Hughey, before making the transfer the previous Friday.[432] Upon review, however, Hughey determined that the $175 million transfer was a "non-allowable asset" for purposes of computing MFGI's net capital.[433] Hughey concluded that MFGI's equity (and thus its net capital level) would be reduced to the extent that

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[427] Dec. 15, 2011 Hearing, *supra* 50, at 50 (statement of Robert Cook, Dir., Div. of Trading and Markets, SEC); *Id.*, at 54 (statement of Terrence A. Duffy, Exec. Chairman, CME Group); E-mail from Robert Wasserman, CFTC, to Gary Barnett, CFTC, and Thelma Diaz, CFTC (Oct.31, 2011, 01:58 a.m.).

[428] E-mail from Christine Serwinski, North American CFO, MF Global, to Mike Bolan, MF Global, Henri Steenkamp, CFO, MF Global (Oct. 31, 2011, 10:25 a.m.).

[429] MFGI Trustee Report, *supra* note 123, at 119.

[430] Mar. 2012 Interview with SEC, *supra* note 355; Telephone Interview by O&I Subcomm. staff with FINRA personnel, in Wash., D.C. (Feb. 29, 2012); Telephone interview by O&I Subcomm. staff with FINRA personnel, in Wash., D.C. (Apr. 25, 2012). In an interview with O&I Subcomm. staff, Christine Serwinski stated that, to her recollection, no one communicated to her an instruction or caution from regulators that MF Global not transfer excess funds from the securities customer account.

[431] E-mail from Matthew Hughey, Controller, Fin. Regulatory Group, MF Global, to Dennis Klejna, MF Global, Kemper Cagney, MFGUK (Oct. 31, 2011, 12:50 a.m.) [hereinafter Hughey E-mail].

[432] Interview with Hughey, *supra* note 383; Mar. 28, 2012 Hearing, *supra* note 179 (testimony of Christine Serwinski) (stating that Serwinski would not have made the transfer had she been consulted).

[433] Hughey E-mail, *supra* note 431.

MFGI could not perfect a security interest in collateral owned by MFGUK equal to the value of the transfer.[434] After consulting with colleagues, Hughey concluded that MFGI could assert a lien against MFGUK assets valued at $120 million, and reduced the amount of the "non-allowable asset" accordingly.[435] There is no indication that MF Global staff consulted with MFGI's regulators or SROs before executing the transfer, despite the fact that it potentially affected MFGI's regulatory capital level. There is also no indication that MF Global staff consulted with the CME Group in order to determine whether the transfer constituted an "equity withdrawal" within the meaning of CME's instruction that the company not make any such withdrawal, except with CME's express written permission.[436]

On Tuesday, November 1, an SEC staff member informed a colleague that MFGI had withdrawn the full amount of the perceived excess from the securities reserve bank account.[437] Separately, a FINRA staff member informed colleagues that he understood MF Global to have ignored an instruction from an SEC official not to transfer the funds.[438] In a follow-up e-mail to Chairman Schapiro and others, the director of the SEC's Division of Trading and Markets related that an SEC staff member had heard from MF Global's General Counsel, Laurie Ferber, that the CFTC had pressured MF Global to make the transfer.[439] Chairman Schapiro responded, "Without telling us? That is unacceptable."[440]

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[434] *See id.*
[435] E-mail from Matthew Hughey, Controller, Fin. Regulatory Group, MF Global, to Dennis Klejna (Oct. 31, 2011, 08:02 p.m.).
[436] Interview with CME Group, *supra* note 130. The transfer may have been an "equity withdrawal" to the extent it constituted an unsecured loan.
[437] E-mail from Ethan Allfree, SEC, to Robert Sollazzo, SEC (Nov. 1, 2011, 01:14 p.m.).
[438] E-mail from Jeffrey Fortune, FINRA, to Grace Vogel, Executive V.P., FINRA (Nov. 1, 2011, 02:00 p.m.).
[439] E-mail from Robert W. Cook, Dir., Div. Trading and Markets, SEC, to Mary Schapiro, Chairman, SEC, et al. (Nov. 1, 2011, 02:16 p.m.).
[440] E-mail from Mary Schapiro, Chairman, SEC, to Robert W. Cook, Dir., Div. Trading and Markets, SEC (Nov. 1, 2011, 02:18 p.m.) [hereinafter Schapiro E-mail].

Bankruptcy Filing and Liquidation

When MF Global informed Interactive Brokers of the shortfall of customer funds, the company withdrew from negotiations.[441] With no other alternatives available, MF Global filed for reorganization under Chapter 11 of the Bankruptcy Code in the United States Bankruptcy Court for the Southern District of New York.[442]

Following MF Global's filing, the Securities Investor Protection Corporation commenced a proceeding to liquidate MFGI under the Securities Investor Protection Act.[443] A federal district court judge appointed James W. Giddens as trustee for the liquidation of MFGI.[444] Giddens then hired his law firm, Hughes Hubbard and Reed, LLP as counsel and retained Ernst & Young and Deloitte as consultants and forensic accountants to aid him in investigating the collapse of MFGI and the shortfall in customer funds.[445] Giddens released a report in June 2012 indicating that the shortfall in segregated property is approximately $900 million in domestic accounts (both commodities and securities), plus approximately $700 million in secured accounts related to trading by customers on foreign exchanges.[446] To date, Giddens has recovered approximately 80 percent of the segregated customer property missing from domestic securities accounts and between 60 and 90 percent of the segregated customer property missing from domestic futures accounts.[447] However, he has only recovered approximately five percent of the funds missing

[441] Felix Salmon, *What happened at MF Global?*, REUTERS, Nov. 1, 2011 (http://blogs.reuters.com/felix-salmon/2011/11/01/what-happened-at-mf-global/) (last visited Oct. 24, 2012).
[442] Freeh Report, *supra* note 191. On Nov. 28, 2011, the bankruptcy court approved the U.S. bankruptcy trustee's appointment of Louis J. Freeh as the trustee of MF Global's estate.
[443] *Id.* at 29, 30; *see also* 15 U.S.C. §78aaa et seq.
[444] Order Granting App. to Liquidate MF Global, Inc. pursuant to Securities Investor Protection Act, *Securities Investor Protection Corp. v. MF Global Inc.*, No. 11-02790, at 1 (S.D.N.Y. entered Oct 31, 2011).
[445] Freeh Report, *supra* note 191, at 34.
[446] MFGI Trustee Report, *supra* note 123, at 2.
[447] *Id.* at 8.

from the accounts of customers who traded on foreign exchanges.[448] Most of the remaining shortfall for these customers involves secured property that is being withheld by the Joint Special Administrators of MFGUK. Giddens has filed a claim to recover those funds.[449] However, Giddens and the MFGUK administrators disagree about whether, under U.K. law, Giddens is entitled to have his claim satisfied from the disputed funds before other creditors.[450] The resolution of the disagreement depends on whether, when MFGI deposited funds into MFGUK's account to support client trades, it also transferred ownership of those funds to MFGUK.[451] If it did, the trustee's claim will be satisfied only after the funds have been used to pay certain other creditors.[452] A trial is scheduled for April 9, 2013, in the U.K. to resolve the dispute.[453]

Whether MF Global's customers get all of their property back depends on whether the MFGI trustee can recover funds held by MFGUK; what he can recover through litigation and negotiation with third parties; and on the ability to allocate the property of the MFGI estate to the company's former customers.[454] Because MFGI's other creditors normally would be entitled to have their claims satisfied from MFGI's estate, diverting MFGI property to make customers whole will diminish any recovery that the company's creditors otherwise would realize.[455]

Ongoing Criminal and Civil Investigations and Litigation

MF Global is currently the subject of multiple civil and criminal investigations in jurisdictions around the world. In the U.S., the company and its former employees remain the

[448] Update Regarding June 20, 2012 Interim Distribution, http://dm.epiq11.com/MFG/Project#Section2_35 (last visited July 23, 2012).
[449] MFGI Trustee Report, *supra* note 123, at 157.
[450] *See, e.g.*, Witness Statement of Richard Heis at 7, *In the Matter of MF Global UK Limited*, No. 9527 (2011).
[451] *Id.* at 9.
[452] *Id.* at 8.
[453] Update to 30.7 Customers Regarding UK Legal Proceedings, June 1, 2012, *available at* http://dm.epiq11.com/MFG/Project#Section2_31 (last visited July 23, 2012).
[454] MFGI Trustee Report, *supra* note 123, at 3.
[455] *See In re Griffin Trading Company*, 245 B.R. 291, 296 (N.D. Ill. 2000) (vacated 270 B.R. 882 (N.D. Ill. 2001)).

subject of an investigation by the Department of Justice, led by U.S. Attorneys in Chicago and New York. Additionally, the company is under investigation by both the SEC and the CFTC. MF Global's customers, shareholders, and former employees have commenced litigation against the company and its executives in multiple jurisdictions.[456] Those actions filed pre-petition against the company have been stayed pursuant to the U.S. Bankruptcy Code.[457] However, several post-petition actions filed against Corzine by MF Global's customers and shareholders are currently pending before the United States District Court for the Southern District of New York.[458]

[456] Freeh Report, *supra* note 191, at 87.
[457] *Id.*
[458] *Id*. at 87, 88, 109-111.

The Collapse of MF Global

FINRA Imposes Capital Charge

When it became clear to MF Global that the SEC agreed with FINRA's interpretation of the net capital rule, MF Global sought to negotiate the size of the capital charge that FINRA would impose.[314] In an August 11, 2011 memorandum to FINRA, MFGI requested that, for purposes of imposing haircuts under the net capital rule, the Belgian, Italian, and Spanish bonds collateralizing its RTM portfolio be treated as if they were U.S. bonds, and that its lower-rated Irish and Portuguese bonds be treated as if they were corporate bonds.[315] Additionally, MFGI argued that the standard haircuts set forth in the net capital rule encompassed several risk components such as default, settlement, market, liquidity, reputational, and legal risk, and because the only risk facing the company's bonds was default risk, the haircuts FINRA imposed on its Belgian, Italian, and Spanish bonds should be discounted by 80 percent to reflect only the default risk component.[316] Based on this requested treatment, MFGI calculated that the regulatory capital charge imposed by FINRA would total $55.8 million.[317]

FINRA rejected MFGI's proposed capital treatment, indicating that there was no justification for treating bonds within the company's portfolio as different types of securities based on either the country of issuance or credit rating, nor was there any justification for imposing haircuts smaller than those required under the net capital rule.[318] FINRA categorized

[314] Interview with FINRA, *supra* note 291.
[315] See Memorandum from MFGI to FINRA (Aug. 11, 2011). Under the net capital rule, the haircuts imposed on U.S. bonds ranges between 0 and 1.5 percent, depending on the maturity date, and the haircuts imposed on corporate bonds is two percent for bonds with a less than one year to maturity and three percent for bonds with between one and two years to maturity. MFGI's Belgian, Italian, and Spanish bonds were rated AA+, AA-, and AA+, and its Irish and Portuguese bonds were rated BBB+ and BBB-, the latter being the lowest investment grade category.
[316] *Id.*
[317] *Id.*
[318] Interview with FINRA, *supra* note 291.

United States Senate
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
Committee on Homeland Security and Governmental Affairs

Carl Levin, Chairman
John McCain, Ranking Minority Member

JPMORGAN CHASE WHALE TRADES: A CASE HISTORY OF DERIVATIVES RISKS AND ABUSES

MAJORITY AND MINORITY STAFF REPORT

PERMANENT SUBCOMMITTEE ON INVESTIGATIONS

UNITED STATES SENATE

RELEASED IN CONJUNCTION WITH THE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS MARCH 15, 2013 HEARING

SENATOR CARL LEVIN
Chairman

SENATOR JOHN McCAIN
Ranking Minority Member

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JPMORGAN CHASE WHALE TRADES:
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JPMORGAN CHASE WHALE TRADES:
A CASE HISTORY OF DERIVATIVES RISKS AND ABUSES

March 15, 2013

JPMorgan Chase & Company is the largest financial holding company in the United States, with $2.4 trillion in assets. It is also the largest derivatives dealer in the world and the largest single participant in world credit derivatives markets. Its principal bank subsidiary, JPMorgan Chase Bank, is the largest U.S. bank. JPMorgan Chase has consistently portrayed itself as an expert in risk management with a "fortress balance sheet" that ensures taxpayers have nothing to fear from its banking activities, including its extensive dealing in derivatives. But in early 2012, the bank's Chief Investment Office (CIO), which is charged with managing $350 billion in excess deposits, placed a massive bet on a complex set of synthetic credit derivatives that, in 2012, lost at least $6.2 billion.

The CIO's losses were the result of the so-called "London Whale" trades executed by traders in its London office – trades so large in size that they roiled world credit markets. Initially dismissed by the bank's chief executive as a "tempest in a teapot," the trading losses quickly doubled and then tripled despite a relatively benign credit environment. The magnitude of the losses shocked the investing public and drew attention to the CIO which was found, in addition to its conservative investments, to be bankrolling high stakes, high risk credit derivative trades that were unknown to its regulators.

The JPMorgan Chase whale trades provide a startling and instructive case history of how synthetic credit derivatives have become a multi-billion dollar source of risk within the U.S. banking system. They also demonstrate how inadequate derivative valuation practices enabled traders to hide substantial losses for months at a time; lax hedging practices obscured whether derivatives were being used to offset risk or take risk; risk limit breaches were routinely disregarded; risk evaluation models were manipulated to downplay risk; inadequate regulatory oversight was too easily dodged or stonewalled; and derivative trading and financial results were misrepresented to investors, regulators, policymakers, and the taxpaying public who, when banks lose big, may be required to finance multi-billion-dollar bailouts.

The JPMorgan Chase whale trades provide another warning signal about the ongoing need to tighten oversight of banks' derivative trading activities, including through better valuation techniques, more effective hedging documentation, stronger enforcement of risk limits, more accurate risk models, and improved regulatory oversight. The derivatives overhaul required by the Dodd-Frank Wall Street Reform and Consumer Protection Act is intended to provide the regulatory tools needed to tackle those problems and reduce derivatives-related risk, including through the Merkley-Levin provisions that seek to implement the Volcker Rule's prohibition on high risk proprietary trading by federally insured banks, even if portrayed by banks as hedging activity designed to lower risk.

I. EXECUTIVE SUMMARY

A. Subcommittee Investigation

The JPMorgan Chase whale trades first drew public attention in April 2012. Beginning that same month, Senator Carl Levin's office made preliminary inquiries into what happened and subsequently received a series of briefings from JPMorgan Chase. On June 13, 2012, the U.S. Senate Committee on Banking, Housing, and Urban Affairs held a hearing in which JPMorgan Chase's Chief Executive Officer Jamie Dimon testified and answered questions about the whale trades.[1] On June 19, 2012, Mr. Dimon appeared at a second hearing before the U.S. House Committee on Financial Services.[2]

In July 2012, the U.S. Senate Permanent Subcommittee on Investigations initiated a bipartisan investigation into the trades. Over the course of the next nine months, the Subcommittee collected nearly 90,000 documents, reviewed and, in some cases transcribed, over 200 recorded telephone conversations and instant messaging exchanges,[3] and conducted over 25 interviews of bank and regulatory agency personnel. The Subcommittee also received over 25 briefings from the bank and its regulators, including the Office of the Comptroller of the Currency (OCC) and Federal Deposit Insurance Corporation (FDIC), and consulted with government and private sector experts in financial regulation, accounting practices, derivatives trading, and derivatives valuation.

The materials reviewed by the Subcommittee included JPMorgan Chase filings with the Securities and Exchange Commission (SEC), documents provided to and by the OCC, JPMorgan Chase board and committee minutes, internal memoranda, correspondence, and emails, chronologies of trading positions, records of risk limit utilizations and breaches, audio recordings and instant messaging exchanges, legal pleadings, and media reports. In addition, JPMorgan Chase briefed the Subcommittee about the findings of an internal investigation conducted by a task force headed by Michael Cavanagh, a senior bank official who is a member of the firm's Executive and Operating Committees. That investigation released its results to the public in a report on January 16, 2013.[4] Bank representatives also read to the Subcommittee portions of notes taken during interviews conducted by the JPMorgan Chase Task Force of CIO personnel, including traders, who were based in London. In addition to bank materials, the Subcommittee reviewed documents prepared by or sent to or from banking and securities regulators, including bank examination reports, analyses, memoranda, correspondence, emails, OCC Supervisory Letters, and Cease and Desist Orders. Those materials included nonpublic OCC examination

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[1] See "A Breakdown in Risk Management: What Went Wrong at JPMorgan Chase?" U.S. Senate Committee on Banking, Housing, and Urban Affairs, S. Hrg. 112-715 (June 13, 2012).

[2] See "Examining Bank Supervision and Risk Management in Light of JPMorgan Chase's Trading Loss," U.S. House of Representatives Committee on Financial Services, H. Hrg. 112-__ (June 19, 2012).

[3] The British regulator, the Financial Services Authority, requires telephone calls regarding trading to be taped, including with respect to all financial transactions likely to result in a trade. See Conduct of Business Sourcebook (Recording of Telephone Conversations and Electronic Communications) Instrument 2008, FSA 2008/6 (U.K.).

[4] See 1/16/2013 "Report of JPMorgan Chase & Co. Management Task Force Regarding 2012 CIO Losses," prepared by JPMorgan Chase, http://files.shareholder.com/downloads/ONE/2288197031x0x628656/4cb574a0-0bf5-4728-9582-625e4519b5ab/Task_Force_Report.pdf.

materials and reports on the whale trades and on the OCC's own oversight efforts.[5] The Subcommittee also spoke with and received materials from firms that engaged in credit derivative trades with the CIO.

JPMorgan Chase has cooperated fully with the Subcommittee's inquiry, as have the regulatory agencies. However, several former JPMorgan Chase employees located in London declined Subcommittee requests for interviews and, because they resided outside of the United States, were beyond the Subcommittee's subpoena authority. Those former employees, Achilles Macris, Javier Martin-Artajo, Bruno Iksil, and Julien Grout, played key parts in the events at the center of this inquiry; their refusal to provide information to the Subcommittee meant that this Report had to be prepared without their direct input. The Subcommittee relied instead on their internal emails, recorded telephone conversations and instant messages, internal memoranda and presentations, and interview summaries prepared by the bank's internal investigation, to reconstruct what happened.

B. Overview

The Subcommittee's investigation has determined that, over the course of the first quarter of 2012, JPMorgan Chase's Chief Investment Office used its Synthetic Credit Portfolio (SCP) to engage in high risk derivatives trading; mismarked the SCP book to hide hundreds of millions of dollars of losses; disregarded multiple internal indicators of increasing risk; manipulated models; dodged OCC oversight; and misinformed investors, regulators, and the public about the nature of its risky derivatives trading. The Subcommittee's investigation has exposed not only high risk activities and troubling misconduct at JPMorgan Chase, but also broader, systemic problems related to the valuation, risk analysis, disclosure, and oversight of synthetic credit derivatives held by U.S. financial institutions.

(1) Increasing Risk

In 2005, JPMorgan Chase spun off as a separate unit within the bank its Chief Investment Office (CIO), which was charged with investing the bank's excess deposits, and named as its head Ina Drew who served as the bank's Chief Investment Officer. In 2006, the CIO approved a proposal to trade in synthetic credit derivatives, a new trading activity. In 2008, the CIO began calling its credit trading activity the Synthetic Credit Portfolio.

Three years later, in 2011, the SCP's net notional size jumped from $4 billion to $51 billion, a more than tenfold increase. In late 2011, the SCP bankrolled a $1 billion credit derivatives trading bet that produced a gain of approximately $400 million. In December 2011, JPMorgan Chase instructed the CIO to reduce its Risk Weighted Assets (RWA) to enable the bank, as a whole, to reduce its regulatory capital requirements. In response, in January 2012, rather than dispose of the high risk assets in the SCP – the most typical way to reduce RWA – the CIO launched a trading strategy that called for purchasing additional long credit derivatives to offset its short derivative positions and lower the CIO's RWA that way. That trading strategy

[5] See 10/26/2012 Confidential Supervisory Report, OCC, PSI-OCC-13-000014 [Sealed Exhibit].

not only ended up increasing the portfolio's size, risk, and RWA, but also, by taking the portfolio into a net long position, eliminated the hedging protections the SCP was originally supposed to provide.

In the first quarter of 2012, the CIO traders went on a sustained trading spree, eventually increasing the net notional size of the SCP threefold from $51 billion to $157 billion. By March, the SCP included at least $62 billion in holdings in a U.S. credit index for investment grade companies; $71 billion in holdings in a credit index for European investment grade companies; and $22 billion in holdings in a U.S. credit index for high yield (non-investment grade) companies. Those holdings were created, in part, by an enormous series of trades in March, in which the CIO bought $40 billion in notional long positions which the OCC later characterized as "doubling down" on a failed trading strategy. By the end of March 2012, the SCP held over 100 different credit derivative instruments, with a high risk mix of short and long positions, referencing both investment grade and non-investment grade corporations, and including both shorter and longer term maturities. JPMorgan Chase personnel described the resulting SCP as "huge" and of "a perilous size" since a small drop in price could quickly translate into massive losses.

At the same time the CIO traders were increasing the SCP's holdings, the portfolio was losing value. The SCP reported losses of $100 million in January, another $69 million in February, and another $550 million in March, totaling at quarter-end nearly $719 million. A week before the quarter ended, on March 23, 2012, CIO head Ina Drew ordered the SCP traders to "put phones down" and stop trading.

In early April, the press began speculating about the identity of the "London Whale" behind the huge trades roiling the credit markets, eventually unmasking JPMorgan Chase's Chief Investment Office. Over the next three months, the CIO's credit derivatives continued to lose money. By May, the Synthetic Credit Portfolio reported losing $2 billion; by the end of June, the losses jumped to $4.4 billion; and by the end of the year, the total reached at least $6.2 billion.

JPMorgan Chase told the Subcommittee that the SCP was not intended to function as a proprietary trading desk, but as insurance or a "hedge" against credit risks confronting the bank. While its original approval document indicated that the SCP was created with a hedging function in mind, the bank was unable to provide documentation over the next five years detailing the SCP's hedging objectives and strategies; the assets, portfolio, risks, or tail events it was supposed to hedge; or how the size, nature, and effectiveness of its hedges were determined. The bank was also unable to explain why the SCP's hedges were treated differently from other types of hedges within the CIO.

While conducting its review of the SCP, some OCC examiners expressed skepticism that the SCP functioned as a hedge at all. In a May 2012 internal email, for example, one OCC examiner referred to the SCP as a "make believe voodoo magic 'composite hedge.'" When he was asked about the Synthetic Credit Portfolio, JPMorgan Chase CEO Jamie Dimon told the Senate Banking Committee that, over time, the "portfolio morphed into something that rather than protect the firm, created new and potentially larger risks." Mr. Dimon has not acknowledged that what the SCP morphed into was a high risk proprietary trading operation.

(2) Hiding Losses

In its first four years of operation, the Synthetic Credit Portfolio produced positive revenues, but in 2012, it opened the year with sustained losses. In January, February, and March, the days reporting losses far exceeded the days reporting profits, and there wasn't a single day when the SCP was in the black. To minimize its reported losses, the CIO began to deviate from the valuation practices it had used in the past to price credit derivatives. In early January, the CIO had typically established the daily value of a credit derivative by marking it at or near the midpoint price in the daily range of prices (bid-ask spread) offered in the marketplace. Using midpoint prices had enabled the CIO to comply with the requirement that it value its derivatives using prices that were the "most representative of fair value." But later in the first quarter of 2012, instead of marking near the midpoint, the CIO began to assign more favorable prices within the daily price range (bid-ask spread) to its credit derivatives. The more favorable prices enabled the CIO to report smaller losses in the daily profit/loss (P&L) reports that the SCP filed internally within the bank.

The data indicates that the CIO began using more favorable valuations in late January and accelerated that practice over the next two months. By March 15, 2012, two key participants, Julien Grout, a junior trader charged with marking the SCP's positions on a daily basis, and his supervisor, Bruno Iksil, head trader in charge of the SCP, were explicit about what they were doing. As Mr. Grout told Mr. Iksil in a recorded telephone conversation: "I am not marking at mids as per a previous conversation." The next day, Mr. Iksil expressed to Mr. Grout his concerns about the growing discrepancy between the marks they were reporting versus those called for by marking at the midpoint prices: "I can't keep this going …. I think what he's [their supervisor, Javier Martin-Artajo] expecting is a re-marking at the end of the month …. I don't know where he wants to stop, but it's getting idiotic."

For five days, from March 12 to 16, 2012, Mr. Grout prepared a spreadsheet tracking the differences between the daily SCP values he was reporting and the values that would have been reported using midpoint prices. According to the spreadsheet, by March 16, 2012, the Synthetic Credit Portfolio had reported year-to-date losses of $161 million, but if midpoint prices had been used, those losses would have swelled by another $432 million to a total of $593 million. CIO head Ina Drew told the Subcommittee that it was not until July 2012, after she had left the bank, that she became aware of this spreadsheet and said she had never before seen that type of "shadow P&L document."

On March 23, Mr. Iksil estimated in an email that the SCP had lost about $600 million using midpoint prices and $300 million using the "best" prices, but the SCP ended up reporting within the bank a daily loss of only $12 million. On March 30, the last business day of the quarter, the CIO internally reported a sudden $319 million daily loss. But even with that outsized reported loss, a later analysis by the CIO's Valuation Control Group (VCG) noted that, by March 31, 2012, the difference in the CIO's P&L figures between using midpoint prices versus more favorable prices totaled $512 million.

On April 10, 2012, the CIO initially reported an estimated daily loss of $6 million, but 90 minutes later, after a confrontation between two CIO traders, issued a new P&L report estimating

a loss of $400 million. That change took place on the first trading day after the whale trades gained public attention; one CIO trader later said CIO personnel were "scared" at the time to hide such a large loss. As a result, the SCP internally reported year-to-date losses of about $1.2 billion, crossing the $1 billion mark for the first time.

One result of the CIO's using more favorable valuations was that two different business lines within JPMorgan Chase, the Chief Investment Office and the Investment Bank, assigned different values to identical credit derivative holdings. Beginning in March 2012, as CIO counterparties learned of the price differences, several objected to the CIO's values, resulting in collateral disputes peaking at $690 million. In May, the bank's Deputy Chief Risk Officer Ashley Bacon directed the CIO to mark its books in the same manner as the Investment Bank, which used an independent pricing service to identify the midpoints in the relevant price ranges. That change in valuation methodology resolved the collateral valuation disputes in favor of the CIO's counterparties and, at the same time, put an end to the mismarking.

On May 10, 2012, the bank's Controller issued an internal memorandum summarizing a special assessment of the SCP's valuations from January through April. Although the memorandum documented the CIO's use of more favorable values through the course of the first quarter, and a senior bank official even privately confronted a CIO manager about using "aggressive" prices in March, the memorandum generally upheld the CIO valuations. The bank memorandum observed that the CIO had reported about $500 million less in losses than if it had used midpoint prices for its credit derivatives, and even disallowed and modified a few prices that had fallen outside of the permissible price range (bid-ask spread), yet found the CIO had acted "consistent with industry practices."

The sole purpose of the Controller's special assessment was to ensure that the CIO had accurately reported the value of its derivative holdings, since those holdings helped determine the bank's overall financial results. The Controller determined that the CIO properly reported a total of $719 million in losses, instead of the $1.2 billion that would have been reported if midpoint prices had been used. That the Controller essentially concluded the SCP's losses could legitimately fall anywhere between $719 million and $1.2 billion exposes the subjective, imprecise, and malleable nature of the derivative valuation process.

The bank told the Subcommittee that, despite the favorable pricing practices noted in the May memorandum, it did not view the CIO as having engaged in mismarking until June 2012, when its internal investigation began reviewing CIO recorded telephone calls and heard CIO personnel disparaging the marks they were reporting. On July 13, 2012, the bank restated its first quarter earnings, reporting additional SCP losses of $660 million. JPMorgan Chase told the Subcommittee that the decision to restate its financial results was a difficult one, since $660 million was not clearly a "material" amount for the bank, and the valuations used by the CIO did not clearly violate bank policy or generally accepted accounting principles. The bank told the Subcommittee that the key consideration leading to the restatement of the bank's losses was its determination that the London CIO personnel had not acted in "good faith" when marking the SCP book, which meant the SCP valuations had to be revised.

The ability of CIO personnel to hide hundreds of millions of dollars of additional losses over the span of three months, and yet survive internal valuation reviews, shows how imprecise, undisciplined, and open to manipulation the current process is for valuing credit derivatives. This weak valuation process is all the more troubling given the high risk nature of synthetic credit derivatives, the lack of any underlying tangible assets to stem losses, and the speed with which substantial losses can accumulate and threaten a bank's profitability. The whale trades' bad faith valuations exposed not only misconduct by the CIO and the bank's violation of the derivative valuation process mandated in generally accepted accounting principles, but also a systemic weakness in the valuation process for all credit derivatives.

(3) Disregarding Limits

In contrast to JPMorgan Chase's reputation for best-in-class risk management, the whale trades exposed a bank culture in which risk limit breaches were routinely disregarded, risk metrics were frequently criticized or downplayed, and risk evaluation models were targeted by bank personnel seeking to produce artificially lower capital requirements.

The CIO used five metrics and limits to gauge and control the risks associated with its trading activities, including the Value-at-Risk (VaR) limit, Credit Spread Widening 01 (CS01) limit, Credit Spread Widening 10% (CSW10%) limit, stress loss limits, and stop loss advisories. During the first three months of 2012, as the CIO traders added billions of dollars in complex credit derivatives to the Synthetic Credit Portfolio, the SCP trades breached the limits on all five of the risk metrics. In fact, from January 1 through April 30, 2012, CIO risk limits and advisories were breached more than 330 times.

In January 2012, the SCP breached the VaR limit for both the CIO and the bank as a whole. That four-day breach was reported to the bank's most senior management, including CEO Jamie Dimon. In the same month, the SCP repeatedly breached the CS01 limit, exceeding the limit by 100% in January, by 270% in early February, and by more than 1,000% in mid-April. In February 2012, a key risk metric known as the Comprehensive Risk Measure (CRM) warned that the SCP risked incurring a yearly loss of $6.3 billion, but that projection was dismissed at the time by CIO personnel as "garbage." In March 2012, the SCP repeatedly breached the CSW10% limit, as well as stress loss limits signaling possible losses in adverse market conditions, and stop loss advisories that were supposed to set a ceiling on how much money a portfolio was allowed to lose over a specified period of time. Concentration limits that could have prevented the SCP from acquiring outsized positions were absent at the CIO despite being commonplace for the same instruments at JPMorgan Chase's Investment Bank.

The SCP's many breaches were routinely reported to JPMorgan Chase and CIO management, risk personnel, and traders. The breaches did not, however, spark an in-depth review of the SCP or require immediate remedial actions to lower risk. Instead, the breaches were largely ignored or ended by raising the relevant risk limit.

In addition, CIO traders, risk personnel, and quantitative analysts frequently attacked the accuracy of the risk metrics, downplaying the riskiness of credit derivatives and proposing risk measurement and model changes to lower risk results for the Synthetic Credit Portfolio. In the

case of the CIO VaR, after analysts concluded the existing model was too conservative and overstated risk, an alternative CIO model was hurriedly adopted in late January 2012, while the CIO was in breach of its own and the bankwide VaR limit. The bank did not obtain OCC approval as it should have. The CIO's new model immediately lowered the SCP's VaR by 50%, enabling the CIO not only to end its breach, but to engage in substantially more risky derivatives trading. Months later, the bank determined that the model was improperly implemented, requiring error-prone manual data entry and incorporating formula and calculation errors. On May 10, the bank backtracked, revoking the new VaR model due to its inaccuracy in portraying risk, and reinstating the prior model.

In the case of the bank's CRM risk metric and model, CIO quantitative analysts, traders, and risk managers attacked it for overstating risk compared to their own far more optimistic analysis. The CIO's lead quantitative analyst also pressed the bank's quantitative analysts to help the CIO set up a system to categorize the SCP's trades for risk measurement purposes in a way designed to produce the "optimal" – meaning lowest – Risk Weighted Asset total. The CIO analyst who pressed for that system was cautioned against writing about it in emails, but received sustained analytical support from the bank in his attempt to construct the system and artificially lower the SCP's risk profile.

The head of the CIO's London office, Achilles Macris, once compared managing the Synthetic Credit Portfolio, with its massive, complex, moving parts, to flying an airplane. The OCC Examiner-in-Charge at JPMorgan Chase told the Subcommittee that if the Synthetic Credit Portfolio were an airplane, then the risk metrics were the flight instruments. In the first quarter of 2012, those flight instruments began flashing red and sounding alarms, but rather than change course, JPMorgan Chase personnel disregarded, discounted, or questioned the accuracy of the instruments instead. The bank's actions not only exposed the many risk management deficiencies at JPMorgan Chase, but also raise systemic concerns about how many other financial institutions may be disregarding risk indicators and manipulating models to artificially lower risk results and capital requirements.

(4) Avoiding and Conducting OCC Oversight

Prior to media reports of the whale trades in April 2012, JPMorgan Chase provided almost no information about the CIO's Synthetic Credit Portfolio to its primary regulator, the Office of the Comptroller of the Currency (OCC), despite the SCP's supposedly important role in offsetting the bank's credit risks, its rapid growth in 2011 and 2012, and its increasingly risky credit derivatives. While the OCC, in hindsight, has identified occasional references to a "core credit portfolio" in bank materials, the OCC told the Subcommittee that the earliest explicit mention of the SCP did not appear until January 27, 2012, in a routine VaR report. By then, the SCP had already lost nearly $100 million. The lack of prior bank disclosures essentially precluded effective OCC oversight of the portfolio's high risk excesses and unsafe and unsound practices.

Because the OCC was unaware of the risks associated with the SCP, it conducted no reviews of the portfolio prior to 2012. Both the OCC and JPMorgan Chase bear fault for the OCC's lack of knowledge – at different points, the bank was not forthcoming and even provided

incorrect information, and at other points the OCC failed to notice and follow up on red flags signaling increasing CIO risk in the reports it did receive from the bank. During 2011, for example, the notional size of the SCP grew tenfold from about $4 billion to $51 billion, but the bank never informed the OCC of the increase. At the same time, the bank did file risk reports with the OCC disclosing that the CIO repeatedly breached the its stress limits in the first half of 2011, triggering them eight times, on occasion for weeks at a stretch, but the OCC failed to follow up with the bank. Later in 2011, the CIO engaged in a $1 billion high risk, high stakes credit derivatives bet that triggered a payout of roughly $400 million to the CIO. The OCC learned of the $400 million gain, but did not inquire into the reason for it or the trading activity behind it, and so did not learn of the extent of credit derivatives trading going on at the CIO.

In January 2012, in its first quarterly meeting with the OCC after disclosing the existence of the SCP, the CIO downplayed the portfolio's importance by misinforming the OCC that it planned to reduce the SCP. Instead, over the course of the quarter, the CIO tripled the notional size of the SCP from $51 billion to $157 billion, buying a high risk mix of short and long credit derivatives with varying reference entities and maturities. The increase in the SCP's size and risk triggered a breach of the CIO's and bankwide VaR limits, which the bank disclosed to the OCC in routine risk reports at the time, but which did not trigger an agency inquiry. Also in January, the bank sent routine risk management notices which informed the OCC of the bank's implementation of a new VaR model for the CIO that would dramatically lower the SCP's risk profile, but the OCC did not inquire into the reasons for the model change, its impact on risk, or how the CIO was able to reduce its risk results overnight by 50%.

In February and March, the bank began to omit key CIO performance data from its standard reports to the OCC, while simultaneously failing to provide timely copies of a new CIO management report. The OCC failed to notice the missing reports or request the new CIO management report until after the April 6 press articles exposed the CIO's risky trades. By minimizing the CIO data it provided to the OCC about the CIO and SCP, the bank left the OCC misinformed about the SCP's risky holdings and growing losses.

Beginning in January and continuing through April 2012, the SCP's high risk acquisitions triggered multiple breaches of CIO risk limits, including its VaR, credit spread, stress loss, and stop loss limits. Those breaches were disclosed on an ongoing, timely basis in standard risk reports provided by the bank to the OCC, yet produced no reaction at the time from the agency. The Subcommittee found no evidence that the OCC reviewed the risk reports when received, analyzed the breach data, or asked any questions about the trading activity causing the breaches to occur.

On April 6, 2012, when media reports unmasked the role of JPMorgan Chase in the whale trades, the OCC told the Subcommittee that it was surprised to read about the trades and immediately directed inquiries to the bank for more information. The OCC indicated that it initially received such limited data about the trades and such blanket reassurances from the bank about them that, by the end of April, the OCC considered the matter closed.

It was not until May 2012, a few days before the bank was forced to disclose $2 billion in SCP losses in its public SEC filings, that the OCC learned of the problems besetting the portfolio. On May 12, OCC staff told staff for a Senate Banking Committee member that the whale trades would have been allowed under the draft Volcker Rule, an assessment that, a few days later, the OCC disavowed as "premature." At the instruction of the OCC's new Comptroller, Thomas Curry, the OCC initiated an intensive inquiry into the CIO's credit derivatives trading activity. Even then, the OCC told the Subcommittee that obtaining information from JPMorgan Chase was difficult, as the bank resisted and delayed responding to OCC information requests and sometimes even provided incorrect information. For example, when the OCC inquired into whether the CIO had mismarked the SCP book, the bank's Chief Risk Officer initially denied it, and the bank delayed informing the OCC of later evidence indicating that CIO personnel had deliberately understated the SCP losses.

On January 14, 2013, the OCC issued a Cease and Desist order against the bank, on top of six Supervisory Letters it issued in 2012, detailing 20 "Matters Requiring Attention" that required corrective action by the bank. In addition, the OCC conducted a review of its own missteps and regulatory "lessons learned," described in an internal report completed in October 2012. Among multiple failures, the OCC internal report concluded that the OCC had failed to monitor and investigate multiple risk limit breaches by the CIO and improperly allowed JPMorgan Chase to submit aggregated portfolio performance data that obscured the CIO's involvement with derivatives trading.

The JPMorgan Chase whale trades demonstrate how much more difficult effective regulatory oversight is when a bank fails to provide routine, transparent performance data about the operation of a large derivatives portfolio, its related trades, and its daily booked values. They also demonstrate the OCC's failure to establish an effective regulatory relationship with JPMorgan Chase founded on the bank's prompt cooperation with OCC oversight efforts. JPMorgan Chase's ability to dodge effective OCC oversight of the multi-billion-dollar Synthetic Credit Portfolio until massive trades, mounting losses, and media reports exposed its activities, demonstrates that bank regulators need to conduct more aggressive oversight with their existing tools and develop more effective tools to detect and stop unsafe and unsound derivatives trading.

(5) Misinforming Investors, Regulators, and the Public

To ensure fair, open and efficient markets for investors, federal securities laws impose specific disclosure obligations on market participants. Public statements and SEC filings made by JPMorgan Chase in April and May 2012 raise questions about the timeliness, completeness, and accuracy of information presented about the CIO whale trades.

The CIO whale trades were not disclosed to the public in any way until April 2012, despite more than $1 billion in losses and widespread problems affecting the CIO and the bank, as described in this Report. On April 6, 2012, media reports focused public attention on the whale trades for the first time; on April 10, which was the next trading day, the SCP reported internally a $415 million loss. The bank's communications officer and chief investment liaison circulated talking points and, that same day, April 10, met with reporters and analysts to deliver reassuring messages about the SCP. Their primary objectives were to communicate, among other matters, that the CIO's activities were "for hedging purposes" and that the regulators were

"fully aware" of its activities, neither of which was true. The following day, April 11, one of the traders told Ms. Drew, "The bank's communications yesterday are starting to work," suggesting they were quieting the markets and resulting in reduced portfolio losses.

At the end of the week, on April 13, 2012, JPMorgan Chase filed an 8-K report with the SEC with information about the bank's first quarter financial results and hosted an earnings call. On that call, JPMorgan Chase Chief Financial Officer Douglas Braunstein reassured investors, analysts, and the public that the SCP's trading activities were made on a long-term basis, were transparent to regulators, had been approved by the bank's risk managers, and served a hedging function that lowered risk and would ultimately be permitted under the Volcker Rule whose regulations were still being developed. CEO Jamie Dimon dismissed the media reports about the SCP as "a tempest in a teapot."

A month later, in connection with its May 10, 2012 10-Q filing finalizing its first quarter financial results, the bank announced that the SCP had lost $2 billion, would likely lose more, and was much riskier than earlier portrayed. The 10-Q filing stated: "Since March 31, 2012, CIO has had significant mark-to-market losses in its synthetic credit portfolio, and this portfolio has proven to be riskier, more volatile and less effective as an economic hedge than the Firm previously believed." Though the markets had not reacted against JPMorgan Chase's stock after the reassuring April 13 8-K filing and earnings call, the bank's stock did drop after the May 10 10-Q filing and call, as well as its announcement on May 15, that Ina Drew was departing the bank, declining from $40.74/share on May 10 to $33.93/share one week later on May 17, representing a drop of 17%. The stock continued to decline to $31/share on June 4, representing an overall decline of 24%.

Given the information that bank executives possessed in advance of the bank's public communications on April 10, April 13, and May 10, the written and verbal representations made by the bank were incomplete, contained numerous inaccuracies, and misinformed investors, regulators, and the public about the CIO's Synthetic Credit Portfolio.

More than a Tempest in a Teapot. In the April 13 earnings call, in response to a question, Mr. Dimon dismissed media reports about the SCP as a "tempest in a teapot." While he later apologized for that comment, his judgment likely was of importance to investors in the immediate aftermath of those media reports. The evidence also indicates that, when he made that statement, Mr. Dimon was already in possession of information about the SCP's complex and sizeable portfolio, its sustained losses for three straight months, the exponential increase in those losses during March, and the difficulty of exiting the SCP's positions.

Mischaracterizing Involvement of Firmwide Risk Managers. Mr. Braunstein stated on the April 13 earnings call that "all of those positions are put on pursuant to the risk management at the firm-wide level." The evidence indicates, however, that in 2012, JPMorgan Chase's firmwide risk managers knew little about the SCP and had no role in putting on its positions. JPMorgan Chase's Chief Risk Officer John Hogan told the Subcommittee, for example, that, prior to the April press reports, he had been unaware of the size and nature of the SCP, much less its mounting losses. Virtually no evidence indicates that he, his predecessor, or any other firmwide risk manager played any role in designing or approving the SCP positions acquired in 2012, until well after the April 13 earnings call when the bank's risk managers effectively took

over management of the SCP. In addition, Mr. Braunstein's statement omitted any mention of the across-the-board risk limit breaches triggered by the SCP during the first quarter of 2012, even though those breaches would likely have been of interest to investors.

Mischaracterizing SCP as "Fully Transparent to the Regulators." In the bank's April 13 earnings call, Mr. Braunstein said that the SCP positions were "fully transparent to the regulators," who "get information on those positions on a regular and recurring basis as part of our normalized reporting." In fact, the SCP positions had never been disclosed to the OCC in any regular bank report. The bank had described the SCP's positions to the OCC for the first time, in a general way, only a few days earlier and failed to provide more detailed information for more than a month. Mr. Braunstein's statement also omitted the fact that JPMorgan Chase had dodged OCC oversight of the SCP for years by failing to alert the agency to the establishment of the portfolio, failing to provide any portfolio-specific information in CIO reports, and even disputing OCC access to daily CIO profit-loss reports. During the April 13 call, the bank led investors to believe that the SCP operated under close OCC supervision and oversight, when the truth was that the bank had provided barely any SCP data for the OCC to review.

Mischaracterizing SCP Decisions as "Made on a Very Long-Term Basis." On the bank's April 13 earnings call, Mr. Braunstein also stated that with regard to "managing" the stress loss positions of the Synthetic Credit Portfolio, "[a]ll of the decisions are made on a very long-term basis." In fact, the CIO credit traders engaged in daily derivatives trading, and the bank conceded the SCP was "actively traded." An internal CIO presentation in March 2012, provided to the bank's executive committee a month before the earnings call, indicated that the SCP operated on a "short" time horizon. In addition, many of the positions producing SCP losses had been acquired just weeks or months earlier. Mr. Braunstein's characterization of the SCP as making long term investment decisions was contrary to both the short-term posture of the SCP, as well as how it actually operated in 2011 and 2012. His description was inaccurate at best and deceptive at worst.

Mischaracterizing SCP Whale Trades As Providing "Stress Loss Protection." During the April 13 call, Mr. Braunstein indicated that the SCP was intended to provide "stress loss protection" to the bank in the event of a credit crisis, essentially presenting the SCP as a portfolio designed to lower rather than increase bank risk. But in early April, days before the earnings call, Ms. Drew told the bank's executive committee that, overall, the SCP was "long" credit, a posture that multiple senior executives told the Subcommittee was inconsistent with providing protection against a credit crisis. Moreover, a detailed analysis reviewed by senior management two days before the April 13 earnings call showed that in multiple scenarios involving a deterioration of credit, the SCP would lose money. While the bank may have sought to reassure investors that the SCP lowered the bank's credit risk, in fact, as then configured, the SCP would have amplified rather than reduced the bank's losses in the event of a credit crisis. The bank's description of the SCP was simply erroneous.

Asserting SCP Trades Were Consistent With the Volcker Rule. The final point made in the April 13 earnings call by Mr. Braunstein was: "[W]e believe all of this is consistent with what we believe the ultimate outcome will be related to Volcker." The Volcker Rule is intended to reduce bank risk by prohibiting high risk proprietary trading activities by federally insured banks, their affiliates, and subsidiaries. However, the Volcker Rule also allows certain trading

activities to continue, including "risk-mitigating hedging activities." Mr. Braunstein's statement gave the misimpression that the SCP was "hedging" risk. When the Subcommittee asked the bank for any legal analyses regarding the Volcker Rule and the SCP, the bank responded that none existed. On the day prior to the earnings call, Ina Drew wrote to Mr. Braunstein that "the language in Volcker is unclear," a statement that presumably refers to the fact that the implementing regulation was then and still is under development. In addition, the bank had earlier written to regulators expressing concern that the SCP's derivatives trading would be "prohibited" by the Volcker Rule. The bank omitted any mention of that analysis to investors, when essentially asserting that the CIO would be permitted under the law to continue operating the SCP as before.

Omitting VaR Model Change. Near the end of January, the bank approved use of a new CIO Value-at-Risk (VaR) model that cut in half the SCP's purported risk profile, but failed to disclose that VaR model change in its April 8-K filing, and omitted the reason for returning to the old model in its May 10-Q filing. JPMorgan Chase was aware of the importance of VaR risk analysis to investors, because when the media first raised questions about the whale trades, the bank explicitly referred analysts to the CIO's VaR totals in its 2011 annual 10-K filing, filed on February 29, 2012. Yet, days later, on April 13, the bank's 8-K filing contained a misleading chart that listed the CIO's first quarter VaR total as $67 million, only three million more than the prior quarter, without also disclosing that the new figure was the product of a new VaR model that calculated a much lower VaR profile for the CIO than the prior model. An analyst or investor relying on the disclosed VaRs for the end of 2011 and the first quarter of 2012 would likely have believed that the positions underlying those VaRs were similar, since the VaR totals were very similar. The change in the VaR methodology effectively masked the significant changes in the portfolio.

When asked in a May 10 call with investors and analysts why the VaR model was changed, Mr. Dimon said the bank made "constant changes and updates to models, always trying to get them better," but did not disclose that the bank had reinstated the old CIO VaR model because the "update[d]" CIO VaR had understated risk by a factor of two, was error prone, and suffered from operational problems. The May 10-Q filing included a chart showing a revised CIO VaR for the first quarter of $129 million, which was twice the VaR amount initially reported for the first quarter, and also twice the average amounts in 2011 and 2010. The only explanation the May 10-Q filing provided was that the revised VaR "was calculated using a methodology consistent with the methodology used to calculate CIO's VaR in 2011."

Together, these misstatements and omissions about the involvement of the bank's risk managers in putting on SCP positions, the SCP's transparency to regulators, the long-term nature of its decisionmaking, its VaR totals, its role as a risk-mitigating hedge, and its supposed consistency with the Volcker Rule, misinformed investors, regulators, and the public about the nature, activities, and riskiness of the CIO's credit derivatives during the first quarter of 2012.

C. Whale Trade Case History

By digging into the details of the whale trades, the Subcommittee investigation has uncovered systemic problems in how synthetic derivatives are traded, recorded, and managed for risk, as well as evidence that the whale trades were not the acts of rogue traders, but involved some of the bank's most senior managers.

Previously undisclosed emails and memoranda showed that the CIO traders kept their superiors informed of their trading strategies. Detailing the Synthetic Credit Portfolio showed how credit derivatives, when purchased in massive quantities, with multiple maturities and reference entities, produced a high risk portfolio that even experts couldn't manage. Internal bank documents revealed that the SCP was not managed as a hedge and, by March 2012, was not providing credit loss protection to the bank. Systemic weaknesses in how some hedges are documented and managed also came to light. In addition, the investigation exposed systemic problems in the derivative valuation process, showing how easily the SCP books were manipulated to hide massive losses. Recorded telephone calls, instant messages, and the Grout spreadsheet disclosed how the traders booking the derivative values felt pressured and were upset about mismarking the book to minimize losses. Yet an internal assessment conducted by the bank upheld the obviously mismarked prices, declaring them to be "consistent with industry practices."

While the bank claimed that the whale trade losses were due, in part, to a failure to have the right risk limits in place, the Subcommittee investigation showed that the five risk limits already in effect were all breached for sustained periods of time during the first quarter of 2012. Bank managers knew about the breaches, but allowed them to continue, lifted the limits, or altered the risk measures after being told that the risk results were "too conservative," not "sensible," or "garbage." Previously undisclosed evidence also showed that CIO personnel deliberately tried to lower the CIO's risk results and, as a result, lower its capital requirements, not by reducing its risky assets, but by manipulating the mathematical models used to calculate its VaR, CRM, and RWA results. Equally disturbing is evidence that the OCC was regularly informed of the risk limit breaches and was notified in advance of the CIO VaR model change projected to drop the CIO's VaR results by 44%, yet raised no concerns at the time.

Still another set of previously undisclosed facts showed how JPMorgan Chase outmaneuvered its regulator, keeping the high risk Synthetic Credit Portfolio off the OCC's radar despite its massive size and three months of escalating losses, until media reports pulled back the curtain on the whale trades. In a quarterly meeting in late January 2012, the bank told the OCC that it planned to reduce the size of the SCP, but then increased the portfolio and its attendant risks. Routine bank reports that might have drawn attention to the SCP were delayed, detailed data was omitted, blanket assurances were offered when they should not have been, and requested information was late or not provided at all. Dodging OCC oversight went to the head of the CIO, Ina Drew, a member of the bank's Operating Committee, who criticized the OCC for being overly intrusive.

Senior bank management was also involved in the inaccurate information conveyed to investors and the public after the whale trades came under the media spotlight. Previously undisclosed documents showed that senior managers were told the SCP was massive, losing money, and had stopped providing credit loss protection to the bank, yet downplayed those problems and kept describing the portfolio as a risk-reducing hedge, until forced by billions of dollars in losses to admit disaster.

The whale trades case history offers another example of a financial institution engaged in high risk trading activity with federally insured deposits attempting to divert attention from the risks and abuses associated with synthetic derivatives. The evidence uncovered by the Subcommittee investigation demonstrates that derivatives continue to present the U.S. financial system with multiple, systemic problems that require resolution.

D. Findings of Fact

Based upon the Subcommittee's investigation, the Report makes the following findings of fact.

(1) Increased Risk Without Notice to Regulators. In the first quarter of 2012, without alerting its regulators, JPMorgan Chase's Chief Investment Office used bank deposits, including some that were federally insured, to construct a $157 billion portfolio of synthetic credit derivatives, engaged in high risk, complex, short term trading strategies, and disclosed the extent and high risk nature of the portfolio to its regulators only after it attracted media attention.

(2) Mischaracterized High Risk Trading as Hedging. JPMorgan Chase claimed at times that its Synthetic Credit Portfolio functioned as a hedge against bank credit risks, but failed to identify the assets or portfolios being hedged, test the size and effectiveness of the alleged hedging activity, or show how the SCP lowered rather than increased bank risk.

(3) Hid Massive Losses. JPMorgan Chase, through its Chief Investment Office, hid over $660 million in losses in the Synthetic Credit Portfolio for several months in 2012, by allowing the CIO to overstate the value of its credit derivatives; ignoring red flags that the values were inaccurate, including conflicting Investment Bank values and counterparty collateral disputes; and supporting reviews which exposed the SCP's questionable pricing practices but upheld the suspect values.

(4) Disregarded Risk. In the first three months of 2012, when the CIO breached all five of the major risk limits on the Synthetic Credit Portfolio, rather than divest itself of risky positions, JPMorgan Chase disregarded the warning signals and downplayed the SCP's risk by allowing the CIO to raise the limits, change its risk evaluation models, and continue trading despite the red flags.

(5) Dodged OCC Oversight. JPMorgan Chase dodged OCC oversight of its Synthetic Credit Portfolio by not alerting the OCC to the nature and extent of the portfolio;

failing to inform the OCC when the SCP grew tenfold in 2011 and tripled in 2012; omitting SCP specific data from routine reports sent to the OCC; omitting mention of the SCP's growing size, complexity, risk profile, and losses; responding to OCC information requests with blanket assurances and unhelpful aggregate portfolio data; and initially denying portfolio valuation problems.

(6) Failed Regulatory Oversight. The OCC failed to investigate CIO trading activity that triggered multiple, sustained risk limit breaches; tolerated bank reports that omitted portfolio-specific performance data from the CIO; failed to notice when some monthly CIO reports stopped arriving; failed to question a new VaR model that dramatically lowered the SCP's risk profile; and initially accepted blanket assurances by the bank that concerns about the SCP were unfounded.

(7) Mischaracterized the Portfolio. After the whale trades became public, JPMorgan Chase misinformed investors, regulators, policymakers and the public about its Synthetic Credit Portfolio by downplaying the portfolio's size, risk profile, and losses; describing it as the product of long-term investment decisionmaking to reduce risk and produce stress loss protection, and claiming it was vetted by the bank's risk managers and was transparent to regulators, none of which was true.

E. Recommendations

Based upon the Subcommittee's investigation and findings of fact, the Report makes the following recommendations.

(1) Require Derivatives Performance Data. Federal regulators should require banks to identify all internal investment portfolios containing derivatives over a specified notional size, and require periodic reports with detailed performance data for those portfolios. Regulators should also conduct an annual review to detect undisclosed derivatives trading with notional values, net exposures, or profit-loss reports over specified amounts.

(2) Require Contemporaneous Hedge Documentation. Federal regulators should require banks to establish hedging policies and procedures that mandate detailed documentation when establishing a hedge, including identifying the assets being hedged, how the hedge lowers the risk associated with those assets, how and when the hedge will be tested for effectiveness, and how the hedge will be unwound and by whom. Regulators should also require banks to provide periodic testing results on the effectiveness of any hedge over a specified size, and periodic profit and loss reports so that hedging activities producing continuing profits over a specified level can be investigated.

(3) Strengthen Credit Derivative Valuations. Federal regulators should strengthen credit derivative valuation procedures, including by encouraging banks to use independent pricing services or, in the alternative, prices reflecting actual, executed trades; requiring disclosure to the regulator of counterparty valuation disputes over a

specified level; and requiring deviations from midpoint prices over the course of a month to be quantified, explained, and, if appropriate, investigated.

(4) Investigate Risk Limit Breaches. Federal regulators should track and investigate trading activities that cause large or sustained breaches of VaR, CS01, CSW10%, stop-loss limits, or other specified risk or stress limits or risk metrics.

(5) Investigate Models That Substantially Lower Risk. To prevent model manipulation, federal regulators should require disclosure of, and investigate, any risk or capital evaluation model which, when activated, materially lowers the purported risk or regulatory capital requirements for a trading activity or portfolio.

(6) Implement Merkley-Levin Provisions. Federal financial regulators should immediately issue a final rule implementing the Merkley-Levin provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act, also known as the Volcker Rule, to stop high risk proprietary trading activities and the build-up of high risk assets at federally insured banks and their affiliates.

(7) Enhance Derivative Capital Charges. Federal financial regulators should impose additional capital charges for derivatives trading characterized as "permitted activities" under the Merkley-Levin provisions, as authorized by Section 13(d)(3) of the Bank Holding Company Act.[6] In addition, when implementing the Basel III Accords, federal financial regulators should prioritize enhancing capital charges for trading book assets.

[6] Section 13(d)(3), which was added by Section 619 of the Dodd Frank Act, states: "CAPITAL AND QUANTITATIVE LIMITATIONS.--The appropriate Federal banking agencies, the Securities and Exchange Commission, and the Commodity Futures Trading Commission shall, as provided in subsection (b)(2), adopt rules imposing additional capital requirements and quantitative limitations, including diversification requirements, regarding the activities permitted under this section if the appropriate Federal banking agencies, the Securities and Exchange Commission, and the Commodity Futures Trading Commission determine that additional capital and quantitative limitations are appropriate to protect the safety and soundness of banking entities engaged in such activities."

BANK FOR INTERNATIONAL SETTLEMENTS

Towards better reference rate practices: a central bank perspective

A report by a Working Group established by the BIS Economic Consultative Committee (ECC) and chaired by Hiroshi Nakaso, Assistant Governor, Bank of Japan

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Towards better reference rate practices: a central bank perspective

Report prepared by a Working Group established by the BIS Economic Consultative Committee (ECC)

Contents

Executive summary

This Report reviews issues in relation to the use and production of reference interest rates from the perspective of central banks. These issues reflect the possible risks for monetary policy transmission and financial stability that may arise from deficiencies in the design of reference interest rates, market abuse, or from market participants using reference interest rates which embody economic exposures other than the ones they actually want or need. In parallel to initiatives in other forums and jurisdictions, including work by the International Organization of Securities Commissions (IOSCO), the European Banking Authority (EBA) / European Securities and Markets Authority (ESMA) and the UK Wheatley Review, the Report provides recommendations on how to improve reference rate practices from a central bank perspective. The Working Group (WG) identifies an urgent need to strengthen the reliability and robustness of existing reference rates and a strong case for enhancing reference rate choice. Both call for prompt action by the private and the public sector.

Several recent developments in particular have highlighted the need for changes to current reference rate practices. First, cases of market manipulation have raised concerns about the reliability of several key reference interest rates and the appropriateness of the processes and methodologies used in formulating them. Second, the sharp contraction in market activity since 2007 has raised questions about the robustness and usefulness of reference interest rates based on term unsecured interbank markets (eg Libor, Euribor, Tibor), particularly in periods of stress. In addition, structural change in derivatives markets, such as the wider use of collateral and the move to centrally clear standardised OTC derivatives transactions, may add to the demand for reference rates that do not embody bank credit risk. As a result, there is a consensus within the Group that there is demand for a range of reference interest rates that are suitable for different purposes.

These developments and the current procedures that produce reference interest rates have potential implications for monetary policy transmission and financial stability. From a monetary policy transmission perspective, reference rates may behave in unexpected ways especially in periods of stress. As a result, economy-wide financing conditions may change in unpredictable and unintended ways. Such risks could be exaggerated when market participants heavily rely on a single reference rate whose components are likely to be volatile in stressed environments. Moreover, cross-border factors may distort the relationship between monetary policy and the key reference rate(s) used in the domestic economy.

A more reliable and robust reference interest rate framework also has many potential benefits in terms of greater financial stability. First, a loss of confidence in reference rates, because they had been shown to be unreliable, could lead to market functioning disruption, especially as some contracts do not have robust fallback arrangements. Second, poorly conceived reference rates could transfer risks, particularly those related to bank funding costs, in inappropriate ways. Similarly, they could transfer pricing errors across financial markets or create greater and unnecessary basis risk. Finally, unreliable reference rates may impair the central bank's ability to respond to financial fragilities in an effective manner.

The WG is of the view that a sound framework for producing reference rates is essential for well-functioning markets. Both the private and public sectors therefore face an immediate need to ensure that reference rates are reliable and robust, and thus adequately governed and administered to appropriately guard against market abuse or systematic errors. Promoting a sound rate setting process based on greater use of transaction data combined with the transparent and appropriate use

of expert judgment would enhance the resilience of reference rates. Steps should also be taken to ensure contracts have robust fallback arrangements for use in the event that the main reference rate is not produced.

This suggests an important role for the official sector in the development of commonly agreed principles to strengthen governance frameworks that enhance the reliability and robustness of reference rates. If the level of governance and administration of existing or modified reference rates are unsatisfactory, then central banks and the public sector may need to work with the private sector in the effort to create sufficiently robust and reliable reference rates and will need to stand ready to help overcome any potential barriers to their adoption. While the official sector has a role to play in developing commonly agreed principles and the strengthening of governance frameworks, choice among appropriately governed and administered reference rates should be left to private sector participants.

There is a range of possible measures central banks could take to deal with such issues. Collaborating with domestic and international regulatory bodies, central banks should work within currently ongoing reform processes to enhance the governance and administration of reference rates. Central banks should work cooperatively with relevant domestic regulators and authorities in developing guidance to encourage private entities to use sufficiently reliable and robust reference rates that are most suited for individual needs. They should also, where appropriate, work cooperatively with relevant authorities to help utilise existing regulatory and supervisory powers in evaluating rate submission processes at regulated institutions.

Market participants should have the choice between a range of reliable and robust interest rates for different uses. In particular, developing widely accepted and liquid reference rates not containing banking sector credit risk for managing exposure to interest rate risk could be beneficial. Again, the private sector should have an interest in seeking greater diversity in reference rates that better match market participants' individual needs. This includes a strong self-interest in contributing to the setting of reference rates to ensure that they are representative of actual market conditions. But there may be market failures, including network externalities, underinvestment in the production of alternative reference rates, and insufficient coordination among market participants. Moreover, there would be sizeable transition issues around any changes given the size of these markets.

Central banks have a range of options available to promote additional choices, including encouraging a rebalancing away from current mainstream reference rates which embed banking sector credit risk, and to alleviate constraints on transition. At the moderate end of the scale, they could encourage change by promoting improvements to the transparency of markets from which reference rates are derived. In order to enhance reference rate choice, central banks can promote the development and improvement of (near) credit risk free reference rates such as overnight rates and overnight index swap (OIS) rates or general collateral (GC) repo rates. Public authorities could also help bring together market participants or industry groups to coalesce around any changes and help smooth any transition. Central banks could, in some cases, even play a more active role by, for example, becoming directly involved in reference rate design and production, although robustness will ultimately depend on a sound rate setting process based on a liquid market. The actual form of involvement will depend on the extent of market failure and country- or currency area-specific circumstances, including market structures and regulatory and institutional arrangements. The issue of diversity is important, and action in this area by both the private and the public sector should start as soon as possible.

1. Introduction

Reference rates are commonly used interest rates that link payments in a financial contract to standard money market interest rates. A large number of reference interest rates are being used in domestic and international financial markets, covering a wide range of unsecured and secured money markets in many currencies. As a consequence, the way reference rates are produced and used is important for the functioning of financial markets.

Reference rates based on unsecured interbank term lending and borrowing have become dominant, partly because they facilitate the management of bank funding risk, but also because they were the first types of rates to be introduced and have emerged as the market standard over time. These rates are now deeply embedded in financial systems, especially in loan and interest rate derivatives contracts.[1]

Cases of market manipulation have raised concerns about the appropriateness of the processes and methodologies used in formulating reference interest rates. These cases reflect both the incentives to manipulate submissions – eg the potential to profit in a large derivatives market that relies on reference rates and the desire during the financial crisis to avoid the stigma associated with relatively high submissions – and a relatively weak governance structure.

Initiatives in a number of forums and different jurisdictions are reviewing how this might be improved, including the UK Treasury Wheatley Review of Libor, EBA/ESMA, and IOSCO. The private and public sectors face an immediate need to ensure that reference rates are adequately governed and administered in order to appropriately guard against market abuse or systematic errors. If existing or modified reference rates are unable to fulfil appropriate governance and administration principles, then central banks and the broader public sector may need to work with the private sector in the effort to create reference rates that do meet this criterion and will need to stand ready to help overcome any potential barriers to their adoption.

Although choices amongst appropriate governed and administered reference rates should be left up to private sector participants, there is a wider question of whether the dominance of rates based on unsecured interbank markets is still economically appropriate. These markets have shrunk following the financial crisis, and the dispersion of bank credit risk has increased sharply, making average rates for unsecured interbank funding a less good proxy for bank funding costs. Moreover, the volatility of bank credit risk premia has made such rates a less appropriate proxy for risk free rates. Market participants must factor these considerations into their choices around alternatives.

Changes in the structure of money markets (eg greater reliance on secured funding) and derivatives markets (eg shift towards central clearing) point to a greater need for reference rates that can be used to manage exposures that involve

[1] According to BIS statistics, more than 50% of all syndicated loans signed in 2011 are linked to either Libor or Euribor. A significant fraction of the world's bonds – to the tune of at least $10 trillion – reference one of these two rates. In addition, a significant share of mortgages and other retail loans are linked to these reference rates. Reference rate use in derivatives markets is also very widespread.

little, or no, credit risk. These changes suggest that there is scope for greater diversity in the use of reference rates, notwithstanding that there will continue to be an important role for reference rates that reflect bank unsecured funding costs to meet specific needs. If central banks believe that there are market or regulatory impediments that prevent private sector participants from adopting economically appropriate alternatives in their jurisdictions, then the public sector should consider measures that could remove impediments and encourage this transition.

Against this backdrop, the Economic Consultative Committee (ECC) agreed in September 2012 to set up a Working Group to examine issues related to the design and choice of reference interest rates in financial markets from a central bank perspective. The Group, chaired by Hiroshi Nakaso (Assistant Governor, Bank of Japan), distinguishes its work from other work in this area by focusing on the role of reference interest rates from a central bank perspective.

The Group examined a broad range of reference rates. Based on this work, and with a view to aiding market choices, the Group has developed views on what features reliable reference rates should have and formulated recommendations on how reference rates could be made more robust under various states of financial markets, including times of stress. It has not focused on issues surrounding administration, governance and oversight of the production process, which are being extensively reviewed elsewhere, including by IOSCO, the EBA/ESMA, the Wheatley Review, and reviewed by the CFTC in published orders of specific cases. The main objective is to provide central bank input into the wider official sector debate coordinated by the Financial Stability Board (FSB). Annex 1 contains the Group's Terms of Reference.

This Report presents the Group's conclusions. It is based on fact-finding and analysis by Group members, including a review of related central bank research and consultations with the private sector. The consultations were mainly done via a series of three regional roundtables (in London, New York and Singapore), which brought together private sector reference rate setters, producers and users from about 50 institutions as well as representatives from central banks. These discussions are summarised in Annex 2.

The Report is structured as follows. Section 2 examines the determinants of the private sector's choice of reference rates. It also sheds light on the factors that could impede the private sector from switching from the current reference rate choices to alternatives. Section 3 discusses the monetary policy and financial stability implications of the use of reference interest rates. Section 4 discusses what role public authorities – including central banks – could play in facilitating greater choice for market participants and in strengthening the reliability and robustness of reference rates. Section 5 concludes.

2. Determinants of private sector reference rate choices

2.1 The benefits of using reference rates

Using reference rates links payoffs in a financial contract to standard money market interest rates. Compared to a situation where each individual contract refers to its own customised interest rate, the use of reference rates reduces the complexity of financial contracts and facilitates their standardisation. This lowers transaction costs and enhances market liquidity, especially if reference rates are widely used. And by

encouraging active trading and increasing the coordination of individual contracts, reference rates reduce the costs of reallocating risks in the financial system.

In principle, any market interest rate can serve as a reference rate. Typically, widely used reference rates reflect general conditions in a well-defined market. Conceptually, different reference rates can be distinguished by the price (or risk) components they include, which can help determine their suitability for different uses. As discussed in Box 1, one important distinction is whether or not a reference rate contains a component related to bank credit risk.[2]

Box 1

Components and uses of reference interest rates

One standard way of de-composing market interest rates is to divide them into a risk free rate and several risk premia, including a term premium, a liquidity risk premium and a credit risk premium. The significance of these risk premia differs across instruments: term premia tend to increase with the maturity of the underlying instrument; the liquidity risk premium depends on the ease with which the money market instrument can be traded; and the credit risk premium depends on the perceived credit quality of the borrower and, in secured funding markets, the collateral.①

Hence, the use of a particular interest rate as reference rate implies a choice about the risk components that one contract party transfers to the other. It also determines to what extent a reference rate provides an effective hedge (or, more generally, is an effective means for managing different types of financial risk).

Reference rates that are based on unsecured interbank markets comprise a risk free rate and a credit risk premium that reflects the perceived common credit risk of the sample of banks contributing to the reference rate ("common bank risk").②

Some users may want the common bank risk component to be in the reference rate. In particular, banks may prefer a reference rate that captures banking sector funding costs. Using such rates in loan contracts provides a proxy hedge against funding cost risks by passing the common bank funding cost risk on to the borrower (leaving the bank only with its bank-specific funding cost risk, which is more controllable by the bank).

For other purposes, users may want a reference rate that is free of common bank risk. For example, managing the cash flows from an interest rate swap may call for a reference rate with little or no credit risk. Yet other users may prefer reference rates with different risk components (eg the issuer of a non-financial corporate bond may wish to have a common corporate sector risk premium instead of a common bank premium in the reference rate).

① Decomposing reference rates into their components in practice is not easy. There do, however, seem to be some empirical patterns. First, liquidity risk premia seem to be relatively more important for shorter tenors (see Gefang et al (2011) and Nobili (2012)). Second, the credit risk premium typically becomes more important the longer the tenor of the loan. Moreover, there is some evidence that the common bank credit risk premium was more important during the financial crisis (see Gefang et al (2011) and Angelini et al (2009)).

② The size and behaviour of the common bank risk component depends on a number of reference rate-specific factors, including the size and composition of the sample of contributing banks, whether quotes are provided for "prime banks" or a broader range of banks. A reference rate also embeds components that reflect the term and liquidity premia incorporated in the underlying market interest rates. These components are not considered further in this Report.

[2] Reference rates can be distinguished from benchmark indices, which are widely used to measure performance (eg of an asset manager), but are not necessarily used as reference prices in financial contracts.

Main applications

The two main uses of reference interest rates are determining payments on the **floating rate legs of loans/notes** and interest rate derivatives. Referencing rates based on unsecured interbank markets has historically been seen as a convenient way for lending banks to share the risk of future changes in their funding costs with borrowers (see Box 1).

Reference rates are also used in derivatives contracts aimed at managing interest risk. Indeed, there are large markets for exchange-traded **derivatives** – typically futures contracts – referencing particular interest rates. In OTC derivatives markets there are also very large amounts outstanding of interest rate swaps and cross-currency swaps as well as credit derivatives that embed existing reference rates.

While mainly used for determining contractual payments, reference rates are also embedded in the global financial system through other applications. These include their widespread use for the valuation of financial instruments, as many market participants rely on discounting of cash flows using yield curves directly or indirectly based on reference rates. As a result, reference rates are also an integral part of risk management, asset-liability management, performance measurement and compensation schemes, credit ratings and accounting practices.

2.2 Properties of a good reference rate

A number of official sector organisations are looking at processes around reference rates to make them both more reliable and more robust. The reliability of reference rates – the extent to which their governance and administration adequately safeguard against manipulation or error – has recently come into question. It is of critical importance that any reference rate has proper oversight to prevent abuses and errors. The robustness of a reference rate – understood as its availability even under stressful market conditions – is another important criterion for users. If the reference rate is not robust to difficult market conditions, there may be a risk of unwanted cash flow mismatches for banks as well as other market participants in periods when they already face difficulties.

There are a number of other properties that are desirable from a user's point of view. Reference rates should be produced based on clear rules, including transparent fallback procedures for periods of market stress; have a sufficiently high frequency of publication to allow the pricing of contracts on an ongoing basis; be readily available to facilitate contract verification; and be representative of a well-defined relevant market segment (see Table 1).

Reference rates based on unsecured interbank markets were for many years seen as timely and reliable proxies for bank funding costs, but also – given the perception of a small and stable common bank risk premium – as representative for instruments with very limited credit risk. It is only since the 2007–09 financial crisis that the robustness and representativeness of these rates have been challenged.

Desirable features of reference interest rates Table 1

General feature	Definition	Important for
Reliability	Proper governance and administration to safeguard against manipulation or error	Market integrity and functioning
Robustness	Clear rules for reference rate production, including transparent and well-known fallbacks in periods of market stress	Availability and usability in times of market stress
Frequency	Rates calculated on a daily basis to facilitate market functioning	Pricing of new contracts, mark-to-market valuation
Ready availability	Published on dedicated sites	Verification of contracts
Representativeness	Rate drawn from a representative sample of the market in question	Correct pricing basis

2.3 Reference rate properties and applications: do they match?

As with any type of standardisation, the use of reference interest rates comes at a cost. In particular, standardised contracts may not match users' risk management requirements as accurately as tailor-made contracts. The bigger the discrepancy between the risks included in a reference rate and those of the contract where it is used, the lower the net benefits arising from using a reference rate.

The optimal match between reference rates and underlying exposures will vary across users, depending on portfolio composition, funding approaches and business models. As such, the choice among properly governed and administered reference rates is best left to private sector participants. For instance, the cost of unsecured interbank term borrowing may still be the relevant measure of marginal funding costs for many banks. But for other market participants such as hedge funds, the marginal funding costs may be better represented by the cost of collateralised term funding or overnight interest rates. Although non-financial corporations might borrow in unsecured markets, their cost of funding might not move closely with unsecured interbank rates, and they too might prefer to use a reference rate with little or no bank credit risk, such as a collateralised or overnight rate.

Over the past few years, changes in the underlying markets and behaviour of key reference rates, on the one hand, and changing needs of reference rate users, on the other, may have added to discrepancies between the risks reflected in commonly used reference rates and users' needs.

Commonly used reference rates (such as Libor and Euribor) were originally designed to contain the common bank credit risk premium of "prime banks". The **increased dispersion of individual bank credit risk** since 2007, however, has undermined the network economies of reference rates capturing common bank risk, even for users seeking a reference rate with exposure to credit risk. Market participants, banks in particular, may not want to link the interest rate paid on outstanding loans and other financial contracts to interest rates that are no longer closely correlated to their individual cost of funding.

In addition, the range of users and funding models has widened over time to include those seeking a proxy for a credit risk free rate. This was not an issue when common bank risk premia were low and stable. In such an environment, the same reference rate could easily be used for different purposes, ranging from pricing syndicated loans to serving as the underlying in interest rate swaps or pricing other derivatives.

Three related trends in the global financial system may over the medium term create a case for greater diversity in the use of reference rates, and in particular a greater role for reference rates that include limited or no credit risk.

- First, **unsecured interbank market activity has declined noticeably** since 2007 especially in the United States and Europe, raising questions about the representativeness of reference rates based on this market. Liquidity in interbank markets is now typically confined to shorter tenors. Some of this decline may be cyclical, reflecting counterparty risk concerns because of financial fragility and weak global economic conditions, or in some cases also monetary easing and the increased provision of central bank reserves. It may also reflect new capital and liquidity regulations that aim at containing the excessive build-up of maturity transformation in the banking sector, much of which occurred through wholesale unsecured funding.
- Second, correspondingly, **banks have increased their reliance on secured wholesale funding** due to regulatory and market efforts to reduce and more actively manage counterparty credit risk exposures.
- Third, **derivatives markets reform also increases the importance of funding with little or no credit risk**. The mandatory shift to central clearing of standardised OTC derivatives and a gradual move towards more comprehensive collateralisation of OTC derivatives positions by market participants places greater emphasis on overnight management of cash collateral. As a result, overnight interest rates and other types of reference rates with a small credit risk component better match the risk of such derivatives positions. This change in practice has been accompanied by an increased use of basis swaps between Libor and overnight rates as well as swaps directly referencing overnight rates.

2.4 Obstacles to a transition to other reference rates

The dominance of reference rates based on unsecured interbank markets domestically and internationally reflects the fact that they have functioned well for private contracting for many years. However, the continued use of such reference rates does not necessarily indicate that market participants see no need for alternatives.

The Working Group's roundtable discussions indicate that market participants are starting to diversify their use of reference rates. In particular, they seem to have become more interested in using (near) credit risk free reference rates. Some market

participants, notably large investment banks and hedge funds, typically use a range of reference rates, including overnight interest rates (unsecured or secured), and they have also started discounting payments based on expected compounded overnight rates. Overnight rates are typically used as reference rates for OIS, although there are variations across jurisdictions (see Box 2).

Box 2

Overnight rates and overnight index swaps (OIS)

Overnight rates and OIS rates are sometimes used synonymously. However, they are distinct concepts and it is worth clarifying this as follows:

Overnight rates are the interest rates at which money market participants borrow and lend at overnight maturities. For many currencies and jurisdictions, a daily average is produced based on a weighted average of these transactions, although there can be regional/currency differences regarding which transactions are covered.

Overnight reference rates can be either secured or unsecured rates, or even a combination. However, currently the more commonly used ones are unsecured rates (eg Fed Funds Effective, EONIA, SONIA, Uncollateralized Overnight Call Rate. In practice, unsecured overnight rates can be seen as near-credit risk free because of their short maturity.

OIS are a particular form of interest rate swap, whereby, for the life of the contract, parties agree to swap a floating interest rate – based on compounded overnight interest rates (eg EONIA, SONIA, Uncollateralised Overnight Call Rate) – for a fixed interest rate (ie the OIS rate).

Unlike the floating rate, which is based on an overnight reference rate, there are at present few common reference rates based on the fixed leg OIS rate, which could for example be used for the pricing of the one- or three- month interest rate leg in loans or derivatives contracts. There are euro reference rates derived from OIS markets, but many jurisdictions do not have such reference rates.

In theory, OIS reference rates could be produced, whether from dealer quotes or traded rates, although liquidity in some OIS markets may be limited. Trade repository data do, however, indicate that for several of the major currencies there is substantial activity in parts of the OIS market (Annex 3). But, according to market participants, the use of term OIS rates as reference rates is not yet common.

Market frictions, coordination failures and other imperfections may, however, prevent users from shifting to new reference rates more rapidly. The Working Group's discussions with market participants points to impediments in four main areas:

- First, there may be obstacles to the development of **new reference rates**. The public good character of reference rates may prevent private sector participants from readily developing new, widely accepted reference rates, for instance by agreeing on reference rate criteria.
- Second, there may be impediments to the adoption of **existing alternative reference** rates compared to more dominant reference rates (ie network externalities). Higher transaction costs associated with alternative reference rates are an obvious disincentive to change. Any widespread change to another reference rate is also a large-scale coordination challenge.
- Third, even if viable alternatives are available, **user-related obstacles** may prevent a faster or smoother transition. One obvious obstacle is the large stock of legacy contracts. For

many users, transiting to alternative reference rates would require costly changes in internal accounting and risk management systems. Concerns about the operational risks associated with such changes may add to inertia.

- Fourth, **accounting rules,** including those for hedging, give preferential treatment to specific reference rates.[3]

3. Reference interest rates, monetary policy and financial stability

3.1 General economic effects of the use of reference interest rates

The characteristics of reference rates used in the loan market are an important influence on risk sharing between lenders and borrowers. The use of reference rates based on unsecured interbank markets exposes the borrower to interest rate movements resulting from changes in the risk free rate and the common bank risk component. At the same time, the lender obtains a (partial) hedge against changes in its own funding costs.

This transfer of risk, and the terms on which it takes place, may affect the provision and allocation of credit. For instance, if banks are able to pass on funding cost risk to borrowers, this may increase bank credit supply. At the same time, if borrowers have to pay rates which reflect bank funding cost risk, borrowing may decline. The magnitude and direction of such effects depend on a number of factors, including the ability of end users to protect themselves against volatility in loan rates, and the ability of banks to cope with funding cost risk.

Moreover, the use of reference rates increases the significance of these rates for financing conditions in an economy. Depending on the specifics of the financial contracts, changes in the reference rate are then transmitted more or less directly to other segments of the financial system and the economy.[4] It may, however, also introduce frictions if markets are subject to different types of risks and shocks (eg, stress in bank funding markets may affect the funding costs of corporate borrowers that issue bonds referencing interest rates based on unsecured interbank markets irrespective of conditions in corporate bond markets).

[3] For example, in the Unites States, the FASB accounting standards currently give preferential treatment to interest rates on direct Treasury obligations and the Libor swap rates. The Fed Funds Rate, the Prime Rate, the FNMA Par Mortgage Rate and the SIFMA Municipal Swap Index cannot be used (Accounting Standards Codification 815-20-25-6A) without so-called effectiveness testing. Libor was included as a practical accommodation to simplify financial reporting. The decision was based on its prevalence as reference rate in interest rate hedging instruments, its historical position in the financial markets, and its role as a liquid, stable and reliable indicator of interest rates.

[4] When reference rates contain more noise and are volatile, fluctuations of financial and economic activity can increase significantly (see Kawata et al (2012), Sudo (2012) and Muto (2012)).

3.2 Implications for monetary policy transmission

The use of reference interest rates hardwires financing conditions in the broader financial sector and in the economy with those in the markets where reference rates are set. Reference rates are therefore an important part of the interest rate channel in monetary policy transmission.

The transmission of monetary policy will depend on the link between key reference rate(s) in a jurisdiction and the central bank's key policy rate and operational target. This link is arguably closest in the case of overnight rates, which many central banks use as operational targets and which are in turn referenced in financial contracts. A somewhat special case is the Swiss National Bank, which has an operational target based on three-month CHF Libor because of its role as key reference rate in the Swiss economy.

The use of reference rates may pose complications to monetary policy transmission for three reasons. First, in periods of market stress, reference rates **may behave in unexpected ways**. In crisis periods, which tend to be associated with rising risk premia and market illiquidity, the liquidity risk and credit risk components embedded in reference rates tend to rise and be very volatile. This implies that changes in policy rates do not necessarily affect key reference rates in the same way they would in normal times. Indeed, as Graph 1 shows, policy interest rates and key reference rates, especially those including a common bank risk premium, drifted apart in 2007–08, and have diverged temporarily on several occasions since.

Second, if reference rates are not used properly, **economy-wide financing conditions may change in unpredictable and unintended ways**. For instance, an increase in the common bank risk component of reference rates could translate into a tightening of credit conditions well beyond interbank lending if such reference rates were used on a large scale for the pricing of corporate bonds, household mortgages or consumer loans.

Third, **cross-border factors** may distort the relationship between monetary policy and the key reference rate(s) used in the domestic economy. One example, albeit a more temporary one, is time zone differences. The fixing for an internationally used reference rate, such as Libor, may reflect market conditions at a particular point in time in that market, but it may not be indicative of market conditions in another market where trading takes place later in the day. For the central bank in this time zone, the reference rate will be a given for that day, potentially delaying and limiting the impact of policy action.[5]

Cross-border effects may also result from using FX-implied interest rates as reference rates, as a number of emerging markets do. A central bank that targets a short-term domestic money market interest rate would have only indirect influence over the FX-implied reference rate. The challenges are potentially compounded in times of unusual volatility in the FX market and/or in the foreign currency reference rate used to compute the FX-implied rate. Even in economies that have already introduced domestic (not FX-implied) reference rates, underdevelopment of their domestic money markets (eg decent liquidity only in a limited range of tenors) can

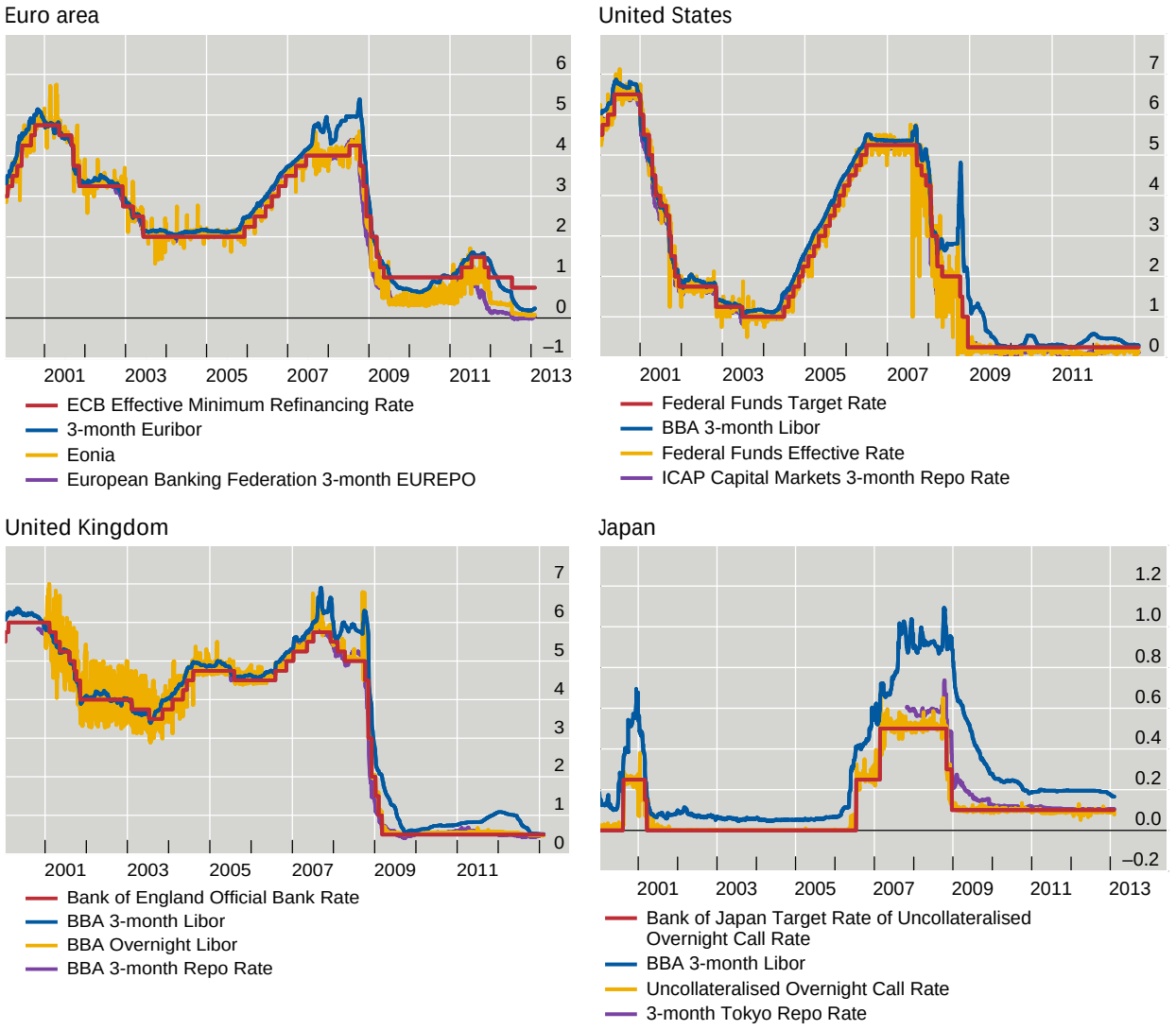
[5] For a discussion of the impact of time zone difference on funding markets during the financial crisis, see the report by the Committee on the Global Financial System and Markets Committee (2010), "The functioning and resilience of cross-border funding markets".

still pose challenges to monetary policy implementation. This helps explain ongoing efforts in many emerging markets to further develop domestic money markets.

Policy rates and selected short-term interest rates

In per cent

Graph 1



Source: Bloomberg.

3.3 Financial stability aspects

The use of reference interest rates can also have implications for financial stability.

First, if reference rates are inadequately managed, there is the possibility that a **loss of confidence** in a widely used reference rate could lead parties to stop transacting in instruments that reference it. The resulting financial market disruptions could have wide-ranging implications for financial stability.

A second issue concerns the possible financial stability implications of a **transfer of bank funding cost risk to borrowers**. There are some good reasons to want banks to be able to pass on the common bank component of their funding cost risk when making loans and thus remove it from the (leveraged) banking

sector. A transfer of common bank funding risks to entities that are better able to bear and manage these risks would tend to enhance stability while facilitating the supply of floating rate-type financial instruments. It is, however, an empirical question to what extent such a transfer actually enhances the system-wide allocation of risks. Also, there is a trade-off between the ability of the banking system to offload risk and its capacity to perform financial intermediation at the macro level.

Third, financial stability concerns can emerge when the use of reference rates spreads **mispricing** in one market to other parts of the financial system. For instance, interbank market participants may underestimate banking sector risks. The resulting underpricing of common bank risk could facilitate the build-up of financial risks, especially if a reference rate is widely used. That the common bank credit risk premium was near zero until 2007 in major currencies arguably encouraged greater reliance on unsecured wholesale market funding. During the crisis, the sharp increase in reference rates because of rising liquidity and/or credit risk premia may have deepened funding problems.

Fourth, divergence of the underlying risk exposures and reference rates may create considerable additional **basis risk**. Valuation problems may arise if a bank uses a pricing model based on an unsecured interbank market reference rate to discount interest swaps that are centrally cleared and hence fully collateralised. In both cases, the mismatch between what the transaction requires and what the reference rate reflects is like an imperfect hedge; basis risk increases as a result. In the interest rates derivatives markets, many users are interested in managing the risk of movements in credit risk free rates, or taking a position on policy rates. For those purposes, a reference rate using (near) credit risk free rates would reduce basis risk.

Finally, in addition to increasing financial stability risks, these developments can also **impair the central bank's ability to respond to financial fragilities** in an effective manner. For instance, assessing general money market conditions and the sources of tensions in interbank markets becomes more difficult if reference rates become highly volatile due to idiosyncratic factors.

4. Towards better reference rate practices

Given the public-good nature of reference rates, it seems entirely appropriate that the official sector should play a role in ensuring reliability and robustness of reference rates and facilitating a range of private sector solutions. Two broad issues are particularly relevant when considering measures to support improvements in reference rate use and practices from a monetary policy transmission and financial stability perspective.

A first issue is how to ensure that the reference rate infrastructure generates rates that are appropriate to perform their functions. There are a number of identifiable, desirable characteristics in the administration and governance of reference rates that should generally be applied. While the choice of which rates to use is ultimately up to the private sector, there appears to be a role for the public sector in ensuring that such a framework for the governance and operations of reference rates is in place. If existing reference rates are unsatisfactory in this regard,

then central banks may need to work with the private sector in the effort to create sufficiently reliable and robust reference rates.

A second issue is how to facilitate market choices in a changing financial system. How can one ensure that market participants make sound reference rate choices from a risk-sharing perspective? This is particularly relevant in an environment with lower interbank market activity and greater heterogeneity of bank credit risk. Reference rates first and foremost facilitate private financial contracting. As such, the private sector ought to have a clear self-interest in ensuring sound practices in the use as well as the production of reference rates. And, in choosing among well-governed and administered reference rates, it is ultimately the private sector that will decide on what uses they are suited for. However, market participants tend to focus on the private benefits and costs of a reference rate, and this could potentially underestimate broader social benefits, preventing a collectively beneficial shift towards better governance or towards reference rates that better fit users' needs. The public sector can facilitate and encourage appropriate private sector choices by helping to remove obstacles, to correct market failures and to facilitate appropriate choices of reference rates, where needed. Public authorities in general, and central banks in particular, have a stake because of the implications for monetary policy and financial stability.

4.1 Enhancing the reliability and robustness of reference rates

Possible improvements

As discussed above, reliability and robustness are key features of good reference rates. A number of initiatives are reviewing how the governance and administration of existing reference rates can be improved, including IOSCO, the EU Commission, EBA/ESMA and the Wheatley Review of Libor. Measures that can instil more discipline in the rate setting process include (i) incorporating more information on actual transactions, (ii) strengthening governance of the rate setting process and (iii) improving transparency by making transaction volumes and prices publicly available. Managing the transparency of the rate setting process can also help to deal with stigma, which may have adverse financial stability implications: during periods of market stress, the publication of individual banks' contributions to reference rates can add to bank funding strains. Various options for dealing with this issue could be considered, including publishing individual contributions with a lag.

A number of reference interest rates do not have well-structured fallback solutions in the event of severe or protracted turmoil in the underlying market. Similarly, current fallback solutions do not address the structural challenges arising from the decline in unsecured interbank activity.[6] To enhance the robustness of reference rates, the private sector should take a more active role in developing clear, pre-agreed fallback procedures that address how to continue to determine and publish these rates in case of sharp falls in market liquidity or market disruptions. Also, financial contracts may need specific provisions to deal with situations where reference rates are not available for prolonged periods.

[6] However, most existing reference rate setting processes already have in place some form of business continuity procedures to safeguard against operational risks such as IT glitches, survey contributors failing to submit on time and other operational risks.

The specific rates used in such a fallback hierarchy should be closely aligned with the risk components included in the original reference rate. This may require different specifications depending on the uses of a reference rate. An issue that requires further consideration is how to put in place an ultimate backstop in the absence of any reasonable market proxy. A second issue is how to construct a system when market participants do not prefer one place in the hierarchy to another, which could generate an incentive to manipulate.

Depending on the market from which the reference rate is derived, a process of producing reference rates with a fallback procedure could comprise two stages: (i) under normal market conditions, rely to the extent possible on effective transactions in the market defining the reference rate; (ii) failing that, submissions should include taking into account proxies such as actual (own) transactions in similar or related markets.[7] Expert judgment is likely to play a greater role in the second stage.[8] Measures to improve the management of the subjectivity in rate setting processes, similar to those proposed in the Wheatley Review, may allow greater scope for the inclusion of expert judgment in a reliable manner in the rate setting process. Measures to make reference rates more reliable can also enhance resilience more generally by increasing confidence in the rate.

More generally, the robustness of references rates depends on major market participants assuming their responsibility for contributing to the setting of reference rates. The relevant industry groups should consider reminding their members of the advantages of having representative panels for widely used reference rates. If representativeness cannot be achieved on a voluntary basis, mechanisms for making submissions mandatory might have to be considered.

The role of the public sector

As can be seen from reports already published by authorities in a number of countries, it is clear that the official sector, and regulators in particular, have a role in enhancing the reliability and robustness of reference rates. Working with domestic and international regulatory bodies, central banks should influence the ongoing reform processes to ensure that reference rates are backed up by sufficiently strong governance and administration.

Central banks are not directly responsible for reference rate processes in many jurisdictions. Nevertheless, as reliable reference rates with well-designed fallback arrangements reduce the risk of market disruptions, central banks and the public sector more generally have a clear financial stability interest in engaging with the private sector and other public authorities on deliberations concerning reference rate setting procedures. Central banks should work cooperatively with relevant domestic regulators and authorities to strengthen governance and to develop guidance to encourage market participants to use reference rates that are reliable and robust. They should also work cooperatively with relevant authorities to effectively monitor rate submission processes. Central banks could also play a role in enhancing transparency by improving financial market statistics closely related to reference rate production.

[7] See the US Commodity Futures Trading Commission (2012) enforcement order against Barclays and Box 4.B in "The Wheatley Review of LIBOR: final report".

[8] Since liquidity and other premia can jump in illiquid markets, appropriate use of expert judgment is likely to become necessary (see Kobayashi (2012)).

Box 3

Central bank involvement in reference rate setting and oversight

The role of central banks in reference rate processes varies considerably across jurisdictions and currency areas, reflecting different institutional arrangements and differences in the way money markets have developed. This box, which draws on contributions received from central banks, gives some examples.

Reference rates have typically developed through private initiative, and there are many examples where central banks do not play any specific role in rate setting or oversight (eg Libor, Euribor).

However, more recently, several central banks (eg South African Reserve Bank, Hong Kong Monetary Authority, Sveriges Riksbank) have been formally involved in reviews of rate setting processes, namely for reference rates based on the unsecured interbank market.

Central banks often play a role in producing overnight interest rates, which are in many cases operational targets of monetary policy. The Federal Reserve and the Bank of Japan publish the Federal Funds Effective Rate and Uncollateralized Overnight Call Rate respectively. Both rates are volume-weighted averages of overnight transactions conducted through brokers. The ECB functions purely as the calculation agent for the Euro Overnight Index Average (EONIA) and the Bank of Canada provides a similar function as an independent third party for the Canadian Overnight Repo Rate Average (CORRA). In the two latter cases, industry bodies are owners of the rates. In all of these cases, the central banks do not have any oversight function related to the reference rate process.

Central banks have also participated in the production of other reference rates to support market development. The Swiss National Bank developed the Swiss Reference Rate and related calculation methodology jointly with the Swiss Stock Exchange (SSE) to aid the development of repo markets. The SSE calculates and publishes the reference rates. Similarly, in response to industry requests to support the development of repo markets, the Bank of Japan started the production of the Tokyo Repo Rate in 2007, before handing over production to the Japan Securities Dealers Association in 2012.

A small number of central banks, including the Bank of Mexico, participate in transactions that determine reference rates. The production of the Equilibrium Interbank Interest Rate (TIIE), the main reference rate for interbank transactions, loans and derivatives involves the Bank of Mexico as counterparty between borrowers and lenders: each day, six banks randomly picked from the sample of participating banks are required to submit bids. The Bank of Mexico determines the TIIE (equilibrium rate) based on the banks' submissions, and depending on where their bids lie in relation to the TIIE, banks are required to either lend to or borrow from the Bank of Mexico on the terms of their bid.

Moreover, the public sector, including central banks, can help underpin fallback procedures by improving the availability of information on the pricing and activity in the markets from which reference rates are derived. By improving awareness of what "normal" market conditions look like, market participants will also be in better position to judge under what conditions the fallback solution is warranted. As in other areas, the actual form of possible central bank involvement depends on country-specific, or currency area-specific, circumstances, including market structures and institutional arrangements.

4.2 Facilitating reference rate choices

Possible improvements

Reference rates derived from term unsecured interbank markets are suitable for some transactions, but not for all. Hence, there is a case for the private sector to move towards the use of, and develop, additional reference rates to suit different needs. Having a menu of different reference rates will allow market participants to

better meet their specific needs. However, the challenge is to build a critical mass in each reference rate to reap the positive network externalities.

The work carried out by the Working Group, including the consultations with the private sector, suggests that there is scope for facilitating the use of alternative reference rates over the medium term. In particular, the use of reference rates may have become too concentrated on rates based on unsecured interbank transactions, and having reference rates that are based on (near) credit risk free rates – and thus are less affected by swings in bank credit and other risks – could be an important complement to existing reference rates. Prime candidates are overnight interest rates (including OIS rates) and rates derived from GC repo markets. These may better serve market participants looking to manage interest rate risk exposures.

There are a number of reasons to use overnight interest rates as reference rates. First, the underlying markets are fairly active and overnight markets are arguably likely to remain relatively liquid, given their central role in the day-to-day management of banks' payments balances and because of their significance for monetary operations. Second, overnight rates are (near) credit risk free. Third, the existence of swap markets referencing the overnight rate is likely to support overnight market liquidity through arbitrage activity and also means that term interest rates are available for pricing purposes. In addition, OIS contracts, which are a form of interest rate swap, are likely to be cleared in the future through central counterparties (CCPs).

There may also be scope for the development of other unsecured reference rates. However, unlike OIS or GC repos, there are no immediately obvious choices. Existing solutions typically also suffer from a lack of activity in the underlying primary market (eg only limited issuance or indeed trading of bank bonds, certificate of deposits). Conceptually, one approach could be to build a hybrid rate using clearly identifiable credit risk and interest rate components – such as combining credit default swap (CDS) premia and a measure of risk free rates. But liquidity issues would persist in this example, and the tenor of generally the most liquid CDS contract is much longer (at five years) than the reference rates currently used. An alternative could be for the lending banks to shift to using a risk free rate plus a fixed spread agreed at the beginning of the loan, but this would leave the risk of changes in funding costs squarely with the bank.

The role of the public sector

Reference rates are akin to public goods, produced by a few but freely usable by many. As such, private sector investment in the production of reference rates tends to be too low. For instance, perceiving only the private cost and not the broader social benefits, market participants may have little incentive to report transactions for reference rate computation or participate in panels. Increased coordination among market participants, potentially facilitated by the public sector, may also be needed to help solve the "chicken and egg problem" with new reference rates: market participants prefer rates that are widely and actively used, as this facilitates transactions. But, these network externalities are only realised if a reference rate becomes widely used.

The public sector can potentially compensate for such underinvestment and lack of coordination in the private sector by encouraging or prompting change. Central banks may play a distinct role in this process. They have a system-wide perspective and well-established communication channels with private market participants. Hence, central banks would be well-positioned to ensure that costs and

distortions potentially associated with a move towards alternative reference rates are kept to a minimum.

If central banks believe that there is a growing discrepancy between the economic rationale and the actual use of reference rates, or that there are market or regulatory impediments that prevent private sector participants from adopting economically appropriate alternatives in their jurisdictions, then they may wish to consider measures that could reduce those barriers and encourage transition. One situation in which such intervention would be clearly called for is if it were determined that the governance and administrative structures of existing reference rates were not capable of adapting to make them reliable. In that case, central banks would need both to work with private sector market participants and other authorities in developing new reference rates that could meet these criteria and to stand ready to help overcome potential barriers to their adoption.

There are a number of specific measures that public authorities, and central banks in particular, could potentially take to either encourage change or support transition to alternative reference rates.

Encouraging change. The authorities and, by extension, central banks have a range of tools open to them if they want to prompt change. At the least active end of the scale, they could encourage change via verbal comments (ie by "open mouth policy"). However, this may be insufficient to alter the current situation, which has withstood a credit crisis during which volumes in interbank transactions dried up and risk premia increased markedly.

Another possible area is the promotion of transparency. Increasing information on the liquidity of the specific segment or tenors of markets from which reference rates are derived will help indicate which rates are more likely to accurately reflect borrowing costs. The public sector could help promote the dissemination of information in several ways, for example by:

- ensuring greater availability of transaction volume and price data for the relevant markets;
- encouraging the development of mechanisms for the collection and dissemination of information on markets from which reference rates are derived, eg the creation of trade repositories; and
- providing public information about available reference rates and encouraging the sharing of knowledge/technology on how to use different types of reference rates for pricing financial instruments.

More concrete steps include, for example, central banks supporting the development of markets for (near) credit risk free rates, say by standardising the coverage and calculation of overnight rates and promoting related OIS and basis swap markets. In fact, public authorities also use interest rate swaps, which tend to use reference rates based on unsecured interbank markets, so they can move to using swaps referenced to overnight rates in an effort to encourage others to do so.[9]

[9] The temporary US dollar liquidity swap arrangements among major central banks use the OIS rate to fix interest payments.

Supporting transition. The consultations with the private sector also suggest that the public sector can play a role in helping the private sector to manage risks associated with reference rate transition. This includes collaboration with the private sector on transition issues, eg by encouraging trade bodies or the largest market participants to examine the issues collectively and then agree on some kind of shift or transition. Public sector involvement would be particularly worthwhile if the market failure the intervention was seeking to address was a coordination failure. Again, there are a range of possible levels of involvement by the authorities that might depend on country-specific, or currency area-specific, factors.

There is also scope for encouraging private sector cooperation and collaboration on legal matters, such as publishing legal opinions or, in the extreme case, requiring a shift from one reference rate to another by law. A special case in this context is the role of the public sector in connection with the transition to new reference rates when the euro was introduced (see Box 4).

Supporting private sector transition might also include modifying accounting standards to ensure that there is no excessive hardwiring of specific reference rates.

Central banks have a genuine interest in reference rates because of their policy and operational proximity to the markets from which reference rates are derived. Depending on the proximity, they can support efforts to improve reference rate practices. The actual form of involvement in such initiatives depends on country-specific, or currency area-specific, circumstances, including market structures and institutional arrangements. In fact, some central banks are involved in calculating or setting reference rates (see Box 3).

Box 4

Reference rate transition – experiences from the introduction of the euro

Although an exceptional case where transition was required by the introduction of a new currency, the introduction of the euro demonstrates how different countries handled the transition from reference rates in national currencies to euro area reference rates. This transition was governed by EU Council Regulations.① While not imposing a change in the specific interest rate referenced in financial contracts, these regulations forced a change in the denomination of the currency underlying existing reference rates. This changeover was implemented in accordance with the principle of the continuity of contracts and other legal instruments.②

The public sector played a key role in the transition. In 1998, the European Monetary Institute (EMI) and subsequently the ECB issued a large number of public opinions assessing the various national legal initiatives regulating the changeover process for the introduction of the euro and the transition from the old national reference rates. These opinions favoured the replacement of the old reference rates with a reference rate able to represent the whole euro area.③ Most member states decided to replace their domestic unsecured interbank reference rates with Euribor/EONIA for both legacy contracts and new contracts starting 1 January 1999.

In **Italy**, national legislation specified the change in the reference rate for financial contracts from the Rome Interbank Offered Rate (Ribor) to Euribor. In **France**, the switch from the Paris Interbank Offered Rate (Pibor) to Euribor also required a change in national legislation. The legal framework confirmed the principle of continuity of interest rates and indices. An order from the Ministry of Finance replaced Pibor by Euribor. In **Germany**, the authorities decided that the Frankfurt Interbank Offered Rate (Fibor) would only be produced until 30 December 1998. From 1 January 1999 onwards, German banks instead contributed to the compilation of Euribor and EONIA.

Public regulation stipulated that EONIA replaced the overnight Fibor rate and Euribor the corresponding Fibor rates for one- to 12 month maturities. Spain permitted the continued use of the Madrid Interbank Offered Rate, Mibor, for legacy contracts. This continued use after the introduction of the euro, in parallel to that of Euribor, was regulated in the Spanish "Umbrella law" on the introduction of the euro.

The private sector also took important initiatives in order to ensure the continuity of outstanding interest rate derivatives contracts entered into before the introduction of the euro and Euribor. The International Swaps and Derivatives Association (ISDA), for example, sponsored a multilateral amendment mechanism, called the ISDA EMU protocol. The protocol modifies Master Agreements between participating parties collectively, eliminating the need to modify each Master Agreement individually. The price sources provision of the ISDA protocol lists a number of "fallback" options for obtaining price sources for cases when national currency reference rates disappear or change.

① Council Regulations 1103/97 and 974/98.

② Article 3 of the 1103/97 regulation therefore states that: "The introduction of the euro shall not have the effect of altering any term of a legal instrument or of discharging or excusing performance under any legal instrument, nor give a party the right unilaterally to alter or terminate such an instrument. This provision is subject to anything which parties may have agreed."

③ See, for example, point 5 (c) of the Opinion of the EMI CON/98/11: http://www.ecb.int/ecb/legal/pdf/en_con_98_11.pdf.

5. Concluding remarks and recommendation

Good reference rate practices, including reliable and robust reference rates that embody sound governance procedures and the adequate use of such reference rates, bring substantial economic benefits. As discussed above, it is therefore essential that market participants use robust and reliable reference rates that are adequately governed and administered and free from market abuse, and are able to choose rates that are most consistent with their business needs.

In their responsibility for monetary policy and financial stability objectives, central banks have a genuine interest in the use of reference rates in a way that supports the efficient and stable functioning of the financial system and in reference rates which are robust even during times of stress.

Central banks should continue to support the development of well-functioning money markets, in line with their primary policy objectives. This includes close monitoring of developments and structural changes in the relevant markets, and constructive interaction with market participants on an ongoing basis.

While initiatives to improve reference rate practices should be led by the private sector, due to their public-good nature, private sector investment in the production of the reference rates tends to be low. Thus, central banks see two other areas where they can contribute. The actual form of involvement will depend on the extent of market failure and country-specific, respectively currency-area specific, circumstances, including market structure and institutional arrangements.

(i) Enhancing the reliability and robustness of reference interest rates

Resilient reference rates, especially during times of stress, will contribute to maintaining the proper functioning of the monetary transmission mechanism and the stability of the financial system. Recognising that much work has already been conducted or is underway in various forums, there are a range of actions central banks or other parts of the public sector should take in this area. They include:

- promoting better governance and oversight of rate setting processes and possible ways to deal with stigma issues surrounding the publication of individual quotes;
- promoting sound rate setting processes based on the enhanced use of transaction data combined with the transparent and appropriate use of expert judgment and, where appropriate, promoting the introduction of robust fallback procedures;
- continuing to work with market participants to improve the availability of information and statistics on the pricing and activity in underlying markets as well as related markets; and
- engaging in a dialogue with the private sector on how financial contracts can deal with situations where reference rates may become unavailable for prolonged periods.

(ii) Enhancing reference rate choices

Having the choice among a number of reliable reference rates would (i) enable market participants to select those which are most consistent with their needs, and

thus (ii) enhance the resilience of the financial system by better aligning reference rate uses.

The combination of strong network economics, coordination problems and transaction costs may hamper the transition to alternative reference rates that better fit users' business needs. There are a range of possible measures central banks could take to promote additional choices and to alleviate constraints to transition from verbal encouragement to more active involvement. They include:

- considering (where appropriate) whether there is a case for a more active role in guiding and facilitating a transition by, for example, working with market participants and other public authorities to review and possibly reduce possible practical, legal and accounting constraints to transition. Aiding the transition to new reference rates would be particularly crucial if central banks believe that there is a growing discrepancy between the economic rationale and the actual use of existing reference rates or if the quality of governance and administration of existing rates is unsatisfactory;
- facilitating informed reference rate choices by improving transparency of markets from which reference rates are derived, eg by encouraging the provision of information on market activity and other relevant data;
- where appropriate, promoting the development of (near) credit risk free policy-related reference rates such as overnight rates, OIS fixed rates and GC repo rates. Specifically, central banks could further assess what obstacles currently prevent greater use of such rates and encourage the private sector, where necessary, to take steps to standardise reference OIS rates and promote the development of related basis swap markets.

In certain cases, central banks or supervisory authorities could become more actively involved in producing reference rates. The decisions to do so would depend on the mandate of the individual central bank and the evolution of money markets in each jurisdiction.

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Annex 1

ECC Working Group on financial market reference rates

Terms of Reference

Background and objective

At its September 2012 meeting, the Economic Consultative Committee (ECC) agreed to set up a group of senior officials to discuss the use of reference rates in financial markets. The Working Group will be chaired by Hiroshi Nakaso (Assistant Governor, Bank of Japan), Chairman of the Markets Committee, and includes experts and senior officials from 13 central banks.

The Group aims to analyse and clarify the role of reference interest rates from a central bank perspective, including the implications of reference rate choice, design and use for financial stability and the conduct of monetary policy. Based on this work, and with a view to aiding market choices, the Group will develop views on what features reliable reference rates should have and formulate recommendations for how reference rates could be made more robust under various states of financial markets, including times of stress. The Group will not consider issues related to market abuse, which are being discussed separately by regulatory bodies.

The main objective is to provide central bank input into the wider official sector debate coordinated by the Financial Stability Board.

Key issues for central banks

Three broad issues the report should seek to cover are (i) financial market use of reference interest rates; (ii) reference interest rates during periods of market stress; and (iii) transition to new reference interest rates. Possible questions for the three areas include:

i. *Financial market use of reference interest rates*

- Why and how are reference rates used for pricing and risk management in different markets and by different types of market participants?
- To what extent does the use of different reference rates affect market functioning and the behaviour of financial institutions?
- How resilient are contracting practices surrounding reference rates?

ii. *Reference interest rates during periods of market stress*

- What constitutes a “robust” reference rate, especially in times of market stress? How inactive are markets from which reference rate quotes/prices are drawn during periods of market stress?

– How can one ensure reference rates are reliable even if markets are illiquid?

– What are the necessary elements from a central bank perspective for reference interest rates in terms of (i) financial stability and (ii) the effective transmission of monetary policy?

iii. Transition to new reference interest rates

– In what circumstances is a transition to new reference rates considered to be necessary and/or desirable?

– Should central banks play a more active role in relation to reference rates?

– What can we learn from the experiences of central banks that have been involved in determining reference rates?

Process

A first part of the process will focus on establishing an empirical and analytical basis. This will include (i) a review of relevant existing research by central banks and others; and (ii) central banks' country studies on the use of reference rates in their jurisdictions and their experiences with such rates during normal times and the recent crisis.

Another part will involve interaction with the private sector. The main objective is to understand how reference rates are used and what this entails for the functioning of markets and the financial system. As part of this work, a series of regional meetings with industry representatives and a broader set of central banks will be organised.

This fact-finding will underpin analytical work to enhance central bank understanding of, among others, which design elements in reference rate setting frameworks are critical to help ensure the soundness of rate setting during periods of underlying market stress, and which elements may need to vary according to the market in which the reference rate is being used. This would help guide the Group in developing recommendations for the design of robust reference rate setting frameworks.

The Group will report back to Governors in January 2013.

Annex 2

Summary of roundtable discussions between central banks and market participants

The Working Group held a series of roundtable meetings with the private sector in Europe, the Americas and Asia.[10] The meetings were attended by banks (as both producers and users of reference rates), and by other institutions, including end users (eg corporates, insurance companies, asset management firms), brokers and service providers. Central bankers from the region, including from central banks which are not members of the Working Group, participated in the meetings.

The discussions covered a range of issues, such as how reference rates are used by market participants, market participants' views on the concept of reference rates, the rate setting process, potential obstacles to the adoption of new reference rates, and the potential role for central banks and the official sector in relation to reference rates. Interactions at the meetings were active and constructive, providing a valuable basis for preparing this report.

Highlights of the meetings are provided below.

Recent market developments

At all three meetings, market participants noted that, due to the global financial crisis and the ensuing low interest rate environment brought about by the aggressive monetary easing of central banks in advanced economies, unsecured interbank market activity had declined, especially in tenors beyond three months. Activity in the secured market had increased in some markets. It was felt by many that such conditions of constrained market activity were likely to persist, due also in part to the new regulatory environment.

Use of reference rates

Reference rates are used for a wide range of financial activity, most commonly to price loans and derivative products. They are also used as a discount factor and some major firms and end users noted their use for internal risk management and performance assessment purposes.

Libor is the most widely used reference rate globally, and a number of banks and users at the meetings in London and New York emphasised that, through its wide use and long history, Libor was deeply embedded in their internal systems. At the same time, many jurisdictions have their own unique reference rates which are actively used in domestic markets. In many countries, overnight rates where the market is most liquid are often used as reference rates. In emerging market economies where foreign banks are often major players in interbank markets, FX-implied reference rates are also used. It was also gradually becoming more common for market participants to use different reference rates for different purposes. For

[10] In London (6 November 2012), New York (8 November 2012) and Singapore (19 November 2012) respectively.

example, when pricing loans, reference rates which reflect bank funding costs would be appropriate, while major financial institutions active in derivatives markets were shifting toward the use of (near) risk free reference rates (eg fixed OIS rates) when calibrating the net present values of their derivatives portfolios. The reasons given for the shift, reflecting the experience from the global financial crisis, were (i) the difficulties in using survey-based reference rates which include bank credit risks; (ii) the shift towards collateralised transactions; and (iii) the shift of OTC derivative transactions to central clearing.

The positive externalities of a reference rate that functions as a "common language" or common reference point enabling market participants to readily take on or transfer risks across products and currencies were frequently mentioned. It was explained that currently Libor is the most useful in this regard due to its wide use and liquidity (ie ability to readily trade). Users globally emphasised the importance of reliability (ie availability of data even in times of stress), transparency (ie clear process for producing rates) and liquidity (ie deep underlying markets).

Concept of reference rates

The Working Group presented the possibility of decomposing reference rates into a core credit risk free (or risk neutral) component and a bank credit risk component (which could possibly be further split into a system-wide bank credit risk factor and an individual bank credit risk factor). Market participants were generally comfortable with this breakdown, but also commented that a liquidity risk component was clearly important especially in times of market stress at the short end and that it would often be quite difficult to distinguish the individual credit and liquidity risk components separately, especially on a real-time basis.

Rate setting process

There was a general consensus among market practitioners that, whenever and to the extent possible, reference rates should be transaction-based. However, the financial crisis has shown that market liquidity can dry up in times of stress, which argues for retention of elements of expert judgment. There was often a fairly mechanical process to deal with situations such as system failure where a reference rate could not be provided (eg using the previous day's rate, asking for quotes from a specific number of reference banks), but it was acknowledged that this would only be feasible for a very short period and not suited for periods of general market stress. Market participants acknowledged the need to improve the process for dealing with stress periods.

In order to maintain the credibility of the reference rate, market practitioners emphasised the importance of having a strong governance framework and a transparent rate setting process. In dealing with situations where liquidity in underlying markets becomes limited, many agreed about the benefits of having a standard process for using information from transaction data in related markets to guide the use of expert judgment in producing individual submissions. More specifically, when the contributing institution is not transacting in the underlying market, it would take into consideration its activity in similar markets, and when that is also limited will look at third-party activity in such markets (a so-called waterfall approach or hierarchy). Some suggested that, within a framework of strong public sector oversight or supervision, the reporting banks could be provided with anonymity in providing rates, or individual submissions could be published with a lag (eg three months). Such a framework could remove or reduce stigma issues.

Possible transition to other reference rates

Especially at the meetings in London and New York, market participants emphasised the dominant role played by Libor. Constraints they mentioned on shifting towards other reference rates included (i) limited liquidity in other reference rates; (ii) large operational costs for moving to alternative reference rates; (iii) the long history of using Libor and the comfort this provided (ie inertia); (iv) possible legal risks that could emerge in switching to alternative reference rates; and (v) accounting rules in the United States (it was explained that under US GAAP only Libor and US Treasury rates would be considered as rates eligible for the recognition of hedge accounting). However, as stated above, major financial institutions were gradually switching to (near) risk free rates in pricing and discounting their derivatives positions, since this better reflected the underlying risks.

Possible role for the public sector including central banks

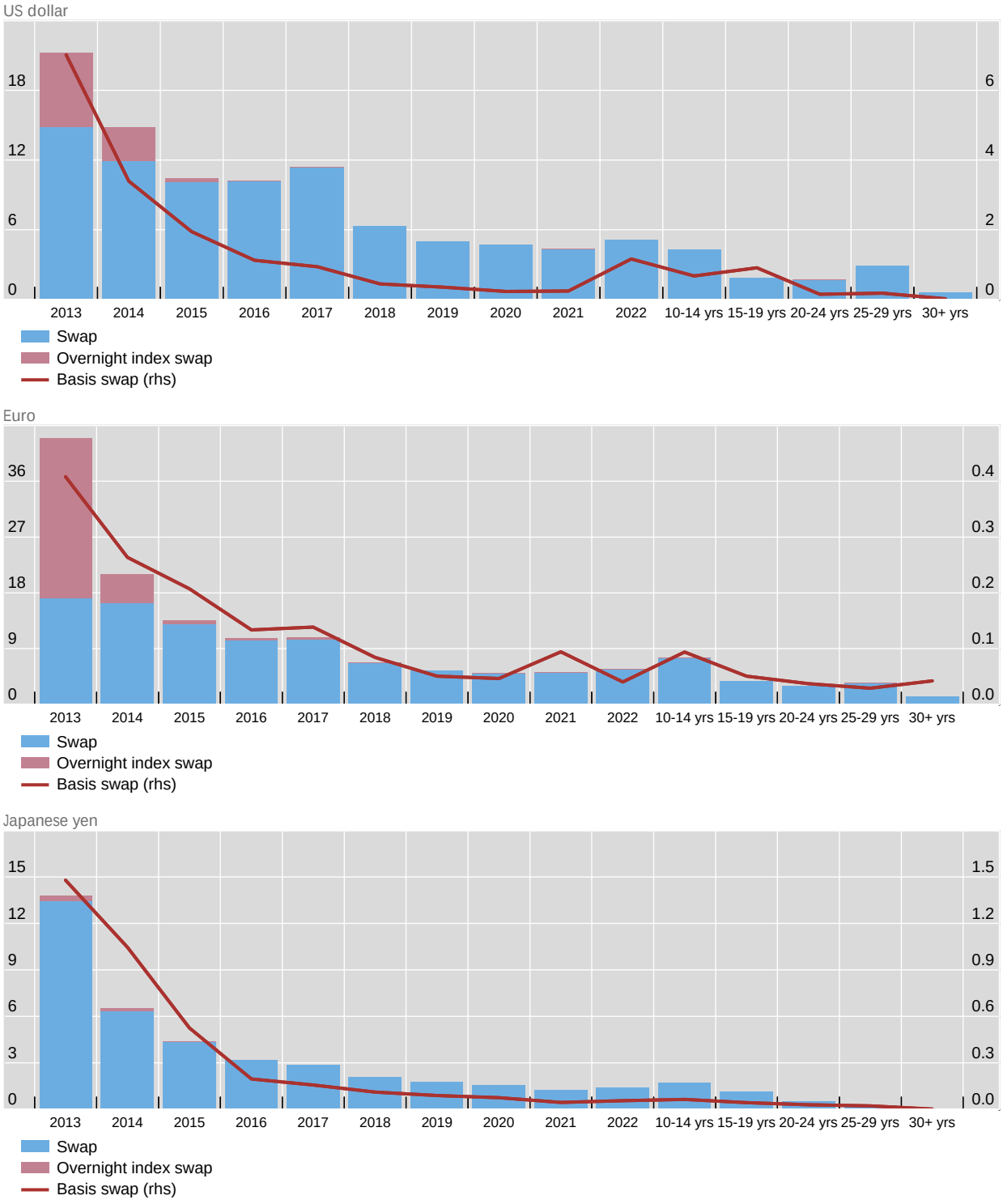
There were a range of views with regard to the role of the public sector. In general, it was noted that the use of reference rates was driven by market forces and in principle should be left to the decision of market participants. There was clear resistance to having the public sector dictate the use of a specific reference rate. At the same time, reflecting on the recent problems regarding the submission of Libor quotes, some commented that the supervisory and/or regulatory role of the public sector could enhance market confidence in reference rates. There were also suggestions that the public sector could play a role in reducing some of the constraints listed above with regard to expanding the possibilities of transiting to alternative reference rates (eg facilitating the standardisation process of alternative reference rates, working with industry bodies to reduce legal risks surrounding transition).

Annex 3

Swap market activity

Maturity distribution of interest rate derivatives[1]

Volume, in trillions of US dollars — Graph A1

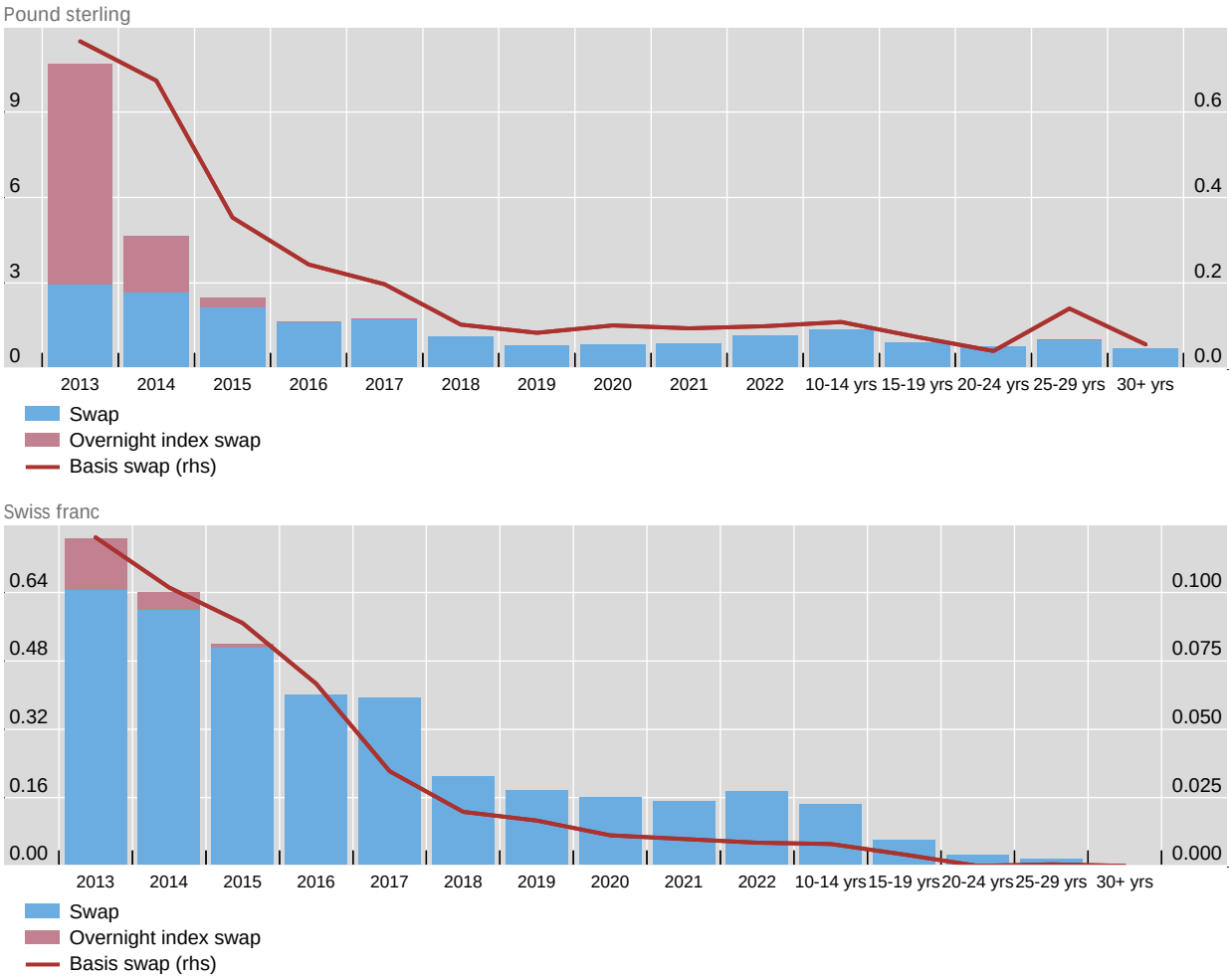


[1] As of 1 February 2013.

Source: DTCC.

Maturity distribution of interest rate derivatives[1]

Volume, in trillions of US dollars — Graph A2



[1] As of 1 February 2013.

Source: DTCC.

Annex 4

Members of the Working Group

Chair	**Hiroshi Nakaso** (Bank of Japan)
Bank of Canada	**Paul Chilcott**
Bank of France	**Alexandre Gautier**
Deutsche Bundesbank	**Andreas Dombret**
	Kai Tänzler
European Central Bank	**Roberto Schiavi**
Hong Kong Monetary Authority	**Henry Cheng**
Bank of Italy	**Emerico Zautzik**
Bank of Japan	**Hiromi Yamaoka**
Bank of Mexico	**Julio Santaella**
Monetary Authority of Singapore	**Bernard Wee**
Swiss National Bank	**Dewet Moser**
Bank of England	**Paul Fisher**
	Andrew Hauser
	Ben Wensley
Federal Reserve Bank of New York	**Simon Potter**
	Kevin Stiroh
Federal Reserve Board	**David Bowman**
Secretariat	**Dietrich Domanski**
	Jacob Gyntelberg
	Corrinne Ho
	Yoshinori Nakata (Bank of Japan)

Annex 5

Central banks providing input to the Working Group process

Reserve Bank of Australia

National Bank of Belgium

Central Bank of Brazil

National Bank of Denmark

Reserve Bank of India

Bank Indonesia

Bank of Korea

Central Bank of Malaysia

Central Reserve Bank of Peru

National Bank of Poland

Central Bank of the Russian Federation

South African Reserve Bank

Bank of Spain

Sveriges Riksbank

Bank of Thailand

Central Bank of the Republic of Turkey

OTC DERIVATIVES: A COMPARATIVE ANALYSIS OF REGULATION IN THE UNITED STATES, EUROPEAN UNION, AND SINGAPORE

Rajarshi Aroskar*

This study compares the regulation of OTC derivatives in the United States, European Union, and Singapore. All jurisdictions require central clearing and reporting of OTC derivatives. The onus of reporting falls primarily on financial counterparties to an OTC contract. The main difference in regulation is that only the United States and the European Union require mandatory trading of cleared derivatives. Additionally, implementation is proceeding in different stages across jurisdictions. These two differences have the potential to result in regulatory arbitrage across jurisdictions.

The over-the-counter (OTC) derivatives market is the largest financial market worldwide. It represents various financial and nonfinancial participants in the United States, Europe, Hong Kong, Singapore, and other financial centers. Nonfinancial participants usually use these markets to hedge business risks, while financial participants use them for both speculation and hedging.

According to the Bank of International Settlements' semiannual survey, the OTC derivatives market has grown from $603.9 trillion in December 2009 to $647.8 trillion in December 2011. As seen in Figure 1, interest rate contracts represent 85% of the total OTC derivatives, while credit default swaps represent 5% of the total OTC derivatives and commodity contracts, equity linked contracts, and foreign exchange contracts each represent 1% of the total OTC derivatives contracts (BIS 2012).

OTC contracts were blamed for the credit crisis of 2008 (Dømler 2012). This led to the Pittsburgh Declaration by G20 members to regulate the OTC derivatives market:

> All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements. We ask the FSB and its

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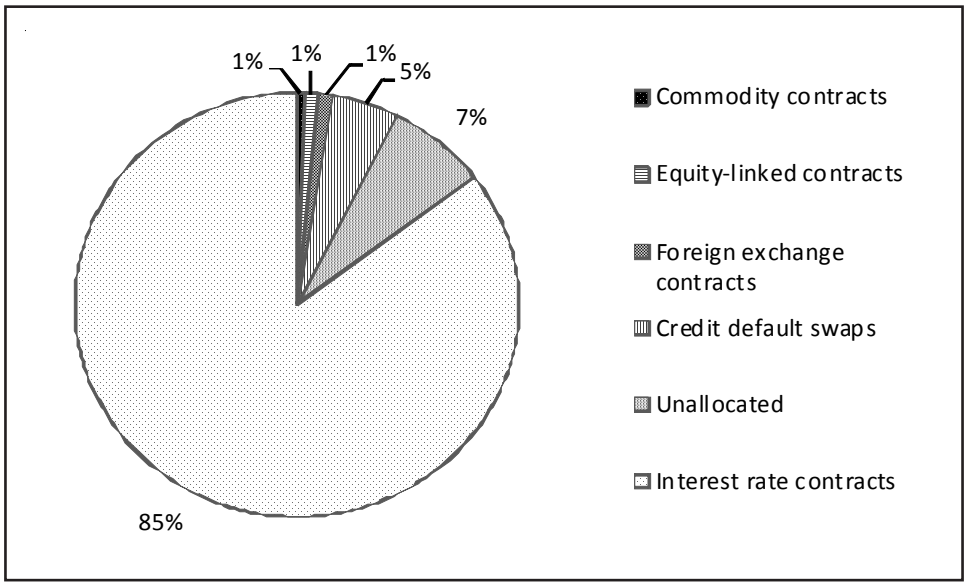
JEL Classification: G18, G28, K22

Figure 1. Outstanding OTC Derivatives by Categories.



relevant members to assess regularly implementation and whether it is sufficient to improve transparency in the derivatives markets, mitigate systemic risk, and protect against market abuse (*Financial Times* 2009).

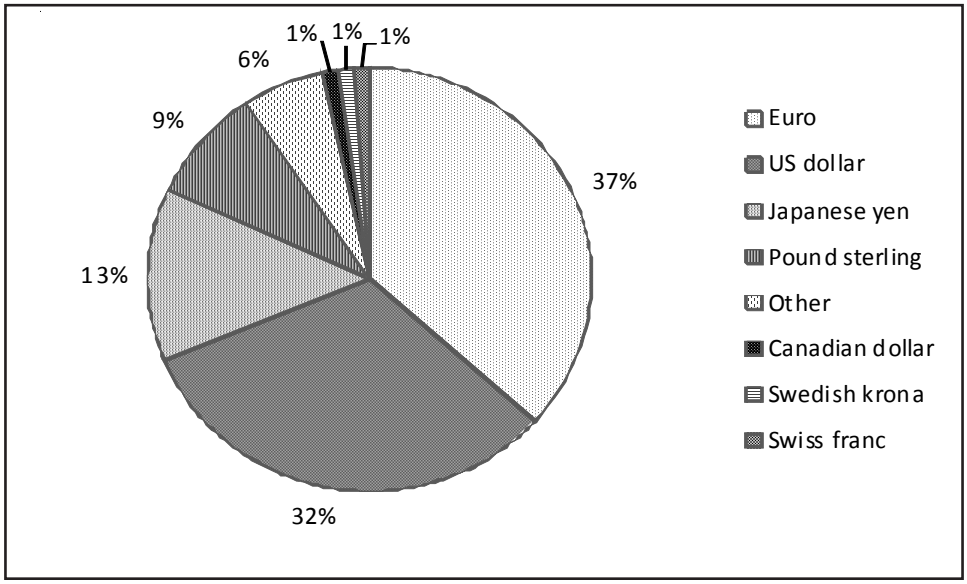
Ever since the declaration there has been sweeping regulation on both sides of the Atlantic with the Dodd-Frank Act in the United States and European Market Infrastructure Regulation (EMIR) in the European Union (EU). Other nations around the world have also formulated their own regulations to monitor and regulate the OTC markets.

This study compares and contrasts regulation of the OTC derivatives markets in three different jurisdictions, the United States, the European Union, and Singapore. As depicted in Figure 2, 32% and 37% of the single currency interest rate OTC derivatives contracts were in US dollars and euros, respectively. These two regulatory regimes were the first to propose regulation of OTC derivatives. The advent of these regulations has led some to fear a loss of OTC markets in countries where there is less or no regulation. Additionally, it is possible for counterparties in countries that have less stringent regulation to avoid business with the US counterparties (e.g., Armstrong 2012).

Singapore has been chosen in this study since regulation of its OTC market has only recently been proposed in February 2012. Also, Singapore does not form a part of the G20. Hence, it serves as an excellent case where there may be a perception that Singapore has less stringent regulations than the G20 countries.[1]

1. The author would like to thank the anonymous reviewer who pointed out that this perception may not be correct, especially in light of the stricter requirements that go beyond Basel III. (See Armstrong and Lim 2011, UPDATE 1-Singapore banks to face tougher capital rules than Basel III. Reuters, http://www.reuters.com/article/2011/06/28/singapore-basel-idUSL3E7HS1TM20110628.)

Figure 2. Percentage of Outstanding OTC Single-Currency Interest Rate Derivatives.



I. LITERATURE REVIEW

A. Central Clearing

An OTC derivative transaction between two parties has inherent risk of default by a counterparty. Before 2007, market participants preferred searching for the best value to close out an OTC position rather than looking for a reduction in counterparty credit risk. This meant that the close out of the OTC position may not have been with the original counterparty (Vause 2010). This resulted in offsetting contracts with a best value provider. Consequently, the number of outstanding OTC contracts increased.

After the credit crisis, management of counterparty credit risk became important. There are various techniques used to reduce counterparty risk, including trade compression and central clearing through a central counterparty (CCP). Standardization of contracts is essential for using trade compression and CCPs (Vause 2010). Trade compression reduces counterparty risk by reducing the number of outstanding contracts among market participants. However, market participants are still subject to bilateral credit risk for the remaining contracts (Weistroffer 2009). This risk could be eliminated using a central counterparty.

A central counterparty (CCP) provides risk mitigation by imposing itself between the buyer and the seller. Thus, it is a buyer to the seller and seller to the buyer. In case of a default by any one of its members, the CCP is the only party that will be affected. All other members of the CCP system remain unaffected. The CCP can reduce or eliminate the impact of default by a member through collateral management.

A CCP could give an open offer to act as a counterparty to members or become

a counterparty after an OTC contract has been signed between two parties. In the latter case, the original contract is void when the CCP becomes the counterparty. Using CCPs doubles the total number of contracts; however, there are also possibilities of netting across contracts (Vause 2010).

Another advantage of a CCP is multilateral netting where, instead of there being one buyer to a seller, CCPs can take off-setting positions with multiple members and, thus, diversify away the risk. The CCP could provide anonymity to transactions and thereby reduce the impact of the trader's position. Additionally, the CCP could provide post-trade management and provide financial management of members' collateral deposits.[2] Thus, a CCP is in a much better position to ensure fulfillment of obligations to its trading members than a bilateral OTC contract.

Cecchetti, Gyntelberg, and Hollanders (2009) indicate that using CCPs improves counterparty risk management and multilateral netting and increases transparency of prices and volume to regulators and the public. Using a CCP can also reduce operational risks and efficiently manage collateral. A CCP is in a better position to mark to market and to manage and evaluate exposure.

Acharya and Bisin (2010) indicate that OTC markets are opaque and participants possess private information that provides them incentive to leverage their position. This increases their likelihood of default. Centralized clearing by a CCP would reduce this opacity by either setting competitive prices or providing transparency of trade positions. Culp (2010) indicates that the CCP structure is time-tested and has sustained various market disruptions and individual institutional defaults. Benefits of using a CCP include a reduction in credit risk and evaluation of exposure, transparency of pricing, evaluation of correlation of exposures, default resolution, and default loss reduction.

Novation of a contract using a CCP concentrates risk with the CCP and, to that extent, will contribute to the systemic risk (BIS 2004; Koeppl and Monnet 2008). The CCP has offsetting long and short positions. Hence, they do not have any directional risk. However, they do face counterparty risk (Duffie, Li, and Lubke 2010). With a CCP, bilateral risk is replaced with that of the failure of a market participant in the CCP. This risk is separate from the operational failure of a CCP (Weistroffer 2009).

Biais, Heider, and Hoerova (2012), Milne (2012), and Pirrong (2010) indicate that central clearing mutualizes risk but does not eliminate risk. Such mutualization can be detrimental to the market as players possess private information, leading to underpricing of risk. Liu (2010) indicates that central clearing reduces counterparty risk but not default risk. Thus, governance and choice of financially robust market participants are more important than central clearing to the elimination of risk. Pirrong (2009) indicates information asymmetry could lead to a preference for bilateral arrangements over that of a CCP. In bilateral arrangements, parties to a contract can better monitor, and hence price, counterparty credit risk. Thus, the benefit of a CCP does not outweigh its cost. Lewandowska and Mack (2010) show

2. http://www.cmegroup.com/clearing/cme-clearing-overview/about-central-counterparties.html.

that multilateral arrangements provide comparable netting efficiency to that of CCP clearing.

Culp (2010) suggests that members could resist clearing through a CCP if they see that the credit risk mitigation is marginal, the margin requirements are not for risk management, or the pricing is not acceptable. Further, the study states that the imposition of the margin is costly due to opportunity cost. Additionally, marking-to-market will impose liquidity constraints on dealers. CCP-required standardization may preclude market participants from being able to effectively hedge their risks as the standardized products lead to basis risk and do not exactly offset their risk exposure. Finally, CCP risk managers who perceive themselves at an information disadvantage with respect to its members may impose higher requirements of collateral (Weistroffer 2009).

Studies have suggested various methods of organizing a CCP, the optimal number of CCPs, and ways CCPs may cope with losses. Koeppl and Monnet (2008) indicate that CCPs can be structured as mutual ownership or for-profit organizations. To secure itself from default by any of its members, a CCP will require margin and a default fund. A profit-maximizing CCP will require a larger default fund, whereas a mutualized CCP will enforce a higher margin requirement. In stressed market conditions, a profit-maximizing CCP will provide efficient trading, while a user CCP will shut down.

The Committee on the Global Financial System (2011) indicates that indirect access of clearing through dealers leads to a concentration of risk at these dealers. Also, it makes the system uncompetitive compared to one in which market participants have direct access to clearing. Indirect clearing can be efficient if end users have portability of their accounts across dealers. A domestic CCP may be helpful in maintaining regulatory oversight; however, multiple CCPs will lead to fragmentation and an increased need for collateral. The Committee further advocates coordination of regulation among global regulators to avoid regulatory arbitrage. Links between multiple CCPs will be advantageous due to multilateral netting possibilities through an expanded number of counterparties. However, these links could provide propagation of shocks and systemic risk.

Duffie and Zhu (2011) advocate having a lower number of CCPs as it will reduce counterparty credit risk. Having a separate CCP for each asset will reduce netting benefits across assets. It will also increase collateral needs and counterparty credit risk. Hence, having interoperability agreements will be beneficial. Multiple CCPs will have initial margin and equity requirements for each CCP. There is also a potential for regulatory arbitrage. Finally, trade and positions across multiple CCPs need to be consolidated.

A CCP could create a fund by contributions from its members. This fund could be utilized in case of default by a member to settle claims with the surviving counterparties (BIS 2004). The net obligations could be limited to the size of this fund. To mitigate this risk, CCPs could impose initial and variation margins, depending on the size and liquidity of positions. Additionally, they could impose capital requirements to create a fund for mutualizing losses (Duffie et al. 2010).

Cecchetti et al. (2009) indicate that a CCP may need access to liquidity from

the central bank in times of market stress or in the case of reduced liquidity due to a member's default.

B. Trade Repositories

In addition to central clearing, regulators across jurisdictions have proposed trade repositories. It has been contended by studies such as Wilkins and Woodman (2010) that there was not enough information about the OTC trades before the crisis. Regulators lacked information about the size of trades and the volume of trades linked to a counterparty. Hence, they were not in a position to identify concentration of risk in a contract or an institution. There was no central database where regulators could gather and analyze OTC information. Studies have suggested that a trade repository (TR) would help reduce this opacity.

Trade repositories can disseminate trade data to the public and help increase market transparency. They can help OTC market participants ascertain the deal on their trades. A trade repository is an institution that maintains a centralized database that records details about OTC derivatives contracts. The purpose of a trade repository is to increase pre-trade (quotes) and post-trade (information on executed trades) transparency. It is a single place where regulators can access data about the entire OTC market, a single trade, or any institution. The objective of a TR is to provide a centralized location where regulators can access data to monitor the OTC market. Regulators can identify concentrations of risk in a trade or with an institution before such concentration becomes destabilizing for the market. They can perform post-mortems on trades and identify guilty parties or aspects that are suspicious or illegal. Trade repositories can help manage trade life cycle events (Hollanders 2012).

Russo (2010) thinks that reporting of OTC trades should be mandatory. Additionally, TRs should give free access to regulators to the information stored in the registry (Wilkins and Woodman 2010). By disseminating trade information to market participants, TRs can improve market transparency and confidence in market participants. This dissemination of information will strengthen OTC markets.

Wilkins and Woodman (2010) advocate exchange trading of standardized and liquid OTC derivatives to improve transparency. Market participants can access firm quotes and see trade prices. This information will help level the playing field for both sophisticated and unsophisticated market participants. Electronic trading platforms, by providing indicative quotes, can offer limited pre-trade transparency.

Avellaneda and Cont (2010) distinguish between pre-trade and post-trade transparency of OTC derivatives data and between regulatory and public dissemination of data where participants in the interest rate swap market use these instruments to hedge the underlying interest rate risk. Standard interest rate derivatives market trades are usually large, OTC, and institutional. Pre-trade information can be disseminated among dealers using dealer networks such as ICAP, Tradition, BGC, and Tullet Prebon. Quotes from dealer networks could be used to provide aggregate indicators of market variables to the whole market.

Post-trade information includes detailed information about trades. Avellaneda and Cont (2010) suggest that electronic trading platforms and clearing facilitites can facilitate processing and transmission of post-trade data to regulators and trade repositories. However, there are impediments to post-trade reporting. Electronic networks have not yet gained traction in OTC markets. Clearing facilities keep trade information confidential and, hence, do not disseminate this information to the market.

Exchange trading of derivative contracts can help pre-trade and post-trade transparency. However, corporations using customized variations of tenors and maturity may not be able to use exchanges, unless the exchanges offer a wide range or variety of products. Additionally, Avellaneda and Cont (2010) and Wilkins and Woodman (2010) indicate that when the trade size is large and volume low, market makers may have to hold a position for a longer period of time. In fragmented markets, full transparency is feasible as a single position does not affect the price. However, when the size of the position is greater than average trading volume, full transparency will lead to front running and will dissuade market makers as they may not be able to offload risk (Avellaneda and Cont 2010). Hence, full post-trade disclosure may adversely affect market makers. They may be reluctant to enter a trade and provide a market (Wilkins and Woodman 2010). Additionally, dealers could stop or reduce OTC market participation in favor of standardized exchange contracts. Both these measures will reduce liquidity in the OTC market and may be, in general, detrimental.

Tuckman (2010) argues that the objective of ascertaining counterparty credit risk may not be met if the data are anonymized or if there is no reporting of intra-company trade. As such, market stability may be impacted.

Knowledge of price and volume data can help market participants decide on the appropriate capital to cushion potential losses and other risk management procedures. Price information can reduce collateral disputes. Public information can help identify counterparty credit risk and help calm markets as the market participants ascertain exposure level to derivatives (Duffie et al. 2010).

Avellaneda and Cont (2010) suggest that if post-trade transparency is mandated, then such dissemination should be delayed and capped at a certain threshold. Duffie et al. (2010) indicate that position data should be reported with a delay. This delay will help market participants trade on fundamental information rather than on market information. Additionally, this delay will reduce the price impact of the knowledge of real time position information and help market makers exit or change positions at close to the available market price.

This study finds that while mandatory clearing is required in all jurisdictions, there are differences in cleared assets, timing, and exemption of parties. Only Singapore exempts foreign exchange swaps and forwards from clearing. Both the EU and Singapore require immediate clearing for all asset classes. The United States phases in clearing based on asset and counterparties to a transaction. All financial institutions face stricter regulations in the EU, with the United States and Singapore exempting smaller financial institutions. Though in theory all jurisdictions are less stringent on nonfinancial institutions, there could be differences in the levels

used to decide the size of an institution. There are also differences in organizational requirements for a CCP in these jurisdictions. These differences in requirements for assets, timing, and counterparties could lead to regulatory arbitrage across jurisdictions. Singapore, alone, does not mandate trading of cleared derivatives. This exemption increases the choices available to market participants who trade OTC products.

Regulations in all three jurisdictions focus on the collection of data and reporting to the TR to increase post-trade transparency. All jurisdictions require reporting of both cleared and uncleared OTC derivatives in all asset classes. However, there is no consistency in priority given to asset classes in various jurisdictions.

In all jurisdictions, the onus of reporting is mostly on large financial institutions. While the United States focuses on complete reporting by both financial and nonfinancial institutions, the EU and Singapore are less stringent on nonfinancial institutions. Also, only the United States has a phased-in approach to reporting depending on the institution's category. This difference in reporting requirements based on asset classes and institutions creates differing costs for reporting entities. As such, there is the potential that these reporting entities will choose more favorable jurisdictions for OTC derivatives, leading to regulatory arbitrage.

The rest of the paper is organized as follows. First, I discuss the scope of the regulations governing central clearing, margin requirements on noncentrally cleared derivatives, backloading of existing transactions, trading, and trade repositories in each of the jurisdictions. This discussion is followed by a comparison of those same regulations and, finally, concluding remarks.

II. REGULATORY AUTHORITY

The US Commodity Futures Trading Commission (CFTC) is charged with the regulation of all OTC derivatives except the OTC derivatives based on exchange-traded securities. The US Securities and Exchange Commission (SEC) is charged with the regulation of OTC derivatives representing exchanged-traded securities

The European Securities Market Authority (ESMA) is the EU-wide regulator charged with drafting regulations on OTC derivatives. It is the sole authority that approves OTC products for mandatory central clearing.

The Monetary Authority of Singapore (MAS) is the sole authority responsible for regulating OTC derivatives market in Singapore.

The United States is the only jurisdiction in this study that has multiple authorities regulating OTC derivatives market. This may lead to delay in legislation on differences in the timing and compliance mandated by the two authorities.

III. REGULATORY REQUIREMENTS

In the United States, OTC derivative contracts called *swaps* are regulated and include all asset classes, interest rate, commodity, equity, foreign exchange, and credit default swaps. Two authorities in the United States regulate swaps. Swaps regulated by the SEC are focused on securities and include single security total

returns or narrowly based indexed total returns. All other swaps including optionality in a total return swap are regulated by the CFTC.

A bilateral mixed swap with a counterparty that is a registered dealer or a major participant with the CFTC and the SEC will be subject to key provisions of the Commodity Exchange Act (CEA) and related CFTC rules and requirements of the federal securities law. For all other mixed swaps, joint permission could be sought to comply with the parallel provisions of either the CEA or the Securities Exchange Act.

The European Market Infrastructure Regulation (EMIR) incorporates all derivatives contracts that are traded OTC and not on a regulated market. There are no exclusions for any particular type of derivatives.

The Monetary Authority of Singapore incorporates all derivatives contracts. The definition of a derivative contract is very broad and includes forwards, options, and swaps.

Of the authorities in these three jurisdictions, all have very comprehensive definitions of derivatives contracts. The US definition, though, is very prescriptive (detailed) and has specific exemptions for insurance, consumer and commercial transactions, and commodity forwards. The EU and Singapore are very broad in their definition and do not have any exceptions. Additionally, complications in the registration with either the SEC or the CFTC are confusing and could be costly.

A. Central Clearing

1. United States

All swaps, regardless of their asset class, need to be centrally cleared. There is a possibility that the Treasury Secretary may exempt foreign exchange swaps and forwards from central clearing. However, the latest clarification from the CFTC (2012) indicated that even if such an exemption from the swap regulation were to be granted by the Treasury Secretary, the swaps would still be subject to reporting requirements under the CEA.

Certain insurance products and commodity forward contracts are not required to be centrally cleared. Additionally, the Federal Energy Regulatory Commission regulates instruments or electricity transactions that the CFTC finds to be in the public interest are exempt from central clearing.

End users of derivatives are exempt from central clearing. Additionally, the definition of end user is expanded to include small financial institutions (with assets of $10 billion or less) (CFTC and SEC 2012) to be exempt from the regulation. Cooperatives such as farm credit unions and credit unions are also exempt from clearing requirements.

2. European Union

All standardized OTC derivatives that have met predetermined criteria need to be centrally cleared. All firms, financial and nonfinancial, that have substantial OTC derivatives contracts need to use central counterparty clearing houses.

Nonfinancial firms below a certain "clearing threshold" are exempt from clearing through a CCP. Any OTC contract that is considered to be a hedge is exempt from clearing and as such does not even count toward the total clearing threshold. The threshold has yet to be set by the ESMA and the European Systemic Risk Board.

The "European System of Central Banks, public bodies charged with or intervening in the public debt, and the Bank for International Settlements" (EUR-Lex 2010) are not subject to clearing. There is a temporary exemption from clearing through the CCP for pension funds. There is also an exemption for intragroup transactions subject to higher bilateral collateralization by the EMIR.

3. Singapore

All standardized OTC derivatives need to be centrally cleared. Singapore dollars interest rate swaps and US dollar interest rate swaps, and nondeliverable forwards (NDFs) denominated in certain Asian currencies have been prioritized for mandatory clearing followed by other asset classes in the future. The MAS exempts foreign exchange forwards and swaps from the clearing obligation. However, currency options, NDFs, and currency swaps are not exempt. They identify the Dodd-Frank Act in the United States for such exemptions or nonexemptions. Clearing is required when at least one leg of the OTC contract is booked in Singapore and if either one of the parties is a resident or has a presence in Singapore and has a clearing mandate.

B. Requirements of CCPs

The CFTC may exempt a foreign CCP from registration if it determines that the CCP is regulated and supervised by an appropriate authority in its home country with regulations comparable to those of the United States.

A CCP is required to maintain adequate capital to cover at a minimum a loss by a defaulting member and one year's operations. It is required to have sufficient liquidity arrangements to settle claims in a timely manner. Organizationally, the board needs to have market participants as its members. The CCP should have fitness standards for its board, members of a disciplinary committee should reduce (mitigate) any conflicts of interest, and it should maintain segregation of client funds. The CCP should be able to measure and manage risks.

The European Union recognizes a third country CCP if the ESMA is satisfied that the regulations in that third country are equivalent to that of the EU. Further, the CCP should be regulated in that third country and that third country regulator must have cooperation arrangements with the ESMA.

The ESMA is responsible for the identification of contracts that need to be centrally cleared (Europa.eu 2012). A competent authority in a member state can authorize a CCP; as such, it will then be recognized and can operate in the entire EU.

There are permanent capital requirements for CCPs of €5 million. A CCP is required to maintain sufficient funds to cover losses by a defaulting clearing member

in excess of the margin posted and default funds. These funds include insurance arrangements, additional funds by other nondefaulting clearing members, and loss sharing arrangements. Additionally, a CCP should have appropriate liquidity arrangements (EUR-Lex 2010).

There are specific organizational and governance requirements for CCPs. These include separation of risk management and operations, remuneration policies to encourage risk management, and frequent and independent audits. Additionally, CCPs must have independent board members and a risk committee chaired by an independent board member. Finally, there are specific guidelines to avoid a conflict of interest and maintain segregation of client funds (EUR-Lex 2010).

Singapore has no requirement of clearing through only domestic CCPs. Singapore-based corporations can act as clearing houses if they are approved. Foreign clearing houses can operate in Singapore if they are recognized.

There are no specific requirements of the central counterparties in relation to the amount of capital required. The only presumption is that the clearing house needs to have sufficient financial, human, and system resources (MAS 2012). The MAS requires segregation of client funds.

C. Margin Requirement for Noncleared OTC Derivatives

In the United States, the CFTC (2011) proposes rulemaking for initial margin and variation margin for swap dealers (SD) and major swap participants (MSP) for which there is no "prudential regulator" on swaps that are not centrally cleared through a derivative clearing organization. The proposal allows for netting of legally enforceable positive and negative marking to market swaps and reduction in margin requirements with off-setting risk characteristics. Only swaps entered after the effective date of the regulation are covered. The forthcoming capital rules will encompass existing swaps. There are no margin requirements on nonfinancial end users. Initial and variation margin requirements would not be required if payments are below the "minimum transfer amount" of $100,000.

SD, MSP, or financial entities can post initial margins in the form of cash; US government or agency securities; senior debt obligations of the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, a Federal Home Loan Bank, or the Federal Agricultural Mortgage Corporation; or any "insured obligation of a farm" credit system bank. A variation margin has to be posted in cash or US Treasury securities. For nonfinancial entities, there is flexibility about assets that could be used as long as their value can be easily assessed on a periodic basis.

Those SD and MSP that have a "prudential regulator" are required to meet the margin requirements of that regulator. A prudential regulator is the Federal Reserve Board, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the Farm Credit Administration, or the Federal Housing Finance Agency. These commissions will propose capital requirements and financial condition reporting for SD and MSP at a later date.

In the EU, financial and nonfinancial firms that enter into OTC contracts that

are not centrally cleared through a CCP have to adopt procedures to measure, monitor, and mitigate both operational and credit risk including timely electronic confirmation of contract terms and early dispute resolution. Additionally, the contracts have to be marked to market on a daily basis. Finally, there should be appropriate exchange of segregated collateral or appropriate and proportionate holding of capital. These rules are applicable only to market participants subject to central clearing obligations (Herbert Smith LLP 2012).

Singapore recommends financial buffers of capital and margins to mitigate the risk of OTC derivatives that are not centrally cleared. The amount of capital and margin should reflect and be proportionate to the risk of noncentrally cleared OTC contracts.

The MAS will be implementing the Basel III requirements of capital for banks and will seek to align capital requirements of other regulated financial institutions with Basel III. The MAS will seek to align margin requirements on noncentrally cleared derivatives in accordance with the recommendations of the working group made up of representatives from the Basel Committee on Banking Supervision (BCBS), the Committee on the Global Financial System, the Committee on Payment and Settlement Systems, and the International Organization of Securities Commissions.

D. Trading

All centrally cleared swaps in the United States are required to trade on a swap execution facility unless the swap execution facility or exchange does not accept the swaps. In the EU, all cleared OTC derivatives have trading requirements mandated by the Markets in Financial Instruments Directive. The MAS does not require trading of centrally cleared OTC derivatives in Singapore.

E. Backloading of Existing OTC Contracts

In the United States, the Dodd-Frank Act applies to swaps entered only after the mandatory clearing requirement. However, this exemption is not applicable for reporting. The EU has proposed to require backloading of outstanding contracts with remaining maturities over a certain threshold (MAS 2012). In Singapore, a contract for a product subject to mandatory central clearing and having more than a year left before maturity is backloaded. Table 1 summarizes the regulatory requirements for these three jurisdictions.

F. Reporting Requirements

1. United States

In the United States, swaps trade repositories are regulated by the CFTC or the SEC. TRs authorized by the CFTC (SEC) deal in swaps regulated by the CFTC (SEC). All traded or bilaterally negotiated swaps have to be reported. These swaps

Table 1. Summary of Regulatory Requirements by Jurisdiction.

	United States	**European Union**	**Singapore**
Mandatory clearing	Yes	Yes	Yes
Who will clear	All financials,all end users, all above $10 billion	All financials and non-financials above a threshold. Temporary exemption for pension funds	All financial counterparties above a threshold, at least one leg in Singapore or one of the parties in Singapore
Assets	All assets	All assets	All except foreign exchange swaps and forwards
Domestic CCP only	Yes (exception if foreign CCP is in comparable jurisdiction)	Yes (exception if foreign CCP is in comparable jurisdiction and contract with foreign regulator)	No
Backloading	Yes	Yes, above a threshold	Yes, above a year
Interoperability	None	Yes	None
Mandatory trading	Yes	Yes	No
Margin requirement for non-centrally cleared derivatives	Yes	Yes	Yes
Base capital for CCP	Yes	Yes	Yes
Organizational requirements	Yes	Yes	Yes
Loss Mitigation	Capital for loss and one year operation liquidity arrangements	Capital liquidity arrangements, default funds, and insurance guarantees	N/A

have to be between two unrelated parties and any changes to the swap agreement have to be reported.

If a swap is executed by a swap execution facility (SEF) or designated contract market (DCM), the SEF or the CCP is required to report swap data to the TR as soon as technologically possible. For an off-facility swap, the hierarchy lies with the SD followed by MSP, followed by a non-SD or non-MSP. When the counterparties are within the same category, they have to choose which one of them will report. Both parties can choose to report and there is no condition of nonduplication. The party required to report is ultimately liable for the reported data even if that party contracts reporting to a third party (Young et al. 2012).

Any swap (mandatory cleared or nonmandatory) that is cleared before the reporting deadlines for primary data can be reported by the clearing facility. Confirmation data on a cleared swap need to be reported by the clearing facility. For a noncleared swap, confirmation data need to be reported by the counterparty as soon as technologically possible. Any changes to the swap over its lifetime need to be reported by the respective parties listed above. Additionally, the state of the swap needs to be reported daily to the TR (Young et al. 2012).

There is a real time public reporting obligation by a TR. Such reporting will not identify the counterparty and should be done when technologically possible. These records must be retained for the life of the swap and for five years after the termination of the swap.

A TR needs to be appropriately organized and be able to perform its duties in a fair, equitable, and consistent manner. The TR should have emergency procedures and system safeguards and provide data to regulators.

2. European Union

The ESMA has the regulatory power to register a trade repository in Europe. Regulators in individual countries cannot do so. Foreign authorities can deal with the ESMA for exchange of information and bilateral negotiations.

Foreign TRs are recognized if regulations in the foreign country are comparable to those of the EU and there is appropriate surveillance in that third country. Additionally, there should be agreement between that country and the EU for exchange of information.

Financial counterparties are required to report to a TR and to report to regulatory authorities if a TR is unable to record a contract. A counterparty required to report may delegate such reporting to another counterparty. Reporting should include the parties to the contract, the underlying type of contract, maturity, and the notional value. A nonfinancial counterparty, above the information threshold, is required to report on OTC contracts. Such reporting must be done in one business day from the execution, modification, or clearing of the contract. There should be no duplication.

The regulation has proposed robust governance arrangements including organizational structure to ensure continuity, orderly functioning of the TR, quality

of management, and adequate policies and procedures. Operational requirements include a secure TR with policies for business continuity and disaster recovery. Data reported to a TR should be confidential even from affiliates or the parent of the TR.

A TR will share information with (a) the ESMA; (b) the competent authorities supervising undertaking subject to the reporting obligation under Article 6; (c) the competent authority supervising CCPs accessing the trade repository; and (d) the relevant central banks of the European System of Central Banks. A TR will maintain confidentiality of information and maintain records for at least 10 years after the termination of a contract. A TR will aggregate data based on both class of derivatives and reporting entity.

3. Singapore

The MAS does not require reporting to a domestic TR. The MAS has proposed two types of trade repositories — approved and recognized overseas trade repositories (ATR and ROTR). Approved TRs are domestic, whereas ROTRs are foreign incorporated TRs. The MAS has not required foreign regulators to indemnify ATRs or ROTRs before obtaining data from them.

The MAS has proposed reporting for all asset classes of derivatives. However, it recommends a phased implementation of the reporting requirement with a priority given to asset derivatives from a significant share of the Singapore OTC market interest rate, foreign exchange, and oil derivatives. Oil forms a significant part of the physical market during the Asian time zone, but it does not form a significant part of the Singapore derivatives market.

All contracts that are booked or traded in Singapore or denominated in Singapore dollars are required to be reported. All contracts where the underlying entity or market participant is resident or has a presence in Singapore also need to be reported. Any foreign finance entities are not required to report in Singapore. However, if MAS has an interest in an entity, it will seek information from a foreign authority.

All financial entities and any nonfinancial entity above a threshold (that takes into account the asset size of the entity) have to report. Additionally, group-wide reporting is required for Singapore incorporated banks.

Singapore allows single-sided reporting and third-party reporting. While single-sided reporting is mandatory for financial entities, only one of the nonfinancial entities (among a group) needs to report. Foreign entities are not required to report, and public bodies are excluded from reporting.

Transaction-level data, including transaction economics, counterparty, underlying entity information, and operational and event data, need to be reported. The content of the data needs to be reported in both functional and data field approaches. Any changes to the terms of the contract over its life need to be reported. The MAS has proposed a legal entity identifier and standard product classification system, but has not required it. The data need to be reported within one business day of the transaction. The MAS requires backloading of pre-existing contracts.

Both TRs are required to have safe and efficient operations with appropriate risk management and security. They are required to avoid conflict of interest and maintain confidentiality of user information. They are required to maintain transparent reporting with authorities. The MAS is considering minimum base capital requirements on TRs. A ROTR may comply with comparable regulations in home jurisdictions. Table 2 summarizes the reporting requirements for the three jurisdictions.

IV. COMPARISON OF REGULATORY REQUIREMENTS

A. Clearing Requirements

Clearing exemptions for a certain asset class may not necessarily mean that these assets will not move to central clearing. As mentioned before, noncentrally cleared assets are required to maintain higher collateral. This increased requirement in collateral may lead to prohibitive costs.

The EU regulation is stricter for all financial entities as it gives no exemption on the size of the financial entity. Financial entities in Singapore below a certain threshold (below $10 billion in the United States) have an exemption from central clearing. As such, they and those exempted entities in the United States may have reduced costs and a competitive advantage over larger domestic rivals and all EU rivals.

The regulations for nonfinancial entities below a certain threshold are comparable in their exemption. While the United States has specified a $10 billion threshold, such has not yet been specified by the EU and Singapore. Any differences among these jurisdictions in the clearing threshold will be beneficial to the entities in respective jurisdictions.

The EU is the only jurisdiction that exempts pensions from clearing requirements. The idea is that pensions are mostly fully invested. To subject them to the clearing requirement will be detrimental to the pension funds.

However, pensions do deal in derivatives to hedge their interest rate and inflation risk. Leahy and Hurrell (2012) indicate that in many cases pension funds hedge those risks with financial counterparties. A requirement on financial counterparties to hold higher collateral on noncentrally cleared derivatives will require them to hold higher collateral for derivative hedges they enter with pension funds. This increases the cost to financial institutions which, in turn, pass them on to pension funds.

An exemption given to any nonfinancial entity below a certain threshold may still be costly for these institutions because, in most cases, the counterparty to these transactions may be a larger financial institution. To the extent that these larger financial institutions have to hold higher collateral, nonfinancial entities will bear a higher cost. This defeats the very purpose of the exemption. The alternative will be that even the exempt nonfinancial institutions will have to centrally clear their products.

Only Singapore gives an exemption from central clearing to domestic and foreign

central banks and supranational institutions. The EU regulation exempts member state banks from central clearing but is not clear on exemptions for foreign central banks.

B. Requirements for CCPs

The United States and EU require clearing through a domestic CCP. Clearing through a foreign CCP is acceptable in these jurisdictions if a foreign CCP is under a jurisdiction that has regulations comparable to that of either the United States or the EU. There are concerns that such requirement of equivalence in regulation will result in comparing identical points of regulations rather than the intent of regulations in foreign jurisdictions. The requirement for equivalency in foreign jurisdictions results in central clearing through a domestic CCP rather than foreign CCP. Having multiple CCPs will result in fragmentation of clearing.

Singapore is the only jurisdiction that allows central clearing using a foreign CCP without requiring investigation of regulations and agreements with foreign regulators. As such, Singapore has much more flexible regulations with respect to the choice of the CCP.

The EU has the most prescriptive regulation on the organization of a CCP and a choice of model for the CCP. The regulation indicates a mutualized CCP where the losses of a clearing member's default are mutualized through a default fund and loss sharing. As mentioned by Koeppl and Monnet (2008), this mutualization may ensure that the impact of default is minimized and may not pose systemic risk. However, liquidity may be affected in the case of default as the CCP focuses on default resolution rather than efficient trading, which is taken care of by the regulation through liquidity arrangements and insurance guarantees.

Only Europe allows interoperability of a CCP and, to that extent, reduces risk. Thus, it allows netting across asset classes. As such, there is a reduced need for collateral. Further, multilateral netting across asset classes also reduces risk.

C. Backloading of Existing Contracts

Backloading of contracts written prior to the regulation requires market participants to clear through CCPs. When these contracts were written, there was no regulation requiring OTC contracts to novate through a CCP. The choice of the counterparty was based on the best value provided rather than the counterparty credit risk and any mandated collateral requirements. Additionally, requiring these contracts to clear through a CCP subjects them to the model of a CCP. Backloading is of particular importance in the case of jurisdiction, such as the EU, that prescribes a CCP model. Each CCP model has specific costs. These costs may not have been considered while writing the original contracts. As such, the original contracts may be uneconomical for market participants subject to new regulations.

The US regulation is strict as it requires backloading with no exemption for the size or the duration of the contract. Therefore, market participants will face additional costs in the United States.

Table 2. Summary of Reporting Requirements.

	United States	European Union	Singapore
Reporting by TR			
Real time public reporting	Yes	No	No
Time delay to report to SDR	Minutes, "as soon as technologically possible"	++1 day	++1 day
Disclosure of identity of counterparty to public	No	No	No
Notional amount reporting to public	Capped	N/A	N/A
Recordkeeping	5 years until swap terminated, 2 years after termination	10 years	N/A
Regulation of TR			
Domestic only	No	No	No
Cooperation among regulators required	Yes	Yes	Yes
Indemnity required	Yes	No	No
Governance of TRs	Yes	Yes	Yes
Capital requirement	No	No	No
Foreign TR reporting	Yes	Yes	Yes
3rd party reporting	Yes	Yes	Yes
Single-party reporting	Yes	Yes	Yes
Double reporting	Yes	No	No

Table 2, continued. Summary of Reporting Requirements.

	United States	**European Union**	**Singapore**
Regulated by	CFTC or SEC	ESMA	MAS
Reporting for Products			
Required for cleared derivatives	Yes	Yes	Yes
Required for un-cleared derivatives	Yes	Yes	Yes
Phased-in reporting by product	Interest rate first followed by foreign exchange & commodity	None	Interest rate, foreign exchange, & oil first, followed by others
Phased reporting by entity	SD and MSP first, followed by non-SD & non-MSP	None	None
Threshold	None	Yes	Yes
Backloading	None	Yes	Yes, over 1 year
Intragroup trades	Not reported	Not reported	Not reported
What swaps need to be reported	All	All	All
When reported	Upon execution and changes	Upon execution and changes	Upon execution and changes
Confirmed	Yes	N/A	N/A
Subsequent changes to the swap	Reported	Reported	Reported
Daily value of the swap	Yes*	N/A	N/A

The EU regulation is most beneficial for transactions below the threshold and does not benefit any specific asset class. The Singapore regulation has the potential to benefit foreign exchange contracts (Global Financial Markets Association 2012) as they are typically short term in nature. As indicated, 99% of these contracts are for less than one year and hence do not need to be renegotiated.

D. Margin Requirements for Noncleared OTC Derivatives

All jurisdictions require an initial and variation margin. The US regulation has details about netting among legally enforceable offsetting contracts and "minimum transfer" amount. The United States exempts all nonfinancial end users, while the EU exempts any user not subject to central clearing. Singapore is not clear on this requirement. As all jurisdictions subject financial companies to these regulations, their costs may increase to hold collateral and margins. To the extent that these financial companies are on the other side of the contract with exempt companies, financial companies are still subject to these regulations. It is likely that these additional costs will be passed on to the nonfinancial companies exempt from the regulation.

E. Reporting Requirements

Reporting requirements are consistent across all three regulatory environments in that they require reporting on all asset classes. However, there is a difference in the timeline for reporting. In Europe, there is no phasing in. Singapore requires interest rate, foreign exchanges, and oil derivatives to be reported, followed by others. Finally, the United States has the most tiered reporting requirement. Interest rate derivatives are to be reported first, followed by the foreign exchange and commodity derivatives. Both cleared and uncleared trades need to be reported in all three jurisdictions.

The Singaporean requirement of reporting affects any party or transactions related to Singapore. Singapore is a relatively smaller market; hence, its immediate reporting requirement of foreign exchange and oil derivatives, which are additional to that of the United States of interest rate derivatives, may not affect a significant number of market participants or transactions.

The European requirement of immediate reporting of all assets will be a dominating requirement. Phasing-in allowed by the United States will give little flexibility if most of the transactions are cross-border.

All countries require financial institutions to report. However, there are significant differences. While Singapore requires only financial institutions above a threshold to report, both the EU and the United States require all financial institutions to report.

Nonfinancial entities only above a certain threshold are required to report in both the EU and Singapore. In the United States, while nonfinancial institutions are the last to report, there is no exemption for smaller institutions. The Singapore

regulation is more accommodating for smaller (financial and nonfinancial) institutions and will help such institutions keep costs down.

Only the US regulation has phased-in reporting, with financial institutions reporting first, followed by nonfinancial institutions. This gives nonfinancial institutions additional time to comply.

All three jurisdictions allow third-party reporting and single-sided reporting. However, only the United States allows for double reporting. Double reporting might be beneficial to the trade repository to confirm the accuracy of the data being reported. It would be costly for the trade repository to verify the accuracy of the data if double reporting is not allowed. However, double reporting involves costs associated with consolidation of data and the reporting costs incurred by each counterparty.

Time to report information to the trade repository is almost immediate in the United States. Both the EU and Singapore allow one day to report information to the trade repository. All three countries require not only initial reporting but also any subsequent changes to the contract. The Depository Trust and Clearing Corporation (DTCC 2012) believes that for day+1 care should be taken to avoid intraday cutoff.

Only the United States requires real time public reporting by the TR. While all countries require that the identity of the counterparties be kept confidential, only the United States requires the notional amount of the swap to be capped while public reporting. Capping of notional amounts will provide an added measure of security in keeping the identity of the counterparty confidential.

All three countries have similar governance of TRs. TRs are required to keep data confidential. The MAS proposal indicates that data collected by a TR serve a regulatory purpose. However, it does not specifically prohibit use of that data by affiliates of the TR or the TR itself for commercial use. Such absence of a specific prohibition may allow these private entities to benefit from privileged information (Argus 2012).

Only the EU prohibits the TR from sharing data with its parent or a subsidiary. Only Singapore is considering base capital requirement from the TR.

Singapore has no requirement for the time to keep records. The United States requires the data to be kept for 5 years and the EU for 10 years after the expiration of the contract.

The objective of the OTC regulation is to improve collection and monitoring of the OTC market. As such, the regulators in the three jurisdictions have focused on post-trade transparency. A major portion of this post-trade transparency deals with reporting information to the TR in a timely manner. Market participants in the United States face the most stringent deadline regarding reporting of information to the TR upon execution. All three jurisdictions have comparable information that needs to be reported.

In all jurisdictions, the onus of reporting falls primarily on financial institutions. Singapore is more favorable to smaller financial institutions. In the United States, nonfinancial institutions have to report only when there is no financial counterparty.

Both Singapore and the EU require only nonfinancial institutions above a certain threshold to report. Thus, regulations in Singapore and the EU are more favorable to smaller, nonfinancial institutions. Additionally, a potential for regulatory arbitrage is possible depending on the threshold level used.

The bulk of the above regulations focus on reducing reporting and regulatory costs for nonfinancial participants and smaller institutions. The idea is that as these participants do not regularly deal with derivatives, it will be costly for them to report. Even if these participants deal with derivatives, the financial counterparties have the requisite manpower and systems to meet the reporting obligations. Thus, it will be more cost effective to use their existing system for reporting.

Single-sided reporting is based on the same concept as stated above. However, only mandating a single counterparty to report while reducing reporting and reconciliation costs may increase inaccuracies in reported data. Improper data will definitely not help the regulators to properly maintain the markets. Though single-sided reporting may reduce costs, there may be situations in which double-sided reporting is preferred. This might be in the case of firms that want to be consistent with reporting and report all their trades. Also, if a party is ultimately responsible for the accuracy of a trade, it may want to report it. Finally, double reporting may be essential for trade repositories as it will be easier to compare and note and/or correct differences (DTCC 2012).

To avoid fractioning of data across jurisdictions and TRs, regulators in all three countries approve of reporting to TRs in foreign jurisdictions. They condition this approval on agreements between regulators in foreign countries with domestic regulators and compatibility of regulation. Bilateral negotiations between jurisdictions could take a considerable amount of time. The two regulators in the United States, the CFTC and SEC, had to go through various negotiations and time to propose rules on OTC derivatives. Hence, it is possible that market participants may have to report in various TRs leading to duplication and increased costs. There is also a chance that this will lead to fragmentation of data. Any fragmentation of data will not give regulators a complete picture of a market participant's exposure or about an asset class. Hence, regulators will not be in a position to maintain global concentration of positions by asset on a counterparty.

Regulators in all three jurisdictions have erred on maintaining confidentiality. The US regulation is more stringent, not just requiring counterparty confidentiality but also requiring capping of the notional amount in public reporting. This requirement will not help post-trade transparency. However, where markets are more concentrated by few participants, it is wise to maintain trade confidentiality. This will help market makers provide liquidity in the market.

V. CONCLUSION

This study compares clearing and reporting regulation of OTC derivatives in Singapore, the United States, and the EU on assets, institutions, and the timing of regulation. The United States and the EU require central clearing and trading of all asset classes. Singapore requires only central clearing but not trading of all assets

except foreign exchange swaps and forwards. Further, only the United States has phased implementation for reporting; Singapore prioritizes foreign exchange derivatives, interest rate contracts, and oil contracts. As the United States is in the most advanced stages of implementation of OTC regulation, the phasing in will be only a marginal reprieve. Singapore's clearing regulation is less stringent on foreign exchange derivatives but not on reporting.

Small nonfinancial companies in Singapore and the EU face no regulation of mandatory clearing and reporting. While smaller financial companies have no clearing requirements in Singapore and the United States, they do face reporting requirements (last to report). Hence, the bulk of the regulation is to minimize costs for nonfinancial companies, in particular, the smaller nonfinancial institutions. Regulatory arbitrage is thus possible only based on the threshold used for clearing and reporting in each of the jurisdictions.

The United States is in the most advanced stages of the derivatives regulation. It has both adopted and implemented regulations on clearing and reporting. The EU has agreement among members on the OTC regulation but has not yet implemented the regulation. Finally, Singapore has not yet adopted nor implemented OTC regulation (Financial Stability Board 2012). Thus, it is the time to implement regulation that may lead to a regulatory arbitrage towards the EU and Singapore.

The main difference in the three regulatory jurisdictions is the nonrequirement of trading of cleared derivatives in Singapore. This difference has the potential to provide substantial choices in trading venues for market participants.

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CHAPTER 2

A NEW LOOK AT THE ROLE OF SOVEREIGN CREDIT DEFAULT SWAPS

Summary

The debate about the usefulness of sovereign credit default swaps (SCDS) intensified with the outbreak of sovereign debt stress in the euro area. SCDS can be used to protect investors against losses on sovereign debt arising from so-called credit events such as default or debt restructuring. SCDS have become important tools in the management of credit risk, and the premiums paid for the protection offered by SCDS are commonly used as market indicators of credit risk. Although CDS that reference sovereign credits are only a small part of the sovereign debt market ($3 trillion notional SCDS outstanding at end-June 2012, compared with $50 trillion of total government debt outstanding at end-2011), their importance has been growing rapidly since 2008, especially in advanced economies.

With the growing influence of SCDS, questions have arisen about whether speculative use of SCDS contracts could be destabilizing. Such concerns have led European authorities to ban uncovered, or "naked," purchases of SCDS protection referencing European Economic Area sovereign debt obligations, that is, banning purchases in which there is no offsetting position in the underlying debt. The prohibition is based on the view that, in extreme market conditions, such short selling could push sovereign bond prices into a downward spiral, which would lead to disorderly markets and systemic risks, and hence sharply raise the issuance costs of the underlying sovereigns.

The empirical results presented in this chapter do not support many of the negative perceptions about SCDS. In particular, spreads of both SCDS and sovereign bonds reflect economic fundamentals, and other relevant market factors, in a similar fashion. Relative to bond spreads, SCDS spreads tend to reveal new information more rapidly during periods of stress, though not typically at other times. The use of SCDS as proxy hedges for other types of credit risks (notably for financial and nonfinancial corporate bonds) means that spillovers to other markets are inevitable. Whether SCDS markets propagate contagion is difficult to assess because the risks embedded in SCDS cannot be readily isolated from those in the financial system. However, SCDS markets do not appear to be more prone to high volatility than other financial markets. While there are some signs that SCDS overshoot their predicted value for vulnerable European countries during periods of stress, there is little evidence overall that such excessive increases in countries' SCDS spreads cause higher sovereign funding costs.

Overall, the evidence here does not support the need to ban purchases of naked SCDS protection. Such bans may reduce SCDS market liquidity to the point that these instruments are less effective as hedges and less useful as indicators of market-implied credit risk. In fact, in the wake of the European ban, SCDS market liquidity already seems to be tailing off, although the effects of the ban are hard to distinguish from the influence of other events that have reduced perceived sovereign credit risk. In any case, concerns about spillovers and contagion effects from SCDS markets could be more effectively dealt with by mitigating any detrimental outcomes from the underlying interlinkages and opaque information. Hence, efforts to lower risks in the over-the-counter derivatives market, such as mandating better disclosure, encouraging central clearing, and requiring the posting of appropriate collateral, would likely alleviate most SCDS concerns.

The impact of sovereign credit default swaps (SCDS) on the stability of financial markets is the subject of heated debate. SCDS are analogous to insurance: in exchange for a fee paid to the seller, they provide protection to buyers from losses that may be incurred on sovereign debt resulting from a "credit event." Credit events include failure to pay interest or principal on, and restructuring of, one or more obligations issued by the sovereign.[1] Many view these swaps as useful market-based risk indicators and valuable hedging instruments. Others consider them to be speculative tools—suggesting their prices do not reflect underlying fundamentals or actual risks and they can therefore unduly raise funding costs for governments, threatening fiscal sustainability and exacerbating market tensions.

Evaluating these contrasting positions requires a clear exposition of the issues and empirical evidence. Sovereign debt and rollover requirements remain large in a number of key countries (see the April 2013 *World Economic Outlook*), and elevated sovereign risk in many advanced economies is likely to drive up the demand for hedging instruments (see Chapter 3 in the April 2012 GFSR). Investors who require appropriate instruments to manage sovereign risk as well as sovereign debt issuers themselves increasingly need to know whether SCDS markets can accommodate hedging needs efficiently while providing reliable information.

This chapter aims to guide the regulatory and policy discussion regarding the usefulness and financial stability implications of SCDS by focusing on some key questions:

- Are SCDS spreads as good as credit spreads derived from government bonds in reflecting the macroeconomic fundamentals that characterize sovereign risk?[2]
- Are SCDS markets as efficient as sovereign cash bond markets in rapidly pricing-in new information?
- Are SCDS markets more likely than other financial markets to be destabilizing?

Overall, we find that SCDS spreads provide indications of sovereign credit risk that reflect the same economic fundamentals and market conditions as the underlying bonds, with little indication that they raise sovereign funding costs. Hence, SCDS can provide a useful hedge to offset sovereign credit risk and can thereby enhance financial stability. In terms of their performance as market indicators relative to bond spreads, SCDS tend to adjust more rapidly to new information during periods of stress, though not typically at other times. For a few countries, we find some evidence that, during the latest period of stress, SCDS spreads moved more than would normally be expected. SCDS can propagate risks and exacerbate systemic events due to their linkages with other markets; but so, too, can other financial assets, which makes it difficult to isolate their independent influences. Finally, as regards policy, the results do not justify the recent ban imposed in Europe on uncovered purchases of SCDS, as it may result in unintended consequences that could negatively affect market liquidity and cause dislocations in other markets. The regulatory reforms under way for over-the-counter (OTC) derivatives generally represent a better avenue to countering any deleterious effects of SCDS markets.

In the remainder of the chapter we discuss the structure of SCDS markets; provide empirical evidence regarding the main questions; examine key regulatory issues, focusing on bans on uncovered purchases of SCDS protection; and summarize and provide policy recommendations.

Note: This chapter was written by Brenda González-Hermosillo (team leader), Ken Chikada, John Kiff, Hiroko Oura, and Nico Valckx, with contributions from Jorge A. Chan-Lau, Dale Gray, and Heiko Hesse. Research support was provided by Yoon Sook Kim.

[1]Restructuring events include interest or principal reductions and postponements, subordination of creditor rights, and redenominations into a nonpermitted currency, and are binding on all holders of the restructured obligations. Permitted currencies are euros or the legal tender of a G7 country or currency issued by a member country of the Organization for Economic Cooperation and Development (OECD) rated AAA/Aaa by Fitch, Moody's, or Standard and Poor's.

[2]An SCDS spread is the effective annual cost of the protection it provides against a credit event, expressed as a percent of the notional amount of protection. A credit spread on a government bond is the difference between its yield to maturity and that of an otherwise similar "riskless" benchmark fixed-income instrument.

Overview of CDS Markets: The Rise of SCDS

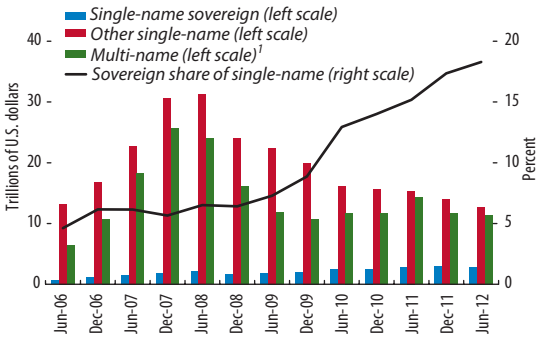
SCDS developed in response to the need to use flexible instruments to hedge and trade sovereign credit risks.[3] Three main purposes are:

- *Hedging.* Owners of sovereign debt buy SCDS to protect themselves against losses arising from a default or other credit event affecting the value of the underlying debt. SCDS are also used widely in so-called proxy hedging, that is, to hedge risks of other assets (such as those of domestic banks or utility companies) whose value is correlated with the creditworthiness of the sovereign.[4]
- *Speculating.* SCDS contracts can be used to buy (or sell) protection on a naked basis—that is, without an offsetting position in the underlying reference assets—to express a negative (or positive) opinion about the credit outlook of the issuer of the underlying bonds. Hence, although SCDS and other CDS are often called "default insurance," they clearly differ from traditional insurance in that the purchasers need not own or have a financial interest in the reference asset. Expressing an opinion about prospective changes in the creditworthiness of a sovereign entity can be executed using other markets (e.g., interest rate futures, cash bond markets, and other derivatives), but they reflect other types of risks in addition to sovereign credit risk.
- *Basis trading.* SCDS are used to profit from pricing differences between SCDS and the underlying debt obligations by taking offsetting positions in the two ("basis trading"). This strategy is based on the principle that CDS can be used to replicate the cash flows of underlying obligations. In this regard, when CDS spreads are narrower than the credit spreads of the underlying debt (i.e., the "basis" is negative), arbitragers may be able to profitably buy the obligations and buy CDS protection—and vice versa if the basis is positive. In theory, the basis should always be close to zero as a result of this arbitrage activity, but in practice there are various costs and frictions that can alter the profitability of these transactions (Annexes 2.1 and 2.2).

[3]Annex 2.1 provides a primer on the SCDS market.

[4]For example, an investor can mitigate the market risk of a corporate equity holding if it has a high negative correlation with SCDS spreads referencing the debt of the country in which the firm is domiciled.

Figure 2.1. Credit Default Swap (CDS) Contracts, Gross Notional Amounts Outstanding



Sources: Bank for International Settlements; and IMF staff calculations.
[1]A contract with a reference entity that is more than one name, as in portfolio or basket CDS or CDS indices.

SCDS are a small but rapidly growing part of the CDS market, which began in earnest in the early 2000s.[5] Initially, some avenues for hedging or trading the credit risk of sovereigns were provided by Brady bond futures contracts (for three countries—Argentina, Brazil, and Mexico) on the Chicago Mercantile Exchange (CME).[6] Some argue that the rise of SCDS probably contributed to the demise of these contracts in October 2001 by providing a superior and more flexible hedging alternative (Skinner and Nuri, 2007). By end-June 2012, the gross notional amount of SCDS outstanding was about $3 trillion, versus $27 trillion in CDS as a whole (Figure 2.1).[7] However, the size of the SCDS market has increased noticeably since 2008, while other CDS markets have fallen off. The post-2008 surge likely relates to the need to hedge derivative counterparty credit risk exposure that had to be more fully disclosed under new accounting rules that came into effect in 2006 (see below). Table 2.1 shows the ranking of selected CDS reference

[5]The Bank for International Settlements (BIS) did not begin collecting comprehensive CDS statistics until 2004. The CDS market was purported to have begun in the early 1990s, initially on corporate debt.

[6]Brady bonds were sovereign bonds that had been exchanged for previously defaulted bank loans to those sovereigns and that had partial collateral in the form of set-aside foreign reserves or guarantees.

[7]Based on latest available data, released in November 2012 (BIS, 2012).

Table 2.1. Rankings of CDS Amounts Outstanding
(In billions of U.S. dollars)

Gross Notional Amounts Outstanding

Rank		End-2008	Rank		End-2010	Rank		End-2012
Top 10			**Top 10**			**Top 10**		
1	Turkey	165	1	Italy	267	1	Italy	388
2	Italy	158	2	Brazil	160	2	Spain	212
3	Brazil	126	3	Turkey	135	3	France	177
4	Russia	98	4	Spain	132	4	Brazil	156
5	Morgan Stanley	79	5	Mexico	111	5	Germany	154
6	Goldman Sachs	76	6	Russia	96	6	Turkey	137
7	Mexico	74	7	GE Capital	96	7	Mexico	117
8	GE Capital	74	8	Germany	80	8	Russia	109
9	GMAC	74	9	Bank of America	80	9	Korea	85
10	Merrill Lynch	72	10	JPMorgan Chase	80	10	Japan	79
Below Top 10			**Below Top 10**			**Below Top 10**		
14	Spain	67	12	Greece	77	14	Portugal	71
48	Greece	37	14	Portugal	69	15	United Kingdom	71
150	Portugal	26	24	United Kingdom	61	30	Ireland	51
262	Ireland	18	44	Ireland	46	124	United States	23
377	United Kingdom	14	50	Japan	41			
592	Japan	7	291	United States	16			
740	United States	5						

Net Notional Amounts Outstanding

Rank		End-2008	Rank		End-2010	Rank		End-2012
Top 10			**Top 10**			**Top 10**		
1	Italy	18	1	Italy	26	1	Italy	21
2	Spain	14	2	France	18	2	Brazil	17
3	GE Capital	12	3	Spain	17	3	France	16
4	Brazil	10	4	Brazil	15	4	Germany	15
5	Germany	10	5	Germany	15	5	Spain	13
6	Deutsche Bank	9	6	GE Capital	12	6	Japan	10
7	Greece	7	7	United Kingdom	12	7	GE Capital	9
8	Morgan Stanley	7	8	Portugal	8	8	Mexico	8
9	Russia	6	9	Mexico	8	9	United Kingdom	8
10	Goldman Sachs	6	10	Austria	7	10	China	8
Below Top 10			**Below Top 10**			**Below Top 10**		
13	Portugal	5	11	Greece	6	12	Turkey	7
16	Turkey	5	12	Turkey	6	15	Russia	5
20	Ireland	5	13	Japan	6	20	Portugal	4
25	Mexico	4	27	Ireland	4	26	United States	3
92	United Kingdom	3	28	Russia	4			
222	Japan	2	40	United States	3			
322	United States	1						

Sources: Depository Trust and Clearing Corporation (DTCC); and IMF staff calculations.

Note: CDS = credit default swaps. Shaded cells indicate advanced ( ) and emerging market ( ) economies' sovereign CDS. DTCC reports only the top 1000 CDS names; outstanding amounts for Greek sovereign CDS are no longer reported.

entities since 2008, illustrating the increasing role of SCDS. However, SCDS remain a small fraction of total government debt outstanding ($50 trillion at end-2011).[8]

[8]Total government debt outstanding (IMF, World Economic Outlook database) is an aggregate of the general government debt of 55 countries that had SCDS notional amounts outstanding in the Depository Trust and Clearing Corporation trade repository database.

Before the global financial crisis, the SCDS market consisted largely of contracts on sovereigns of emerging market economies because investors viewed those issuers as having higher and more variable credit risk. However, since end-2009, the deterioration in the perceived safety of the sovereign debt of advanced economies and rising hedging demands have boosted activity in SCDS referencing

those economies.[9] Such activity rose first for SCDS referencing the euro area periphery countries, then the core (particularly Germany), and then Japan and the United Kingdom, with some of the countries serving as proxy hedges or as safe haven trades (Table 2.1). Nonetheless, as of end-2011, trading in SCDS (gross notional amounts outstanding) tended to be a larger proportion of the underlying government debt for emerging market economies (19 percent) than for advanced economies (3 percent).

Gross notional amounts provide a convenient measure of market size, but net notional amounts (after subtracting the value of the collateral posted) represent the maximum economic transfer if a credit event transpires. The net notional amount represents a counterparty's nominal amount of credit risk exposure to a particular entity at any given time, considering offsetting transactions.[10] Gross notionals far exceed net notionals because of the market practice of reducing or reversing positions by using offsetting transactions rather than by terminating contracts or transferring them to other parties. However, gross notional amounts outstanding are also useful in gauging the risk arising from interconnections among the contract holders ("counterparty risk"), particularly during periods of stress, since the entire value of all the contracts associated with a given counterparty would be at risk if that counterparty failed.

Dealer banks (global systemically important financial institutions or G-SIFIs) dominate the buy and sell sides of the SCDS markets largely because of their market-making activities and risk management of their exposures to sovereigns. A high level of market concentration could potentially lead to market dysfunction when the dominant dealers are under stress.[11] Dealer banks are exposed to sovereigns because of their direct holdings of sovereign debt as well as the counterparty credit risk associated with their derivatives trades with sovereigns, the effective values of which they have been obliged to disclose since 2006.[12] Sovereigns traditionally have not agreed to post collateral to cover the mark-to-market risks of their OTC positions in interest rate and cross-currency swaps and other derivatives; therefore, dealer banks have credit exposures on these OTC contracts when sovereigns owe money on them. SCDS can therefore provide dealer banks with a convenient hedge. The amount of SCDS trading by dealer banks that facilitates transactions compared with the amount for hedging their own sovereign risk is not discernible from existing data.[13] Non-dealer banks and securities firms are the next most important group of buyers and sellers of SCDS protection, followed by hedge funds, but the SCDS activity of all these is much smaller than that of dealer banks (BIS, 2012).

A given type of institution has no consistent role as either buyer or seller of SCDS protection. Subtracting notional amounts outstanding sold from notional amounts bought by the dealer banks provides a rough measure of the positions for their counterparties. On this basis, other banks and securities firms have been net sellers of SCDS protection, thereby taking credit risk and earning premiums (Figure 2.2). Many of these banks also own sovereign debt and are hence "doubling up" on this type of credit exposure. Hedge funds have been prominent net buyers of SCDS protection since 2010, but they were sellers before then. It is not possible to discern from publicly available data whether the protection is meant to cover risks of existing debt holdings or are uncovered (naked) to profit from expected spread widening. Moreover, hedge fund prominence appears larger in SCDS than in other CDS holdings. The use of SCDS by other investors, including nonfinancial institutions, appears much more limited, although anecdotal evidence suggests that some large asset

[9]The perceived safety of sovereign debt of advanced economies is discussed in Chapter 3.

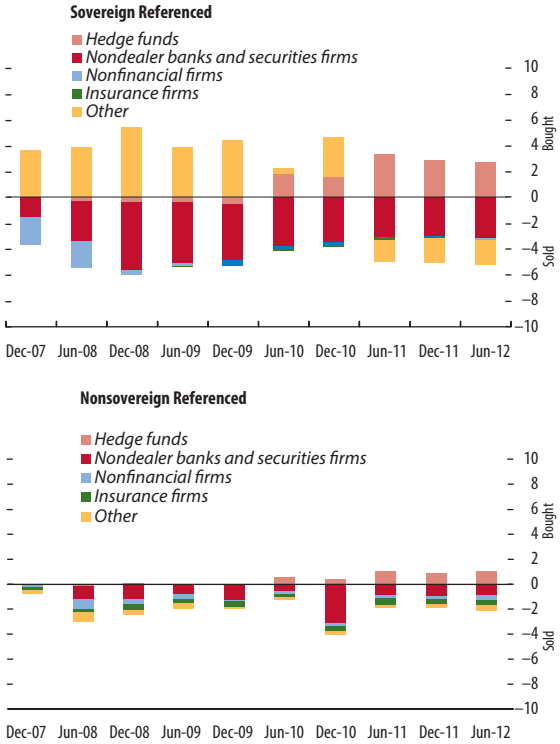
[10]An even better metric would include the risk mitigation impact of any collateral posted, but these data are unavailable.

[11]Fitch Ratings (2011) reports that the top 10 U.S. and European financial institutions constitute about 80 percent of all CDS trade counterparties. However, the 2011 EU Capital Exercise conducted by the European Banking Authority indicates that exposures of large European banks to SCDS (protection sales) are minuscule when compared with their exposures to sovereign debt.

[12]The International Accounting Standards Board IAS 39 and, in the United States, the Financial Accounting Standards Board FAS 157 phased in a mandate (between 2006 and 2007) for fuller disclosure of counterparty credit risk, in the form of "credit value adjustments" (CVAs).

[13]The prominence of outstanding SCDS referencing Italy may reflect dealers' hedging their counterparty risk associated with large uncollateralized OTC interest rate and cross-currency swap transactions with the government of Italy.

Figure 2.2. Nondealer Buyers and Sellers of Credit Default Swap Protection: Net Positions by Counterparty
(In percent)



Sources: Bank for International Settlements; and IMF staff calculations.
Note: For a detailed definition of dealer banks, see BIS (2012). "Other" comprises financial institutions such as mutual funds and central counterparties.Net positions are calculated as (notional amounts bought minus notional amounts sold)/(gross notional amounts outstanding), where gross notional amounts outstanding is calculated as an average of total notional amounts bought and sold. By construction of the statistics, net position for dealer banks is close to zero.

managers (including some mutual funds) are active participants.[14]

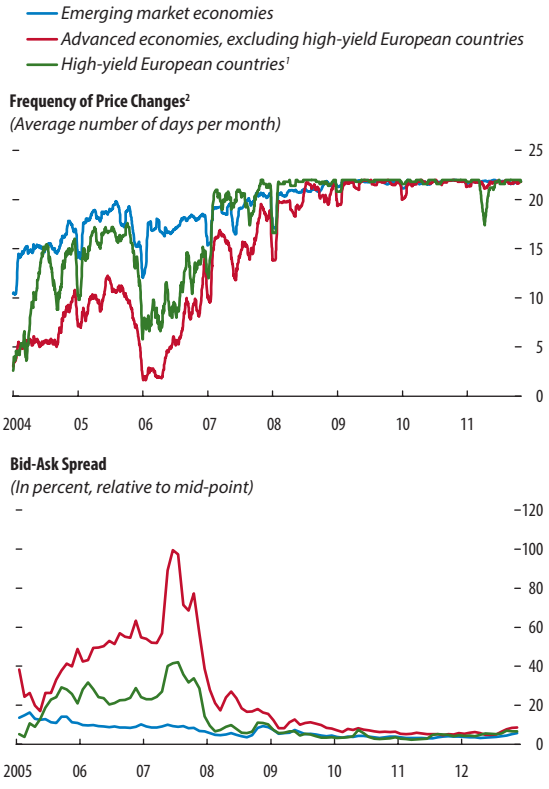
Measures of market liquidity in the SCDS market indicate the following:

- According to data from the Depository Trust and Clearing Corporation (DTCC), SCDS transactions volumes vary widely by reference entity and tend to be concentrated in contracts referencing larger emerging market economies and economies experiencing financial stress.
- During 2010 and 2012, on average, the number of trades was larger in high-stress periods, when SCDS spreads were relatively elevated.
- In general, market liquidity in SCDS (proxied by narrow bid-ask spreads) has been higher for those referencing emerging market economies than for those referencing advanced economies; the difference probably reflects the fact that the SCDS market was largely represented by emerging market sovereigns before the crisis. However, liquidity for SCDS referencing advanced economies began improving after 2008 with higher volumes (Figure 2.3).

What Drives SCDS Spreads and How Do They Relate to Other Markets?

Some view SCDS markets, especially relative to underlying bond markets, as more prone to specula-

Figure 2.3. Liquidity Indicators in the Sovereign Credit Default Swaps (SCDS) Market



Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: See Table 2.3 for the list of countries.
[1]Greece, Ireland, Italy, Portugal, and Spain.
[2]Number of days per month on which the SCDS price changed from the previous day, averaged across countries.

[14]A survey by the IMF (see Chapter 2 of the September 2011 GFSR) also found that the use of CDS by most long-term institutional investors (mainly pension funds and asset managers) was considerably less than their use of other derivatives products, such as futures contracts and interest rate swaps.

tion and opacity and disassociated from economic fundamentals. These views are given plausibility, for instance, by seemingly excessive volatilities of SCDS spreads relative to spreads in government bond markets in some countries (Figure 2.4).[15]

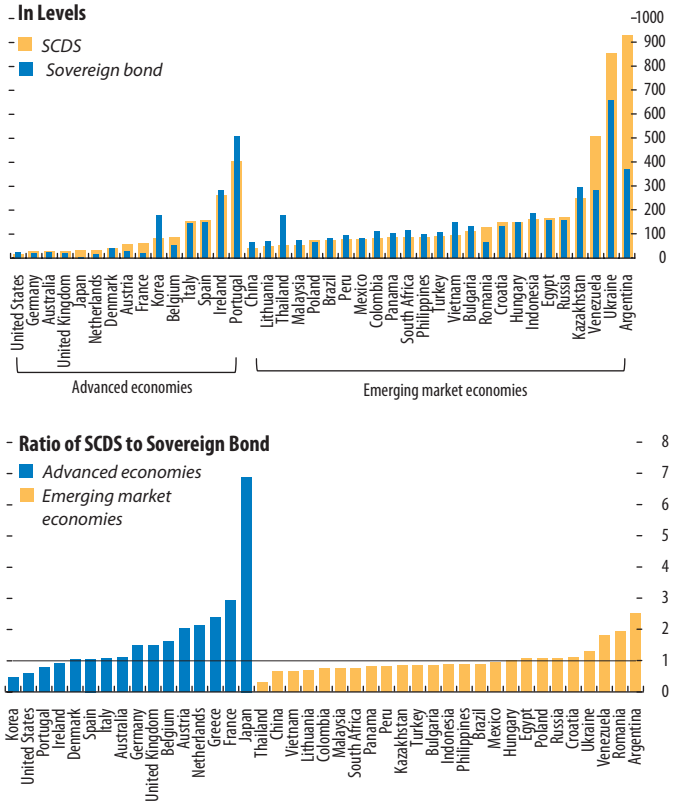
We examine these views by analyzing the drivers of SCDS spreads relative to those influencing government bond spreads, by investigating the dynamic relationships between the two, and by assessing the prognosis for contagious linkages to other markets.[16] Presumably, both SCDS spreads and bond spreads respond to economic fundamentals, market microstructure factors, and global financial market factors (see Annex 2.2 and Tables 2.3 and 2.4 therein for a description of the sample countries, framework, results, variables, and sources).[17] If SCDS spreads indeed indicate that SCDS are more speculative than government bonds, we might find that SCDS spreads are not explained by economic fundamentals to the same extent as government bonds and that they are instead driven more by financial market factors than are bonds.[18]

Determinants of Spreads on SCDS and Government Bonds

The fundamental economic factors that drive spreads for SCDS and government bonds are generally the same, suggesting that both types of instrument reflect sovereign risk according to the empirical evidence provided in Figure 2.5, and in Table 2.5 in Annex 2.2:[19]

- Government debt, GDP growth, and, to a lesser extent, foreign reserves are significant economic factors for spreads for both instruments, and the magnitudes of the effects for SCDS and government bonds are comparable.
- There is some evidence that a weaker financial sector (proxied by lower bank returns on assets) adds to sovereign risk in both SCDS and government bond

Figure 2.4. Volatility of Sovereign Credit Default Swap (SCDS) Spreads and Sovereign Bond Spreads
(Standard deviation 2008–12)



Sources: Bloomberg L.P.; and IMF staff calculations.

Note: For sovereign bond spreads, JPMorgan Asia credit indices are used for Korea and Thailand; EMBI Global indices are used for other emerging market economies; and Bloomberg L.P.'s constant maturity yields minus swap spreads are used for other advanced economies. See Table 2.4 for the definition of SCDS and bond spreads.

[15]The large spike shown for Japan in the bottom panel of Figure 2.4 is largely driven by the unusually low volatility in its sovereign bond market, because yields have been close to zero for an extended period of time.

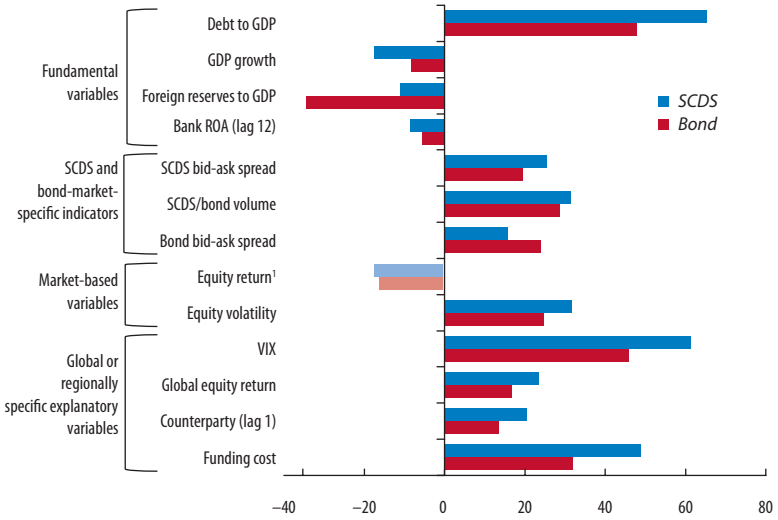
[16]SCDS spreads and bond spreads represent appropriate measures for comparing SCDS and government bonds. For advanced economies, bond spreads are constructed as bond yields minus the interest swap rate (i.e., fixed rate for floating LIBOR rate); for individual emerging market economies, they are the EMBI spreads. Use of these measures is motivated by arbitrage trading actually undertaken in markets that identically match the cash flows of the two sides of the trade (see Figure 2.13 in Annex 2.1).

[17]Credit ratings were not included in the list of independent variables because they reflect fundamental factors (see Chapter 3 of the October 2010 GFSR), and adding credit ratings to other fundamental variables is likely to cause multicollinearity problems (see Hartelius, Kashiwase, and Kodres, 2008). Moreover, rating agencies have started to use SCDS spreads when they determine their own ratings, introducing reverse causality from SCDS spreads to ratings.

[18]The wide range of countries used here distinguishes this study from earlier ones that focus on emerging market economies and from more recent ones whose data primarily focus on advanced euro area economies (Table 2.3).

[19]Broadly similar results are obtained for groups of advanced and emerging market economies estimated separately, and for differences rather than levels.

Figure 2.5. Determinants of Sovereign Credit Default Swap (SCDS) Spreads and Bond Spreads, October 2008–September 2012
(Relative sizes of factors)



Source: IMF staff estimates.
Note: ROA = return on assets; VIX = implied volatility on S&P 500 index options. For explanation of the variables, see Table 2.4. Relative sizes computed as coefficients from full country panel estimation multiplied by one standard deviation of each explanatory variable (averaged across countries). Results based on Table 2.5. Relative size is significant at the 90 percent confidence level or greater, except as noted.
[1]Not statistically significant.

markets, especially during periods of stress.[20] Box 2.1 illustrates how the connection between sovereigns and the financial sector can run in both directions.

Market microstructure characteristics are also influential in both markets:

- Larger bid-ask spreads for SCDS and government bonds (i.e., lower liquidity) are associated with higher levels of spreads for both SCDS and government bonds. This could happen if liquidity in the markets for SCDS and government bonds is correlated,[21] or if this measure reflects some elements of underlying sovereign credit risk common to both SCDS and government bonds.[22]
- Larger SCDS trading volume (relative to government bonds) is associated with higher spreads for SCDS and their reference bonds. This could imply that trading volume surges when the need to hedge or the desire to speculate is higher because of higher credit risks. In most markets, improvements in liquidity with larger volumes are associated with lower CDS spreads.[23]

The relationship with variables representing general financial market conditions is also similar across the SCDS and government bond markets:

- There is evidence that SCDS are more sensitive than government bonds with respect to market risk factors, although the difference between the two is not statistically significant, especially in terms of the VIX and funding costs.

[20]This is in line with Diekman and Plank (2012), who emphasize the role of risk transfer from the financial sector to sovereigns for SCDS pricing.

[21]Calice, Chen, and Williams (2013) find similar effects, which they interpreted as liquidity spillovers between CDS and bond markets.

[22]Supplemental analysis confirms that SCDS and government bond bid-ask spreads increase when perceived sovereign risk (lagged SCDS or bond spread) rises.

[23]Supplemental analysis confirms that SCDS volumes relative to government bonds outstanding increase when perceived sovereign risk (lagged SCDS or government bond spreads) rises.

Box 2.1. Interconnectedness between Sovereigns and Financial Institutions

A network analysis performed in a contingent claims analysis framework shows how SCDS and sovereign credit risk endanger financial stability via two-way risk transmission between sovereigns and financial institutions.

Risks can be transmitted in both directions between sovereigns and financial institutions through several well-known channels. Banks are exposed to sovereign risks through their holdings of sovereign bonds and through the influence of the sovereign's funding costs on their own funding costs. In the other direction, explicit and implicit government guarantees and potential fiscal costs of recapitalization transmit bank risk to the sovereign. Such two-way feedback between the sovereign and financial institutions can create a destabilizing spiral if risks arise in one or the other.

Strong evidence supports the claim that implicit and explicit government backing for banks depresses bank CDS spreads to levels below where they would be in the absence of government support. Bank creditors are thus beneficiaries of implicit and explicit government guarantees, but equity holders are not. Contingent claims analysis (CCA), which uses bank equity market information together with balance sheet data, can estimate credit risk indicators and infer a fair-value CDS spread (FVCDS) for financial institutions.[1] The FVCDS is an estimate of the spread without implicit or explicit government support and thus identifies its effect.

The extent to which sovereign risk is linked to banks varies across countries, with correspondingly varied implications for financial stability and the effective use of proxy hedging of sovereign risk with bank CDS. The average bank CDS tracked the SCDS in the periphery euro area countries from 2007 to 2012 (Figure 2.1.1). During the earlier part of the crisis, in 2008–09, observed bank CDS spreads were somewhat lower than FVCDS because of the depressing effect of implicit and explicit government guarantees on observed CDS, especially during times of stress. After 2010, however, bank FVCDS remained lower than both the observed bank CDS and SCDS as high sovereign spreads spilled over, increasing bank CDS. For banks in countries with low sovereign spreads, such as core euro area countries, the ratio of bank FVCDS to sovereign spreads was around 20 times sovereign CDS in 2008–09, declining to 10 in 2010–11, showing a decrease in the implicit guarantees and less integration between sovereign and bank risks.[2] If the ban on naked SCDS protection encourages market participants to use bank-referenced CDS as a proxy for SCDS, hedges may be less effective in countries where the correlations between the sovereign and the bank are likely to be lower (as seen in the core euro area countries).

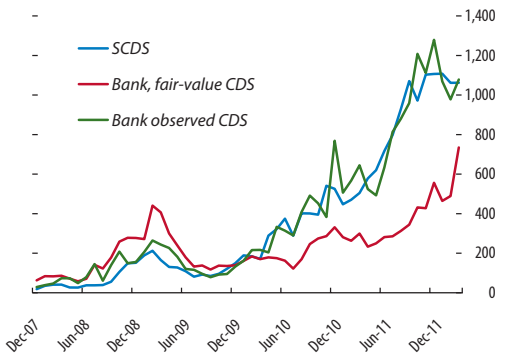
By integrating network models using CCA risk indicators between sovereigns and selected types of financial institutions (banks and insurance companies), we can gauge how, when, and how

Note: Prepared by Dale Gray.

[1]The FVCDS are calculated and reported by Moody's Analytics (2011) using CCA. See related work: the April 2009 GFSR (Chapter 3); Gray and Jobst (2011); Schweikhard and Tsesmelidakis (2012); and Billio and others (2012, and forthcoming).

[2]Similarly, SCDS may be affected by explicit and implicit support from international institutions or by special purpose vehicles guaranteeing sovereign debt, such as the European Financial Stability Facility, but quantifying the impact is not yet possible.

Figure 2.1.1. Measures of Sovereign Credit Risk for Euro Area Periphery Countries
(In basis points, average, five-year spreads)



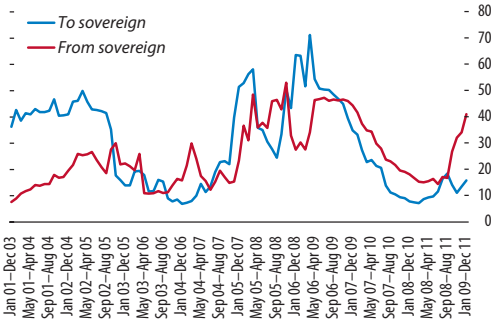
Sources: Bloomberg L.P.; Moody's Analytics; and IMF staff estimates.
Note: CDS = credit default swap; SCDS = sovereign credit default swap. Euro area periphery countries are Greece, Ireland, Italy, Portugal, and Spain.

Box 2.1 *(continued)*

strongly sovereign risks are transmitted to financial institutions and vice versa.[3] An examination of 17 sovereigns (15 in the European Union plus the United States and Japan), 63 banks, and 39 insurance companies shows that from 2003 to 2005 the proportion of significant connections to sovereigns from financial institutions was greater, whereas the reverse (connections *from* sovereigns to institutions) was dominant from mid-2009 to 2012 (Figure 2.1.2). Significant connections are those at a 99 percent confidence level or higher using a Granger causality test. This suggests that risks embedded in SCDS cannot be readily isolated from the risk of the financial system and that a holistic approach to both sectors is required.

[3]Network models using correlation and Granger causality relationships are based on the approach described in Billio and others (2012). The indicators used are expected loss ratios derived from sovereign SCDS and from bank and insurance FVCDS (see Billio and others, forthcoming).

Figure 2.1.2. Interconnectivity Measures: Financial Institutions, to and from Sovereigns
(In percent, monthly average over three-year rolling window)



Source: Billio and others (2012).
Note: Interconnectivity measures based on 17 sovereigns, 63 banks, and 39 insurance companies. Percent of significant connections to sovereigns from financial firms and from financial firms to sovereigns.

- Looking specifically at periods of stress (see interaction terms in Table 2.5), there is some evidence that the SCDS and government bond markets react to different economic fundamentals and microstructure proxies, but mostly in the same direction as during the nonstress periods.[24]

Which Market Leads: SCDS or Government Bonds?

We also examine whether SCDS or government bonds adjust relatively faster to new information by analyzing lead-lag relationships between SCDS spreads and government bond spreads.[25] Thus, the price leadership of SCDS would be superior if SCDS markets are faster than government bond markets at eliminating pricing differences from the long-run equilibrium relationship between SCDS spreads and government bond spreads. Specifically, SCDS markets are relatively faster in incorporating new information when the Hasbrouck statistic is greater than 0.5, and bond markets are faster if the statistic is less than 0.5.[26]

Using this definition, our analysis shows that the information value of SCDS has become more important but varies across countries and over time.[27] Across countries, SCDS incorporate information faster as SCDS liquidity increases (Figure 2.6), as one would expect in well-functioning, efficient markets. Over time, the degree of price leadership is quite volatile. That said, a few observations are worth noting:

- SCDS markets processed information faster in emerging market economies in the early crisis

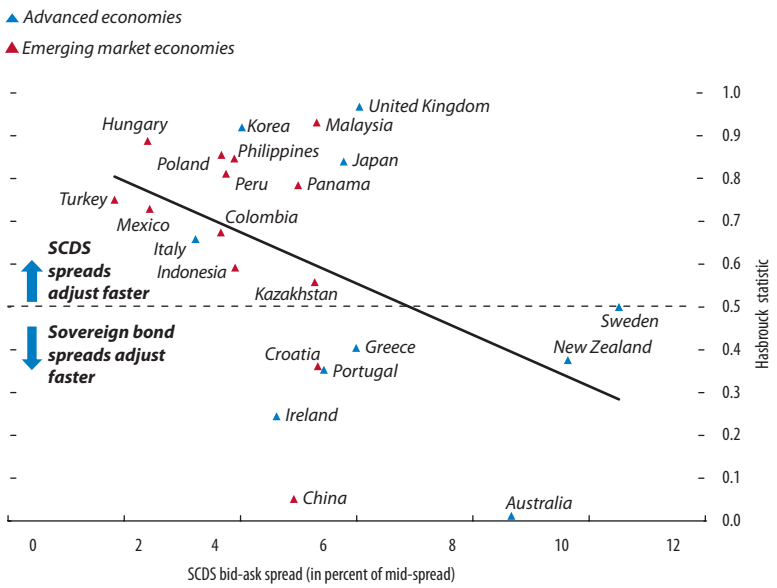
[24]The periods of stress are determined by a Markov switching model technique that detects when the VIX (the implied volatility of the S&P 500 index options) is in the highest one-third of the volatility distribution (see González-Hermosillo and Hesse, 2011).

[25]The literature refers to this as "price discovery" power, to denote the relative information value of the market in question.

[26]Hasbrouck (1995) and Gonzalo and Granger (1995) quantified how fast various related markets adjust to a new equilibrium, and the measures used in each paper are closely related. In practice, the results in the two papers are very similar and therefore only the statistic from Hasbrouck is reported here.

[27]This is in line with the literature on price discovery. See, for example, Augustin (2012).

Figure 2.6. Sovereign Credit Default Swap (SCDS) Price Leadership and Liquidity, March 2009–September 2012



Sources: Bloomberg L.P.; and IMF staff estimates.

Note: Hasbrouck statistic shows whether SCDS or sovereign bond markets move faster to incorporate news: when the statistic is higher than 0.5,SCDS lead the price discovery process; otherwise bonds lead. Statistics are estimated at the country level using a vector error correction model.

period (2006–08) and then again in the most recent period (Figure 2.7).[28]

- In advanced economies, SCDS seemed to move faster than bonds around crisis times.
- Euro area countries show patterns that are broadly similar to those of other EU countries, including a notable decline in the power of SCDS price leadership since mid-2011. This could reflect the market's anticipation of plans for banning naked short SCDS sales in the EU, or central bank interventions in the sovereign bond markets, or simply the dissipation of any informational processing advantage for the SCDS market.[29]

[28]Because activity in SCDS markets in advanced economies began in earnest only in the current crisis, comparisons across advanced and emerging market economies during earlier periods is not possible.

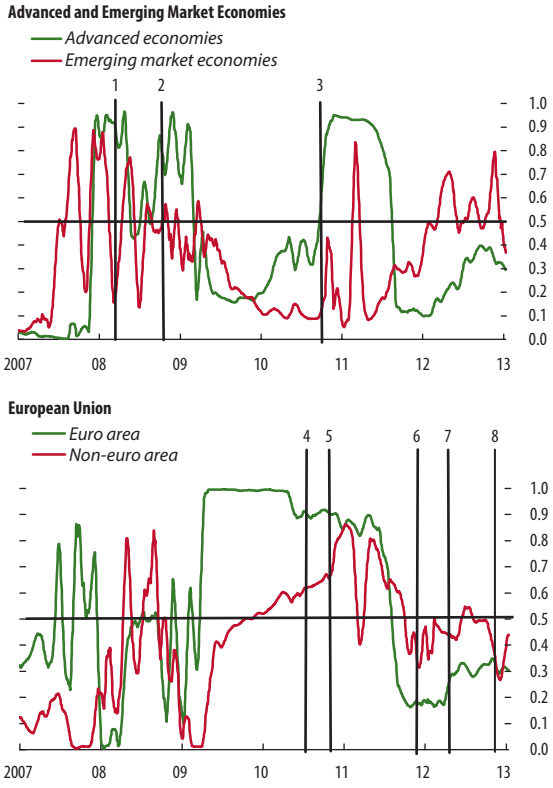
[29]See the section below on effects of regulations and policy initiatives, and Box 2.2.

Are SCDS Markets More Prone To Be Destabilizing than Other Markets?

Concerns about excessive SCDS volatility and contagion across countries partly underpin policies attempting to limit SCDS trading (discussed in the next section). Hence, it is useful to examine measures that identify spillovers and those that might suggest SCDS move more than warranted using known explanatory factors. Also useful is an examination about whether such overshooting raises the borrowing costs of the underlying sovereign issuer.

Indeed, there is evidence of significant co-movement of SCDS spread volatilities across some countries in the euro area, especially during periods of stress. The effect can be seen by determining the residual volatility of SCDS spreads of selected euro area countries (i.e., the volatility for each country not explained by factors specific to that country) and then decomposing that residual into common market factors (VIX and TED spread) and the spillover effects from the SCDS volatility of other euro area countries (Figure 2.8). For Germany,

Figure 2.7. Time-Varying Price Leadership Measures of Sovereign Credit Default Swaps (SCDS)
(Hasbrouck statistic)



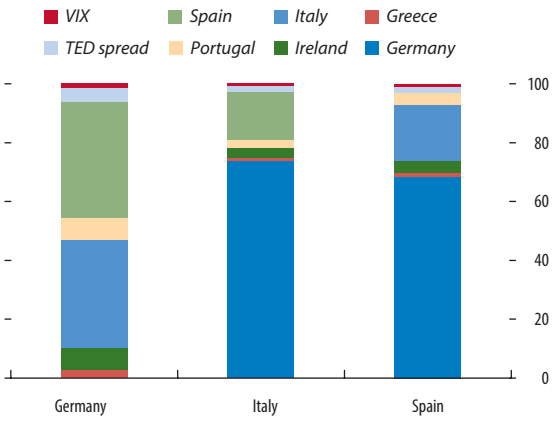
Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: The Hasbrouck statistic shows whether SCDS or sovereign bond markets move faster to incorporate news: when the statistic is higher than 0.5, SCDS lead the price discovery process; otherwise, bonds lead. Statistics are estimated from a panel vector error correction model using rolling two-year windows of daily data. Resulting series are smoothed using a one-month moving average. Vertical lines indicate events related to the global financial and sovereign debt crisis (upper panel) and to the EU's ban on naked short sales of SCDS instruments (lower panel) as follows:

1. Bear Stearns collapse (March 14, 2008).
2. Lehman Brothers bankruptcy (September 15, 2008).
3. EU debt crisis intensifies in October 2010 ahead of Ireland's financial aid request.
4. European Commission consultation on short selling (June 14, 2010).
5. European Commission short selling regulation proposed, banning naked short sales and SCDS protection sales (September 15, 2010).
6. European Parliament adopts short selling regulation (November 15, 2011).
7. Final Version of EU short selling regulation published (March 24, 2012).
8. EU short-selling regulation becomes effective (November 1, 2012).

most of the volatility that is not explained by Germany's own country-specific factors is driven by volatility in the SCDS for Italy and Spain, with other EU periphery countries under stress (Greece, Ireland, and Portugal) having a comparatively small effect.[30] For Spain, almost

[30]Germany's SCDS are often viewed by markets as instruments to hedge systemic risk, or general concerns, in the euro area (Credit Suisse, 2012).

Figure 2.8. Sovereign Credit Default Swaps (SCDS): Decomposition of Volatility Factors for Germany, Italy, and Spain, February 2009–October 2012
(In percent)



Source: IMF staff estimates.
Note: VIX = implied volatility on S&P 500 index options. Figure shows decomposition of SCDS volatility that is not explained by own (or idiosyncratic) factors.

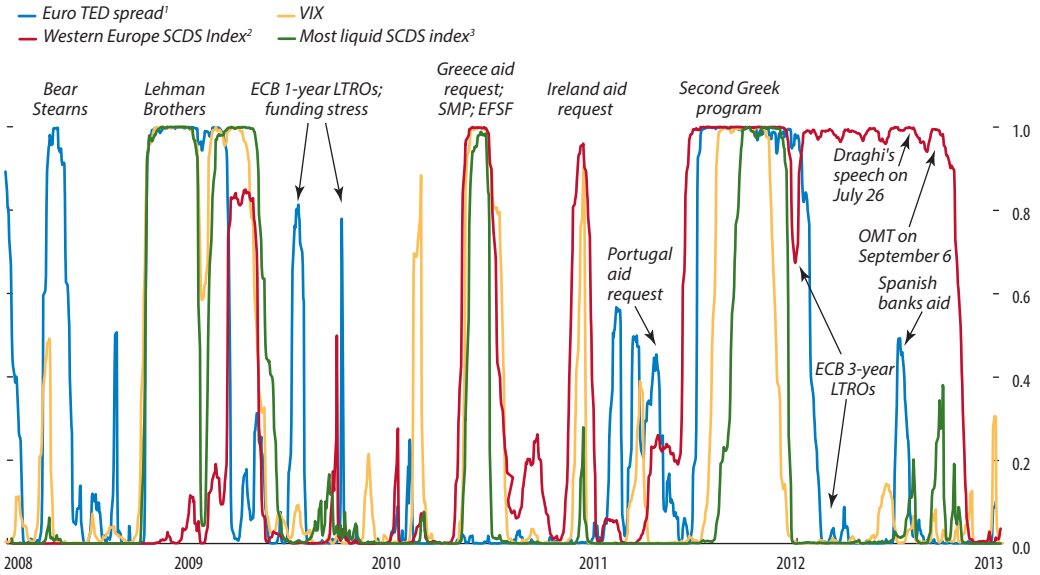
three-fourths of its residual volatility is driven by Germany's SCDS, while Italy's volatility is also a significant contributor (almost 20 percent), with the other factors having a much smaller impact. Roughly the same results hold for Italy, where Germany and Spain are large contributors and other factors less so.[31]

In general, the question of whether SCDS markets are more likely to be contagious than other markets is difficult to answer because the interconnections across many markets are high. The most critical set of interconnections has probably developed among sovereigns and financial institutions, quite apart from the development of SCDS markets per se. Indeed, risks embedded in SCDS cannot be readily isolated from the risks of the financial system; a more integrated analysis of both sectors is required (see Box 2.1).

Yet, many researchers have found that other financial asset markets, not merely those for SCDS, tend to exhibit high and correlated volatility during

[31]The results are based on a stochastic volatility model and standard GARCH specifications using daily data; see González-Hermosillo and Johnson (forthcoming). Beirne and Fratzscher (2013) also find evidence of sharp and simultaneous increases (which they term "herding contagion") in sovereign yields across countries at certain times and among a few markets.

Figure 2.9. Markov-Switching ARCH Model of VIX, European TED Spread, and Sovereign Credit Default Swap (SCDS) Indices
(Probability of being in high-volatility state)



Sources: Bloomberg L.P.; Markit; and IMF staff estimates.

Note: ECB = European Central Bank; EFSF = European Financial Stability Facility; LTRO = longer-term refinancing operations; OMT = outright monetary transactions; SMP = Securities Market Programme; VIX = implied volatility on S&P 500 index options.

[1]Spread between yields on three-month euro LIBOR and on the three-month German government bill.

[2]Average five-year ITRAXX SCDS spread of 12 western European countries (Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom).

[3]Average five-year ITRAXX CDS spread of the 20 most liquid sovereign names (Austria, Brazil, China, Colombia, Croatia, France, Germany, Italy, Japan, Korea, Malaysia, Mexico, Peru, Poland, Qatar, Russia, South Africa, Spain, the United Kingdom, and the United States).

periods of systemic stress.[32] Using a statistical model to detect periods of high volatility among four commonly watched market indices (including the Western Europe SCDS index), we too find that since 2008 several periods of stress have been characterized by high volatility among all four of the indices (Figure 2.9).[33] The main exception was in the first eight months of 2012, during the most severe bout of turbulence in Europe, when the Western Europe SCDS index was the only one of the four to remain in a state of high volatility—a situation that abated only after the establishment of the European Central Bank's (ECB's) Outright Monetary Transactions (OMT) program. Based on the probability of being in a high volatility state, the results suggest that the three other markets decoupled from the Western Europe SCDS index in early 2012, as they were more sensitive to the policy moves represented by the second Greek program and the introduction of the ECB's three-year longer-term refinancing operation (LTRO).

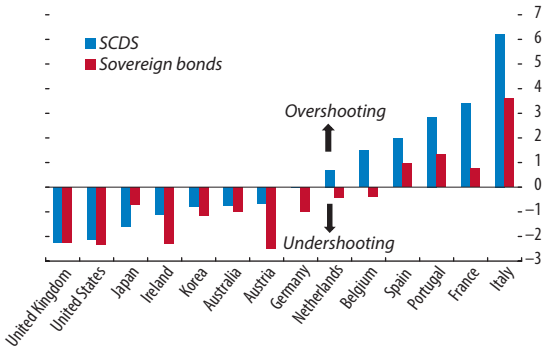
Claims of overshooting are not unfounded, as there is some evidence of overshooting in SCDS and sovereign bond markets for a few European countries during the height of the European debt crisis. Reexamining the model discussed above for SCDS and government bond spreads, we ask how well the model predicts SCDS and government bond yields during the period when the European crisis deepened (July 2011 through September 2012).[34] Spreads on SCDS (and, to a lesser extent, on bonds) overshot the model's predictions for

[32]See, for example, Forbes and Rigobon (2002); Dungey and others (2011); and Forbes (2012).

[33]The estimated ARCH Markov regime-switching volatility model is described in González-Hermosillo and Hesse (2011).

[34]Predictions are calculated using the parameters reestimated from the base models in Table 2.5 using data from October 2008 to June 2011 for 14 advanced economies, including those in the euro area, where concerns about overshooting were most concentrated.

Figure 2.10. Overshooting and Undershooting of Sovereign Credit Default Swaps (SCDS) and Sovereign Bond Markets
(Standardized average prediction error for July 2011–September 2012)



Source: IMF staff estimates.
Note: Ratio of the average out-of-sample prediction errors relative to the standard deviation of in-sample residuals. The in-sample estimation uses the results of the base model (as shown in Table 2.5) for 14 advanced economies during October 2008–June 2011.

the relatively more distressed European countries (Italy, France, Portugal, Spain, and Belgium) and undershot the model for the other nine countries, most of which are not in the euro area (Figure 2.10). Hence, during the height of the European debt crisis, SCDS (and government bond) spreads in more vulnerable European countries rose above the level that can be explained by the changes in the fundamental and market drivers considered in our model. Some of the reason for the overshooting behavior in SCDS and government bond markets may also reflect illiquidity in these markets during periods of acute stress.

Despite concerns that overshooting leads to higher borrowing costs for governments, we do not find strong and pervasive evidence of such effects. To examine the concern, we perform a Granger causality test using the SCDS and the bond residuals from the base model. This allows us to formally test the timing relationships between the measures of overshooting spreads in the two markets after controlling for the effects from common drivers.[35] If we find that SCDS residuals generally lead government bond residuals and not vice versa, this would be consistent with the view that the overshooting of SCDS spreads artificially increases sovereign funding costs. The results (Table 2.2) show that this may be the case for a couple of countries in our sample (Italy and the United States) but not for the majority of the advanced economies examined. Bond residuals also have a unidirectional impact on SCDS in the cases of Austria, France, the Netherlands, and Portugal, suggesting that bond market overshooting influences the SCDS markets. Overall, the evidence is mixed, and there is no consistent pattern for periphery European countries. Therefore, we do not find support for the view that, on average, increases in SCDS spreads generally increase the cost of sovereign bond funding for these countries.

Summary

In sum, the empirical results do not support many of the negative perceptions about SCDS relative to their underlying sovereign bond markets, although there is some evidence of overshooting for euro area countries during periods of stress. A battery of tests suggests that:

- Both SCDS and government bond spreads exhibit similar and significant dependence on key economic fundamentals, and both are similarly influenced by financial market risk factors.

[35]To better capture the dynamics in advanced economies, the base model in Table 2.5 is reestimated using data for 14 advanced economies rather than for all 33 countries. SCDS and bond residuals are highly correlated, and adding SCDS (bond) residuals (contemporaneous or lagged) to the base model for bonds (SCDS) produces statistically significant positive coefficients while appreciably raising the explanatory power of the models. This seems to indicate that there are other common drivers that are not in the model but that are relevant for explaining both SCDS and bond spread dynamics.

Table 2.2. Lead-Lag Relationship between Sovereign Credit Default Swaps (SCDS) and Bond Residuals

	SCDS Granger cause Bonds	SCDS do not Granger cause Bonds
Bonds Granger cause SCDS	Korea, Spain	Austria, France, Netherlands, Portugal
Bonds do not Granger cause SCDS	Italy, United States	Australia, Belgium, Germany, Ireland, Japan, United Kingdom

Source: IMF staff estimates.
Note: SCDS = sovereign credit default swaps. Based on Granger causality test. Residuals from base model estimation (as shown in Table 2.5) for 14 advanced economies.

- New information seems to be incorporated faster in SCDS markets than in sovereign bond markets during periods of stress despite wide differences across countries in normal times. Generally, the more liquid the SCDS market, the more rapidly it incorporates information relative to bond markets.
- Overall, SCDS markets do not appear to be particularly more prone to high volatility than other financial markets.
- However, there is evidence of significant comovement of SCDS spread volatilities across some countries and signs of overshooting for some vulnerable European countries during the height of the debt crisis.
- There is no pervasive evidence that the unexplained portion of SCDS spreads (part of which could be attributable to speculative activities) leads to increases in sovereign funding costs.
- Whether SCDS markets are more likely to propagate shocks than other markets is unclear because the risks embedded in SCDS cannot be readily isolated from the risks of the financial system.

Effects of SCDS Regulations and Policy Initiatives on Financial Stability

Several regulatory and policy initiatives are under way that have affected, or are likely to affect, the functioning of SCDS markets and their implications for financial stability. Evidence presented above casts doubt on the idea that SCDS markets unduly influence underlying bond markets, but some regulations are aimed at limiting the use of SCDS contracts—the most prominent being the EU's ban on naked short selling that was announced on March 24, 2012, and went into effect on November 1, 2012 (Box 2.2).[36] The ban is likely to increase the cost of SCDS trading, as are other new regulations such as those associated with broader reforms of OTC derivatives designed to make markets safer. The relative merits of the ban and the broader reforms of OTC derivatives are discussed below.

The EU ban on SCDS naked protection buying is part of a regulatory effort to harmonize EU short selling and CDS trading rules. Underpinning it is a view that "in extreme market conditions there is a risk that short selling can lead to an excessive downward spiral in prices leading to a disorderly market and possible systemic risks" (European Commission, 2010a, p. 3). In general, the benefits of bans on short positions—to stabilize financial markets, support prices, or contain credit spreads—have not been empirically verified in studies of other bans. Bans on short selling in equity markets are generally viewed as merely reducing market liquidity, hindering price discovery, and increasing price volatility (Beber and Pagano, 2013).

However, using theoretical models, some researchers show that a ban on uncovered CDS could help remove behavior that leads to instability. For example, Che and Sethi (2012) use a theoretical model to show that when naked CDS protection buying is allowed, there is greater volatility in borrowing costs and scenarios could develop in which borrowers would not be able to roll over their maturing debt. In addition, the analysis conducted here of the relative efficiency with which news is incorporated into prices in euro area countries found that SCDS markets generally incorporate new information faster than bond markets during periods of turbulence. Some researchers interpret this lead-lag relationship as indirect evidence that SCDS drive up the cost of government funding (bond yields) and cause fiscal sustainability problems (Palladini and Portes, 2011; and Delatte, Gex, and López-Villavicencio, 2012). However, results from Granger causality tests based on the residuals from a more full-fledged panel model suggest that this relationship is only discernible for two advanced economies in our sample (Table 2.2).[37]

The impact report from the European Commission (2010b) assessed the possibility of imposing

[36]On November 15, 2011, the European Parliament formally adopted the proposed regulation, the final version of which was passed on March 14, 2012, and published on March 24, 2012. On June 29 and July 5, 2012, the European Commission published various technical standards, and on November 1, 2012, the bans applicable to all relevant trades executed after March 25, 2012, went into effect.

[37]See Ashcraft and Santos (2009); and Subrahmanyam, Tang, and Wang (2011) for evidence that CDS trading increased the cost of funding for some companies because of "empty-creditor" problems (i.e., insured lenders lose incentives to monitor borrower performance or to renegotiate). There is no similar empirical study for sovereign issuers.

Box 2.2. The European Union's Ban on Buying Naked Sovereign Credit Default Swap Protection

The European Union's ban on naked short selling and naked SCDS protection buying is summarized and compared with the similar but temporary ban of 2010/11 in Germany.

The EU regulation "Short Selling and Certain Aspects of Credit Default Swaps" went into effect on November 1, 2012. Its purported aim is to harmonize fragmented short selling rules and regulations with respect to sovereign debt and CDS across the European Economic Area (EEA; the 27 countries of the EU plus Iceland, Liechtenstein, and Norway). In particular, it seeks to reduce the risks of negative price spirals for sovereign debt and settlement failures caused by uncovered (naked) short selling and CDS protection buying.

The regulation applies to debt issued by all 30 EEA countries, including their agencies and their regional, local, and municipal governments.[1] However, according to the European Securities and Markets Authorities, the naked SCDS ban applies to all market participants, including those outside the EEA. Also, the regulation applies only to transactions executed after March 25, 2012. Implementation and enforcement is delegated to the relevant country authorities, but enforcement will be difficult (see Annex 1.2 in the October 2010 GFSR).

Under the regulation, market participants can buy protection referencing EEA sovereign debt only if they hold the issuer's debt or if they have exposures that are "meaningfully" correlated with the relevant sovereign debt at the time of execution.[2] Transactions that do not meet these conditions are permitted only if they are related to market-making activities and primary-dealer operations.[3]

The ban is similar to the temporary naked CDS ban in effect in Germany from May 19, 2010, to March 31, 2011, except that the current ban appears to be seen as a permanent measure. In the German case, the policy covered all euro area sovereigns, but it applied only to transactions concluded in Germany, and the exceptions were not as clear-cut as those in the current ban. The ban resulted in reduced liquidity in the market for SCDS referencing the debt of Greece, Ireland, Italy, Portugal, and Spain. In contrast, SCDS market volatility declined for all contracts referencing euro area countries, whereas volatility usually increases during bans on short sales in equity markets.

The German ban was accompanied by prohibitions against naked short positions in the underlying sovereign debt and in corporate equities, as is the new EU ban, although the German ban was temporary and applied only to the shares of major financial institutions.

Note: Prepared by John Kiff.

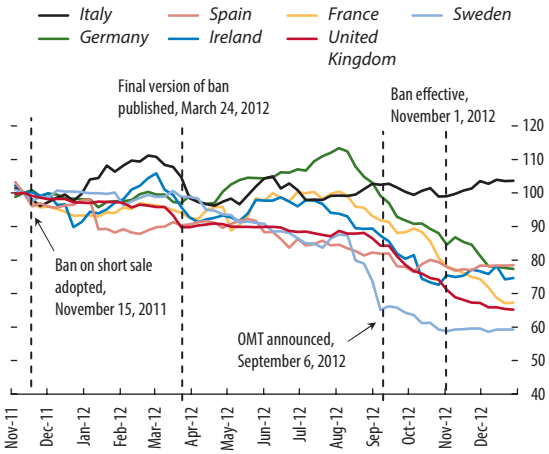
[1]Agencies include the European Investment Bank and may include special purpose vehicles such as the European Financial Stability Facility.

[2]To meet the "correlation" exemption, the hedged exposure must be to an entity in the same country, and the amount of protection bought must be proportional to the delta-adjusted size of the exposure. The correlation criteria can be satisfied by a quantitative or qualitative test or by an analytic proof (e.g., by showing that the exposure is to an entity whose fortunes are significantly dependent on the relevant sovereign). The quantitative test is satisfied if the adjusted Pearson's correlation coefficient between the value of the exposure and the referenced sovereign debt over the previous 12 months is at least 70 percent.

[3]However, the exemption does not apply to the other activities of market makers and primary dealers.

temporary bans. In particular, it found some evidence that "circuit breakers" provided a cooling-off period for investors to reassess intrinsic value. On the other hand, some of the studies they reviewed found that circuit breakers merely lengthened the period over which the pent-up (large) price movements would occur while interfering with market liquidity. Pu and Zhang (2012) found similar effects for the 2010–11 temporary German ban on naked SCDS protection buying. Moreover, determining a priori the optimal time for officials to call for a temporary suspension of trade in OTC markets is difficult, especially without the exchange-trading platforms in place whereby trading can be physically halted. Given the number of countries involved in the SCDS market, it may be unclear which body would call for a halt. Although the European Markets in Financial Instruments Directive (MiFID) as it currently stands is well able to deal with abusive trading practices, including any that regulators deem important to SCDS markets, the

Figure 2.11. Sovereign Credit Default Swaps: Net Notional Amounts Outstanding, Selected EU Countries
(November 11, 2011 = 100, weekly data)



Sources: Depository Trust and Clearing Corporation; and IMF staff calculations.
Note: OMT = Outright Monetary Transactions.

results of the forthcoming review by the European Securities and Markets Authority may reduce the perceived need for the trading ban.

Since March 2012, when the European Parliament adopted the final version of the rules banning naked SCDS protection buying, market liquidity has declined for SCDS referencing EU sovereigns, although not clearly because of the ban. Net notional outstandings had already fallen off ahead of November 1, 2012, the starting date for enforcement of the ban, perhaps because short positions, including proxy positions, were unwound early (see France and Germany in Figure 2.11). Notably, net outstandings of contracts referencing Italy have remained fairly steady, possibly because banks have related sovereign counterparty hedging activity.[38] Discussions with some market participants indicate that they are removing positions even if they are covered; they fear that the hedging rules are so vague that they may be viewed as speculating even if they are not. The drop in market liquidity (and a narrowing of many of the euro area SCDS spreads) has coincided with other events, notably policy announcements such as the OMT, which may have reduced the demand for insurance (Figure 2.12). Given the confluence of events, the reduced SCDS market liquidity cannot be unequivocally interpreted as evidence that the ban has impaired the SCDS market.

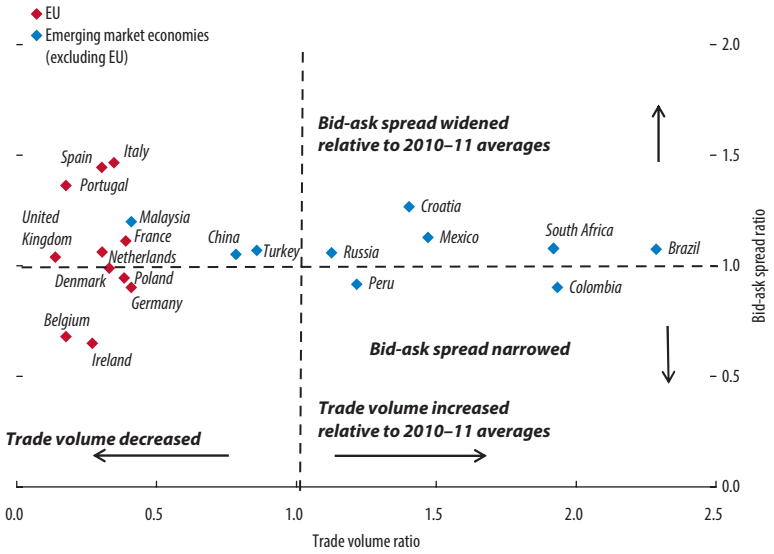
With lower SCDS liquidity, market participants could be expected to substitute less liquid proxies such as bank-referenced CDS and government bond futures contracts for SCDS in their hedging and trading strategies. Box 2.3 outlines how a hypothetical impairment of the SCDS market could force a migration of trading and affect different types of countries. In general, hedging using the "next best" market (bank and some corporate CDS contracts and bond futures) is likely to be more expensive and less precise. While the recent ban is more likely to affect smaller advanced economies (where SCDS are a larger proportion of underlying bonds), ultimately, this could reduce investor interest in the underlying bond market of many countries, raising the costs of debt issuance there. However, it is encouraging that the European Securities and Markets Authority is in the process of evaluating the effects of the regulation, and will present the results of its investigations to the European Parliament by June 30, 2013. Furthermore, there are provisions in the regulation that allow European authorities to suspend the ban in the event it is found to be reducing market liquidity unduly.

A route that will make the SCDS market safer without disenfranchising specific types of participants is the push to clear all standardized OTC derivatives contracts through central counterparties (CCPs). The higher costs that will be incurred by the move to CCPs are balanced by the benefits that central clearing could bring to reduce counterparty risk by enforcing robust risk management standards, the multilateral netting of positions, and the sharing of extreme losses. These costs will be borne by all participants, not just those that take certain types of positions. Clearing members are required to cover their negative mark-to-market positions by the daily posting of collateral ("variation margin") and to post "initial margin" to cover potential losses in excess of their posted variation margin in the event of their own default. Moreover, members must contribute to a default fund to cover extreme losses arising from their own default or that of other clearing members.

Although the movement of contracts to CCPs is likely to reduce risks in OTC derivatives markets

[38]According to market sources, Italy has substantial uncollateralized interest rate swap, swaption, and cross-currency swap positions with a number of banks. Such banks are purportedly using Italy-referenced SCDS to hedge the counterparty risk on these contracts.

Figure 2.12. Market Liquidity Measures before and after Ban on Short Sales of Sovereign Credit Default Swaps (SCDS)



Sources: Bloomberg L.P.; Depository Trust and Clearing Corporation; and IMF staff estimates.
Note: The vertical axis is the ratio of an average bid-ask SCDS spread in November–December 2012 to that in 2010–11. The horizontal axis is the ratio of new trades in November–December 2012 to new trades in 2010–11.

generally, SCDS are more difficult to clear than other derivatives—so far the SCDS of only four reference countries are cleared in CCPs.[39] The reason that CCPs are reluctant to clear SCDS is their concern about "wrong-way" risks, a term referring to the fact that the posted initial margin and the default fund contributions would be in dollars or euros or in government securities denominated in those currencies. Such securities are the same as those underlying most of the SCDS contracts. So distress of a sovereign would create a vicious cycle (a realization of the wrong-way risk) by impairing the value of the collateral while at the same time increasing the risk in the SCDS contract, which would require more such collateral to be posted. In any case, according to recent proposals being considered by the European Parliament, European sovereigns and their agencies will be exempt from the requirement that their trades be moved to CCPs, leaving their counterparties with continuing counterparty risks when money is owed to them.

An alternative to moving SCDS to CCPs would be to require margin posting by all counterparties to bilateral OTC SCDS transactions. While variation margin is currently transferred between most bank-dealer counterparties, the posting of initial margin is not currently the market norm.[40] Regulations requiring all financial firms and systemically important nonfinancial entities to post initial and variation margin on non-centrally cleared transactions are currently being developed by standard setters (BCBS-IOSCO, 2013). They will likely help lower counterparty risks and help protect both parties in case one of them reneges on the contract, but they will also increase the cost of using the SCDS

[39]Almost all CDS central clearing is done through the U.S. and European facilities of Intercontinental Exchange Inc. (ICE); and according to the Financial Stability Board (2012), only 12 percent of outstanding CDS contracts are centrally cleared, virtually all of them dealer-to-dealer transactions. Among all SCDS, the four referencing sovereigns currently cleared are Argentina, Brazil, Mexico, and Venezuela.

[40]According to the ISDA (2012a) margin survey, 93.4 percent of CDS transactions are subject to collateral posting requirements versus 71.4 percent on all OTC derivatives. The survey does not distinguish between initial and variation margin requirements, but the ISDA (2012b) analysis of the costs of imposing initial margin requirements suggests that few market participants post initial margin.

Box 2.3. What Could Be the Impact of the Demise of SCDS?

To assess a hypothetical scenario in which SCDS markets are effectively shut down, it is useful to examine the benefits and costs of SCDS markets and of potential substitutes.

Why is buying naked SCDS protection economically useful and what are the alternatives?

Naked SCDS protection buying is economically equivalent to short selling the underlying bonds. In both cases, trades are usually profitable if the likelihood of a credit event increases. Also, both provide useful functions by increasing the liquidity of the underlying markets (Beber and Pagano, 2013). In addition, both CDS protection buying and short selling keep prices from reflecting the activity of only the most optimistic market participants.

In general, SCDS are more efficient than short sales as a means of trading on, or hedging against, negative credit events. Short selling requires a sufficient quantity of bonds that can be borrowed and deep repurchase agreement (repo) markets in which to borrow them. Only a handful of advanced economies have such repo markets (Australia, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States). Particularly for countries experiencing stress, short selling demand can sometimes overwhelm the supply of bonds available to lend. Moreover, such loans may be recalled at any time so, unlike with SCDS, positions cannot be locked in over longer terms.

Other alternatives include government bond futures contracts and proxies such as the CDS of large financial corporations and utilities. However, government bond futures contracts are available on only a handful of sovereigns, and bond futures embed both credit and interest rate risk, whereas SCDS isolate credit risk. Although the interest rate risk of a futures contract can be mostly offset using interest rate swaps, such transactions will increase operational risks and require the posting of additional safe assets as collateral (see Chapter 3 in the April 2012 GFSR). The problem with proxy hedging sovereign risk using the CDS of large financial firms or utilities is that these markets are generally not big enough, plus their usage could involve other unwanted risks (Table 2.3.1). Any meaningful transfer of risk from SCDS to financial CDS markets is likely to further strengthen the connectivity between these two markets—in contrast to the goal of other policies. Also, other, more opaque and customized OTC derivative contracts, such as total return swaps, could serve as alternatives to SCDS.[1]

Table 2.3.1. Relative Size of Sovereign and Bank Credit Default Swap Markets
(In billions of U.S. dollars, net notional amounts)

	July 2012	December 2012	Change
France			
SCDS	23.3	15.7	–7.6
Bank CDS	7.1	6.3	–0.8
Germany			
SCDS	22.1	15.3	–6.8
Bank CDS	6.2	6.6	0.4
Italy			
SCDS	20.4	21.3	0.9
Bank CDS	6.4	5.9	–0.5
Spain			
SCDS	13.6	12.7	–1.0
Bank CDS	5.2	5.0	–0.3
United Kingdom			
SCDS	10.9	8.2	–2.7
Bank CDS	10.0	10.5	0.5

Sources: Depository Trust and Clearing Corporation; and IMF staff calculations.

Note: Net notionals demonstrate the risk exposures in both markets relevant for hedging effectiveness. Bank CDS are contracts referencing the following large banks: for France, BNP Paribas, Crédit Agricole, and Société Générale; for Germany, Deutsche Bank and Commerzbank; for Italy, Banca Monte dei Paschi di Siena, Banca Popolare di Milano, Intesa Sanpaolo, and UniCredito; for Spain, BBVA, Banco de Sabadell, Banco Santander, and Bankia; and for the United Kingdom, Barclays, HSBC, Lloyds TSB, Standard Chartered, and Royal Bank of Scotland.

What would happen to the market for the underlying bonds if SCDS contracts ceased to exist?

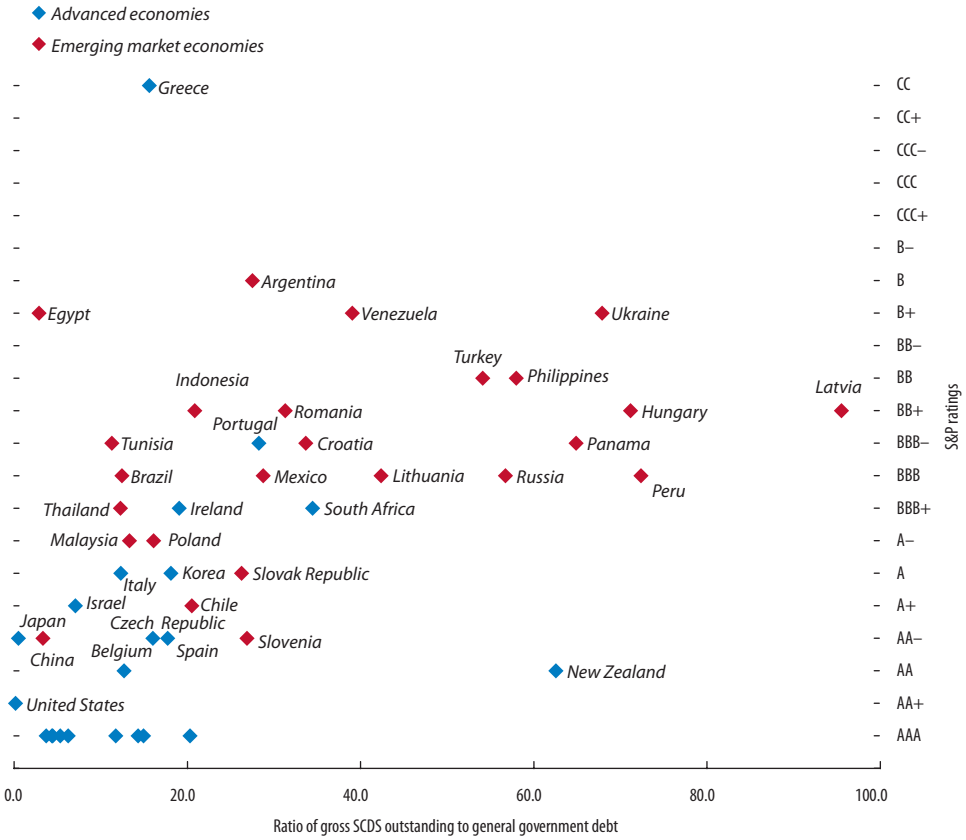
For advanced economies, especially larger economies and those perceived to be safe, SCDS markets are generally small compared with the underlying government debt outstanding, indicating that the demise of the SCDS market would have little effect on the underlying bond market. However, SCDS gross notional amounts are large relative to underlying government debt for many emerging market

Note: Prepared by Brenda González-Hermosillo, Ken Chikada, and John Kiff.

[1]A total return swap is a derivative in which the variable payments are based on the return of an underlying asset.

Box 2.3 *(continued)*

Figure 2.3.1. Country Credit Ratings and Ratio of Outstanding Sovereign Credit Default Swaps (SCDS) to Government Debt, 2011



Sources: IMF, World Economic Outlook and International Financial Statistics databases; Standard and Poor's; and IMF staff estimates.
Note: Countries rated AAA, in order of the ratio of gross SCDS outstanding to general government debt, are the United Kingdom, Germany, Norway, the Netherlands, France, Australia, Sweden, Finland, Denmark, and Austria.

economies and some European countries (Figure 2.3.1, horizontal axis).

Generally, prohibiting the purchase of naked SCDS protection could permanently impair SCDS markets, as trading would exclude a set of participants that help provide liquidity and balance to markets—a complete ban on SCDS contracts would be even more dire.[2] However, the effects of a loss of liquidity and pricing influence will likely depend on the type of country. For example, some advanced economies have substitute markets through which negative sovereign credit risk views can be expressed. However, in many emerging market economies, such alternatives are unavailable, so the loss of SCDS as a hedging instrument could have negative consequences for other credit markets, including the underlying bond markets, and could raise issuance costs. In addition, SCDS dealers that hedge their counterparty risk on their other derivative transactions with sovereigns would face higher costs on such hedging activities.

[2]Beber and Pagano (2013), studying bans on short selling around the world, concluded that they were detrimental for market liquidity and may not have the intended effect of supporting market prices.

market. However, sovereigns and their agencies may be exempt from margin posting on bilateral and centrally cleared trades (BCBS-IOSCO, 2013).[41]

In summary, in an effort to remove destabilizing speculation, the likely effects of the ban on naked short selling are a continuing drop in volumes and liquidity, which could harm the hedging role of SCDS markets. Less liquidity is likely to lead to more proxy hedging and higher spillovers to other markets—potentially with the unintended consequence of reducing financial stability. Whether the ban restrains speculation that could be related to overshooting, and hence to unstable market conditions, remains to be seen. The policy of moving OTC derivatives to CCPs appears to be a concrete method of making the SCDS market safer. Although, in the short term, the cost of posting initial margin would be high, it is expected to have positive stability implications in the medium term, as counterparty risks would be lowered and transparency potentially improved. However, the exemption of sovereign counterparties from posting collateral is problematic, as it continues to leave dealer banks exposed to sovereign default risks that they will likely hedge with the purchase of SCDS protection.

Conclusions and Policy Implications

The findings in this chapter suggest conclusions and policy implications in the following areas:

- *Role of SCDS as generally reliable market indicators.* When examined relative to their comparable bond spreads, SCDS spreads are approximately equivalent as indicators of sovereign credit risk—reflecting the same economic fundamentals and other market factors. SCDS markets appear to incorporate information faster than bond markets during periods of stress, but this is not always the case at other times.
- *Financial stability implications.* SCDS can be used to hedge sovereign credit risks, thus enhancing financial stability. However, like other instruments, SCDS may be prone to spillovers during periods of stress (especially given their use as proxy credit hedges for other financial and nonfinancial institutions). Our analysis suggests that this threat is no more tied to SCDS markets than to the underlying bond markets; indeed, both may be destabilizing during periods of stress, as contagious forces are present across all financial market assets during these periods. We find evidence of overshooting using the model-based predicted values for some euro area countries' SCDS spreads during the most recent period of distress, though the tendency was not widespread.
- *Role of government and regulation.* Governments and regulators have the opportunity to improve the functioning of SCDS and of CDS markets more generally.
  - Cases in point are recent efforts, in line with the G20 regulatory agenda, to require counterparties to post initial margin on bilateral trades or move them to CCPs (where such margin requirements would be lower). While costly in the short term, such improvements in risk management could yield benefits in the longer term by lessening counterparty risks and reducing the potential for spillovers from sovereign credit events.
  - The recent European ban on purchasing naked SCDS protection appears to move in the wrong direction. While the effects of the ban are hard to distinguish from the influence of other policy announcements, the prohibition may have already caused some impairment of market liquidity. And the ban may yet cause some important buyers of SCDS net protection, including those not targeted by the ban, to withdraw from the market; if so, SCDS market liquidity will likely be further reduced and hedging costs raised. The effects of the ban on speculation, hedging costs, and the information value of SCDS remain to be seen, but they bear scrutiny as evidence accumulates.
  - More broadly, as an apparently permanent measure, the ban may fundamentally impair the functioning of the SCDS market by generating alternative trading schemes or the transfer of risk to other markets that may be less transparent. Even temporary trading bans have been found to be of only limited usefulness and to

[41]That said, if sovereigns and their agencies are not obliged to post collateral, their European bank counterparties may get relief from the new Basel III capital requirements for counterparty credit risk on transactions with those entities. As far as we know, no other jurisdictions are considering such relief.

have many of the negative consequences of permanent ones.
  - The concerns that SCDS can overshoot fundamentals or cause contagion in other markets would be better addressed by mechanisms to temporarily halt trading, such as "circuit breakers" with bright-line criteria for triggering and lifting such halts. Granted, imposing temporary trading halts in an OTC market, as opposed to an exchange trading environment, is particularly difficult, as there is no formal trading platform. But enforcing a ban, which requires identifying institutions that maintain uncovered short positions, is also quite difficult although upcoming reporting requirements for short positions should help.
- *Data gaps.* While it may be inappropriate to release detailed information about individual counterparty SCDS positions to the public, macroprudential supervisors should be able to access these data. Such information may enable them to assess risks to financial stability and circumvent, or at least anticipate, channels for contagion. To the degree that uncertainty about exposures and interconnections can be lessened through the public release of some aggregated or masked information, potential contagion and overshooting (among the motivations for the ban on uncovered SCDS protection) could be diminished.

Overall, SCDS markets help enhance financial stability by providing a mechanism to hedge sovereign risks. We find no evidence to support the concern that SCDS markets may be less effective than government bond markets in reflecting economic fundamentals, and we find little evidence that the SCDS market is any more destabilizing than other financial markets. That said, we find some evidence of SCDS overshooting in a few euro area countries during the most recent period of stress. Spillovers to other countries' SCDS markets and the ongoing linkages between domestic banks and sovereigns also exist within the context of CDS markets, as they do more generally. Recent efforts to address the underlying, fundamental nature of these connections would be more productive than placing restrictions on the SCDS market that can limit and distort its role as "messenger."

Annex 2.1. A Primer on Sovereign Credit Default Swaps

CDS are bilateral agreements to transfer the credit risk of debt obligations of "reference entities"—corporations (financial and nonfinancial), sovereigns, and other legal entities such as securitization special purpose vehicles. Purchasers of CDS are protected against losses relating to predefined credit events (such as failure to pay) during the term of the contract in return for premium payments to the protection seller.[42] If a credit event occurs, the premium payments terminate and the contract is settled; settlement consists of the protection seller paying an amount equal to the contract notional value minus the value of "deliverable" debt obligations issued by the reference entity ("recovery value").[43]

To illustrate, suppose that CDS protection could be purchased for a spread of 100 basis points per year until contract termination. If it terminates with a credit event, and the recovery value is 20 percent of par, the protection seller would pay 80 percent of the notional value to the protection buyer. The recovery value is based on the value of a reference asset as determined after the credit event; the types and characteristics of the reference assets are contractually specified, with protection buyers effectively determining specifically which of them is used and ultimately the recovery price used to settle the contracts.[44]

Since June 2005 there have been 103 CDS credit events but only two SCDS credit events with publicly documented settlements.[45] The most recent SCDS event was the March 2012 Greece debt exchange, which serves as an example of the potential complexity of SCDS credit event triggering and settlement (Box 2.4). Concerns about European banks rumored to be large sellers of Greek debt protection (and the losses they could potentially suffer) led to various tactics by international authorities to delay SCDS settlement triggering.[46] The SCDS contracts were eventually triggered and rumors shown to be unfounded, but the episode led some to question the usefulness of SCDS.

CDS can be used to take unfunded short (or long positions) in the reference obligations by buying (or selling) protection. Also, traders try to exploit pricing differences between CDS and underlying reference bonds by taking offsetting positions, called "basis trading." For example, suppose that a five-year par bond with a 5 percent coupon could be funded over

Note: Prepared by Ken Chikada, John Kiff, and Hiroko Oura.

[42]Before 2009, the annual premium paid by the protection buyer was equal to the CDS par spread—the spread at which the discounted present value of the periodic premium payments is equal to the expected present value of the settlement amount in case of a credit event. Starting in 2009, the protection buyer pays an annual premium that has been fixed at one of several standard levels (25, 100, 300, 500, and 1,000 basis points) plus or minus an upfront payment to compensate for the difference between the par spread and the fixed premiums. The SCDS spreads used in the chapter's empirical work are the par spreads (Willemann, Leeming, and Ghosh, 2010).

[43]The protection buyer also pays premiums accrued since the previous payment to the protection seller. Also, CDS used to usually settle physically through the delivery of defaulting obligations to the protection seller in exchange for an amount equivalent to the CDS' notional value. They are now mostly settled via a two-stage auction-based CDS protocol to produce fair and unbiased recovery values to feed into cash, not physical, settlements.

[44]In the two-stage auction referred to above, participants who are selling bonds will deliver the cheapest of the bonds designated as eligible by the International Swaps and Derivatives Association's Determination Committee. See Andritzky and Singh (2006) and Ammer and Cai (2011) for more on this potentially valuable cheapest-to-deliver option that drives the auction recovery price.

[45]Of the sovereign credit events and restructurings since June 2005, when information on CDS settlements became available, only the credit events for Ecuador in 2008 and Greece in 2012 resulted in CDS settlements. According to various market sources, at least three other credit events may have triggered CDS settlements (Belize in 2006, Seychelles in 2008, and Jamaica in 2010). In addition, according to Das, Papaionnou, and Trebesch (2012), there have been 26 sovereign restructurings since June 2005.

[46]Legislation was adopted to effectively "retrofit" collective action clauses (CACs) to €177 billion of old Greek government bonds (GGBs) on February 24, 2012, in case voluntary participation would not be high enough. The retrofitted CACs allowed bondholders with one-third of the aggregated outstanding principal of old GGBs to bind all bondholders to the restructuring. In contrast, typical CACs apply only to a specific bond series, and require a supermajority to change the bond terms, allowing investors with large positions to block a restructuring of that series. The Greek retrofit law did not allow any bond series to drop out and the aggregate nature of the CAC made blocking unlikely. To protect the ECB and national central banks, their bond holdings were swapped for new bonds with identical terms but different serial numbers, to ensure that they would not be covered by any debt exchange. Since bondholders were not legally subordinated, the SCDS were not triggered. Gelpern and Gulati (2012) argue that a credit event may have been triggered earlier if the issuance of new bonds to the ECB for the express purpose of excluding them from a restructuring had been recognized as subordination. A more "textualist" reading of the CDS contracts in this case blurred the trigger criteria, but this may have been needed to reconcile competing demands of the authorities and market participants.

Box 2.4. The Greece Debt Exchange and Its Implications for the SCDS Market

The March 2012 Greek debt exchange was the largest sovereign restructuring event in history. About €200 billion of Greek government bonds (GGBs) were exchanged for new GGBs. Holders of old GGBs who had SCDS protection on them recovered roughly the par value of their holdings, but the uncertainties of the process cast doubts on the viability of SCDS as a hedging tool. An industry-led initiative is rethinking the settlement process of SCDS credit events.

Two main factors determine the effectiveness of CDS protection: (1) whether the event responsible for the losses triggers the CDS payout and (2) if it is triggered, whether the payout offsets the losses. On the surface, the Greek SCDS settlement went according to plan. A restructuring event was called on March 9, and the ensuing March 19 settlement yielded SCDS payouts roughly in line with losses incurred in the debt exchange.

Many market participants regarded the outcome a fortunate coincidence because the payout could have been much smaller than the losses on the old GGBs. The exchange removed all outstanding old GGBs *before* the CDS settlement, thus requiring the new GGBs to be accepted as deliverable obligations. Luckily, the new GGBs were trading at about 22 percent of par going into the CDS settlement, the same price at which the old GGBs were trading before the exchange; hence, the payout matched the losses on the old GGBs. Nevertheless, the uncertainty surrounding the payout of the CDS contracts eroded market confidence in SCDSs.

However, if markets had viewed the exchange as supportive of Greece's debt sustainability, the market value of the new GGBs would have been higher than that of the old bonds. In this case, the SCDS payout would not have covered the losses caused by the exchange. As a result, the International Swaps and Derivatives Association (ISDA) is looking at ways to alter standard CDS documentation to deal with such situations.

One proposal is to settle by delivering a package of new instruments in proportion to the instruments they replace (see Duffie and Thukral, 2012). In this case, every €100 of Greek SCDS would have been exchanged for €31.5 of new GGBs, €15.0 of European Financial Stability Facility–guaranteed notes, and €31.5 of GDP warrants. With the new GGBs trading at about 22 percent of par, this package, excluding the value of the warrants, would have also been worth about 22 percent of par—€31.5 of the new GGBs at 22 percent plus €15 of the guaranteed notes.

Note: Prepared by Jorge A. Chan-Lau and John Kiff.

the full five years at a fixed 4 percent.[47] That would produce expected annual cash inflows of 100 basis points (500 – 400 basis points). For the CDS–bond "basis" to be zero, the CDS referencing that bond must also be trading at 100 basis points (Figure 2.13).[48] Also, if a credit event occurs, the bond and CDS basis package would suffer identical losses.[49]

When the basis is positive, selling CDS protection and covering it by short selling reference bonds can be profitable. When the basis is negative, it can be arbitraged by buying the bonds and buying CDS protection. These actions should narrow the basis. In practice, the basis is seldom zero due to factors such as transactions costs, funding and counterparty risks, the protection buyer's cheapest-to-deliver option, currency mismatches between the CDS and reference bonds, and nonpar bonds used as reference bonds (Figure 2.14). However, a nonzero SCDS basis may also reflect obstacles to arbitrage in combination with differential reactions of SCDS and bond markets to economic and market developments (O'Kane, 2008).

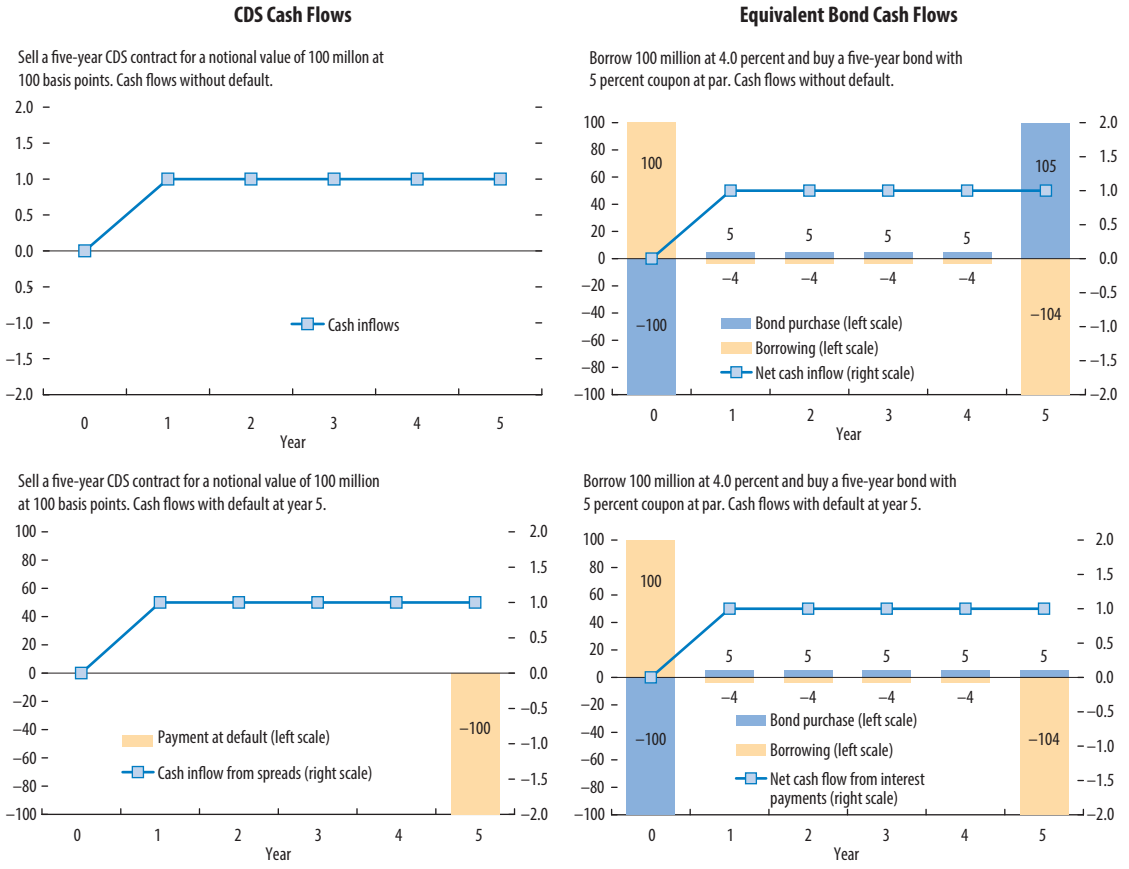
Measuring the risks of SCDS contracts turns on the differences between gross notional amounts outstanding and net notional amounts. Most

[47]In order to achieve fixed-rate funding, the bonds are typically funded in the repo market on a floating-rate basis and swapped into fixed rates over the full term using interest rate swaps.

[48]If there is no credit event, the package and the reference obligation both return par value. In the example, if there is a default, the CDS package returns zero percent of par (the par value of the riskless investment minus the 100 percent of notional CDS protection payment), which is identical to the reference obligation recovery value.

[49]The transaction in Figure 2.13 assumes zero recovery of principal upon a credit event.

Figure 2.13. Constructing the Arbitrage Trade between Credit Default Swaps (CDS) and Bonds
(In millions)



Source: IMF staff.

SCDS data are collected and disbursed using these concepts.

Gross notional values are calculated on a per-trade basis. For example, if Bank A sells $100 of CDS protection to Bank B, the gross notional amounts (the transactions highlighted in orange in the following table) and net notional amounts are reported as $100.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank A	–100		–100	
Bank B		100		100
Total	–100	100	–100	100

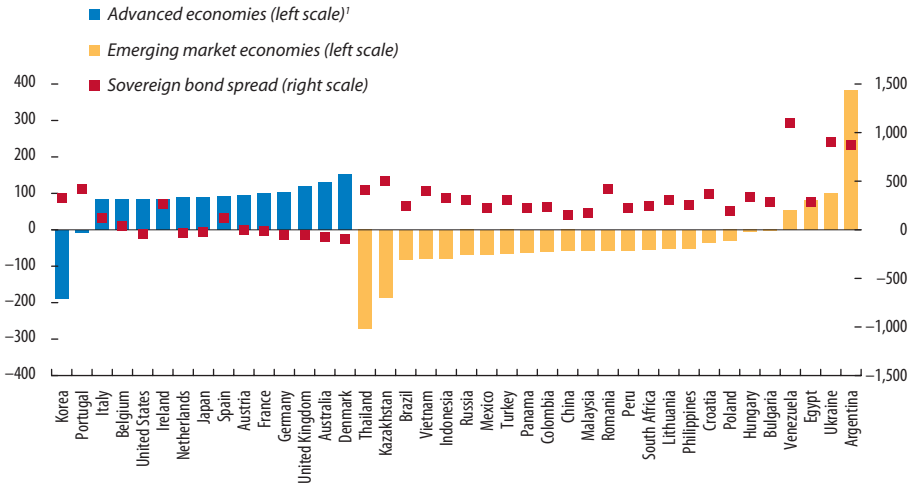
If Bank A hedges its position by buying $100 of CDS protection on the same reference entity from Bank C (the transactions highlighted in blue in the following table), the total gross notional amount rises to $200 but the net notional amount remains at $100. The $100 number is a relevant metric of risk transfer, but $200 is relevant as a counterparty risk metric because, although Bank A is "flat" (no exposure), Banks B and C remain exposed to the risk of Bank A defaulting on its contractual obligations.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank A	–100	100		
Bank B		100		100
Bank C	–100		–100	
Total	–200	200	–100	100

Trade compression and "tear ups" can be used to reduce gross notional amounts by canceling offsetting

Figure 2.14. Difference between Sovereign Credit Default Swap Spreads and Sovereign Bond Spreads, Selected Countries

(In basis points, average for 2008–12, five-year tenors)



Sources: Bloomberg L.P.; and IMF staff calculations.

Note: For sovereign bond spreads, the JPMorgan Asia credit indices are used for Korea and Thailand; EMBI Global indices are used for other emerging market economies; and Bloomberg L.P.'s constant maturity yields minus swap spreads are used for other advanced economies. A similar relationship holds if the EMBI yield-swap rate is used for emerging market conomies.

[1]Excluding Greece, where the average basis is more than 1,300 basis points.

redundant contracts. In this case Bank A can transfer ("novate") to Bank B its contractual obligations to Bank C as shown in the table below, bringing gross notional amounts in the system back to $100.

	Gross Sold	Gross Bought	Net Sold	Net Bought
Bank B		100		100
Bank C	–100		–100	
Total	–100	100	–100	100

In reality, a proliferation of these redundant offsetting trades has created large gaps between gross and net notional amounts. That said, compression operations are limited, as some transfers do not work on account of counterparty limits and restrictions, or the offsetting trades are not quite perfect matches (for example, the same reference entity but different contractual terms) and only dealers (and not end users) take part in the operations.

Annex 2.2. Technical Background: Determinants of SCDS Spreads and Bond Spreads

When comparing SCDS and bond markets, research papers often compare SCDS spreads to bond spreads instead of bond yields.[50] Bond spreads for most advanced economies are measured by the difference between bond yields and interest swap rates, as in Fontana and Scheicher (2010).[51] For emerging market economies, we use the EMBI spread, as in Chan-Lau and Kim (2005). The results are robust if EMBI yields minus swap rates are used instead.

Data

We examine a wide range of countries (Table 2.3) that have meaningful data on SCDS and government bond spreads and other variables used in the analysis. The sample includes both advanced and emerging market economies (33 in total), whereas most previous analyses use one or the other.[52] We use data from October 2008, when the liquidity (bid-ask spread) for SCDS in the advanced economies improved appreciably and DTCC started to provide volume data. For most advanced economies, SCDS contracts reference domestic government bonds, and hence we use their domestic government bond yields. For advanced economies whose SCDS contracts reference external government bonds (e.g., Korea, New Zealand, Sweden,), we use their external bond yields if possible (Korea) or drop them from the analysis. For emerging market economies the SCDS contracts reference their external debt, and we take their external bond spreads from JPMorgan indices (EMBI or the JPMorgan Asia Credit Index).

Determinants of the Spreads

We estimate panel models regressing SCDS spreads and government bond spreads (y_i) on various economic and financial explanatory variables (Xi) listed in Table 2.4 using monthly data. If SCDS markets are more speculative or more influenced by financial market conditions than bond markets, we should see smaller or insignificant coefficients (β) for economic fundamentals variables and larger and more significant coefficients for market and global variables in the SCDS model than in the bond model.

$$\text{Base model } y_i = \alpha_i + \beta X_i + \varepsilon_i \text{ for country } i \quad (2.1)$$

We selected the explanatory variables that are frequently used in the literature on sovereign risk (Table 2.4).[53]

- *Macroeconomic fundamental variables.* The model includes countries' debt-to-GDP ratios, real GDP growth rates, and international reserves. The first variable would be expected to increase spreads, whereas the latter two would reduce them. In addition, lagged return on assets (ROA) of the country's banking sector is included to reflect the possible risk transfer effects from the banking sector to sovereigns (higher bank ROA should reduce the expected contingent liability to the government and lower sovereign risks), as in Diekman and Plank (2012).
- *Market microstructure indicators.* We also include market liquidity (bid-ask spreads) and volume measures (net SCDS volumes outstanding in percent of sovereign debt outstanding). Low

Note: Prepared by Hiroko Oura; based on Oura and Valckx (forthcoming).

[50]Augustin (2012) provides a comprehensive overview of SCDS literature.

[51]Some studies examine euro area countries by looking at bond spreads vis-à-vis German bunds (e.g., Palladini and Portes, 2011), but that approach precludes including Germany in the analysis and complicates bond spread measurements for other advanced economies outside of the euro area such as Japan, the United Kingdom, and the United States. Discussions with market participants suggest that they use measures very similar to ours (i.e., asset swap spreads), taking interest rate swap rates as the relevant funding cost for arbitrage trading. Asset swap spreads and our measures have a high correlation (close to 1).

[52]Beirne and Fratzscher (2013) study a similar sample but with more focus on contagion across countries, taking SCDS and bonds as alternative measures of sovereign risk.

[53]Early studies (Edwards, 1984, 1986; and Boehmer and Megginson, 1990) established the role of fiscal and macro fundamentals for credit spreads. Others emphasized that market factors such as risk appetite, risk premiums, and liquidity are also important (Duffie, Pederson, and Singleton, 2003; Baek, Bandopadhyaya, and Du, 2005; Remolona, Scatigna, and Wu, 2008; Hartelius, Kashiwase, and Kodres, 2008; Pan and Singleton, 2008; Caceres, Guzzo, and Segoviano, 2010; and Alper, Forni, and Gerard, 2012).

Table 2.3. List of Countries Included in Empirical Studies

Countries Used in Panel Estimations[1]			Countries Used in Price Discovery Estimations and Stylized Fact Section										
				Advanced Economies (AE)					Emerging Market Economies (EM)				
All (33)	Advanced Economies (14)	Emerging Market Economies (19)	All (40)	All AE (15)	Euro Area (9)	Core Euro Area (5)	Other Euro Area (4)	Non-Euro Area (6)	All EM (25)	European EM (9)	Other EM (16)	EU (16)	Non-EU (24)
Argentina	Australia	Argentina	Argentina	Australia	Austria	Austria	Ireland	Australia	Argentina	Bulgaria	Argentina	Austria	Argentina
Australia	Austria	Brazil	Australia	Austria	Belgium	Belgium	Italy	Denmark	Brazil	Croatia	Brazil	Belgium	Australia
Austria	Belgium	Bulgaria	Austria	Belgium	France	France	Portugal	Japan	Bulgaria	Hungary	China	Bulgaria	Brazil
Belgium	France	China	Belgium	Denmark	Germany	Germany	Spain	Korea	China	Lithuania	Colombia	Denmark	China
Brazil	Germany	Colombia	Brazil	France	Ireland	Netherlands		United Kingdom	Colombia	Poland	Egypt	France	Colombia
Bulgaria	Ireland	Egypt	Bulgaria	Germany	Italy			United States	Croatia	Romania	Indonesia	Germany	Croatia
China	Italy	Hungary	China	Ireland	Netherlands				Egypt	Russia	Kazakhstan	Hungary	Egypt
Colombia	Japan	Indonesia	Colombia	Italy	Portugal				Hungary	Turkey	Malaysia	Ireland	Indonesia
Egypt	Korea	Kazakhstan	Croatia	Japan	Spain				Indonesia	Ukraine	Mexico	Italy	Japan
France	Netherlands	Malaysia	Denmark	Korea					Kazakhstan		Panama	Lithuania	Kazakhstan
Germany	Portugal	Mexico	Egypt	Netherlands					Lithuania		Peru	Netherlands	Korea
Hungary	Spain	Peru	France	Portugal					Malaysia		Philippines	Poland	Malaysia
Indonesia	United Kingdom	Philippines	Germany	Spain					Mexico		South Africa	Portugal	Mexico
Ireland	United States	Poland	Hungary	United Kingdom					Panama		Thailand	Romania	Panama
Italy		Russia	Indonesia	United States					Peru		Venezuela	Spain	Peru
Japan		South Africa	Ireland						Philippines		Vietnam	United Kingdom	Philippines
Kazakhstan		Thailand	Italy						Poland				Russia
Korea		Turkey	Japan						Romania				South Africa
Malaysia		Ukraine	Kazakhstan						Russia				Thailand
Mexico			Korea						South Africa				Turkey
Netherlands			Lithuania						Thailand				Ukraine
Peru			Malaysia						Turkey				United States
Philippines			Mexico						Ukraine				Venezuela
Poland			Netherlands						Venezuela				Vietnam
Portugal			Panama						Vietnam				
Russia			Peru										
South Africa			Philippines										
Spain			Poland										
Thailand			Portugal										
Turkey			Romania										
Ukraine			Russia										
United Kingdom			South Africa										
United States			Spain										
			Thailand										
			Turkey										
			Ukraine										
			United Kingdom										
			United States										
			Venezuela										
			Vietnam										

Note: Greece excluded; including it tremendously affects the estimated parameters in estimations owing to substantial jumps in credit default swap (CDS) spreads and bond spreads since 2011. Greek sovereign CDS spread and bond spread rose from about 1,000 and 1,100 basis points, respectively, at end 2010 to a peak of over 25,000 and 6,000 basis points in March 2012.

[1]Countries are included only when CDS and referenced bond yields are available from mid-2008 (Croatia, Denmark, Lithuania, and Romania are excluded). Some countries are excluded because of missing explanatory variables: Panama (equity prices), Venezuela (equity prices), and Vietnam (CDS volume).

Table 2.4. List of Variables Used in Regression Analysis

Variables	Definition	Original Frequency	Method of Frequency Conversion	Data Source
Dependent variables				
SCDS spread	Five-year sovereign CDS spread, in basis points.	Daily	Period average	Bloomberg L.P.
Bond spread[1]	Advanced economies: five-year generic government bond yield from Bloomberg – (five-year fixed-for-floating [LIBOR]) interest swap rate. Emerging market economies: five-year EMBI spread for each EMBI member country. Country-specific spreads from JPMorgan Asia Credit indices for Korea and Thailand. In basis points.	Daily	Period average	Bloomberg L.P.
Basis	Sovereign CDS spread – bond spreads, in basis points.	Daily	Period average	Bloomberg L.P.
Country-specific explanatory variables				
Fundamental variables				
Debt-to-GDP ratio	Gross general government debt in percent of GDP.	Annual	Cubic spline	IMF, WEO
GDP growth	Real GDP growth rate, in percent.	Annual	Cubic spline	IMF, WEO
Ratio of foreign reserves to GDP	International reserves minus gold, in percent of GDP.	Monthly	Period average	IMF, IFS
Bank ROA	Market-capitalization-weighted average return on assets for the financial sector in each country, in percent.	Annual	Cubic spline	IMF, CVU[2]
SCDS and bond market-specific indicators				
SCDS bid-ask spread	Sovereign CDS bid-ask spread in percent of mid spread.	Daily	Period average	Bloomberg L.P.
Bond bid-ask spread	Government bond bid-ask yield in percent of mid yield. Available only for countries where the CDS contract references domestic bonds (i.e., advanced economies excluding Korea). Values for other countries are set at zero.	Monthly	Period average	Bloomberg L.P.
Sovereign CDS/bond volume	Notional amount for outstanding sovereign CDS contracts (net of offsetting contracts) in percent of government debt outstanding.	Weekly	Period average	DTCC; WEO
Central bank operation	Central bank bond purchase amount per period, in percent of government bonds outstanding. Available only for euro area countries (ECB), Japan, the United Kingdom, and the United States. For euro area economies, the variable is calculated as total bond purchase by ECB/country-specific government bonds outstanding. Values are set at zero for the other economies.	Weekly	Period sum	Central bank websites
Market-based variables				
Equity return	Annualized return of MSCI country equity index (U.S. dollars). Calculated net of MSCI Global Equity Index (residual from linear regression), in percent, in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Equity volatility	Volatility estimated by GARCH (1,1) using (gross) returns of MSCI country equity index (U.S. dollars). Calculated net of the GARCH (1, 1) estimated volatility for MSCI Global Equity Index (residual from linear regression), in percent, in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Global or region-specific explanatory variables				
VIX	Implied volatility on S&P 500 index options.	Daily	Period average	Bloomberg L.P.
High stress	High market stress period, measured by the probability that the VIX is in a high volatility state (out of three possible states), estimated by a regime-switching framework (Gonzalez-Hermosillo and Hesse, 2011).	Daily	Period average	Bloomberg L.P.; IMF staff estimates
Global equity return	Annualized return in excess of one-month U.S. Treasury yields, in percent.	Monthly	Period average	Bloomberg L.P.
Counterparty	Average CDS spreads for 12 CDS dealer banks (Bank of America, Barclays, BNP Paribas, Citi, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Royal Bank of Scotland, Société Générale, and Wells Fargo). Calculated net of VIX (residual from linear regression) in basis points in order to avoid multicollinearity issues.	Monthly	Period average	Bloomberg L.P.; IMF staff estimates
Funding cost	Three-month LIBOR-OIS spread, in basis points. In own currency for advanced economies, excluding Korea, and in U.S. dollars for emerging market economies and Korea.	Daily	Period average	Bloomberg L.P.

Source: IMF staff.

Note: AE = advanced economies; CDS = credit default swaps; CVU = Corporate Vulnerability Utility; DTCC = Depository Trust and Clearing Corporation; ECB = European Central Bank; EM = emerging market economies; IFS = IMF, International Financial Statistics database; OIS = overnight indexed swap; ROA = return on assets; WEO = IMF, World Economic Outlook database.

[1]For all AE (except for Korea) in the panel sample, sovereign CDS contracts reference domestic bonds, hence domestic government bond yields are used to calculate corresponding bond spreads. For all EM and Korea, sovereign CDS contracts reference external debt, hence JPMorgan's EMBI country-specific spreads are used (country-specific spreads from JPMorgan's Asia Credit indices are used for Korea and Thailand). AE, EM definitions follow IMF, WEO classification of countries and groups.

[2]CVU: an internal database at the IMF constructed using market data from DataStream and company financial statement data from Worldscope.

market liquidity (i.e., high bid-ask spreads) is expected to increase SCDS spreads. The impact of volume is ambiguous: spreads increase with volume if more trading takes place when sovereign risk and demand for insurance are high but decrease if more trading improves market liquidity (e.g., as the SCDS market develops).

- *Country-specific market variables and global variables.* Positive domestic or international equity returns should be associated with better economic performance and lower SCDS spreads. Higher uncertainty and risk aversion (higher country-specific equity volatility and VIX—the implied volatility on S&P 500 index options) should raise SCDS spreads. Higher counterparty risk (proxied by lagged average CDS spreads of major dealer banks) should reduce SCDS spreads, as it reduces the value of SCDS protection sold by financial firms (Arce, Mayordomo, and Pena, forthcoming; and Chan-Lau, 2008). Higher funding costs (LIBOR-OIS spreads and repo haircuts) could make it more expensive to buy reference bonds, and higher margin requirements could reduce the supply of SCDS protection sales, thereby raising spreads. Some of these variables are highly correlated, which may cause multicollinearity problems. Therefore, we use country-specific equity returns net of global equity returns, country-specific equity volatility net of global equity volatility, and counterparty risk net of VIX.[54]

We also estimate a variation of the base model to examine different sensitivities to each explanatory variable during distressed time periods. We proceed by including interaction terms constructed by multiplying a high market stress indicator by the explanatory variables (X_i). Our measure of high stress, based on González-Hermosillo and Hesse (2011), is the probability (ranging from 0 to 1) that VIX is in a high volatility regime (see Figure 2.9).

$$\text{Variation } y_i = \alpha_i + \beta X_i + \gamma HighStress \cdot X_i + \varepsilon_i \quad (2.2)$$

Models are then estimated with and without cross-section and time fixed effects, using robust or clustered standard errors. They are estimated both in levels and in differences as a robustness check, as in Diekman and Plank (2012), to account for possible unit roots or for unobserved cross-section-specific effects. The results are broadly consistent with each other, and the level results are used in Figure 2.5 and Table 2.5.

[54]For instance, we use residuals of a simple ordinary least squares regression of country-specific equity returns on global equity returns. See Table 2.4 for details.

Determinants of the "SCDS-Bond Basis"

The SCDS-bond basis is usually positive for most advanced economies and negative for most emerging market economies.[55] This is because spreads on advanced economy government bonds are negative given that their sovereign yields are generally lower than their comparable interbank rates, which are used to calculate the bond spread, while SCDS spreads are always positive (see Figure 2.14). The opposite is true for emerging market economies whose bond spreads are in foreign currency and are calculated relative to the corresponding maturity U.S. Treasury bonds. At the same time, generalized periods of distress were reflected in notable jumps in the basis for both advanced and emerging market economies.

We estimate a panel model similar to equations (2.1) and (2.2) with the same explanatory variables but with the SCDS-bond basis as the dependent variable (see Table 2.6 for results). The role of central bank purchases is also explored. In general, the results for the SCDS-bond basis should reflect the relative effects of the various factors on the SCDS spreads and government bond spreads. The effects of factors would have a positive effect if SCDS markets are more sensitive to the factor than are government bond markets. Similarly, an opposite sign is expected if the government bond market is the more sensitive. Regarding market microstructure factors, all else remaining constant, liquid SCDS markets would reduce SCDS spreads and hence lower the basis.[56] In

[55]For purposes of the model estimated here, the basis is the difference between the CDS spread and the bond spread, which is equivalent to the basis measure described in Annex 2.1.

[56]See Arce, Mayordomo, and Pena (forthcoming); Ammer and Cai (2011); and Chan-Lau (2008). Ammer and Cai (2011) also show that the option for protection buyers to deliver a wide range of bonds, allowing them to choose the cheapest, leads to a positive basis because protection sellers charge a higher premium to account for the possibility of being delivered less valuable bonds.

Table 2.5. Summary of Estimation of Monthly Drivers for Sovereign Credit Default Swap (SCDS) Spreads and Bond Spreads, October 2008–September 2012

	Expected Sign		CDS, Level			Bond, Level		
				Estimation: With High Stress[2]			Estimation: With High Stress[2]	
	SCDS	Bond	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction Term	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction Term
Country-specific explanatory variables								
Fundamental variables								
Debt-to-GDP ratio	+	+	12.73***	13.32***	-0.64	9.26***	9.76***	–1.17*
GDP growth	–	–	–6.70***	–10.03***	11.49	–2.64*	–4.23***	0.41
Ratio of foreign reserves to GDP	–	–	–6.93*	–5.13	–1.73*	–19.82***	–18.14***	0.33
Bank ROA (lag 12)	–	–	–7.15*	–4.01	–21.79**	–4.54**	–3.75**	–11.22
SCDS and bond market-specific indicators								
SCDS bid-ask spread	+	+/–	10.78***	16.54***	-4.31	8.23***	14.18***	–6.73**
SCDS/bond volume	+/–	+/–	45.16***	48.26***	6.30	41.05***	40.56***	5.44
Bond bid-ask spread, selected advanced economies[3]	+/–	+	37.33***	26.18***	13.25	56.86***	47.62***	17.10*
Market-based variables								
Equity return	–	–	–0.22	–0.29**	0.14	–0.20	–0.29***	0.24
Equity volatility	+	+	1.16***	–0.01	1.68*	0.91***	–0.01	1.38***
Global and region-specific explanatory variables								
VIX	+	+	5.22***	–0.59	8.00**	3.83***	0.25	6.49**
Global equity return	–	–	0.32*	–0.47*	0.97**	0.23*	–0.33**	0.71**
Counterparty (lag 1)	–	+/–	0.31***	–0.05	0.23	0.18**	–0.07	0.30
Funding cost	+	+	1.03**	4.19***	–3.86***	0.63**	2.77***	–2.71***
Adjusted *R*-squared[4]			0.67	0.68		0.77	0.78	

Source: IMF staff estimates.

Note: ROA = return on assets; VIX = implied volatility on S&P 500 index options. This table summarizes the results of the fixed-effects panel estimation on monthly drivers for SCDS and bond spreads using level data. + and – indicate the sign of expected coefficients. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on clustered standard errors. For explanation of the variables, see Table 2.4.

[1]Model estimates for 33 advanced and emerging market economies. See Table 2.3 for the list of countries.

[2]This estimation includes the interaction term for high-stress periods. The results are shown in two columns: "Direct Impact" shows the coefficients for explanatory variables on their own, and "High-Stress Interaction Term" shows the coefficients for high-stress period indicator multiplied by explanatory variables (see the text). High-stress periods are identified as the ones in the highest one-third of the volatility distribution for VIX using a Markov-Switching approach. See Figure 2.9.

[3]Bond bid-ask spreads are available only for advanced economies using domestic bond yields, except for Korea, which is an advanced economy following the World Economic Outlook classification, but whose SCDS reference external debt.

[4]In the high-stress estimation, the adjusted *R*-squared applies to both the direct impact and high-stress interaction terms.

contrast, in several advanced economies, programs of the central bank to purchase government bonds lower their government bond yields, widening it (see IMF, forthcoming). Since these market features might affect advanced economies differently from emerging market economies, these two groups are estimated separately.

The expected relationships for the variables are as follows:

- *Factors limiting arbitrage.* Higher counterparty risk and funding costs could reduce the basis, as the impact of counterparty risk should fall more on SCDS as an OTC derivatives contract, and the impact of funding costs should fall more on bonds that make it more expensive to borrow cash for trading. Larger SCDS (bond) bid-ask spreads should increase (decrease) basis as lower liquidity in the market should primarily bid up spreads in that specific market. The impact of volume is ambiguous.
- *Factors creating differential reactions between the markets.* For the analysis of basis, we introduce bond purchase operations by central banks, as such purchases are expected to reduce bond spreads below SCDS spreads. The coefficients for other variables (fundamentals and markets), together with the results from spread determinants analysis, should indicate which market reacts more to economic and market developments. For example, if both SCDS spreads and bond spreads show positive and significant signs vis-à-vis the debt-to-GDP ratio, and the bond market reacts more than (about the same as)

SCDS, its coefficient in basis regression should be negative (insignificant). Making the assessment in combination with determinants analysis is critical because a negative or insignificant coefficient may also reflect insignificant or unreasonable estimates in both SCDS and bond spread analysis.

The regression analysis of the SCDS-bond basis shows that, overall, the SCDS market is not more sensitive than the government bond market to the factors evaluated (Table 2.6). For some factors, the SCDS spreads react more; for some others, the reverse; and for still other factors, no statistical relationship is detected at all.

- For the full sample of countries and the sample of emerging market economies, SCDS react more than bonds to some economic fundamental factors but less to others.
- On the other hand, the SCDS-bond basis appears to be only weakly related to financial market risk factors.[57]
- The SCDS-bond basis is significantly related to specific forces in the SCDS and government bond market microstructures. However, for advanced economies, higher SCDS bid-ask spreads reduce the basis, suggesting that less SCDS market liquidity has a larger effect on bond spreads than on SCDS spreads. This result is somewhat counterintuitive, as usually one would expect market liquidity to have a larger effect on the underlying market.

During stress periods, the SCDS market appears to react more than the bond market, but mostly for emerging market economies.

[57]This is in line with other studies, including Fontana and Scheicher (2010) and Arce, Mayordoma, and Pena (forthcoming).

Table 2.6. Summary of Estimation Results on Drivers for Basis, October 2008–September 2012

		Full Sample			Advanced Economies			Emerging Market Economies		
			Estimation: With High Stress[2]			Estimation: With High Stress[2]			Estimation: With High Stress[2]	
	Expected sign	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction Term	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction Term	Estimation: Base Model[1]	Direct Impact	High-Stress Interaction Term
Country-specific explanatory variables										
Fundamental variables										
Debt-to-GDP ratio	+/–	3.31**	2.95***	0.77*	–2.12***	–2.33***	0.15	17.50***	15.00***	2.81***
GDP growth	+/–	–4.92***	–4.62***	8.52**	16.48***	3.89***	8.97***	–5.12**	–5.11***	13.14**
Ratio of foreign reserves to GDP	+/–	19.06***	17.16***	–2.70**	28.81***	31.88***	–2.30**	14.09***	11.48***	–1.81**
Bank ROA (lag 12)	+/–	–3.67*	–0.55	–8.95**	–0.56	–2.41**	–3.48	–5.61**	–1.95	–9.66*
SCDS and bond market-specific indicators										
SCDS bid-ask spread, EM	+	39.65***	37.04***	7.98	…	…	…	59.59***	51.13***	–5.69
SCDS bid-ask spread, AE	+	1.62	–1.53	4.32	–4.60***	–4.12***	–0.41	…	…	…
SCDS/bond volume, EM	+/–	–3.62	–1.53	3.60	…	…	…	9.13**	10.33*	6.19**
SCDS/bond volume, AE	+/–	58.58***	39.28***	14.94	11.69	14.99	–9.17	…	…	…
Bond bid-ask spread, AE excluding Korea[3]	–	–12.64***	–15.79***	–4.41	–9.39**	–9.90*	1.89	…	…	…
Central bank operation, selected AE[4]	+	2.51**	0.14	–1.03	2.79**	2.57	0.27	…	…	…
Market-based variables										
Equity return	+/–	–0.05	0.01	–0.14	–0.02	–0.01	–0.04	–0.14	–0.11	0.11
Equity volatility	+/–	0.18	–0.14	0.36	0.09	0.45***	–0.41**	0.07	–0.29	0.52
Global and region-specific explanatory variables										
VIX	+/–	…	0.04	–0.32	…	0.02	1.39	…	–2.27	–0.46
Global equity return	+/–	…	–0.13	0.04	…	–0.12*	0.27***	…	–0.41*	0.39
Counterparty (lag 1)	–	…	0.12	0.15	…	0.49***	–0.32**	…	0.01	–0.14
Funding cost	+	…	1.05***	–0.94**	…	0.41**	–0.14	…	1.58*	–1.68**
Adjusted *R*-squared[5]		0.55	0.55		0.79	0.77		0.52	0.51	

Source: IMF staff estimates.

Note: AE = advanced economies; EM = emerging market economies; ROA = return on assets; VIX = implied volatility on S&P 500 index options. The table summarizes the results of the fixed-effects panel estimation on drivers for the "basis" (SCDS-bond spreads) using monthly level data. + and – indicate the sign of expected coefficients. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on robust standard errors for the base model and on clustered standard errors for the other models. Cells with "..." indicate that the variables are not part of the model. For explanation of the variables, see Table 2.4.

[1]Model estimates for 33 advanced and emerging market economies. See Table 2.3 for the list of countries.

[2]This estimation includes the interaction term for high-stress periods. The results are shown in two columns: "Direct Impact" shows the coefficients for explanatory variables on their own, and "High-Stress Interaction Term" shows the coefficient for high-stress period indicator multiplied by explanatory variables (see text). High-stress periods are identified as the ones in the highest one-third of the volatility distribution for VIX using a Markov-Switching approach. See Figure 2.9.

[3]Bond bid-ask spreads are available only for countries using domestic bond yields, except for North Korea, which is an advanced economy following the World Economic Outlook classification, but whose SCDS reference external debt.

[4]Countries that have central bank bond purchase operation data, including euro area countries, Japan, the United Kingdom, and the United States.

[5]In the high-stress estimation, the adjusted *R*-squared applies to both the direct impact and high-stress interaction terms.

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Capital Planning at Large Bank Holding Companies: Supervisory Expectations and Range of Current Practice

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Contents

Introduction

The Federal Reserve has previously noted the importance of capital planning at large, complex bank holding companies (BHCs). Capital is central to a BHC's ability to absorb unexpected losses and continue to lend to creditworthy businesses and consumers. It serves as the first line of defense against losses, protecting the deposit insurance fund and taxpayers. As such, a large BHC's processes for managing and allocating its capital resources are critical not only to its individual health and performance, but also to the stability and effective functioning of the U.S. financial system. The Federal Reserve's Capital Plan Rule and the associated annual Comprehensive Capital Analysis and Review (CCAR) have emphasized the importance the Federal Reserve places on BHCs' internal capital planning processes, and on the supervisory assessment of all aspects of these processes, which is a key element of a supervisory program that is focused on promoting resiliency at the largest BHCs.[1]

These initiatives have focused not just on the amount of capital that a BHC has, but also on the internal practices and policies a firm uses to determine the amount and composition of capital that would be adequate, given the firm's risk exposures and corporate strategies as well as supervisory expectations and regulatory standards. BHCs have long engaged in some form of capital planning to address the expectations of shareholders, creditors, customers, and other stakeholders. The Federal Reserve's interest in and expectations for effective capital planning reflect the importance of the ongoing viability of the largest BHCs even under stressful financial and economic conditions. Even if current assessments of capital adequacy suggest that a BHC's capital level is sufficient to withstand potential economic stress, robust capital planning helps ensure that this outcome will continue to hold in the future. Robust internal capital planning can also help ensure that BHCs have sufficient capital in a broad range of future macroeconomic and financial market environments by governing the capital actions—including dividend payments, share repurchases, and share issuance and conversion—a BHC takes in these situations.

The Federal Reserve's Capital Plan Rule requires all U.S.-domiciled, top-tier BHCs with total consolidated assets of $50 billion or more to develop and maintain a capital plan supported by a robust process for assessing their capital adequacy.[2] CCAR is the Federal Reserve's supervisory program for assessing the capital plans. In 2013, CCAR covered 18 BHCs that participated in the 2009 Supervisory Capital Assessment Program (SCAP).[3] The Federal Reserve's assessment of a BHC's capital planning process includes an evaluation of the risk-identification, -measurement, and -management practices that support the BHC's capital planning and stress scenario analysis, an assessment of stressed loss and revenue estimation practices, and a review of the governance and controls around these practices. The preamble to the Capital Plan Rule outlines the elements on which the Federal Reserve evaluates the robustness of a BHC's internal capital planning—also referred to as the capital adequacy process, or "CAP." These principles are summarized in figure 1.[4]

This publication describes the Federal Reserve's expectations for internal capital planning at the large, complex BHCs subject to the Capital Plan Rule in light of the seven CAP principles. It expands on previous articulations of these supervisory expectations by providing examples of observed practices among the BHCs participating in CCAR 2013 and by highlighting those practices considered to be stronger or leading practices at these firms. In addition, it identi-

[1] See SR Letter 12-17, "Consolidated Supervision Framework for Large Financial Institutions," (December 17, 2012), www.federalreserve.gov/bankinforeg/srletters/sr1217.htm; 12 CFR 225.8.

[2] 12 CFR 225.8.

[3] The plans of the remaining BHCs subject to the Capital Plan Rule have been assessed through a separate process (the Capital Plan Review). Beginning in 2014, the capital plans of all BHCs subject to the Capital Plan Rule will be evaluated in a single, unified process through CCAR.

[4] See 76 *Fed. Reg.* 74631, 74634 (December 1, 2011).

Figure 1. Seven principles of an effective capital adequacy process

Principle 1: Sound foundational risk management

The BHC has a sound risk-measurement and risk-management infrastructure that supports the identification, measurement, assessment, and control of all material risks arising from its exposures and business activities.

Principle 2: Effective loss-estimation methodologies

The BHC has effective processes for translating risk measures into estimates of potential losses over a range of stressful scenarios and environments and for aggregating those estimated losses across the BHC.

Principle 3: Solid resource-estimation methodologies

The BHC has a clear definition of available capital resources and an effective process for estimating available capital resources (including any projected revenues) over the same range of stressful scenarios and environments used for estimating losses.

Principle 4: Sufficient capital adequacy impact assessment

The BHC has processes for bringing together estimates of losses and capital resources to assess the combined impact on capital adequacy in relation to the BHC's stated goals for the level and composition of capital.

Principle 5: Comprehensive capital policy and capital planning

The BHC has a comprehensive capital policy and robust capital planning practices for establishing capital goals, determining appropriate capital levels and composition of capital, making decisions about capital actions, and maintaining capital contingency plans.

Principle 6: Robust internal controls

The BHC has robust internal controls governing capital adequacy process components, including policies and procedures; change control; model validation and independent review; comprehensive documentation; and review by internal audit.

Principle 7: Effective governance

The BHC has effective board and senior management oversight of the CAP, including periodic review of the BHC's risk infrastructure and loss- and resource-estimation methodologies; evaluation of capital goals; assessment of the appropriateness of stressful scenarios considered; regular review of any limitations and uncertainties in all aspects of the CAP; and approval of capital decisions.

fies practices that the Federal Reserve deems to be weaker, or in some cases unacceptable, and thus in need of significant improvement. However, practices identified in this publication as leading or industry-best practices should not be considered a safe harbor. The Federal Reserve anticipates that leading practices will continue to evolve as new data become available, economic conditions change, new products and businesses introduce new risks, and estimation techniques advance further.

While the supervisory scenarios and supervisory stress tests that are required under the Dodd-Frank Act[5] play an important role in CCAR,[6] they are not meant to be and should not be viewed as providing for an all-encompassing assessment of the possible risks a BHC may face. A robust internal capital planning process should include modeling practices and scenario assumptions that reflect BHC-specific factors. In certain instances, these practices and assumptions may differ considerably from those used by the Federal Reserve. Indeed, designing an internal capital planning process that simply seeks to mirror the Federal Reserve's stress testing is a weak practice. Many lagging practices identified in this publication involve modeling approaches or BHC stress scenarios that fail to reflect BHC-specific factors or that rely on generic assumptions or "standard" modeling techniques, without sufficient consideration of whether those assumptions or techniques are the most appropriate ones for the BHC.

The supervisory expectations summarized here are broad and reflect, at a general level, the key characteristics of a sound and robust internal capital planning process. While certain aspects of the detailed discussion that follows may be less relevant to individual BHCs based on their business mix and risk

[5] 12 CFR part 225, subpart F.

[6] See 12 CFR 225.8(d)(2), 225.8(e)(1).

profile, the core tenets espoused are broadly applicable to all BHCs subject to the Capital Plan Rule.

Importantly, the Federal Reserve has tailored expectations for BHCs of different sizes, scope of operations, activities, and systemic importance in various aspects of capital planning. For example, the Federal Reserve has significantly heightened supervisory expectations for the largest and most complex BHCs—in all aspects of capital planning—and expects these BHCs to have capital planning practices that are widely considered to be leading practices. In addition, the Federal Reserve recognizes the challenges facing BHCs that are new to CCAR and further recognizes that these BHCs will continue to develop and enhance their capital planning systems and processes to meet supervisory expectations.

The purpose of this publication is two-fold. First, it is intended to assist BHC management in assessing their current capital planning processes and in designing and implementing improvements to those processes. Second, it is intended to assist a broader audience in understanding the key aspects of capital planning practices at large, complex U.S. BHCs and the importance the Federal Reserve puts on ensuring that these firms have robust capital resources.

The sections that follow provide greater detail on supervisory expectations and the range of current practice across several dimensions of BHCs' internal capital planning processes. The first section discusses foundational risk management, including identification of risk exposures. The next two sections focus on controls and governance around internal capital planning processes. The fourth section covers expectations and the range of current practice concerning BHCs' capital policies—the internal guidelines governing the capital action decisions made by a BHC under a range of potential future conditions for the firm and for the macroeconomic and financial market environments in which it operates. The subsequent three sections focus on the key elements of BHCs' internal enterprise-wide scenario analysis: design of the stress scenarios and modeling the impact of the scenarios on losses, revenues, balance sheet composition and size, and capital. The final section summarizes the Federal Reserve's conclusions on the current range of practice at BHCs.

Foundational Risk Management

BHCs are expected to have effective risk-identification, -measurement, -management, and -control processes in place to support their internal capital planning.[7] In addition to the assessments of a BHC's stress scenario analysis and stressed loss- and revenue-estimation practices, supervisory assessments of BHCs' internal capital planning will continue to focus on fundamental risk-identification, -measurement, and -management practices, as well as on internal controls and governance. Weaknesses in these areas may contribute to a negative supervisory assessment of a BHC's capital planning process that could lead to an objection to a BHC's capital plan.[8]

A key lesson from the recent financial crisis is that many financial companies simply failed to adequately identify the potential exposures and risks stemming from their firm-wide activities. This was in part a failure of information technology and management information systems (MIS), the often fractured nature of which made it difficult for some companies to identify and aggregate exposures across the firm. But more importantly, many companies failed to consider the full scale and scope of exposures, and to analyze how the size and risk characteristics of their exposures and business activities might evolve as economic and market conditions changed. Combining a comprehensive identification of a firm's business activities and associated positions across the organization with effective techniques for assessing how those positions and activities may evolve under stressful economic and market conditions, and assessing the potential impact of that evolution on the capital needs of the firm, are critical elements of capital planning. A robust internal capital adequacy assessment process relies on the underlying strength of each of these elements.

[7] 12 CFR 225.8(d)(2).

[8] 12 CFR 225.8(e)(2).

Risk Identification

BHCs should have risk-identification processes that ensure that all risks are appropriately accounted for when assessing capital needs.[9] These processes should evaluate the full set of potential exposures stemming from on- and off-balance sheet positions, including those that could arise from provisions of non-contractual support to off-balance-sheet entities, and risks conditional on changing economic and financial market conditions during periods of stress. BHCs should have a systematic and repeatable process to identify all risks and consider the potential impact to capital from these risks. In addition, BHCs should closely assess any assumptions about risk reduction resulting from risk transfer and/or mitigation techniques, including, for example, analysis of the enforceability and effectiveness of any guarantees or netting and collateral agreements and the access to and valuation of collateral as exposures and asset values are changing rapidly in a stressed market.

Stronger risk-identification practices include standardized processes through which senior management regularly update risk assessments, review risk exposures and consider how their risk exposures might evolve under a variety of stressful situations. For example, many BHCs maintain a comprehensive inventory of risks to which they are exposed, and refresh it as conditions warrant (such as changes in the business mix and the operating environment) with input from various units across the BHC. Senior representatives from major lines of business, corporate risk management, finance and treasury, and other business and risk functions with perspectives on BHC-wide positions and risks provide input to the process. Consideration of the risks inherent in new products and activities should be a key part of

[9] 12 CFR 225.8(d)(2).

risk-identification and -assessment programs, which should also consider risks that may be associated with any change in the BHC's strategic direction.

Risk measures should be able to capture changes in an institution's risk profile—whether due to a change in the BHC's strategic direction, specific new products, increased volumes, changes in concentration or portfolio quality, or the overall economic environment—on a timely basis. These risk measures should support BHCs' assessments of capital adequacy and may be helpful in capital contingency plans as early warning indicators or contingency triggers, where appropriate.

BHCs should be able to demonstrate how their identified risks are accounted for in their capital planning processes. If certain risks are omitted from the enterprise-wide scenario analysis, BHCs should note how these risks are accounted for in other aspects of the capital planning process (see box 1 for illustration of how BHCs identified and captured certain risks that are more difficult to quantify in their capital planning process). If a BHC employs risk quantification methodologies in its capital planning that are not scenario-based, it should identify which risks each of the methodologies covers, to facilitate comparability and informed decisionmaking with respect to overall capital adequacy. BHCs with lagging practice did not transparently link their evaluation of capital adequacy to the full range of identified risks. These BHCs were not able to show how all their risks were accounted for in their capital planning processes. In some cases, staff responsible for capital planning operated in silos and developed standalone risk inventories not linked to the enterprise-wide risk inventory or to other risk governance functions within their BHCs.

Box 1. Incorporating Risks That Are More Difficult to Quantify

Scenario-based stress testing is a critical element of robust capital planning. However, stress testing based on a limited number of discrete scenarios cannot and is not expected to capture all potential risks faced by a BHC, and therefore, it should serve as one of several inputs to the capital planning process. Given the scope of operations at and the associated breadth of risks facing large, complex BHCs—including the risk of losses from exposures and of reduced revenue generation—they are often exposed to risks, other than credit or market risk, that are either difficult to quantify or not directly attributable to any of the specific integrated firm-wide scenarios that are evaluated as part of the BHC's scenario-based stress testing ("other risks"). Examples of these other risks include reputational risk, strategic risk, and compliance risk. As noted in the section on risk identification, a BHC should identify and assess all risks as part of its risk-identification process and should capture the potential effect of all risks in its capital planning process. A BHC's capital planning process should assess the potential impact of these other risks on the BHC's capital position to ensure that its capital provides a sufficient buffer against all risks to which the BHC is exposed.

There is a wide range of practices around how BHCs account for other risks as part of their capital planning process. Many BHCs used internal capital targets to account for such risks, putting in place an incremental cushion above their targets to allow for difficult-to-quantify risks and the inherent uncertainty represented by any forward-looking capital planning process. Other BHCs assessed the effect of in terms of some combination of reduced revenue, added expenses, or a management overlay on top of loss estimates. BHCs with lagging practices did not even attempt to account for other risks in their capital planning process.

To the extent possible, BHCs should incorporate the effect of these other risks into their projections of net income over the nine-quarter planning horizon. BHCs should clearly articulate and support any relevant assumptions and the methods used to quantify the effect of other risks on their revenue, expenses, or losses.

For those BHCs that did not incorporate the potential impact of these other risks into their capital targets, stronger practices included a clear articulation of which risks were being addressed by putting in place a cushion above the capital target, and how this cushion is related to identified risks. BHCs should clearly support the method they used to measure the potential effect of such risks. Using a simple rule (such as a percent of capital) or expert judgments to determine the cushion above the capital target, without providing analysis or support, is a lagging practice.

Internal Controls

As with other aspects of key risk-management and finance area functions, a BHC should have a strong internal control framework that helps govern its internal capital planning processes. These controls should include (1) regular and comprehensive review by internal audit; (2) robust and independent model review and validation practices; (3) comprehensive documentation, including policies and procedures; and (4) change controls.

Scope of Internal Controls

A BHC's internal control framework should address its entire capital planning process, including the risk measurement and management systems used to produce input data, the models and other techniques used to generate loss and revenue estimates; the aggregation and reporting framework used to produce reports to management and boards; and the process for making capital adequacy decisions. While some BHCs may naturally develop components of their internal capital planning along separate business lines, the control framework should ensure that BHC management reconciles the separate components in a coherent manner. The control framework also should help assure that all aspects of the capital planning process are functioning as intended in support of robust assessments of capital needs.

BHCs with stronger control coverage reviewed the controls around capital planning on an integrated basis and applied them consistently. Management responded quickly and effectively to issues identified by control areas and devoted appropriate resources to continually ensure that controls were functioning effectively.

Internal Audit

Internal audit should play a key role in evaluating internal capital planning and its various components. Audit should perform a review of the full process, not just of the individual components, periodically to ensure that the entire end-to-end process is functioning in accordance with supervisory expectations and with a BHC's board of directors' expectations as detailed in approved policies and procedures. Internal audit should review the manner in which deficiencies are identified, tracked, and remediated. Audit staff should have the appropriate competence and influence to identify and escalate key issues, and the internal audit function should report regularly on the status of all aspects of the capital planning process—including any identified deficiencies related to the BHC's capital plan—to senior management and the board of directors.

BHCs with stronger audit practices provided a comprehensive, robust review of all components of the capital planning process, including all of the control elements noted earlier.[10] BHCs with leading internal audit practices around internal capital planning had strong issue identification and remediation tracking as well. They also ensured that audit staff had strong technical expertise, elevated stature in the organization, and proper independence from management.[11]

Independent Model Review and Validation

BHCs should conduct independent review and validation of all models used in internal capital planning, consistent with existing supervisory guidance on model risk management (SR Letter 11-7).[12] Validation staff should have the necessary technical compe-

[10] See 12 CFR 225.8(d)(1)(iii).

[11] See SR Letter 13-1, "Supplemental Policy Statement on the Internal Audit Function and Its Outsourcing," (January 23, 2013) www.federalreserve.gov/bankinforeg/srletters/sr1301.htm, for detailed guidance on expectations for the governance and operational effectiveness of an institution's internal audit function.

[12] See SR Letter 11-7, "Supervisory Guidance on Model Risk Management," (April 4, 2011), www.federalreserve.gov/bankinforeg/srletters/sr1107.htm.

tencies, sufficient stature within the organization, and appropriate independence from model developers and business areas, so that they can provide a critical and unbiased evaluation of the models they review.

The model review and validation process should include

- an evaluation of conceptual soundness;
- ongoing monitoring that includes verification of processes and benchmarking; and
- an "outcomes analysis."

BHCs should maintain an inventory of all models used in the capital planning process, including all input or "feeder" models that produce projections or estimates used by the models that generate the final loss, revenue or expense projections. Consideration should be given to the validity of the use of a model under stressed conditions as models designed for ongoing business activities may be inappropriate for estimating net income and capital under stress conditions. BHCs should also maintain a process to incorporate well-supported adjustments to model estimates when model weaknesses and uncertainties are identified.

BHCs continue to face challenges in conducting outcomes analysis of their stress testing models, given limited realized outcomes against which to assess loss, revenue, or expense projections under stressful scenarios. BHCs should attempt to compensate for the challenges inherent in back-testing stress models by conducting sensitivity analysis or by using benchmark or "challenger" models. BHCs should ensure that validation covers all models and assumptions used for capital planning purposes, including any adjustments management has made to the model estimates (management overlay).

Supervisory reviews have found that, in general, BHCs should give more attention to model risk management, including strengthening practices around model review and validation. Nonetheless, some BHCs exhibited stronger practices in their capital planning, including

- maintaining an updated inventory of all models used in the process;
- ensuring that models had been validated for their intended use; and
- being transparent about the validation status of all models used for capital planning and appropriately addressing any models that had not been validated (or those that had identified weaknesses) by restricting their use, or using benchmark or challenger models to help assess the reasonableness of the primary model output.

BHCs with lagging practices were not able to identify all models used in the capital planning process. They also did not formally review all of the models or assumptions used for capital planning purposes (including some high-impact stress testing models). In addition, they did not have validation staff that were independent and that could critically evaluate the models.

Policies and Procedures

BHCs should ensure they have policies and procedures covering the entire capital planning process.[13] Policies and procedures should ensure a consistent and repeatable process for all components of the capital planning process and provide transparency to third parties regarding this process. Policies should be reviewed and updated at least annually and more frequently when warranted. There should also be evidence that management and staff are adhering to policies and procedures in practice, and there should be a formal process for any policy exceptions. Such exceptions should be rare and approved by the appropriate level of management.

Ensuring Integrity of Results

BHCs should have internal controls that ensure the integrity of reported results and the documentation, review, and approval of all material changes to the capital planning process and its components. A BHC should ensure that such controls exist at all levels of the capital planning process. Specific controls should be in place to

- ensure that MIS are sufficiently robust to support capital analysis and decisionmaking, with sufficient flexibility to run ad hoc analysis as needed;
- provide for reconciliation and data integrity processes for all key reports;
- address the presentation of aggregate, enterprise-wide capital planning results, which should describe any manual adjustments made in the

[13] See FR Y-14A reporting form: Summary Schedule Instructions, pp. 5–7.

aggregation process and how those adjustments compensate for identified weaknesses; and

- ensure that reports provided to senior management and the board contain the appropriate level of detail and are accurate and timely. The party responsible for this reporting should assess and report whether the BHC is in compliance with its internal capital goals and targets, and ensure the rationale for any deviations from stated capital objectives is clearly documented and obtain any necessary approvals.[14]

BHCs with stronger practices in this area ensured that good information flows existed to support decisions, with significant investment in controls for data and information. For example, some BHCs had an internal audit group review the data for accuracy and ensured that any data reported to the board and senior management were given extra scrutiny and cross-checking. In addition, BHCs with stronger practices had strong MIS in place that enabled them to collect, synthesize, analyze, and deliver information quickly and efficiently. These systems also had the ability to run ad hoc analysis to support capital planning as needed without employing substantial resources. Other BHCs, however, continue to face challenges with MIS. Many BHCs have systems that are antiquated and/or siloed and not fully compatible, requiring substantial human intervention to reconcile across systems.

[14] See id.

Documentation

BHCs should have clear and comprehensive documentation for all aspects of their capital planning processes, including their risk-measurement and risk-management infrastructure, loss- and resource-estimation methodologies, the process for making capital decisions, and efficacy of control and governance functions.[15] Documentation should contain sufficient detail, accurately describe BHCs' practices, allow for review and challenge, and provide relevant information to decisionmakers.[16]

[15] See id.

[16] See id.

Governance

BHCs should have strong board and senior management oversight of their capital planning processes.[17] This includes ensuring periodic review of the BHC's risk infrastructure and loss- and resource-estimation methodologies; evaluation of capital goals and targets; assessment of the appropriateness of stress scenarios considered; regular review of any limitations in key processes supporting internal capital planning, such as uncertainty around estimates; and approval of capital decisions. Together, a BHC's board and senior management should establish a comprehensive capital planning process that fits into broader risk-management processes and that is consistent with the risk-appetite framework and the strategic direction of the BHC.

Board of Directors

A BHC's board of directors has ultimate oversight responsibility and accountability for capital planning and should be in a position to make informed decisions on capital adequacy and capital actions, including capital distributions.[18] The board of directors should receive sufficient information to understand the BHC's material risks and exposures and to inform and support its decisions on capital adequacy and planning. The board should receive this information at least quarterly, or when there are material developments that affect capital adequacy or the manner in which it is assessed. Capital adequacy information provided to the board should include capital measures under current conditions as well as on a post-stress, pro forma basis and should be framed against the capital goals and targets established by the BHC.

The information provided to the board should include sufficient details on scenarios used for the BHC's internal capital planning so that the board can evaluate the appropriateness of the scenarios, given the current economic outlook and the BHC's current risk profile, business activities, and strategic direction. The information should also include a discussion of key limitations, assumptions, and uncertainties within the capital planning process, so that the board is fully informed of any weaknesses in the process and can effectively challenge reported results before making capital decisions. The board should also receive summary information about mitigation strategies to address key limitations and take action when weaknesses in internal capital planning are identified, applying additional caution and conservatism as needed.

BHCs with stronger practices had boards that were informed of and generally understood the risks, exposures, activities, and vulnerabilities that affected the BHC's capital adequacy. They also understood the major drivers of loss and revenue changes under the scenarios used. The boards of BHCs with stronger practices had sufficient expertise and level of engagement to understand and critically evaluate information provided by senior management. Importantly, they recognized that internal capital planning results are estimates and should be viewed as part of a range of possible results. In addition, the boards of BHCs with stronger practices discussed weaknesses identified in the capital planning process, whether they needed to take immediate action to address those weaknesses, and whether the weaknesses were material enough to alter their view of current capital planning results. They also discussed whether a sufficient range of potential stress events and conditions had been considered in assessing capital adequacy.

Board Reporting

The board of directors is required to approve a BHC's capital plan under the Capital Plan Rule.[19] In order for boards to carry out this requirement, management should provide adequate reporting on key

[17] See 12 CFR 225.8(d)(1)(iii)(A)–(B).
[18] See 12 CFR 225.8(d)(1)(iii)(C).
[19] Id.

areas of the analysis supporting capital plans. BHCs with stronger practices included information about the independent review and validation of models, information on issues identified by internal audit, as well as key assumptions underpinning stress test results and a discussion of the sensitivity of capital levels to those assumptions. BHCs with stronger practices also supplied their boards with information about past capital planning performance to provide a perspective on how the capital planning process has functioned over time.

BHCs with weaker practices provided insufficient information to the board of directors. For example, at some BHCs, capital distribution recommendations did not include all relevant supporting information and appeared to be based on optimistic expectations about how a given scenario may affect the BHC. In addition, the information did not specifically identify and address key assumptions that supported the capital planning process. In other cases, the board of directors did not receive information about governance and controls over internal capital planning, making it difficult to assess the strength of its capital planning processes and whether results were reliable and credible.

Senior Management

Senior management is responsible for ensuring that capital planning activities authorized by the board are implemented in a satisfactory manner and is accountable to the board for the effectiveness of those activities. Senior management should ensure that effective controls are in place around the capital planning process—including ensuring that the BHC's stress scenarios are sufficiently severe and cover the material risks and vulnerabilities facing the BHC.[20]

Senior management should make informed recommendations to the board of directors about the BHC's capital, including capital goals and distribution decisions. Senior management also should ensure that proposed capital goals have sufficient analytical support and fully reflect the expectations of important stakeholders, including creditors, counterparties, investors, and supervisors. Senior management should identify weaknesses and potential limitations in the capital planning process and evaluate them for materiality. In addition, it should develop remediation plans for any weaknesses affecting the reliability of internal capital planning results. Both the specific identified limitations and the remediation plans should be reported to the board.

Senior management with stronger practices recognized the imprecision and prevalence of uncertainty in predicting future outcomes when reviewing information and results from enterprise-wide scenario analysis. At BHCs with stronger practices, senior management maintained an ongoing assessment of all capital planning areas, identifying and clearly documenting any weaknesses, assumptions, limitations, and uncertainties, and did not consider a one-time assessment of the capital planning process to be sufficient. Furthermore, management developed clear remediation plans with specific timelines for resolving identified weaknesses. In some cases, based on its review of the full capital planning process, senior management made more cautious or conservative adjustments to the capital plan, such as recommending less aggressive capital actions. Management also included key assumptions and process weaknesses in reports and specifically pointed them out to the board, in some cases providing analysis showing the sensitivity of capital to alternative outcomes.

Documenting Decisions

BHCs should document decisions about capital adequacy and capital actions taken by the board of directors and senior management, and describe the information used to reach those decisions.[21] Final decisions regarding capital planning of the board or of a designated committee thereof should be recorded and retained in accordance with the company's policies and procedures.

BHCs with stronger documentation practices had board minutes that described how decisions were made and what information was used. Some documentation provided evidence that the board challenged results and recommendations, including reviewing and assessing how senior management challenged the same information. BHCs with weaker documentation practices had board minutes that were very brief and opaque, with little reference to information used by the board to make its decisions. Some BHCs did not formally document key decisions.

[20] 12 CFR 225.8(d)(2)(i)(A)–(D).

[21] See FR Y-14A reporting form: Summary Schedule Instructions, p. 6.

Capital Policy

As noted earlier, a capital policy is the principles and guidelines used by a BHC for capital planning, capital issuance, and usage and distributions. A capital policy should include internal capital goals; quantitative or qualitative guidelines for dividends and stock repurchases; strategies for addressing potential capital shortfalls; and internal governance procedures around capital policy principles and guidelines.[22] The capital policy, as a component of a capital plan, must be approved by the BHC's board of directors or a designated committee of the board.[23] It should be a distinct, comprehensive written document that addresses the major components of the BHC's capital planning processes and links to and is supported by other policies (risk-management, stress testing, model governance, audit, and others). A capital policy should provide details on how a BHC manages, monitors, and makes decisions regarding all aspects of capital planning. The policy should also address roles and responsibilities of decisionmakers, process and data controls, and validation standards. Finally, the capital policy should explicitly lay out expectations for the information included in the BHC's capital plan.

A capital policy should describe targets for the level and composition of capital and provide clarity about the BHC's objectives in managing its capital position. The policy should explain how the BHC's capital planning practices align with the imperative of maintaining a strong capital position and being able to continue to operate through periods of severe stress. It should include quantitative metrics such as common stock dividend (and other) payout ratios as maximums or targets for capital distributions. The policy should include an explanation of how management concluded that these ratios are appropriate, sustainable, and consistent with its capital objectives, business model, and capital plan. It should also specify the capital metrics that senior management and the board use to make capital decisions. In addition, a capital policy should include governance and escalation protocols that are clear, credible, and actionable in the event an actual or projected capital ratio target is breached.

The policy should describe processes surrounding how common stock dividend and repurchase decisions are made and how the BHC arrives at its planned capital distribution amounts. Specifically, the policy should discuss the following:

- the main factors and key metrics that influence the size, timing, and form of capital distributions
- the analytical materials used in making capital distribution decisions (e.g., reports, earnings, stress test results, and others)
- specific circumstances that would cause the BHC to reduce or suspend a dividend or stock repurchase program
- factors the BHC would consider if contemplating the replacement of common equity with other forms of capital
- key roles and responsibilities, including the individuals or groups responsible for producing the analytical material referenced above, reviewing the analysis, making capital distribution recommendations, and making the ultimate decisions

BHCs should establish a minimum frequency (at least annually) and other triggers for when its capital policy is reevaluated and ensure that these triggers remain relevant and current. The capital policy should be reevaluated and revised as necessary to address changes to organizational structure, governance structure, business strategy, capital goals, regulatory environment, risk appetite, and other factors potentially affecting a BHC's capital adequacy. BHCs should develop a formal process for approvals, change management, and documentation retention relating to their capital policies.

Weak capital policies were typically characterized by a limited scope. They only addressed parts of the

[22] 12 CFR 225.8(c)(4).

[23] See 12 CFR 225.8(d)(1)(iii)(C), 225.8(d)(2)(iii).

capital planning process, did not provide sufficient detail to convey clearly how capital action decisions will be made, were not well integrated with or supported by other risk and finance policies, and/or did not contain all of the elements described above (e.g., clearly defined capital goals, guidelines for capital distributions and capital composition, etc.). In some cases, the capital policy was overly generic and not tailored to the BHC's unique circumstances. For example, the policy appeared to be restating supervisory expectations without concrete examples or BHC-specific considerations. In other cases, the more detailed procedures were not presented to the board, thus limiting the board's ability to understand the analysis underlying its capital planning decisions.

Capital Goals and Targets

BHCs should establish capital goals aligned with their risk appetites and risk profiles as well as expectations of internal and external stakeholders, providing specific goals for the level and composition of capital, both current and under stressed conditions. Internal capital goals should be sufficient to allow a BHC to continue its operations during and after the impact of stressful conditions. As such, capital goals should reflect current and future regulatory capital requirements, as well as the expectations of shareholders, rating agencies, counterparties, creditors, supervisors, and other stakeholders.

BHCs should also establish capital targets above their capital goals to ensure that capital levels will not fall below the goals during periods of stress. Capital targets should take into consideration forward-looking elements related to the economic outlook, the BHC's financial condition, the potential impact of stress events, and the uncertainty inherent in the capital planning process. The goals and targets should be specified in the capital policy and reviewed and approved by the board.[24]

In developing their capital goals and targets, particularly with regard to setting the levels of capital distributions, BHCs should explicitly take into account general economic conditions and their plans to grow their on- and off-balance-sheet size and risks organically or through acquisitions. BHCs should consider the impact of external conditions during both normal and stressed economic and market environments and other factors on their overall capital adequacy and ability to raise additional capital, including the potential impact of contingent exposures and broader market or systemic events, which could cause risk to increase beyond the BHC's chosen risk-tolerance level. BHCs should have contingency plans for such outcomes.

Additionally, BHCs should calculate and use several capital measures that represent both leverage and risk, including quarterly estimates of regulatory capital ratios (including tier 1 common ratio) under both baseline and stress conditions. BHCs with weaker practices in this area did not clearly link decisions regarding capital distributions to capital adequacy metrics or internal capital goals.

Weak practices observed in this area included establishing capital goals based solely on regulatory minimums and the ratios required to be considered well-capitalized without consideration of a BHC's specific capital needs given its risk profile, financial condition, business model and strategies, overall complexity, and sensitivity to changing conditions. Some BHCs did not recognize uncertainties and limitations in capturing all potential sources of loss and in projecting loss and revenue estimates, which reduced the BHCs' ability to establish effective capital goals and targets. Other BHCs were not transparent about how they determined the capital goals and targets in their capital policies.

Capital Contingency Plan

BHCs should outline in their capital policies specific capital contingency actions they would consider to remedy any current or prospective deficiencies in their capital position.[25] In particular, a BHC's policy should include a detailed explanation of the circumstances—including deterioration in the economic environment, market conditions, or the financial condition of the BHC—in which it will reduce or suspend a dividend or repurchase program or not execute a previously planned capital action. The policy also should define a set of capital triggers and events that would correspond with these circumstances. These triggers should be established for both baseline and stress scenarios and measured against the BHC's capital targets in those scenarios. These triggers and events should be used to guide the frequency with which board and senior management will revisit planned capital actions as well as review

[24] 12 CFR 225.8(c)(4).

[25] Id.

and act on contingency capital plans. The capital contingency plan should be reviewed and updated as conditions warrant, such as where there are material changes to the BHC's organizational structure or strategic direction or to capital structure, credit quality, and/or market access.

Capital triggers should provide an "early warning" of capital deterioration and should be part of a management decisionmaking framework, which should include target ranges for a normal operating environment and threshold levels that trigger management action. Such action should include escalation to the board, potential suspension of capital actions, and/or activation of a capital contingency plan. Triggers should also be established for other metrics and events that measure or affect the financial condition or perceived financial condition of the firm—for example, liquidity, earnings, debt and credit default swap spreads, ratings downgrades, stock performance, supervisory actions, or general market stress.

Contingency actions should be flexible enough to work in a variety of situations and be realistic for what is achievable during periods of stress. The capital plan should be prepared recognizing that certain capital-raising and capital-preserving activities may not be feasible or effective during periods of stress. BHCs should have an understanding of market capacity constraints when evaluating potential capital actions that require accessing capital markets, including debt or equity issuance and also contemplated asset sales. Contingency actions should be ranked according to ease of execution and their impact and should incorporate the assessment of stakeholder reactions (e.g., impacts on future capital-raising activities).

Weak capital contingency plans provided few options to address contingency situations and/or did not consider the feasibility of options under stressful conditions. Plans with overly optimistic assumptions or excessive reliance on past history (in terms of both possible contingency situations and options to address those situations) were also considered weak, as were plans that lacked support for the feasibility and availability of possible contingency actions. Other weak practices included establishing triggers based on actual results but not on projected results, or based on minimum regulatory capital ratios only with no consideration of the expectations of other stakeholders including counterparties, creditors and investors, or of other metrics or market indicators.

BHC Scenario Design

Under the Capital Plan Rule, a BHC is required to use a BHC-developed stressed scenario that is appropriate for its business model and portfolios.[26] Accordingly, BHCs should have a process for designing scenarios for enterprise-wide scenario analysis that reflects the BHC's unique business activities and associated vulnerabilities.

The range of observed practice for developing BHC stress scenarios was broad. Some BHCs designed stress scenarios using internal models and expertise. Other BHCs used vendor-defined macroeconomic scenarios or used vendor models to define customized macroeconomic scenarios. For BHCs with internally developed scenarios, those with stronger scenario-design practices used internal models in combination with expert judgment rather than relying solely on either models or expert judgment to define scenario conditions and variables. Among BHCs that used third-party scenarios, those with stronger practices tailored third-party-defined scenarios to their own risk profiles and unique vulnerabilities.

Regardless of the method used to develop the scenario, BHCs should have a scenario-selection process that engages a broad range of internal stakeholders such as risk experts, business managers, and senior management. Although they are required to submit only one BHC stress scenario for CCAR, BHCs should develop a suite of scenarios that collectively capture their material risks and vulnerabilities under a variety of stressful circumstances and should incorporate them into their overall capital planning processes.

Scenario Design and Severity

As indicated in the preamble to the Capital Plan Rule, "the bank holding company-designed stress scenario should reflect an individual company's unique vulnerabilities to factors that affect its firm-wide activities and risk exposures, including macroeconomic, market-wide, and firm-specific events."[27] Thus, BHC stress scenarios should reflect macroeconomic and financial conditions that are tailored specifically to stress a BHC's key vulnerabilities and idiosyncratic risks, based on factors such as its particular business model, mix of assets and liabilities, geographic footprint, portfolio characteristics, and revenue drivers. A BHC stress scenario that simply features a generic weakening of macroeconomic conditions similar in magnitude to the supervisory severely adverse scenario does not meet these expectations.

BHCs with stronger scenario-design practices clearly and creatively tailored their BHC stress scenarios to their unique business-model features, emphasizing important sources of risk not captured in the supervisory severely adverse scenario. Examples of such risks observed in practice included a significant counterparty default; a natural disaster or other operational-risk event; and a more acute stress on a particular region, industry, and/or asset class as compared to the stress applied to general macroeconomic conditions in the supervisory adverse and severely adverse scenarios.

At the same time, BHC stress scenarios should not feature assumptions that specifically benefit the BHC. For example, some BHCs with weaker scenario-design practices assumed that they would be viewed as strong compared to their competitors in a stress scenario and would therefore experience increased market share. Such assumptions are contrary to the supervisory expectations for and the intent of a stress testing exercise that informs capital planning.

While a broad-based recession adversely affects a wide range of most BHCs' business activities, BHCs may have business models or important business

[26] 12 CFR 225.8(d)(2)(i)(A).

[27] See 77 *Fed. Reg.* 74631, 74636 (December 1, 2011).

activities that generate vulnerabilities that are not particularly well captured by scenario analysis based on a stressed macroeconomic environment (or for which even a severe recession is not the primary source of potential vulnerability). These BHCs should incorporate into their stress scenarios elements that address the key revenue vulnerabilities and sources of loss for their specific businesses and activities. In combination, the recession incorporated into the BHC stress scenario and any additional elements intended to address specific businesses or activities should result in a substantial stress for the organization, including a significant reduction in capital ratios relative to baseline projections. However, a BHC stress scenario that produces post-stress capital ratios lower than those under the supervisory severely adverse scenario is not, in and of itself, a safe harbor. The stress scenario included in a BHC's capital plan should place substantial strains on its ability to generate revenue and absorb losses, consistent with its unique risks and vulnerabilities.

Variable Coverage

The set of variables that a BHC includes in its stress scenario should be sufficient to address all material risks arising from its exposures and business activities. A business line could face significant stress from multiple sources, requiring more than one risk factor or macroeconomic variable. The scenario should generally contain the relevant variables to facilitate pro forma financial projections that capture the impact of changing conditions and environments. BHCs should have a consistent process for determining the final set of variables and provide this rationale as part of the scenario narrative.

Overall, BHCs with stronger scenario-design practices generated scenarios in which the link between the variables included in the scenario and sources of risk to the BHC's financial outlook were transparent and straightforward. Clear narratives helped make these links more transparent. BHCs with weaker scenario-design practices developed stress scenarios that excluded some variables relevant to the BHC's risk profile and idiosyncratic vulnerabilities. For example, some BHCs with significant trading activities and revenues included a limited set of relevant financial variables. Other BHCs with significant regional and/or industry concentrations did not include relevant geographic or industry variables.

Clear Narratives

The scenario should be supported by a clear narrative describing how the scenario addresses the particular vulnerabilities and material risks facing the BHC. BHCs with stronger scenario-design practices provided narratives describing how the scenario variables related to the risks faced by a BHC's significant business lines and, in some cases, how the scenario variables corresponded to variables in the BHC's internal risk-management models. The narratives also provided explanations of how a scenario stressed a BHC's unique vulnerabilities specific to its business model and how the paths of the scenario variables related to each other in an economically intuitive way. Weaker practices included scenario narratives that did not provide any context for the variable paths as well as scenario narratives that described features that were not reflected in any variables considered in a BHC's internal capital planning.

Estimation Methodologies for Losses, Revenues, and Expenses

A BHC's capital plan must include estimates of projected revenues, expenses, losses, reserves, and pro forma capital levels, including any minimum regulatory capital ratios, the tier 1 common ratio and any additional capital measures deemed relevant by the BHC, over the planning horizon under expected conditions and under a range of stressed scenarios.[28]

General Expectations

Projections of losses, revenues, and expenses under hypothetical stressed conditions serve as the fundamental building blocks of the pro forma financial analysis supporting enterprise-wide scenario analysis. BHCs should have stress testing methodologies that generate credible estimates that are consistent with assumed scenario conditions. It is important for BHCs to understand the uncertainties around their estimates, including the sensitivity of the estimates to changes in inputs and key assumptions. Overall, BHCs' estimates of losses, revenues, and expenses under each of the scenarios should be supported by empirical evidence, and the entire estimation process should be transparent and repeatable. The Federal Reserve generally expects BHCs to use models or other quantitative methods as the basis for their estimates; however, there may be instances where a management overlay or other qualitative approaches may be appropriate due to data limitations, new products or businesses, or other factors. In such instances, BHCs should ensure that such processes are well supported, transparent, and repeatable over time.

Establishing a Quantitative Basis for Enterprise-Wide Scenario Analysis

Generally, BHCs should develop and use internal data to estimate losses, revenues, and expenses as part of enterprise-wide scenario analysis.[29] However, in certain instances, it may be more appropriate for BHCs to use external data to make their models more robust. For example, BHCs may lack sufficient, relevant historical data due to factors such as systems limitations, acquisitions, or new products. When using external data, BHCs should take care to ensure that the external data reasonably approximate underlying risk characteristics of their portfolios, and make adjustments to modeled outputs to account for identified differences in risk characteristics and performance reflected in internal and external data.

BHCs can use a range of quantitative approaches to estimate losses, revenues, and expenses, depending on the type of portfolio or activity for which the approach is used, the granularity and length of available time series of data, and the materiality of a given portfolio or activity. While the Federal Reserve does not require BHCs to use a specific estimation method, each BHC should estimate its losses, revenues, and expenses at sufficient granularity so that it can identify common, key risk drivers and capture the effect of changing conditions and environments. For example, loss models should be estimated at a sufficiently granular subportfolio or segment level so that they can capture observed variations in risk characteristics and performance across the subportfolios or segments and across time, and account for changing exposure or portfolio characteristics over the planning horizon.

While BHCs often segment their portfolios and activities along functional areas, such as by line of business or product type, the leading practice is to determine segments based on common risk characteristics (e.g., credit score ranges or loan-to-value ratio ranges) that exhibit meaningful differences in historical performance. The granularity of segments typically depends on the type, size, and composition of the BHC's portfolio. For example, a more diverse portfolio—both in terms of borrower risk character-

[28] 12 CFR 225.8(d)(1).

[29] BHCs are required to collect and report a substantial amount of risk information to the Federal Reserve on FR Y-14 schedules. These data may help to support the BHCs' enterprise-wide scenario analysis.

istics and performance—would generally require a greater number of segments to account for the heterogeneity of the portfolio. However, when segmenting portfolios, it is important to ensure that each risk segment has sufficient data observations to produce reliable model estimates.

As a general practice, BHCs should separately estimate losses, revenues, or expenses for portfolios or business lines that are sensitive to different risk drivers or sensitive to risk drivers in a markedly different way. For instance, losses on commercial and industrial loans and commercial real estate (CRE) loans are, in part, driven by different factors, with the path of property values having a more pronounced effect on CRE loan losses. Similarly, although falling property value affects both income-producing CRE loans and construction loans, the effect often differs materially due to structural differences between the two portfolios. Such differences can become more pronounced during periods of stress. BHCs with leading practices have demonstrated clearly the rationale for selecting certain risk drivers over others. BHCs with lagging practices used risk drivers that did not have a clear link to results, either statistically or conceptually.

Many models used for stress testing require a significant number of assumptions to implement. Further, the relationship between macroeconomic variables and losses, revenues, or expenses could differ considerably in the hypothetical stress scenario from what is observed historically. As a result, while traditional tools for evaluating model performance (such as comparing projections to historical out-of-sample outcomes) are still useful, the Federal Reserve expects BHCs to supplement them with other types of analysis. Sensitivity analysis is one tool that some BHCs have used to test the robustness of models and to help model developers, BHC management, the board of directors, and supervisors identify the assumptions and parameters that materially affect outcomes. Sensitivity analysis can also help ensure that core assumptions are clearly linked to outcomes. Using results from different estimation approaches (challenger models) as a benchmark is another way BHCs can gain greater comfort around their primary model estimates, as the strengths of one approach could potentially compensate for the weaknesses of another. When using multiple approaches, however, it is important that BHCs have a consistent framework for evaluating the results of different approaches and supporting rationale for why they chose the methods and estimates they ultimately used.

In certain instances, BHCs may need to rely on third-party models—for example, due to limitations in internal modeling capacity. In using these third-party models (vendor models or consultant-developed models), BHCs should ensure that their internal staff have working knowledge and a good conceptual understanding of the design and functioning of the models and potential model limitations so that management can clearly communicate them to those governing the process. An off-the-shelf vendor model often requires some level of firm-specific analysis and customization to demonstrate that it produces estimates appropriate for the BHC and consistent with scenario conditions. Sensitivity analysis can be particularly helpful in understanding the range of possible results of vendor models with less transparent or proprietary elements. Importantly, all vendor and consultant-developed models should be validated in accordance with SR 11-7 guidelines.[30]

Some BHCs generated annual projections for certain loss, revenue, or expense items and then evenly distributed them over the four quarters of each year. This practice does not reflect a careful estimate of the expected quarterly path of losses, net revenue, and capital, and thus is only acceptable when a BHC can clearly demonstrate that the projected item is highly uncertain and the practice likely results in a conservative estimate.

Qualitative Projections, Expert Judgment, and Adjustments

While quantitative approaches are important elements of enterprise-wide scenario analysis, BHCs should not rely on weak or poorly specified models simply to have a modeled approach. In fact, most BHCs use some forms of expert judgment for some purposes—generally as a management adjustment overlay to modeled outputs. And BHCs can, in limited cases, use expert judgment as the primary method to produce an estimate of losses, revenue, or expenses. BHCs may use a management overlay to account for the unique risks of certain portfolios that are not well captured in their models, or otherwise to compensate for specific model and data limitations. Material changes in BHCs' businesses or limitations in relevant data may lead some BHCs to rely wholly on expert judgment for certain loss, revenue, or expense projections. In using expert judgment, BHCs

[30] See SR Letter 11-7, "Supervisory Guidance on Model Risk Management," (April 4, 2011), www.federalreserve.gov/bankinforeg/srletters/sr1107.htm.

should ensure that they have a transparent and repeatable process, that management judgments are well supported, and that key assumptions are consistent with assumed scenario conditions.

As with quantitative methods, the assumptions and processes that support qualitative approaches should be clearly documented so that an external reviewer can follow the logic and evaluate the reasonableness of the outcomes.[31] Any potential shortcomings should be investigated and communicated to decisionmakers. In addition, any management overlay or qualitatively derived projections should be subject to effective review and challenge. BHCs should evaluate a range of potential estimates and conduct sensitivity analysis for key assumptions used in the estimation process. For example, if a BHC makes extensive adjustments to its modeled estimates of losses, revenue, and expenses, the impact of such adjustments should be quantified relative to unadjusted estimates, and these results should be documented and made available to BHC management and the board of directors. Finally, extensive use of management judgment to adjust modeled estimates should trigger review and discussion as to whether new or improved modeling approaches are needed. In reporting to the board of directors, management should always provide both the initial results and the results after any judgmental adjustments.

Conservatism and Credibility

Given the uncertainty inherent in a forward-looking capital planning exercise, the Federal Reserve expects BHCs to apply generally conservative assumptions throughout the stress testing process to ensure appropriate tests of the BHCs' resilience to stressful conditions. In particular, BHCs should ensure that models are developed using data that contain sufficiently adverse outcomes. If a BHC experienced better-than-average performance during previous periods of stress, it should not assume that those prior patterns will remain unchanged in the stress scenario. BHCs should carefully review the applicability of key assumptions and critically assess how historically observed patterns may change in unfavorable ways during a period of severe stress for the economy, the financial markets, and the BHC.

In the context of CCAR loss and revenue estimates, BHCs should generally include all applicable loss events in their analysis, unless a BHC no longer engages in a line of business or its activities have changed such that the BHC is no longer exposed to a particular risk. BHCs should not selectively exclude losses based on arguments that the nature of the ongoing business or activity has changed—for example, because certain loans were underwritten to standards that no longer apply or were acquired and, therefore, differ from those that would have been originated by the acquiring institution.

Similarly, BHCs should not rely on favorable assumptions that cannot be reasonably assured to occur in stressed environments given the high level of uncertainty around market conditions. BHCs should also not assume any foresight of scenario conditions over the projection horizon beyond what would reasonably be knowable in real-life situations. For example, some BHCs have used the path of stress scenario variables to make optimistic assumptions about possible management actions *ex ante* in anticipation of stressful conditions, such as preemptively rebalancing their portfolios or otherwise adjusting their risk profiles to mitigate the expected impact. In the event of a downturn, the future path or progression of economic and market conditions would not be clearly known, and this uncertainty should be reflected in the capital plans.

Documentation of Estimation Practices

The Federal Reserve expects BHCs to clearly document their key methodologies and assumptions used to estimate losses, revenues, and expenses.[32] BHCs with stronger practices provided documentation that concisely explained methodologies, with relevant macroeconomic or other risk drivers, and demonstrated relationships between these drivers and estimates. Documentation should clearly delineate among model outputs, qualitative overlays to model outputs, and purely qualitative estimates.[33] BHCs with weaker practices often had limited documentation that was poorly organized and that relied heavily on subjective management judgment for key model inputs with limited empirical support for and documentation of these adjustments.

[31] See FR Y-14A reporting form: Summary Schedule Instructions, pp. 5–6.

[32] See id.

[33] See id.

Loss-Estimation Methodologies

As noted earlier, a BHC's internal stress testing processes should be designed to capture risks inherent in its own exposures and business activities. Consistent with any good modeling practices, when developing loss-estimation methodologies, BHCs should first determine whether there is a sound theoretical basis for macroeconomic and other explanatory variables (risk drivers) used to estimate losses, and then empirically demonstrate that a strong relationship exists between those variables and losses. For example, most BHCs' residential-mortgage loss models used some measure of unemployment and a house price index as explanatory variables, which affect a borrower's ability and incentive to repay.

Beyond the core set of macroeconomic variables that typically represents a given scenario, such as gross domestic products (GDP), unemployment rate, Treasury yields, credit spreads, and various price indices, BHCs often project additional variables that have a more direct link to particular portfolios or exposures. Some examples of these variables include regional macroeconomic variables that better capture the BHC's geographic exposures and sector-specific variables, such as office vacancy rates and corporate profits. Using these additional variables to estimate the model can enhance the sensitivity of loss estimates to a given scenario and also improve the overall fit of the model. Any models used to produce additional risk drivers are key components of the loss-estimation process and, therefore, should be included in BHCs' model inventories and receive the same model risk-management treatment as core loss-estimation models.

Generally, BHCs sum up losses from various portfolios and activities to produce aggregate losses for the enterprise-wide scenario analysis. BHCs should have a repeatable process to aggregate losses, particularly when they transform model estimates to combine disparate risk measures (such as accounting-based and economic loss concepts), different measurement horizons, or otherwise dissimilar loss estimates.

BHCs with leading practices used automated processes that showed a clear audit trail from source data to loss estimation and aggregation, with full reconcilement to source systems and regulatory reports and mechanisms requiring approval and logging of judgmental adjustments and overrides. These systems often leveraged existing enterprise-wide financial and regulatory consolidation processes.

BHCs with lagging practices exhibited a high degree of manual intervention in the aggregation process, and applied aggregate-level management adjustments that were not transparent or well supported.

Retail and Wholesale Credit Risk

BHCs used a range of approaches to produce loss estimates on loans to retail and corporate customers, often using different estimation methods for different portfolios. This section describes the observed range of practice for the methods used to project losses on retail and wholesale loan portfolios.

Data and Segmentation

Sources of data used for loss estimation have often differed between retail and wholesale portfolios. Due to availability of a richer set of retail loss data, particularly from the most recent downturn, BHCs generally used internal data to estimate defaults or losses on retail portfolios and only infrequently used external data with longer history to benchmark estimated losses on portfolios that had more limited loss experience in the recent downturn. For wholesale portfolios, some BHCs supplemented internal data with external data or used external data to calibrate their models due to a short time series (5–10 years) that included only a single downturn cycle.

BHCs with stronger practices accounted for dynamic changes in their portfolios, such as loan modifications or changes in portfolio risk characteristics, and made appropriate adjustments to data or estimates to compensate for known data limitations (including lack of historical periods of stress).

BHCs with weaker practices failed to compensate for data limitations or adequately demonstrate that external data reasonably reflect the BHC's actual exposures, often failing to capture geographic, industry, or lending-type concentrations.

The level of segmentation used for modeling varied depending on the type and size of portfolio and estimation methods used. For example, BHCs often segmented the retail portfolio based on some combinations of product; lien position; risk characteristics such as credit score, loan-to-value ratio, and collateral; and underlying collateral information (e.g., single-family home versus condominium), though some models were estimated at the loan-level and others at the portfolio level.

BHCs with stronger practices had segmentation schemes that were well supported by the BHC's data and analysis, with sufficient granularity to capture exposures that react differently to risk drivers under stressed conditions.

BHCs with weaker practices used a single model for multiple portfolios, without sufficiently adjusting modeling assumptions to capture the unique risk drivers of each portfolio. For example, in estimating losses on wholesale portfolios, these BHCs did not adequately allow for variation in loss rates commonly attributed to industry, obligor type, collateral, lien position, or other relevant information.

Common Credit Loan Loss-Estimation Approaches

BHCs have used a wide range of methods to estimate credit losses, depending on the type and size of portfolios and data availability. These methods can be based on either an accounting-based loss approach (that is, charge-off and recovery) or an economic loss approach (that is, expected losses). BHCs have flexibility in selecting a specific loss or estimation approach; however, it is important for BHCs to understand differences between the two loss approaches, particularly in terms of the timing of loss recognition, and to account for the differences in setting the appropriate level of reserves at the end of each quarter.

Expected Loss Approaches

Under the expected loss approach, losses are estimated as a function of three components—probability of default (PD), loss given default (LGD), and exposure at default (EAD). PD, LGD, and EAD can be estimated at a segment level or at an individual loan level, and using different models or assumptions. In general, BHCs used econometric models to estimate losses under a given scenario, where the estimated PDs were conditioned on the macroeconomic environment and portfolio or loan characteristics. Some BHCs used other approaches, such as rating transition models, to estimate stressed default rates as part of an expected loss framework.

BHCs with leading practices were able to break down losses into PD, LGD, and EAD components, separately identifying key risk drivers for each of those components, though they typically did not demonstrate this level of granularity consistently across all portfolios. For certain wholesale portfolios, some BHCs used long-run average PD, LGD, and EAD for a particular segment, such as a rating grade, to estimate losses. By design, estimates based on long-run average behavior over a mix of conditions, including periods of economic expansion and downturn, are not appropriate for projecting losses under stress and should not be used for these purposes.

BHCs with leading practices clearly tied LGD to underlying risk drivers, accounted for collateral and guarantees, and also incorporated the likelihood of a decline in collateral values under stress. However, most BHCs have more limited data on LGD and, as a result, BHCs often applied a simple, conservative assumption (e.g., 100 percent LGD for credit cards), based stressed LGD on their experience during the crisis, or scaled up the historical average LGD using expert judgment. In using such methods, it is important for BHCs to ensure that the process is well supported and transparent in line with the Federal Reserve's general expectation for expert judgment-based estimates. Wherever possible, BHCs should benchmark their estimates with external data or research and analysis.

BHCs with lagging practices modeled LGD using a weighted-average approach at an aggregate portfolio level, without some level of segmentation (e.g., by lending product, priority of claim, collateral type, geography, vintage, or LTV). Or, they failed to demonstrate that LGD estimates were consistent with the severity of the scenario.

Although some BHCs found a relationship between EAD and credit quality, most BHCs did not model EADs to vary according to the macroeconomic environment, in large part due to data limitations. Rather, many BHCs applied a static assumption to estimate stressed EAD.

BHCs with stronger practices included the use of loan equivalent calculations (i.e., estimated additional drawdowns as a percentage of unused commitments, which are added to the outstanding or drawn balance) and credit-conversion factors (i.e., additional drawdowns during the period leading up to default—usually one year prior—as a percentage of both drawn and undrawn commitments) to capture losses associated with undrawn commitments.

BHCs with weaker practices did not project stressed exposures associated with undrawn commitments and/or relied on the assumption that they can

actively manage down committed lines during stress scenarios.

Rating Transition Models

Many BHCs have used a rating transition-based approach to produce a stressed rating transition matrix for each quarter, which is then used to estimate losses for their wholesale portfolios under stress. These approaches used credit ratings applied to individual loans by the BHC and projected how these ratings would change over time given the macroeconomic scenario. Although the details of techniques used to link rating transitions to scenario conditions varied across firms, the process usually involved the following steps: (1) converting the rating transition matrix into a single summary measure; (2) estimating a time-series model linking the summary measure to scenario variables; (3) projecting the summary measure over the nine-quarter planning horizon, using the parameter estimates from the time-series model; and (4) converting the projected summary measure into a full set of quarterly transition matrices. BHCs using such an approach should be able to demonstrate that the summary measure responds to changes in economic conditions as expected (that is, worsens as the economic condition deteriorates) and results in projected rating transition matrices that are consistent with the severity of scenario. Judgmentally selecting transition matrices from past stress periods is a weak practice, as it may produce loss estimates that are not consistent with a given scenario and fails to recognize that conditions in the future may not precisely mirror conditions observed by the BHC in the past.

Sound rating transition models require two fundamental building blocks: a robust time series of data and well-calibrated, granular-risk rating systems. The Federal Reserve expects BHCs that use rating transition models to have robust time series of data that include a sufficient number of transitions, which allows BHCs to establish a statistically significant relationship between the transition behavior and macroeconomic variables. Data availability has been a widespread constraint inhibiting the development of granular transition models because a sufficient number of upgrades and downgrades are necessary to preclude sparse matrices. In order to overcome these data limitations, BHCs have often relied on third-party data to develop rating transition models. Consistent with the Federal Reserve's general expectations, when using third-party data, BHCs should be able to demonstrate that the transition matrices estimated with external data are a reasonable proxy for the migration behavior of their portfolios. Rating transition models also require granular ratings systems that capture differences in the potential for defaults and losses for a given set of exposures in various economic environments. BHCs that lack well-calibrated, granular credit-risk rating systems are often unable to produce useful transition matrices.

BHCs with stronger practices typically had more granular ratings system and accounted for limitations in their data and/or credit rating systems by making adjustments to model assumptions or estimates, or by supplementing internal data with external data.

BHCs with weaker practices often failed to demonstrate that supplemented external data adequately reflected the ratings performance of the BHC's portfolio. BHCs with weaker practices also sometimes relied on a risk rating process that historically resulted in lumpiness in rating upgrades and downgrades or material concentrations in one or two rating categories. As a result, these BHCs often produced transition matrices with limited sensitivity to scenario variables, and resulting estimates were more consistent with long-term average default rates than with default rates that would be experienced under severe economic stress.

Roll-Rate Models

Many BHCs have used roll-rate models to estimate losses for various retail portfolios. Roll-rate models generally estimate the rate at which loans that are current or delinquent in a given quarter roll into delinquent or default status in the next period. As a result, they are conceptually similar to rating transition models. The Federal Reserve expects BHCs that use roll-rate models to have a robust time series of data with sufficient granularity. The robust time series data allow the BHC to establish a strong relationship between roll rates and scenario variables, while the availability of granular data enables BHCs to model all relevant loan transitions and to segment the portfolio into subportfolios that exhibit meaningful variations in performance, particularly during the period of stress. In general, BHCs should estimate roll rates using models that are conditioned on scenario variables. For certain transition states where statistical relationships between roll rates and sce-

narios are weak (such as late stage loan delinquency), BHCs should incorporate conservative assumptions rather than relying solely on statistical relationships.

While roll-rate models have some advantages, including transparency and ease of use, they often have a weak predictive power outside the near future, particularly if they are not properly conditioned on scenario variables. As a result, some roll-rate models have limited usefulness for stress testing over a longer horizon, such as the nine-quarter planning horizon required in CCAR. Some BHCs have used roll-rate models in conjunction with other estimation approaches (such as a vintage model described below) that project losses for later periods. In general, it is a weaker practice to combine two different models, as it can introduce unexpected jumps in estimated losses over the planning horizon, though some BHCs have judgmentally weighed two different estimation methods to smooth projected losses. If BHCs combine two models, they should be able to demonstrate that such an approach is empirically warranted based on output analysis, including sensitivity analysis, and that the process of transitioning from one set of results to the other is consistent, well supported, and transparent.

Vintage Loss Models

Some BHCs use vintage loss models, also known as age-cohort-time models, to estimate losses for certain retail portfolios. BHCs that use vintage loss models generally segment their retail portfolios by vintage and collateral- or credit-quality-based segments. Losses are estimated using a multistep process—developing a baseline seasoning curve for each segment and using a regression model to estimate sensitivity of losses to macroeconomic variables at each seasoning level (e.g., four quarters after origination). This technique is commonly used in several vendor models, but BHCs also have developed and used proprietary models using this technique.

These models have several advantages (such as natural segmentation of portfolio by cohort and maturity) and ease of application to credit products (such as auto loans) that exhibit lifecycle effects. However, vintage models can be very challenging to construct, calibrate, and validate. In particular, it may be difficult to separately identify vintage effects from the effects of macroeconomic variables, which can result in poorly specified models. These models also assume that different cohorts will experience similar losses over time, generating results that are representative of average years, rather than during the period of stress. In using vintage models, it is important for a BHC to be able to demonstrate that the approach appropriately reflects its portfolio composition and history, and that modeled outputs are consistent with stressed conditions.

Charge-Off Models

A minority of BHCs have used net charge-off (NCO) models as either a primary loss-estimation model or a benchmark model. Typically, the NCO models BHCs used estimated a statistical relationship between charge-off rates and macroeconomic variables at a portfolio level, and often included autoregressive terms (lagged NCO rates). While some BHCs also incorporated variables that describe the underlying risk characteristics of the portfolio, NCO models that BHCs used for capital planning generally did not capture variation in sensitivities to risk drivers across important portfolio segments nor accounted for changes in portfolio risk characteristics over time. As a matter of general practice, BHCs should not use models that do not capture changes in portfolio risk characteristics over time and in scenarios used for stress testing as part of their internal capital planning.

NCO models often exhibit lower explanatory power than models that consider distinct portfolio risk drivers. In addition, NCO models implicitly assume that historical charge-off performance is a good predictor of future performance; however, the historical relationship between charge-offs and macro variables may not be realized under very stressful scenarios that fall outside the portfolio's actual historical experience. Accordingly, a NCO model that is estimated without using sufficient segmentation or does not account for current or changing portfolio composition is unlikely to produce robust loss estimates. Thus, BHCs should avoid using such a NCO model as the primary loss-estimation approach for a material portfolio.

Scalar Adjustments

Some BHCs have used simple scalars to adjust portfolio loss estimate under a baseline scenario upward for stress scenarios. Scalars have been calibrated based on some combination of historical performance, the ratio of modeled stressed losses to baseline losses estimated for other portfolios, and expert judgment. Scalar adjustments are easy to develop, implement, and communicate; however, the approach

has significant shortcomings, including lack of transparency and lack of sensitivity to changes in portfolio composition and scenario variables. Consequently, the use of these types of approaches should be, at most, limited to immaterial portfolios.

Available-for-Sale (AFS) and Held-to-Maturity (HTM) Securities

BHCs should test all credit-sensitive AFS and HTM securities for potential other-than-temporary impairment (OTTI) regardless of current impairment status. The threshold for determining OTTI for structured products should be based on cash-flow analysis and credit analysis of underlying obligors. Most BHCs used a ratings-based approach to determine OTTI of direct obligations such as corporate bonds, based on the projection of ratings migration under a stress scenario and a ratings-based OTTI threshold. However, some BHCs with weaker practice used a ratings-based approach that kept the ratings static over the scenario horizon.

BHCs should have quantitative methods that capture appropriate risk drivers and explicitly translate assumed scenario conditions into estimated losses. Estimation methods should generate results that conform to standard accounting treatment, are consistent with scenario conditions, and are appropriately sensitive to changes in key variables. Any assumptions (e.g., assumptions related to loss recognition) should be consistent with the intent of a stress testing exercise. Additionally, models should be independently validated for their use in projecting OTTI losses for specific classes of securities.

OTTI processes for AFS and HTM securities portfolios varied in sophistication across BHCs. BHCs with leading practices used estimation methods that capture both security-specific and country-specific performance data for relevant portfolios. For securitized products, they modeled the credit risk of underlying exposures (e.g., commercial real estate loans) to estimate potential losses. Where BHCs used management judgment, it was limited and well supported in the methodology documentation.

In addition, BHCs with leading practices chose conservative approaches and assumptions for OTTI loss estimation, such as recognizing losses in early quarters rather than over the entire scenario horizon. Though, under current accounting rules, OTTI losses are recognized only up to the amount of unrealized losses, some BHCs have taken a conservative approach to allow OTTI losses to exceed projected unrealized losses.

BHCs with lagging practices did not test all credit-sensitive securities for potential OTTI; rather, they tested only currently impaired positions or securities that met a certain criteria (e.g., only securities rated below investment grade) for OTTI. BHCs should not rely solely on a ratings-based threshold to determine OTTI for structured products. BHCs with lagging practices had OTTI loss-estimation methodologies that did not capture appropriate risk drivers or scenario conditions and/or were not applied at a sufficiently granular level. In some cases, BHCs excluded key explanatory variables for certain asset classes. For example, the unemployment rate was used to project OTTI losses for non-agency residential mortgage-backed securities (RMBS), but the housing price index (HPI) was excluded even though the theory and empirical evidence points to a strong relationship between mortgage losses and housing prices. As a result of these methodology deficiencies, these BHCs projected OTTI losses that were inconsistent with the risk characteristics of the portfolio and assumed scenario conditions.

Operational Risk

Best practices in operational-risk models are still evolving, and the Capital Plan Rule does not require BHCs to use advanced measurement approach (AMA) models for stressed operational-risk loss estimation.[34] However, BHCs that have developed a rich set of data to support the AMA should consider leveraging the same data and risk-management tools to estimate operational losses under a stress scenario, regardless of a particular methodology they choose to estimate losses.

Most operational-risk models use historical data on operational-risk loss "events"—incidences in which a BHC has experienced a loss or been exposed to loss due to inadequate or failed internal processes, people, or systems or from external events. Generally, operational-risk events are grouped into one of several event-type categories, such as internal fraud, external fraud, or damage to physical assets.[35] In general, BHCs should use internal operational-loss data

[34] 12 CFR part 225, appendix G.

[35] For example, the seven event-type categories used for AMA are internal fraud; external fraud; employment practices and workplace safety; clients, products, and business practices; damage to physical assets; business disruption and system failures; and execution, delivery, and process management.

as a starting point to provide historical perspective, and then incorporate forward-looking elements, idiosyncratic risks, and tail events to estimate losses. Most BHCs have supplemented their internal loss data with external data when modeling operational-risk loss estimates and scaled the losses to make the external loss data more commensurate with their individual risk profiles. The Federal Reserve expects such scaling approaches to be well supported. Few BHCs have incorporated business environment and internal control factors such as risk control self-assessments and other risk indicators into their operational-risk methodology. While the Federal Reserve does not expect BHCs to use these qualitative tools as direct inputs in a model, they can help identify areas of potential risk and help BHCs select appropriate scenarios that stress those risks.

Internal Data Collection and Data Quality

The Federal Reserve expects BHCs to have a robust and comprehensive internal data-collection method that captures key elements, such as critical dates (i.e., occurrence, discovery, and accounting), event types, and business lines. In general, BHCs should use complete data sets of internal losses when modeling, and not judgmentally exclude certain loss data.

Data quality and comprehensiveness have varied considerably across BHCs. BHCs with lagging practices often excluded certain internal loss data from model input for various reasons. Examples include

- excluding large items such as legal reserves and tax/compliance penalties;
- omitting losses from merged or acquired institutions mergers or acquisitions due to complications in collection and aggregation; and
- excluding loss data from discontinued business lines, even though the loss events were reasonably generic and applicable to remaining business lines within the organization.

Some BHCs have addressed observed outliers by omitting them from the data set, modeling them separately, or applying an add-on based on scenario analysis or management input. If BHCs do not have the data from potential mergers and acquisitions, one way to account for this limitation is to scale existing internal data using the size of operations and apply an add-on to applicable business lines or units of measure. If a BHC excludes data or uses data-smoothing techniques, especially as they affect large losses, it should have a well-supported rationale for doing so, and clearly document the rationale and the process.[36]

The Federal Reserve expects BHCs to segment their loss data into units of measure that are granular enough to capture similar losses while balancing it with the availability of data. Most BHCs have segmented datasets by event type; however, some BHCs have segmented the loss data by consolidated business lines, event types, or some combination of the two.

Correlation with Macroeconomic Factors

Most BHCs have attempted to identify correlation between macroeconomic factors and operational-risk losses, but some have struggled to identify a clear relationship for some types of operational-risk loss events. BHCs that did not identify a significant correlation typically developed other methodologies, such as scenario analysis layered onto modeled results, to project stressed operational-risk losses. These approaches can be reasonable alternatives if BHCs can demonstrate that their approach results in sufficiently conservative loss estimates that are consistent with the stress scenario.

BHCs that identified correlations between macroeconomic factors and operational-risk elements typically had large data sets and often used external loss data to supplement internal data. These BHCs often identified correlations between loss frequency and macroeconomic factors for certain event types and adjusted the frequency distributions for the respective event type accordingly.

Common Operational-Loss-Estimation Approaches

Most BHCs have used their annual budgeting or forecasting process to estimate operational losses in the baseline scenario. The process typically uses a combination of historical loss data and management input at a business-line level. Some BHCs have used historical averages from internal loss data to estimate losses in the baseline scenario.

BHCs with stronger practices used a combination of approaches to incorporate historical loss experience, forward-looking elements, and idiosyncratic risks into their stressed loss projections. Using a combination of approaches can help address model and data

[36] See FR Y-14A reporting form: Summary Schedule Instructions, p. 5.

limitations. Some BHCs used separate models for certain events types such as fraud or litigation, and used other approaches (e.g., using historical averages) for event types where no correlation with macroeconomic factors was identified. A simple approach may be acceptable depending on the size and complexity of the BHC as well as data and sophistication of models available to them. Very few BHCs have yet developed benchmarks to either challenge or further support the projections provided by their main models.

Regression Models

Most BHCs have used a regression model, either by itself or with another approach described below, to estimate operational-risk losses for stress scenarios. Some BHCs also have used a regression model for the baseline scenarios, albeit with different parameters. Operational-risk regression models are generally used to estimate two variables: loss frequency (i.e., the number of operational-risk losses) and loss severity (i.e., the loss amount).

BHCs that were able to identify significant correlation between macroeconomic variables and operational-risk losses have used regression models to stress the loss frequency or total operational-risk losses. Some macroeconomic variables were adjusted for the purpose of correlation analysis or to reflect time-lag assumptions. Most BHCs judgmentally chose time periods for estimation and model specification rather than justifying them with statistical evidence.

Most BHCs were not able to find meaningful correlation between macroeconomic variables and operational-risk loss severity. As a result, BHCs that used a regression model to estimate loss frequency typically applied the loss-severity assumption (e.g., static or four-quarter moving average) based on the most recent crisis period to estimate operational losses.

Modified Loss-Distribution Approach (LDA)

The LDA is an empirical modeling technique commonly used by BHCs subject to the AMA to estimate annual value-at-risk (VaR) measures for operational-risk losses based on loss data and fitted parametric distributions. The LDA involves estimating probability distributions for the frequency and the severity of operational loss events for each defined unit of measure, whether it is a business line, an event type, or some combination of the two. The estimated frequency and severity distributions are then combined, generally using a Monte Carlo simulation, to estimate the probability distribution for annual operational-risk losses at each unit of measure.

For purposes of CCAR, LDA models have generally been used in one of two ways: (1) by using a lower confidence interval than the 99.9th percentile used by the AMA, or (2) by adjusting the frequency based on outcomes of correlation analysis. BHCs that modified the LDA by using a lower confidence interval typically have used either the mean or median for the baseline estimates and higher confidence intervals—typically ranging from 70th percentile to 98th percentile—for the stressed estimates. Additionally, some BHCs have used different confidence intervals for different event types. The Federal Reserve does not require BHCs to use a particular percentile to produce stressed estimates. However, it expects BHCs to implement a credible, transparent process to select a percentile; be able to demonstrate why the percentile is an appropriate choice given the specific scenario under consideration; and perform sensitivity analyses around the selection of a percentile to test the impact of this assumption on model outputs. Some BHCs modified the LDA by adjusting frequency distributions based on the observed correlation between macroeconomic variables and operational-risk losses.

Scenario Analysis

Scenario analysis is a systematic process of obtaining opinions from business managers and risk-management experts to assess the likelihood and loss impact of plausible severe operational-loss events. Some BHCs have used this process to determine a management overlay that is added to losses estimated using a model-based approach. BHCs have used this overlay to incorporate idiosyncratic risks (particularly for event types where correlation was not identified) or to capture potential loss events that the BHC had not previously experienced. BHCs should be able to demonstrate the quantitative effect of the management overlay on final loss estimates.

Scenario analysis, if used effectively, can help compensate for data and model limitations, and allows BHCs to capture a wide range of risks, particularly where limited data are available. The Federal Reserve expects BHCs using scenario analysis to have a clearly defined process and provide an appropriate rationale for the specific scenarios included in their

loss estimate. The process for choosing scenarios should be credible, transparent, and well supported.

Historical Averages

Some BHCs used historical averages of operational-risk losses, in combination with other approaches noted above, to estimate operational-risk losses under stress scenarios. For example, BHCs have used historical averages for event types where no correlation between macroeconomic factors and operational-risk losses was identified but used a regression model for event types where correlations were identified. A small number of BHCs have used historical averages as the sole approach to develop stressed loss estimates. When used alone, this approach is backward-looking and excludes potential risks the BHCs have not experienced. When using historical averages, BHCs should support the chosen time periods, thresholds, and any excluded or adjusted outliers and demonstrate that loss estimates are consistent with what are expected in the stress scenario.

Legal Exposures

Since legal exposure represents a significant portion of operational losses for many BHCs, a number of BHCs have analyzed and projected legal losses separately from non-legal losses. The Federal Reserve expects BHCs to include all legal reserves and settled legal losses in their total loss estimate for operational risk. BHCs have used various methods to estimate legal losses, such as applying a judgment-based add-on for significant losses; using legal reserves; using historical averages; or creating separate regression models for the clients, products, and business practices event type. To estimate litigation losses resulting from representations and warranties liabilities related to mortgage underwriting activities, some BHCs have developed hazard-rate models based on historical loan performance to estimate default rates and then estimated repurchase claim rates.

Market Risk and Counterparty Credit Risk

BHCs that have sizeable trading operations may incur significant losses from such operations under a stress scenario due to valuation changes stemming from credit and/or market risk, which may arise as a result of moves in risk factors such as interest rates, credit spreads, or equity and commodities prices, and counterparty credit risk owing to potential deterioration in the credit quality or outright default of a trading counterparty.[37] BHCs use different techniques for estimating such potential losses. These techniques can be broadly grouped into two approaches: probabilistic approaches that generate a distribution of potential portfolio-level profit/loss (P/L) and deterministic approaches that generate a point estimate of portfolio-level losses under a specific stress scenario.

Both approaches have different strengths and weaknesses. A probabilistic approach can provide useful insight into a range of scenarios that generate stress losses in ways that a deterministic stress testing approach may not be able to do. However, the probabilistic approach is complex and often lacks transparency, and as a result, it can be difficult to communicate the relevant scenarios to senior managers and the board of directors. In addition, the challenges inherent in tying probabilistic loss estimates to specific underlying scenarios can make it difficult for management and the board of directors to readily discern what actions could be taken to mitigate portfolio losses in a given scenario. Combined, these factors complicate the use of probabilistic approaches as the primary element in an active capital planning process that reflects well-informed decisions by senior management and the board of directors. The Federal Reserve expects BHCs using a probabilistic approach to provide evidence that such an approach can generate scenarios that are potentially more severe than what was historically experienced, and also to clearly explain how BHCs use the scenarios associated with tail losses to identify and address their idiosyncratic risks.

By comparison, a deterministic approach generally produces scenarios that are easier to communicate to senior management and the board of directors. However, a deterministic approach often uses a limited set of scenarios, and may miss certain scenarios that may result in large losses. The Federal Reserve expects BHCs using a deterministic approach to demonstrate that they have considered a range of scenarios that sufficiently stress their key exposures.

For CCAR, most BHCs generally relied on a deterministic approach. BHCs using deterministic approaches often relied on statistical models—for

[37] Under the Federal Reserve's stress testing rules, BHCs with greater than $500 billion in total consolidated assets who are subject to the market risk rule (12 CFR part 225, appendix E) are required to apply the global market shock as part of their annual Dodd-Frank Act company-run stress tests.

example, to inform the magnitude of risk-factor movements and covariances between risk factors—and also considered multiple scenarios as part of the broader internal stress testing supporting their capital planning process. BHCs using deterministic approaches used a three-step process to generate P/L losses under a stress scenario:

1. Design and selection of stress scenarios
2. Construction and implementation of the scenario (that is, translation to risk-factor moves)
3. Revaluation (and aggregation) of position and portfolio-level P&L under the stress scenarios

The Federal Reserve expects BHCs to have robust operational and implementation practices in all areas, including position inclusion, risk-factor representations, and revaluation methods.

Stress Scenarios

Most BHCs using deterministic approaches developed a set of broad narratives and considered a number of market shock scenarios that address the breadth of the BHCs' risks before selecting the scenario included in their capital plans. In general, these BHCs used some combination of historical events and hypothetical projections to inform and develop the market shock scenarios. They also developed certain core themes or narratives for each scenario, which was sometimes supplemented with an overlay to capture additional nuances. BHCs generally developed the overlays using expert judgment based on the knowledge of their positions and market developments.

The Federal Reserve expects BHCs to consider multiple market shock scenarios as part of their internal stress testing. BHCs should develop and use stress scenarios that severely stress BHCs' mark-to-market positions and account for BHCs' idiosyncratic risks, in the event of a market-wide or firm-specific stress. In developing scenarios, BHCs should ensure that stress scenarios appropriately stress positions or products in which the BHC has a large market share (net or gross) or is a dominant player and should also consider more unusual basis risks arising from complex interlocking and interdependent positions, if such moves could result in large losses. BHCs that only use a scenario that closely mirrors the Federal Reserve's global market shock component of the severely adverse and adverse scenarios should be aware that such an approach may omit significant risks that are unique to their positions, and that such omissions could lead to a negative assessment of a firm's capital planning process. BHCs should clearly document the process they use to select stress scenarios, with sufficient justification and clear articulation of key aspects of the scenarios.[38]

Translating Scenarios to Risk Factor Shocks

Once broad scenarios were developed, BHCs translated these scenarios into concrete specification of individual risk factors that were the actual inputs to pricing models, typically using the existing risk infrastructures and processes used for risk management, such as VaR and credit valuation adjustment (CVA). Most BHCs used instantaneous market shocks for stress testing, which assumed highly stressful outcomes that have typically occurred over a period of time (days, weeks, or months) will occur instantaneously. Given the uncertainty surrounding a firm's ability to exit or manage positions during a period of severe market stress, this is an appropriate practice and suitably conservative for capital planning. Consistent with general supervisory expectations around risk-measurement processes, BHCs should clearly document the approximations and assumptions used as part of their measurement of risks under stress, assess the potential impacts, and address any deficiencies identified.[39]

The size of shocks assumed in the stress scenario is often quite large. As a result, mechanical application of such shocks to current levels of risk factors could result in implausible outcomes such as negative risk-free rates or negative forward rates. BHCs should ensure that the proposed shocks produce results that are plausible. In particular, BHCs should take care in modeling dislocations and discordant moves of risk factors that normally move similarly. Additionally, while dislocations and discordant moves are expected under stress, BHCs should have a process to assess that the resulting joint moves of risk factors are reasonable. Also, the dislocations and discordant moves implied by a stress scenario may require risk-factor mappings that deviate from the normal mappings. BHCs should clearly document instances of such deviation and provide support.[40]

[38] See FR Y-14A reporting form: Summary Schedule Instructions, pp. 5–6.

[39] See id., p. 6.

[40] See id., pp. 5–6.

Revaluation Methodologies and P/L Estimates

In principle, revaluation for stress testing can be carried out using the same infrastructure and calculators as conventional risk-measurement tools. However, practical revaluation methods may embed a number of approximations, which could introduce mismeasurement into the stress test results. In particular, VaR methodologies often use approximation methods for a number of reasons—for example, to economize on computational costs related to running a large number of scenarios daily. Although approximation methods may perform adequately for the risk-factor moves that are considered in normal conditions (for a small number of scenarios), BHCs should generally use "full-revaluation" methods for stress testing, given the very large risk-factor moves, especially for nonlinear positions with value dependent on multiple risk factors. BHCs can use approximation methods on a limited basis if extensive tests and analyses suggest that the potential mismeasurement from using such methods is not significant. BHCs should clearly support the process they use to ascertain the extent of such mismeasurements. Also, for certain parameters that are not easily "market-observable" and, therefore, cannot be inferred from traded instruments (e.g., correlations for credit-default baskets and correlations for certain interest-rate and exchange-rate pairs), BHCs should consider suitably perturbed values of the model parameters.

In addition, BHCs should ensure that P/L estimates under the stress scenario are relatively easy to interpret and explain. For example, BHCs with leading practices easily identified key P&L drivers in terms of positions, asset classes, and risk types. BHCs should also conduct sensitivity analysis to ensure that P/L estimates under the stress scenario are robust, without being unduly sensitive to small changes in inputs, assumptions, and modeling choices.

Counterparty and Issuer Defaults

Defaults of counterparties or issuers and/or reference entities are typically not embedded directly within the instantaneous market shock scenario. BHCs often use a model similar to that used for the incremental risk regulatory capital charge—a probabilistic approach based on some measure of PD, LGD, and EAD of counterparties or issuers—to estimate losses from possible defaults over some future horizon (e.g., to the typical margin period of risk). BHCs with leading practices also considered for their internal stress testing an explicit default scenario of one or more of their largest counterparties and/or customers. This approach has the benefit of allowing the BHC to consider targeted defaults of counterparties and customers to which the BHC has large exposures.

Risk Mitigants and Other Assumptions

Some BHCs have incorporated management responses to the stress, assuming, for example, some positions would be sold or hedged over time under the stress scenario. The Federal Reserve expects any assumptions about risk mitigation to be conservative. Where BHCs assume management actions that have the effect of reducing losses under the scenario, they should be able to demonstrate that such actions are consistent with established policy, supported by historical experience, and executable with high confidence in the market environment contemplated by the scenario. BHCs should recognize that their ability to take mitigating actions may be more limited in the stress scenario. For example, it may not be reasonable to assume that BHCs can easily sell their positions to other BHCs under the stress scenario. In addition, BHCs should avoid making unrealistic assumptions about their ability to foresee precisely how a scenario would play out, and take action on the basis of that information.

PPNR Projection Methodologies

The Capital Plan Rule requires BHCs to estimate revenue and expenses over the nine-quarter planning horizon.[41] Accordingly, BHCs should have effective processes for projecting PPNR and its revenue and expense subcomponents over the same range of stressful scenarios and environments used for estimating losses. In projecting these amounts, BHCs should consider not only their current positions, but also how their activities and business focus may evolve over time under the varying circumstances and operating environments reflected in the scenarios being used.

General Considerations for Robust PPNR Projections

As part of a comprehensive enterprise-wide scenario analysis program, BHCs should have methodologies that generate robust projections of PPNR consistent with the current and projected paths of on-and off-

[41] 12 CFR 225.8(d)(2)(i).

balance-sheet exposures, risk-weighted assets (RWA), and other exposure assumptions used for related loss estimation. PPNR projections should also be consistent with assumed scenario conditions and be projected in accordance with the same accounting basis that would be used to calculate relevant capital ratios. BHCs should project all key elements of PPNR at a level of granularity consistent with the materiality of revenue and expense components and sufficient to capture differing drivers of revenue and expenses across the organization. Finally, BHCs should consider the effects that regulatory changes (e.g., changes in deposit insurance coverage limits) may have on their ability to replicate historical performance or achieve stated goals.

Key assumptions that may materially affect PPNR estimates should be consistent with assumed scenario conditions and internally consistent within each scenario, particularly assumptions related to the business model and strategy (e.g., deposit growth, pricing assumptions, expense reductions, and other management actions). Management is expected to evaluate the reasonableness and timing of projected strategies, including mitigating actions taken in a stressful scenario, to ensure that the assumptions reflect realistic and achievable outcomes for a given scenario. Where possible, assumptions should be supported by quantitative analysis or empirical evidence.

In all cases, BHCs should ensure that projections (including those of PPNR, loss, balance sheet size and composition, and RWA) present a coherent story within each scenario. BHCs should clearly establish a relationship among revenue, expenses, the balance sheet, and any applicable off-balance-sheet items and document how their process generates a consistent and coherent evolution of these items over the course of the scenario.[42] For example, origination assumptions should be the same for projecting loan balances, related loan fees, origination costs, and loan losses. Similarly, there should be coherence among trading revenue projections, trading assets, trading liabilities, and trading RWA projections. Management should document the relationships among these items and avoid cases where outcomes move in counterintuitive directions.[43]

[42] See 12 CFR 225.8(d)(i)–(ii); FR Y-14A reporting form: Summary Schedule Instructions, pp. 5–6.

[43] See id.

Observed PPNR Projection Practices

The translation of macroeconomic assumptions into projections of PPNR over a range of stressful scenarios and environments can take many forms, and BHCs used a variety of approaches and models to make these projections. BHCs with stronger practices demonstrated strong interactions among central planning functions, business lines, and the treasury group, with an open flow of information and a robust challenge process. At these BHCs, the role of the central group was not just to aggregate components of PPNR projections. In some cases, the corporate planning areas also provided independent projections that were compared to the aggregated business line results as a part of the challenge process. At other BHCs, the corporate planning group derived the PPNR projections, which were then discussed and challenged by business lines. Both approaches resulted in better-supported assumptions and projections than approaches in which the central group simply aggregated projections made by others.

In addition, BHCs with stronger practices made projections based on a full exploration of the most relevant relationships between assumed scenario conditions and revenues and expenses. At these BHCs, business-line expertise was leveraged in the development of methodologies. A key part of this exploration was determining the way that revenues and expenses were segmented for projection purposes. BHCs with stronger practices did not rely exclusively on the line-item definitions in regulatory reports, though these BHCs often established a process to clearly map internal BHC reporting conventions to the various line items on the FR Y-14 schedules.

In contrast, BHCs with lagging practices lacked clear processes for translating assumed scenario conditions into revenue and expense projections. Frequently, it was observed that one or more material components of their projections appeared inconsistent with scenario conditions. In some cases, projections of certain revenue and expense components relied heavily on management judgment, which was not transparent, well supported, or subject to a robust challenge process. In other cases, revenue estimates varied from historical experience and conventional expectations, and management provided no documented support or analysis around the reasonableness and sensitivity of modeling assumptions. Overall, data limitations, unclear or unsubstantiated management assumptions, and poor documentation were the problems most prevalent across the BHCs.

Another commonly observed practice for estimating PPNR under stressed conditions was the adjustment of budget or baseline estimates, with budget estimates largely qualitatively derived through input from a variety of business lines and/or stakeholders across the BHC. Although a process of adjusting baseline estimates is not problematic in itself, some BHCs relied heavily on baseline estimates to develop stress scenario outcomes without considering favorable strategic actions and assumptions incorporated into baseline results that might not be realistic or feasible under stressed conditions. If a BHC derives stressed estimates by applying a stress overlay to baseline estimates, it should demonstrate the link between baseline estimates and baseline conditions, demonstrate the appropriateness of the overlay based on the differing conditions between the scenarios, and appropriately consider changes in management actions or other related assumptions under a stress scenario.

BHCs with weaker practices used models with low predictive power, in part due to data limitations. BHCs should not use weak models just for the sake of using a modeled approach to PPNR. Some BHCs used weak models either as a frame of reference or a starting point to translate economic factors into estimates of key PPNR components, but then adjusted the results using expert judgment. In such cases, BHCs should thoroughly explain and document why results, once adjusted, are consistent with the scenario conditions.[44] In cases where models have low predictive power, BHCs with stronger practices found other ways to compensate, such as using industry-level models with BHC-specific market share assumptions to project revenue. In all cases, BHCs with stronger practices provided supplemental analysis describing why the approach was appropriate.

In cases where BHC-specific data were limited, BHCs with stronger practices used external data to augment and extend their internal data. BHCs with weaker practices relied on models that were overly influenced by limited data covering a single economic cycle. This approach is particularly problematic if the BHC also experienced favorable conditions, such as a significant recovery, during the single cycle, which might not recur in future downturns. In some cases, data were limited to as few as 10 quarters, which would not encompass a period of economic weakening or be sufficient to estimate a robust model, and thus would not be appropriate for considering potential results in a downturn. Many BHCs cited challenges due to systems mergers or changes that limited data availability, but failed to adequately compensate for these limitations by supplementing internal data with external industry data, where appropriate, or by considering whether longer time series of available aggregate data would be preferable to a shorter time series of more granular data.

Some BHCs with weaker practices made business model and strategy assumptions (e.g., new business, expense reductions, the assumption of mitigating actions) that were not consistent with stressed scenario conditions and the intent of a capital planning and stress testing exercise. For example, management assumed it would be able to drastically reduce loan origination activity, cut expenses, or take other mitigating actions in a severely adverse scenario without considering the longer-term consequences on the BHC's strategy and operating structure.

The following sections provide specific expectations for projecting key components of PPNR, as well as summary points on observed range of practice.

Net Interest Income

Net interest income projections are closely linked to many other elements of a BHC's capital plan. Balance sheet assumptions used to project net interest income should be consistent with balance sheet assumptions considered as part of loss estimation as well as with other asset and liability management assumptions. Loan pricing should be consistent with both scenario conditions and competitive and strategic factors, including projected changes to the size of the portfolio. Deposit projections should incorporate the impact of strategic plans and pricing on deposit growth or decline, in addition to scenario factors.

Net interest income projections are expected to incorporate the balances and contractual terms of current portfolio holdings as well as the behavioral characteristics of these portfolios. The methods BHCs use to project their net interest income should be able to capture dynamic conditions for both current and projected balance sheet positions. Such conditions include but are not limited to prepayment rates, new business spreads, re-pricing rates due to changes in yield curves, behavior of embedded optionality such

[44] See id.

as caps or floors, call options, and/or changes in loan performance (that is, transition to nonperforming or default status) consistent with loss estimates.

Some BHCs specified product characteristics and conducted analysis around these characteristics (e.g., repricing behavior, line utilizations) both for current assets and new originations in order to understand the variance in behaviors under the different scenarios considered. They also attempted to capture the product mix changes that would occur as a result of customer and market conditions (e.g., changes in domestic deposit mix due to anticipated growth in demand for time deposits for a specified scenario). BHCs with stronger documentation practices provided detailed tables explaining underlying assumptions such as balance drivers and spread and growth assumptions by product.

Some BHCs partially integrated loss projections into net interest income projections but did not adequately align all projection-related assumptions. For example, these BHCs might take the full loan loss projections and allocate them across the portfolios based on the current mix of nonperformance across those loan portfolios, without considering the changing relative performance of those portfolios over the course of the scenario. Other BHCs were unable to demonstrate coherence between net interest income projections and loss projections, generally because one or both modeling approaches did not fully capture the behavioral characteristics of the loan portfolio.

BHCs with stronger practices had net interest income projection methodologies that captured adjustments in the amortization of discounts or premiums for assets held at a value other than par that would occur under various scenarios. Under FASB Statement No. 91,[45] yields would adjust under varying scenarios as amortization schedules change due to changes in expected payment speeds.

For pricing, many BHCs assumed a constant spread to a designated index. BHCs with stronger practices considered whether this assumption was consistent with historical experience and assumed scenario conditions as well as the BHC's strategy as reflected in the balance sheet projections. Some BHCs recognized that new business pricing could differ as a result of tightening or widening of spreads and documented these assumptions.

Non-Interest Income

BHCs are expected to produce stressed projections of non-interest income that are consistent with assumed scenario conditions, as well as with stated business strategies. Due to inherent challenges in estimating certain non-interest income components, some BHCs used more than one method and/or employed benchmark analysis to inform estimates. Stronger methodologies estimated non-interest income at a granular-enough level to capture key risk factors or characteristics specific to an activity or product. For example, for asset management, many BHCs used different methods to project revenue from brokerage activities and fund management activities.

Like all aspects of PPNR, internal consistency between non-interest income and other assumptions such as projected paths for the balance sheet and RWA is important. BHCs should establish relationships between material components of non-interest income and the balance sheet for components that are highly correlated with the path of the balance sheet, such as some kinds of loan-related fee income. BHCs with trading assets should document how trading revenue projections are linked to trading assets, trading liabilities, and trading RWA and how all these elements are consistent with conditions in the stress scenario.[46] BHCs with business profiles driven by off-balance-sheet items should document how revenue projections are linked to on- and off-balance-sheet behavior.[47] Although relationships between revenue and trading assets or off-balance-sheet items may be weak over short periods, BHCs should nevertheless establish a procedure for projecting relevant balance sheet and RWA categories in support of those revenues and test for the reasonableness of the implied return on assets (ROA). If a BHC estimates trading or private equity revenue by tying balance changes to changes in broad indices, the BHC should establish the level of sensitivity of its positions relative to the indices and not automatically assume a perfect correlation between the two.

[45] Financial Accounting Standards Board, "Accounting for Nonrefundable Fees and Costs Associated with Originating or Acquiring Loans and Initial Direct Costs of Leases—an Amendment of FASB Statements No. 13, 60, and 65 and a Rescission of FASB Statement No. 17 (Issued 12/86)," FASB Statement No. 91.

[46] See FR Y-14A reporting form: Summary Schedule Instructions, p. 5.

[47] 12 CFR 225.8(d)(3)(iii); see also FR Y-14A reporting form: Summary Schedule Instructions, pp. 5–6.

BHCs with mortgage servicing right (MSR) assets should ensure that delinquency, default, and voluntary prepayment assumptions are robust and scenario-dependent. These models should capture macroeconomic variables, especially home prices. For those BHCs that routinely hedge MSR exposure, hedge assumptions and results for enterprise-wide scenario analysis should reflect the stress scenario. Some BHCs assumed a perfect or near-perfect hedge relationship between changes in the value of their MSR and hedge portfolio, and captured the ineffectiveness of the hedge under the stress scenario through the net carry, transaction costs, and/or bid-ask spread components. BHCs with stronger practices used an optimization routine that dynamically rebalanced the hedge portfolio each quarter.

BHCs with stronger practices considered individual business models and client profiles when projecting revenue and fee income from various business activities. BHCs with stronger practices also considered capacity constraints when estimating mortgage loan production and loan sales over the scenario horizon, whereas BHCs with weaker practices assumed significant increases in volume without regard to market saturation or other factors. Other weaker practices observed included using the same strategic business assumptions in both the baseline and stress scenarios and making favorable assumptions around new business and/or market share gains. For example, some BHCs assumed that all baseline initiatives would be implemented in stress scenarios without interruption or changes to the outcomes.

In addition, BHCs with weaker practices did not show sufficiently stressed declines in revenue relative to assumed scenario conditions, despite stated correlations to macroeconomic and other drivers. For example, while many BHCs showed significant declines in credit card gross-interchange fee revenue due to declines in consumer spending, some BHCs also assumed that significant declines in marketing expenses recorded as contra-revenue would more than offset the declines in gross interchange revenue, resulting in an increase in net revenue. Other BHCs assumed revenue components, such as fees or trading revenue, could not fall below historical levels.

Further, BHCs with weaker practices considered only a very limited set of scenario variables and/or drivers in establishing relationships, which resulted in estimates that appeared inconsistent with the scenario. For example, some BHCs used interest rates only to project origination activity or solely used asset balances (instead of the number of accounts) to estimate account fees. Other BHCs simply regressed high-level revenue items against scenario factors rather than considering how scenario conditions would affect the key drivers of those line items (such as volume). For instance, modeling interchange revenues or asset management fees is likely to be less effective than modeling customer spending or assets under management, respectively, given the scenario being used, and then considering fee and/or rate movement.

Non-Interest Expense

BHCs should fully consider the various impacts of the assumed scenario conditions on their non-interest expense projections, including costs that are likely to increase during a downturn. For example, items such as other real estate owned or credit-collection costs may spike, whereas management may have some ability to control other expenses. Like other projections, non-interest expense projections should be consistent with balance sheet and revenue estimates and should reflect the same strategic business assumptions. BHCs with weaker practices did not account for additional headcount needs in certain areas, nor for any corresponding changes to compensation expense associated with increased collections activity resulting from declines in portfolio quality and/or increased underwriting activity to support any assumed portfolio growth.

To the extent the projections assume mitigating actions to offset revenue declines, BHCs should demonstrate that such actions are attainable in the scenario, given assumed asset levels and the resources necessary to support operations. If the projections embed material expense reductions, such assumptions should be supported with analysis of historical data or empirical evidence and subject to challenge and review. BHCs with weaker practices assumed mitigating actions consistent with past actions but failed to consider how differences in the business environment and the severity of the economic conditions might affect their ability to execute such actions. BHCs are expected to evaluate the timing of projected strategies and their impact on future revenue, expenses, and operating structure.

BHCs with stronger practices had estimation methodologies that considered the drivers of individual expense items and the sensitivity of those drivers to changing scenario conditions and business strategies. They considered the timing of non-interest expense

cuts and recognized that the BHC might not be able to react to a developing stressful scenario immediately or might be subject to existing contractual obligations that could not be altered. BHCs with weaker practices generated non-interest expense estimates that appeared unrealistic in light of assumed scenario conditions. Some BHCs assumed that they could immediately reduce costs through dramatic cuts in marketing and rewards programs, compensation, or other discretionary expenses. Projecting sizeable reductions in key expense components without providing sufficient support as to the reasonableness of the cuts, how management intends to realize the cuts, and how the cuts will affect future revenue is not acceptable. Additionally, such assumptions imply perfect knowledge of the conditions as they unfold, rather than a series of independent decisions that would be made by management as the scenario unfolds.

Assessing Capital Adequacy Impact

Balance Sheet and RWAs

BHCs should have a well-documented process for generating projections of the size and composition of on- and off-balance sheet positions and RWA over the scenario horizon.[48] Balance projections are a key input to enterprise-wide scenario analysis given their direct impact on the estimation of losses, PPNR, and RWA. Estimating the evolution of balance sheet size and composition under stress integrates many interrelated features. For example, loan balances and the stock of AFS securities at a point in time will depend upon origination, purchase, and sale activity from period to period, as well as maturities, prepayments, and defaults. Due to complexities related to dynamically projecting and integrating various components (e.g., originations, prepayments and defaults), most BHCs made direct projections of balances for each major segment of the balance sheet (e.g., loans, deposits, trading assets and liabilities, and other assets) for each quarter of the scenario horizon.

BHCs often faced challenges in integrating the ultimate balance projections with other aspects—for example, borrower or depositor behavior. BHCs with stronger practices separately considered the drivers of change to asset and funding balances, such as contractual paydowns, modeled prepayments, nonperformance, and new business activity for assets, rather than simply projecting targeted balances directly. At these BHCs, each element was separately assessed for consistency with scenario conditions and other management assumptions. BHCs with stronger practices also either directly considered the impact of these various factors in their balance projections or had procedures to evaluate the reasonableness of any implied behavior by including input from business-line leaders in the process and iterating to reasonable estimates in a well-supported and transparent manner.

[48] 12 CFR 225.8(d)(2)(i)(A); see also FR Y-14A reporting form: Summary Schedule Instructions, p. 6.

BHCs should clearly establish and incorporate into their scenario analysis the relationships among and between revenue, expense, and on- and off-balance-sheet items under stressful conditions. Most BHCs used asset-liability management (ALM) software as a part of their enterprise-wide scenario-analysis toolkit, which helps integrate these items. BHCs that do not use ALM software must have a process that integrates balance sheet projections with revenue, loss, and new business projections. BHCs with more tightly integrated procedures were better able to ensure appropriate relationships among the scenario conditions, losses, expenses, revenue, and balances.

As noted above, BHCs should not rely on favorable assumptions that cannot be reasonably assured in stress scenarios given the high level of uncertainty around market conditions. Examples of aggressive or favorable balance sheet assumptions include (1) large changes in asset mix that serve to decrease BHCs' risk weights and improve post-stress capital ratios but that are not adequately supported or reflected in PPNR or loss estimates; (2) "flight-to-quality" assumptions and funding mix changes that increase deposits and reduce the dollar cost of funding; (3) significant balance sheet shrinkage with no consideration of the potential losses associated with reducing positions in periods of market stress; and (4) operating margin improvement. BHCs that make favorable assumptions should have sufficient evidence that they can be reasonably assured in the assumed stress scenario.

BHCs' RWA projections should be based on corresponding projections of on- and off-balance-sheet exposures and their risk attributes and should be consistent with the severity of the stress conditions under each scenario. For general credit-risk exposures, BHCs should project balances for material asset categories with sufficient granularity to facilitate application of regulatory risk-weighting approaches associated with different asset categories. For trading exposures, BHCs should translate changes in scenario variables into risk-parameter

estimates that drive RWA calculations (e.g., the potential for RWA per dollar of some trading book positions to increase in periods of higher levels of general market volatility). Where RWA projections are based on internal risk models, BHCs should not assume any RWA reductions from potential data or model enhancements to RWA calculation methodologies over the projection period. In all cases, BHCs should document any assumptions made as part of the balance sheet and RWA projection process and perform independent reviews and validations of balance sheet and RWA projection methodologies and resulting estimates.[49]

Allowance for Loan and Lease Losses (ALLL)

BHCs should maintain an adequate ALLL along the scenario path and at the end of the scenario horizon. Reserve adequacy should be assessed against projected size, composition, and risk characteristics of the loan portfolio throughout the scenario horizon. In general, the ALLL build and release should be consistent with the scenario path, portfolio credit quality, loss recognition approach, loan loss estimates, and loan portfolio balance projections (including any portfolio growth assumptions). If BHCs use estimation approaches that implicitly delay the recognition of losses, such as net charge-off models, they should adequately build reserves to account for losses not recognized during the scenario horizon. If the approach relies on top-down coverage levels, BHCs should compare coverage ratios and loss-emergence periods to historical stress environments and to internal policies and explain the differences if material differences exist.

Aggregation of Projections

BHCs should have a well-established and consistently executed process for aggregating loss, revenue and expense, and on- and off-balance sheet and RWA estimates, as part of enterprise-wide scenario analysis, to assess the post-stress impact of those estimates on capital ratios. BHCs that are more effective at implementing such a process have established centralized groups with responsibility for

- combining loss, revenue, balance sheet, and RWA projections;
- providing strong governance and controls around the process;
- ensuring coherence of component estimates and aggregate results; and
- applying and documenting any adjustments.[50]

These centralized groups have been able to source estimates from a range of internal parties involved in enterprise-wide scenario analysis and develop consolidated pro forma financial results that are internally consistent and conform to accounting standards.

BHCs should develop a governance structure around the enterprise-wide scenario analysis process that provides for a robust analysis and challenge of the coherence of the aggregate results and determine whether any adjustments need to be made based on the analysis. In particular, BHCs should assess whether the paths of individual loss and revenue components are consistent with the paths of balance sheet and RWA estimates and the overall scenario path. For example, an increase in PPNR amid declining balances would appear generally inconsistent and should warrant further investigation. In assessing consolidated financial results, BHCs should account for any potential changes in relationships between losses and financial performance drivers during periods of stress.

BHCs should have good understanding of instances when exposures with similar underlying risk characteristics that are part of different portfolios or business lines exhibit different sensitivities to scenario conditions. BHCs should identify instances where the differences are due to inconsistent assumptions or modeling approaches that require management attention, rather than differences in accounting treatment. In addition, if a BHC's enterprise-wide scenario analysis results in post-stress outcomes that are more favorable than those under baseline conditions, BHCs should critically evaluate the reasonableness and consistency of assumptions across portfolios, business lines, and other areas of loss and revenue estimation.

BHCs that had an effective aggregation process leveraged their business planning and financial and regulatory reporting systems as part of that process. Using standalone tools or spreadsheets in the aggregation process is a weak process. If a BHC needs to

[49] See id.

[50] See id.

use standalone tools or spreadsheets due to systems limitation, management should ensure robust controls are in place, including access and change controls, and should maintain an audit trail and document all approvals for any adjustments made. BHCs should also have reconciliation procedures and data-quality and logic checks in place to ensure that the results from the enterprise-wide scenario analysis reconcile to both management reporting and regulatory reports, with a transparent mapping between various reporting taxonomies.

BHCs with weaker practices had limited or no reconciliation procedures or other controls in place to ensure the integrity, completeness, and accuracy of the consolidated post-stress capital metrics. BHCs with weaker practices also had no process to ensure consistency in the BHC-wide application of scenario assumptions and management adjustments, and had weak governance and documentation standards.

Concluding Observations

The goal of this publication is to outline the Federal Reserve's expectations for internal capital planning at large BHCs and to highlight the range of current practice as observed during the 2013 CCAR. This discussion is intended to provide a more comprehensive set of criteria to assist BHC management in assessing their current capital planning processes and in designing and implementing improvements to those processes, as well as to provide insight to a broader audience about the key aspects of BHCs' capital planning practices.

Internal capital planning practices have evolved considerably since the financial crisis and the implementation of the Federal Reserve's Capital Plan Rule in 2011. BHCs have made advances in the identification and measurement of the risks to their capital and in the integration of stress testing and capital planning into their broader strategic planning processes. The fundamental insight governing the Federal Reserve's expectations about capital planning is the importance of having a forward-looking perspective on the risks to a BHC's capital resources under severely stressful conditions. In particular, a forward-looking perspective involves understanding how a BHC's revenue-generating capacity and potential losses could be affected in stressed economic and financial market conditions; understanding the particular vulnerabilities arising from its business model and activities; and having a capital policy in place that governs the BHC's capital actions under both "normal" and stressed economic conditions. These elements represent substantial conceptual and operational improvements in capital planning that go well beyond simple consideration of current and expected future capital ratios.

While many of the large BHCs subject to the Capital Plan Rule have made substantial improvements in capital planning, there is still considerable room for advancement across a number of dimensions. Areas where some BHCs continue to fall short of leading practice include

- not being able to show how all their risks were accounted for in their capital planning processes;
- using stress scenarios and modeling techniques that did not address the particular vulnerabilities of the BHC's business model and activities;
- generating projections for at least some components of loss, revenue, or expenses using approaches that were not robust, transparent, and/or repeatable, or that did not fully capture the impact of stressed conditions;
- having capital policies that did not clearly articulate a BHC's capital goals and targets, did not provide analytical support for how these goals and targets were determined to be appropriate, and/or were not comprehensive or detailed enough to provide clear guidance about how the BHC would respond as its capital position changed in different economic circumstances; and
- having less-than-robust governance or controls around the capital planning process, including around fundamental risk-identification, -measurement, and -management practices that are among the critical elements that support robust capital planning.

All the BHCs that participated in CCAR faced challenges across one or more of these areas. And although many BHCs demonstrated leading practices in several dimensions of capital planning, the leading capital planning practices identified in this paper will continue to evolve as new data become available, economic conditions change, new products and businesses introduce new risks, and estimation techniques advance further. As the frontier of capital planning practice advances, the Federal Reserve's expectations for how BHCs implement the requirements of the Capital Plan Rule and the related company-run stress testing required under the Dodd-Frank Act will also evolve.[51] Such advances in capital planning practices will enhance the health and stability of individual BHCs and of the overall banking system.

[51] 12 CFR part 252, subpart G.

Sovereign creditworthiness and financial stability: an international perspective

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Financial stability depends critically on the two-way interaction between banks and governments. Sovereign creditworthiness represents the ultimate source of insurance for the financial system and provides a solid basis for the pricing of assets, by supplying a risk-free security. A sound banking sector ensures the smooth flow of credit to the economy as well as solid revenue and financing for the government. Weakness in either sector can give rise to a vicious circle of uncertainty and distress with highly damaging consequences for the economy. An interconnected global economy means that problems can propagate across borders. The policy recommendation is simple: appropriate buffers should be built in good times to cushion the impact of bad times. Fiscal buffers support the risk-free status of sovereign debt, while capital and liquidity buffers underpin the soundness of the financial system.

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The global economic crisis originated in the financial systems of some advanced economies, but it quickly spread to engulf much of the global economy. Governments have found themselves at the centre of the storm from the beginning. First, they led the efforts to deal with the crisis. Later, many of them took financial hits as a result of it. Most recently, some have become the focal point of a crisis of confidence in their ability to service their debts.

The number of sovereigns that have experienced considerable fiscal difficulties lately is much larger than the number of financial systems that went through significant problems at the start of the crisis. Moreover, concerns about sovereign solvency have seriously affected the health of banking systems, within and across borders. The feedback loop cycles with destructive force.

Why did this happen? Why are governments now battling against bond markets and banks struggling with liquidity and solvency concerns? After all, the ability of the government to build a bridge over troubled waters has always been the ultimate source of the stability of the financial system. Importantly, what are the lessons for policy looking ahead?

The confluence of three *key initial conditions* largely explains the severity and spread of the crisis.

• First, the banking systems of most major developed economies entered the crisis with inadequate capital. Buoyed by exceedingly abundant liquidity in the run-up to the turmoil, financial institutions, large and small, took on greater and greater risks. Neither their internal risk management practices nor external oversight, whether by market participants or public authorities, was able to contain this process. As a result, they went into the crisis poorly capitalised, highly leveraged, and with huge maturity and currency balance sheet mismatches (McGuire and von Peter, 2009). This made them quite vulnerable to the original shocks and exacerbated the perverse feedback effects between banks and sovereigns.

• Second, major sovereigns had not accumulated adequate fiscal buffers during the boom prior to the crisis. Private credit booms had given rise to temporary, unsustainable increases in revenues, over and above the typical cyclical boost driven by the strong economic growth in the 2002–07 period. This lulled many governments into a false sense of security and encouraged them to live beyond their means. As a result, they were unprepared to deal with the consequences of the serious shocks that hit the international financial system in 2007–08 and the subsequent slowdown in economic activity. To be sure, they were able to quickly provide the fiscal resources that were urgently needed for the immediate recapitalisation of their banking systems, for the working of automatic stabilisers and for discretionary fiscal stimulus. But the small reserves meant that the response proved unsustainable, not least given the longer-term unfunded commitments governments faced. All this jeopardised their risk-free status in the later stages of the crisis.

• Third, the unprecedented degree of interconnectedness in the global financial system complicated matters further. The dense international web of connections among sovereigns and financial institutions around the world intensified and propagated the crisis. The benefits and desirability of global financial integration are indisputable. But greater financial integration inevitably carries greater responsibility. On the fiscal front, it strengthens the need for resilient state finances. On the financial system front, it makes a well capitalised and reasonably liquid banking system vital.

We would also argue that, to a considerable extent, the lack of adequate buffers reflects policymakers' failure to internalise the impact of their decisions on the global financial system. And many of them did not realise that their actions, or lack thereof, would trigger a chain of events that would in turn feed back onto their own economies and financial systems.

We next develop this argument in five steps. In the first section, we review the two-way interaction between government finances and banks. In the second, we trace the evolution of that nexus during the expansionary phase that preceded the crisis, outlining how the above initial conditions came to be. In the third, we investigate how they interacted so as to amplify the unfolding crisis. In the fourth, we use the latest data on bank exposures to sovereigns in order to gauge the degree to which weaknesses in bank balance sheets threaten to extend the life of the malign feedback loop between bank and sovereign risk. In the last section, we present our policy prescriptions.

1| The two-way interaction between government finances and banks

How did a crisis that originated in the financial sectors of a small number of economies morph into a sovereign debt crisis which has affected a much larger set of governments? In turn, how did financial institutions that survived the first stages of the crisis relatively unscathed become infected once the crisis engulfed sovereigns? The answers to both of these questions are related to the interaction between the three initial conditions discussed above. In this section, we review the main channels in the feedback loop between bank risk (the first initial condition) and sovereign risk (the second initial condition) in the context of a highly interconnected global financial system (the third initial condition).

1|1 Transmission of financial sector risk to sovereigns

A remarkable feature of Europe's sovereign debt strains is the role played by governments that had spent years apparently on the right side of the Maastricht criteria, keeping a seemingly prudent lid on both deficits and debt. Nevertheless, in several of those countries, weaknesses in financial sector balance sheets infected the sovereign. These weaknesses can be transmitted from banks to sovereigns through three main channels.

- First, credit booms, while masking weaknesses in financial sector balance sheets, can give a one-off boost to governments' fiscal balances over and above that linked to normal cyclical economic expansions. This makes the government's fiscal position appear much stronger than it actually is. In turn, this may unjustifiably give governments the confidence to pursue policies that result in increases in spending that are unsustainable in the long run. As the recent experience of Spain illustrates, such policies may be difficult to reverse once the credit boom and associated revenues come to an end, leaving scant room to manoeuvre.

- Second, any constraints on lending caused by a deterioration in the balance sheets of banks and other financial institutions result in macroeconomic costs that weaken fiscal accounts further. If financial institutions fail to build up sufficient capital and liquidity buffers during the boom, credit constraints tighten over and above any perceived deterioration in borrower quality. This can choke off the credit supply and, unless balance sheets are repaired quickly, lead to serious distortions in its allocation. This further dampens economic activity, which, in turn, causes tax revenues to decline and government expenditures to increase. As a result, the public sector deficit widens and the creditworthiness of the sovereign deteriorates. If sovereigns do not respond in a timely manner to the fiscal deterioration caused by a turn in the credit cycle, they may compound the errors arising from complacency during the credit build-up phase.

- Finally, when large systemically important financial institutions face the threat of bankruptcy in the absence of effective resolution regimes, sovereigns may have little alternative but to provide them with financial support in order to preserve financial stability. Regardless of whether the government support takes the form of liquidity assistance, direct injections of capital, asset purchase programmes or debt guarantees, it is bound to increase the explicit or implicit obligations of the sovereign, and thus weaken its balance sheet. This channel has been most prominent in the case of Ireland during the 2008–11 period.

1|2 Transmission of sovereign risk to the financial sector

In a number of euro area countries, most notably Greece and Italy, weaknesses in sovereign balance sheets have infected banking systems. In general, a deterioration in the perceived creditworthiness of sovereigns can affect the financial sector through five main channels.

- The first channel involves direct portfolio exposures. The higher bond yields (lower bond prices) associated with higher sovereign risk can hurt financial institutions through their holdings of domestic and foreign sovereign debt. In most economies, banks tend to have a strong home bias in their government bond portfolios. Not surprisingly, holdings of domestic government bonds as a percentage of bank capital tend to be larger in countries with high public debt. To be sure, accounting practices typically shield banks from the immediate impact of declines in the market prices of sovereign

bonds. For example, across EU countries, most of the domestic sovereign exposure (85% on average) is held in the banking book (CGFS, 2011). But accounting is one thing, and market participants' assessments are another.

Financial institutions are vulnerable not only through their exposure to the domestic public sector, but also through that to foreign public sectors (recall the third initial condition). As we demonstrate below, many internationally active banks' foreign exposures to the public sectors of the countries currently at the centre of the European sovereign debt crisis (i.e. Greece, Ireland, Italy, Portugal and Spain) were quite sizeable at their peak in 2009.

• The second channel works through funding conditions. Sovereign securities are used extensively by banks as collateral to secure wholesale funding from central banks, private repo markets and covered bond markets. Increases in sovereign risk reduce the availability or eligibility of collateral, and hence banks' funding capacity. There is evidence that in 2010 30% of the spread at launch on bank bonds reflected the conditions of the sovereign, and this figure was as high as 50% for countries for which sovereign strains were most pronounced (CGFS, 2011).

• The third channel is more subtle and relates to the perceived ability of the sovereign to provide a backstop to banks under strain. A government that is perceived by market participants to be in a weaker fiscal position provides less credible and valuable guarantees or financial support to banks in its jurisdiction. This increases the credit risk of these financial institutions. Despite efforts to reduce the safety net through the implementation of orderly resolution mechanisms, as of the second quarter of 2011, rating agencies still reckoned that the prospect of government support justified higher ratings by two to five notches (Hannoun, 2011).[1] Nevertheless, over the second half of 2011 deterioration in the creditworthiness of sovereigns in Greece, Italy, Portugal and Spain led to a decline in the perceived official support for banks in those jurisdictions and, consequently, to a fall in their all-in ratings (Tarashev, 2011).

• The fourth channel relates to the possibility of government debt crowding out private sector debt. Banks have to compete with the sovereign when raising funds from investors. Sovereign distress increases the cost and/or reduces the availability of bank funding through debt. Even though this effect is not limited to banks, it affects them more strongly, given their sizeable funding needs. If the sovereign loses its riskless status, the likelihood of crowding out increases, as the two forms of debt become closer substitutes in investors' portfolios.

• Finally, a loss of market confidence in sovereign debt may trigger fiscal consolidation. This is unambiguously beneficial in the long term. In the short term, however, the net effect is not as easy to predict. On the one hand, fiscal consolidation may weaken aggregate demand and economic activity, weighing further on credit quality and bank profitability. On the other hand, if confidence has deteriorated far enough, fiscal consolidation may actually buoy economic activity.

2| Developments in the pre-crisis period (2002-07)

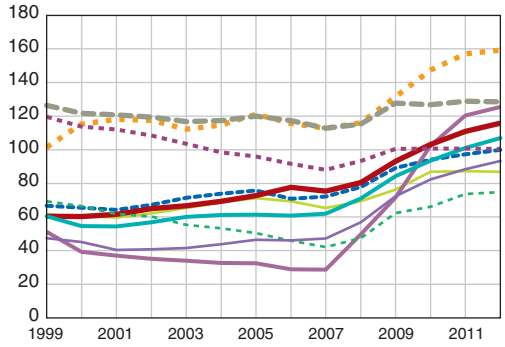
Just as in the run-up to other financial crises, in the 2002–07 period there were no signs that market participants saw the build-up in risks. The debt-to-GDP ratios of most governments in the developed world were within what are typically considered sustainable ranges (Chart 1a). Sovereign bond markets (Chart 1b) and credit rating agencies (Chart 1c) generously rewarded governments' behaviour. Banks, especially large and internationally active ones, would report higher profits year in and year out. Equity investors cheered enthusiastically, and, despite banks' ever increasing leverage, credit rating agencies and financial market participants regarded them as safe (Chart 2). Vulnerabilities kept growing below the radar. Governments cheered alongside market participants. Complacency was the order of the day.

1 *Furthermore, over the past couple of years governments have started providing significant implicit support to non-systemically relevant medium-sized and smaller banks. As of the end of July 2011, the implicit support for these banks in four large EU economies was of similar magnitude to the implicit support provided to large banks (CGFS, 2011).*

Chart 1
Sovereign credit risk indicators

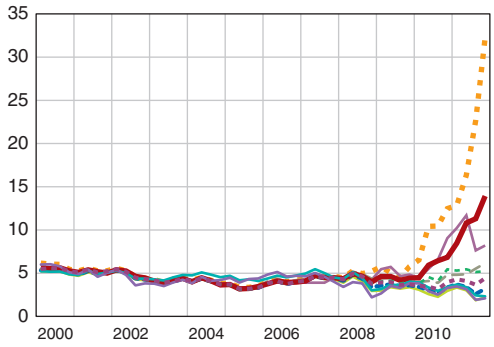
a) General government gross financial liabilities[a)]

(as a percentage of nominal GDP; annual data)



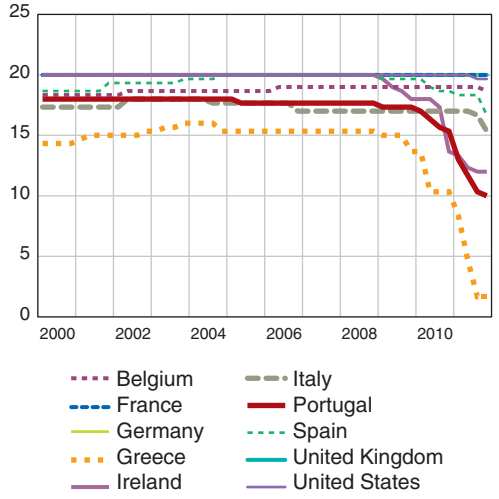
b) Ten-year government bond yields

(in %; quarterly data)



c) Sovereign credit ratings[b)]

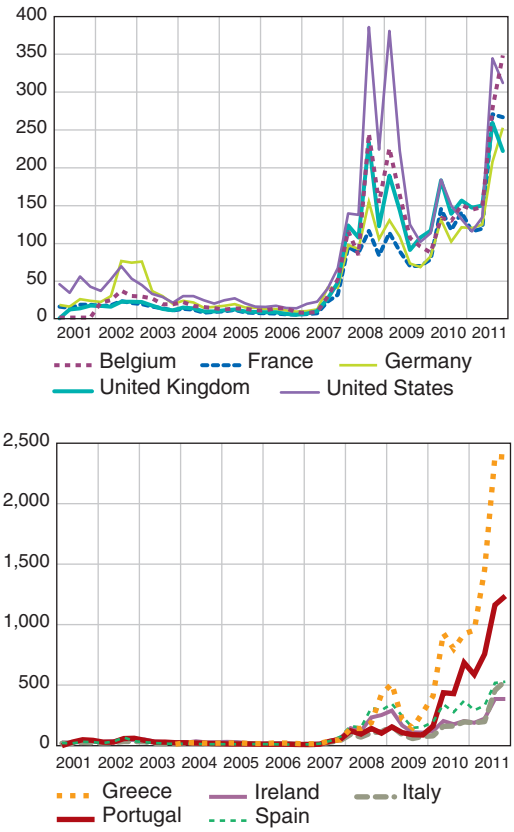
(quarterly data)



a) Belgium includes the debt of the Belgian National Railways Company (SNCB) from 2005 onwards.
b) Average of Fitch, Moody's and Standard & Poor's foreign currency long-term sovereign ratings. Vertical scale is calibrated so that 20 represents the highest possible rating category and each unit represents one notch.
Sources: OECD, Economic Outlook; Bloomberg; BIS calculations.

Chart 2
Bank CDS spreads for selected banks nationalities[a)]

(in basis points; quarterly data)

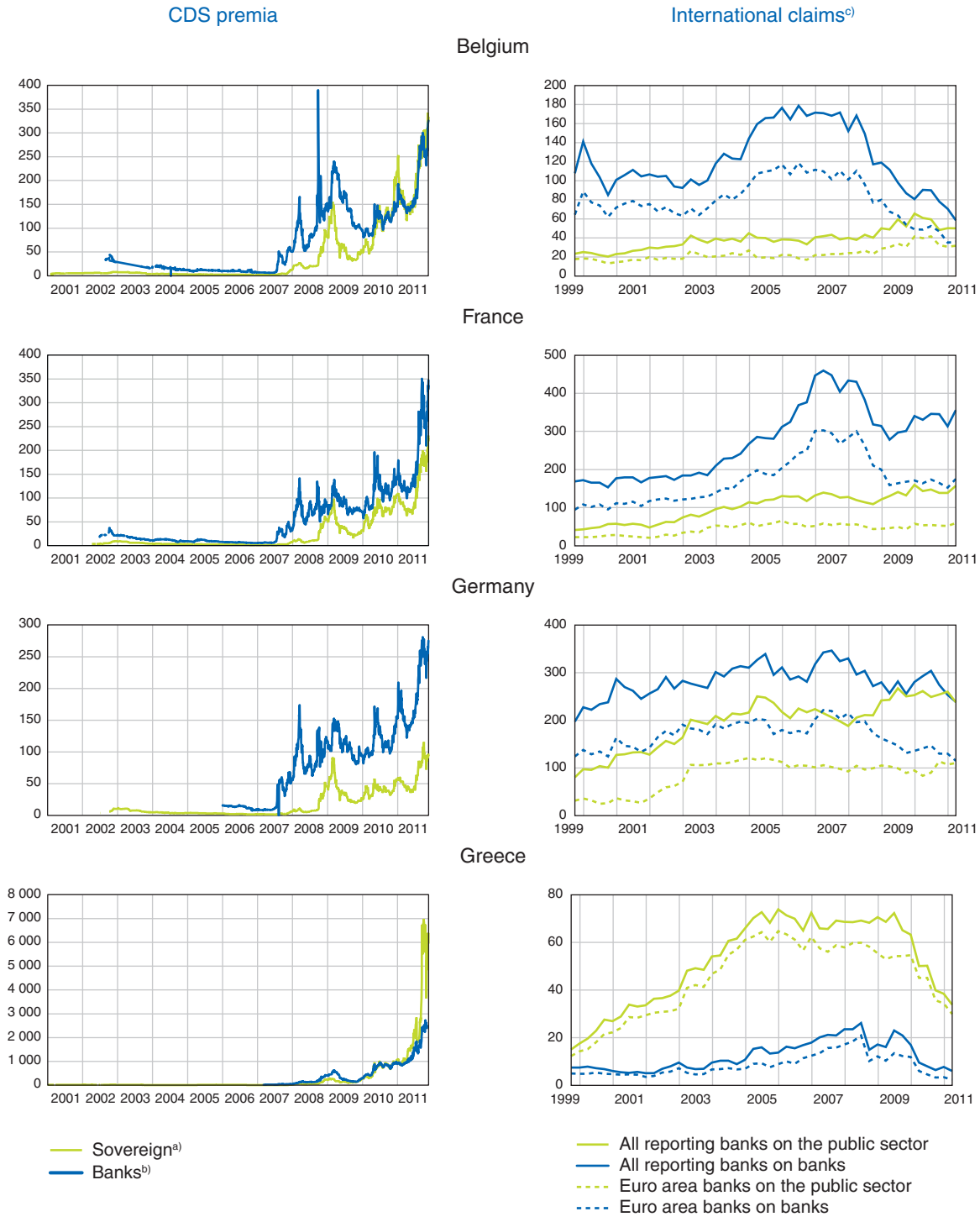


a) Equally weighted average of senior five-year CDS spreads for a sample of domestic financial institutions.
Source: Markit.

Global financial integration played a crucial role in facilitating this leveraging process. On the demand side, in some countries (e.g. Greece and Italy), the main borrowers from abroad were governments that needed to finance their excessive spending. In others (e.g. Spain and Ireland), banks drew on international credit and in turn financed private credit booms in their home economies.

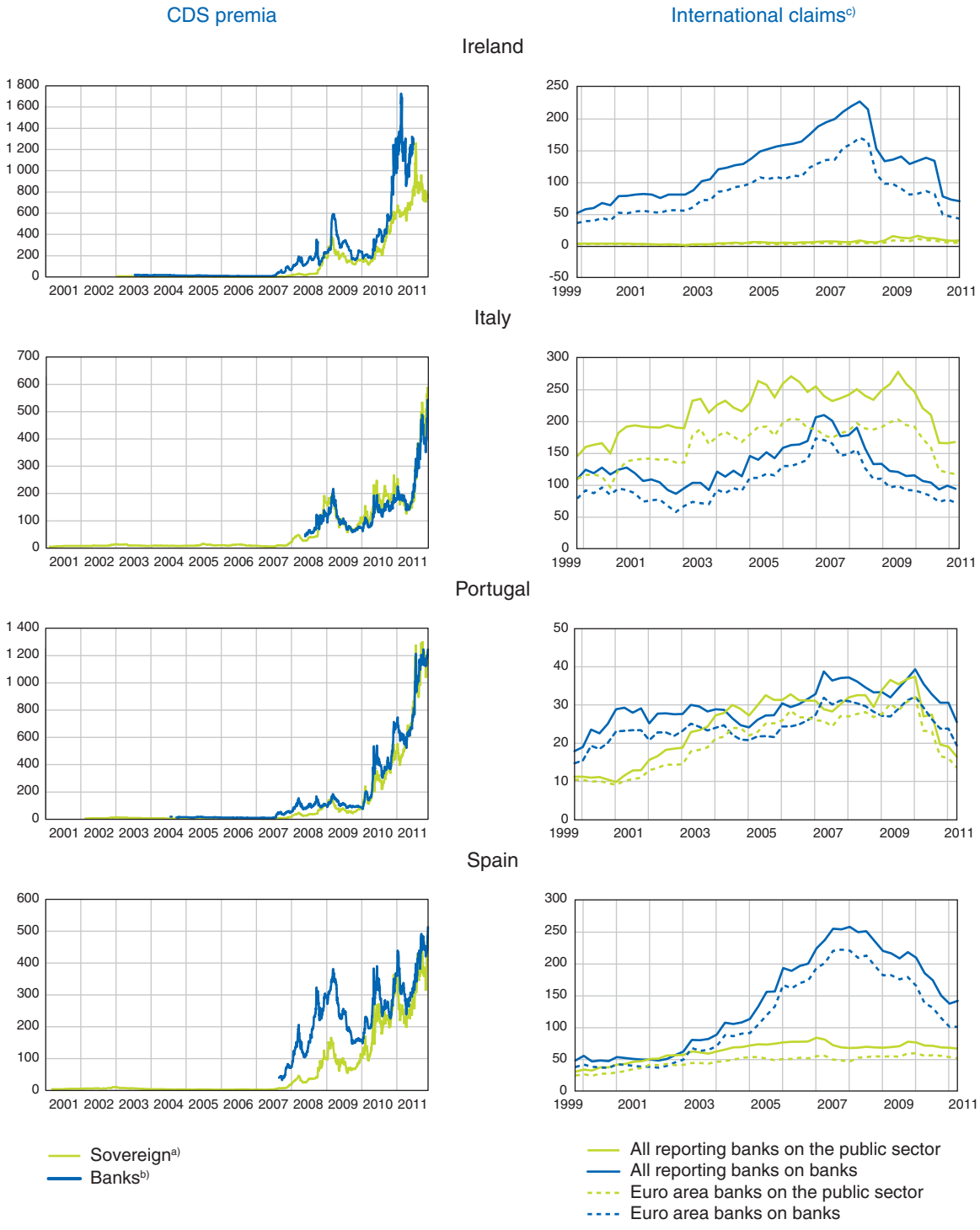
On the supply side, internationally active banks (particularly those headquartered in the euro area) readily accommodated the credit demands of borrowers regardless of their geographical location. Not surprisingly, euro area banks turned into the main suppliers of credit to the euro area sectors whose indebtedness increased the most during the last decade (Chart 3, right panels). More specifically, euro area banks were the main foreign bank lenders

Chart 3
CDS spreads and international claims on selected countries



a) Five-year on-the-run CDS spreads; in basis points.
b) Equally weighted average of senior five-year CDS spreads for a sample of domestic financial institutions; in basis points.
c) By counterparty sector, in billions of euros. All claims are assumed to be denominated in euros. International claims consist of cross-border claims and local claims denominated in foreign currencies. Local claims denominated in local currencies are not included.
Sources: Markit; BIS consolidated banking statistics (immediate borrower basis); BIS calculations.

Chart 3
CDS spreads and international claims on selected countries (cont'd)



a) Five-year on-the-run CDS spreads; in basis points.
b) Equally weighted average of senior five-year CDS spreads for a sample of domestic financial institutions; in basis points.
c) By counterparty sector, in billions of euros. All claims are assumed to be denominated in euros. International claims consist of cross-border claims and local claims denominated in foreign currencies. Local claims denominated in local currencies are not included.
Sources: Markit; BIS consolidated banking statistics (immediate borrower basis); BIS calculations.

to the Greek and Italian public sectors and to the Spanish and Irish banking sectors. Furthermore, euro area banks proved more eager than their peers to finance riskier foreign sovereigns (Chart 4). They had significantly larger shares of foreign claims on the public sectors of the riskier euro area sovereigns (Italy, Spain and Greece) than banks from the rest of the world, who lent primarily to the more solid euro area sovereigns (Germany and France).

Banks were equally complacent about rollover risk in the interbank market. Many became too dependent on cheap, but unreliable, short-term funding and failed to build adequate liquidity buffers. Not surprisingly, under stress, unsecured funding dried up and banks turned increasingly to collateralised borrowing, both short-term (e.g. the repo market) and long-term (e.g. covered bonds). The ECB Euro Money Market Surveys reported a halving in overall volumes in unsecured transactions between early 2007 and early 2010, with longer maturities more than proportionally reduced. Secured transactions rose from less than two thirds of all cash transactions to more than three quarters (CGFS, 2011).

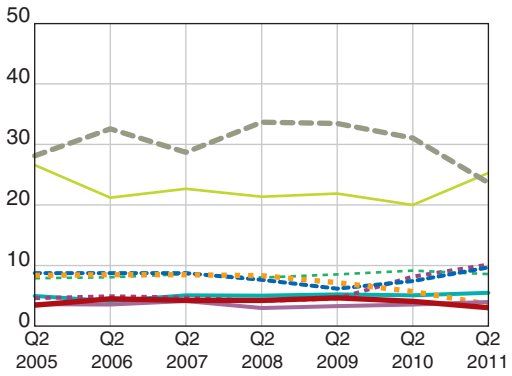
As hubris became pervasive, underneath the surface trouble loomed. First, in some economies private credit-to-GDP ratios and property prices had soared far above their long-term trends. This should have been a crucial warning signal for financial institutions around the world since, as Drehmann *et al* (2011) have shown, the former of these two variables is the most reliable single indicator of the build-up of systemic risk in a given economy and a helpful predictor of impending systemic banking crises (Caruana, 2010). However, financial institutions, unperturbed by such signs of impending danger, kept increasing their leverage. Thus, the first initial condition for the spread of the crisis was in place.

Second, two temporary factors flattered the fiscal balances of most sovereigns in the developed world. For one, the expansionary phase of the business cycle boosted the public sector's accounts (Chart 5). The average overall fiscal balance for the 2005–07 period exceeded its cyclically adjusted counterpart in all but seven OECD economies. In some countries (e.g. Estonia, Sweden, Iceland, Ireland and Hungary) the difference surpassed a full percentage point. In addition, and not accounted for in traditional cyclically

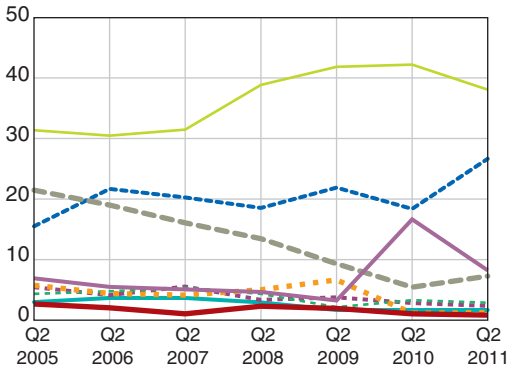
Chart 4
BIS reporting banks' foreign claims on selected euro area public sectors

(as percentage of their foreign claims on all euro area public sectors, by nationality of banks; quarterly data)

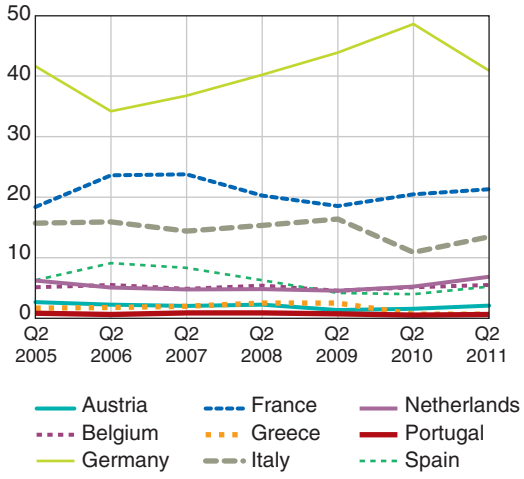
a) Euro area banks



b) European non-euro area banks



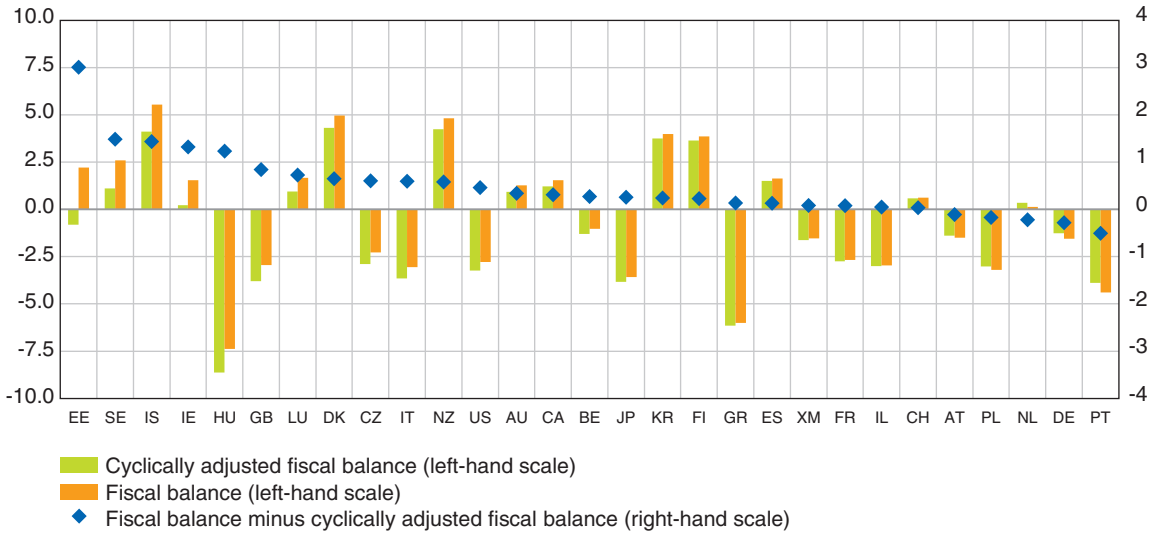
c) Non-European banks



Source: BIS consolidated banking statistics (ultimate risk basis)

Chart 5
General government fiscal balance, selected countries

(Average for 2005–07; as a percentage of GDP)



AT = Austria; AU = Australia; BE = Belgium; CA = Canada; CH = Switzerland; CZ = Czech Republic; DE = Germany; DK = Denmark; EE = Estonia; ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; HU = Hungary; IE = Ireland; IL = Israel; IS = Iceland; IT = Italy; JP = Japan; KR = Korea; LU = Luxembourg; NL = Netherlands; NZ = New Zealand; PL = Poland; PT = Portugal; SE = Sweden; US = United States; XM = euro area.
Sources: OECD, Economic Outlook; BIS calculations.

adjusted figures, the credit- and asset price-intensive boom made matters worse. All this encouraged the authorities to spend more freely. Thus, the second initial condition for the crisis was in place.

As Governor Honohan of the Central Bank of Ireland so aptly put it (2010):

"The tax revenue generated by the boom came in many forms: capital gains on property, stamp duty on property transactions, value added tax on construction materials and income tax from the extra workers – immigrants from the rest of Europe, from Africa, from China, flooded in as the construction sector alone swelled up to account for about 13 per cent of the numbers at work (about twice the current level, which is closer to what would be normal)."

With the benefit of hindsight, it is clear that both financial stability and fiscal authorities could have been more aware of the build-up of risks – and they would have been, if the experience of previous crises had been heeded. This would have prevented them from adopting policies that were both unsafe and unsustainable. Furthermore, it would have allowed them to detect and react to the first signs of impending trouble much more promptly than they actually did. More concretely, financial stability authorities could have been more alert to the risk that the capital banks had set aside to address sovereign exposures would be insufficient (i.e. that the first of the initial conditions for the spread of a crisis was in place). For their part, fiscal authorities could have taken appropriate actions as soon as the early signs of problems in the financial system began to emerge. This would have put them in a much better position to deal with a major financial crisis (i.e. it would have ensured that the second of the initial conditions for the spread of a crisis was not in place).

3| Banks and sovereigns during the crisis (2007-present)

The first signs of stress in the financial system surfaced in the summer of 2007. In the immediate aftermath, there was little evidence that market participants were aware of the potential for the development of the malign feedback loop between bank and sovereign risk described in Section 1. Data on bond yields (Chart 1b) and CDS spreads (Chart 2 and left panels of Chart 3) for banks and sovereigns between July 2007 and August 2008 confirm this: investors worried mainly about the health of certain financial institutions and little about sovereign creditworthiness.

Indeed, even though sovereign CDS spreads for most developed countries did inch up slightly during the initial phase of the crisis, the increases in the CDS spreads of banks in the same countries were orders of magnitude greater (Chart 6a). For example, while the average bank CDS in Ireland increased by more than 350 basis points between June 2007 and September 2008, the corresponding sovereign CDS rose by less than 30 basis points during the same period. The picture was similar in most other developed economies, with especially large discrepancies in the cases of the United States, Spain and Australia.[2]

The situation changed drastically in September and October 2008, when a large number of sovereigns in the developed world provided support to their financial institutions in the form of asset purchase programmes, debt guarantees and direct equity injections. The financial support programmes were often sizeable, with upfront costs reaching up to 55% of GDP (Borio *et al*, 2010). Had sovereigns built adequate fiscal buffers during the expansionary phase of the economic cycle, the financial assistance would have reduced the tensions in the financial system without significantly affecting their creditworthiness. But this was not the case (Chart 6b). As a result, while the CDS spreads of financial institutions declined, those of the respective sovereigns rose considerably (Ejsing and Lemke, 2009).

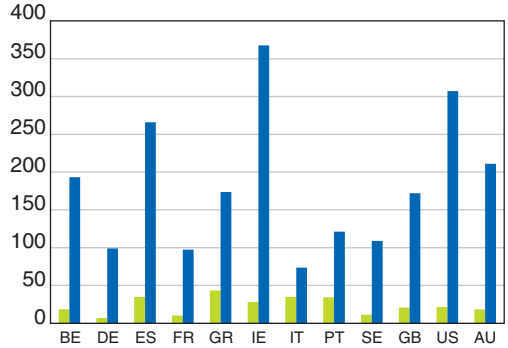
That said, the same period saw the first signs that market participants were beginning to factor in the effects of the indirect channels in the feedback loop described in Section 1. In particular, in September and October 2008 not all the changes in sovereign and bank CDS spreads were negatively correlated. Some countries, such as Greece and Italy, experienced relatively large increases in their sovereign CDS spreads without any noticeable declines in those of their banks.

Despite these early signs, not all investors were differentiating among sovereigns based on the health of their balance sheets. In the first year after the Lehman Brothers bankruptcy, some banking systems, most notably those in the euro area, started rebalancing their foreign portfolios towards the public sector indiscriminately. In particular, and in contrast to banking systems in the rest of the world, they substantially increased the foreign portfolio's share of claims on both relatively safe sovereigns, such as the United States, and relatively risky ones, from countries that would subsequently be at the epicentre of the

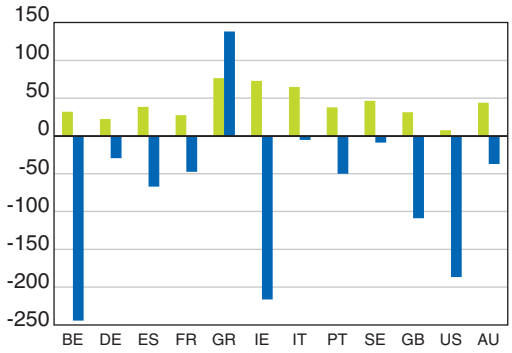
Chart 6
Sovereign and bank CDS spreads for selected nationalities

(in basis points)

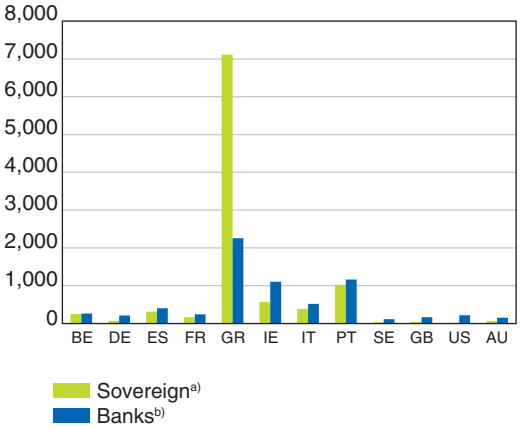
a) Changes between 1 June 2007 and 25 Sep. 2008



b) Changes between 26 Sep. and 31 Oct. 2008



c) Changes between 1 Oct. 2009 and 30 Nov. 2011



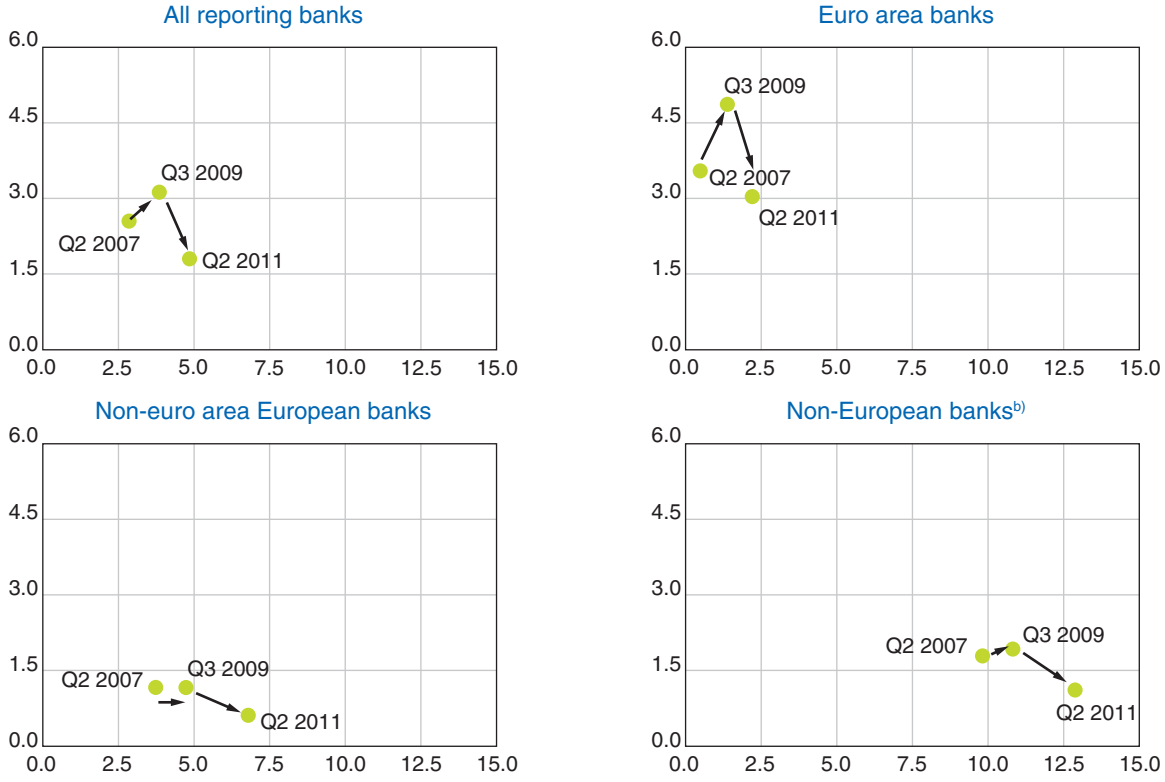
AU = Australia; BE = Belgium; DE = Germany; ES = Spain; FR = France; GR = Greece; IE = Ireland; IT = Italy; PT = Portugal; SE = Sweden; GB = United Kingdom; US = United States.

a) Five-year on-the-run CDS spreads.
b) Equally weighted average of senior five-year CDS spreads for a sample of domestic financial institutions.
Source: Markit.

2 *For further discussion, see Acharya* et al. *(2011).*

Chart 7
Consolidated foreign claims on the public sectors of the GIIPS[a] countries and the United States

(by bank nationality, as a percentage of banks' total foreign claims; x-axis: US public sector; y-axis: GIIPS public sectors)



a) GIIPS = Greece, Ireland, Italy, Portugal, Spain.
b) Excluding US banks.
Source: BIS consolidated banking statistics (ultimate risk basis).

European sovereign debt crisis: Greece, Ireland, Italy, Portugal and Spain (Chart 7).

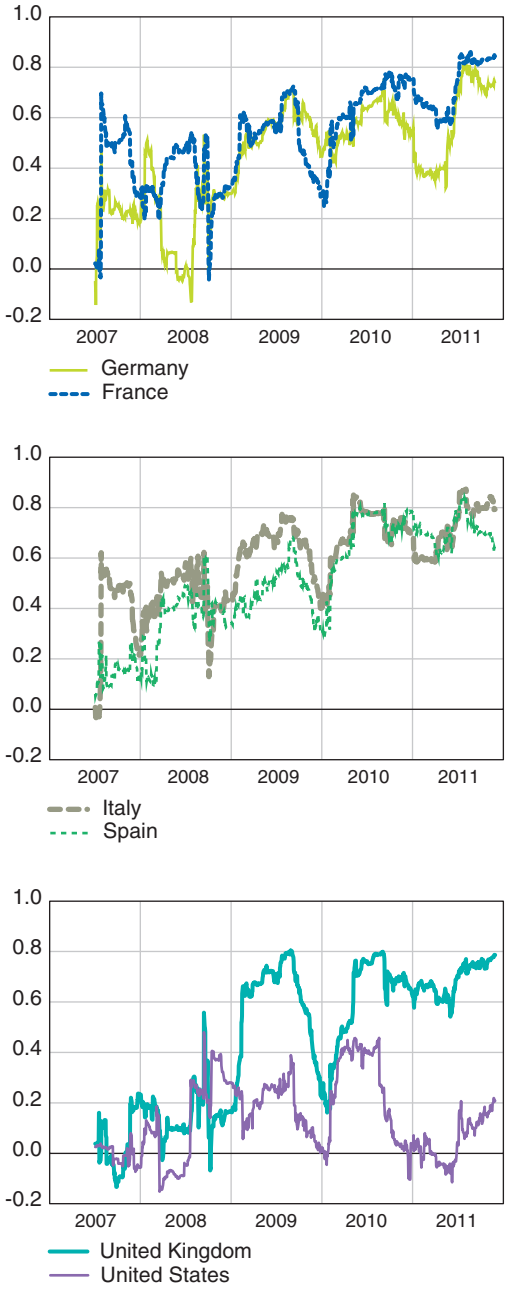
After the fourth quarter of 2009, when the first serious signs of fiscal problems in the euro area began to emerge, investors became much more aware of the possible channels for risk transfer between banks and sovereigns. As a result, they started to price their joint credit risks accordingly. Bank and sovereign CDS spreads became much more positively correlated with each other, both at low (Chart 6c) and high frequencies (Chart 8), and within and across countries. Against this backdrop, internationally active banks, including those headquartered in the euro area, started to rebalance their foreign portfolios away from the riskier sovereigns in the euro area, such as Greece, Ireland, Italy, Portugal and Spain, and towards perceived safer sovereigns, such as the United States (Chart 7) and Germany (Chart 4).

4| Where do we stand now?

The BIS consolidated international banking statistics can shed light on the degree to which the direct exposures of banks to sovereign debt are still a factor in the European sovereign debt crisis.

The combined foreign claims of BIS reporting banks on the public sectors of Greece, Ireland, Italy, Portugal and Spain fell from EUR 568 billion at the end of the third quarter of 2009 to EUR 335 billion at the end of the second quarter of 2011 – a decline of roughly 41% (Chart 9). There are three possible drivers of this decline. First, banks may have marked the value of some of the government debt on their trading books down to its market value or provisioned against future losses on their government debt holdings in the banking book. Second, banks may have let a portion of the government debt on their balance sheets mature without replenishing it. Third, banks

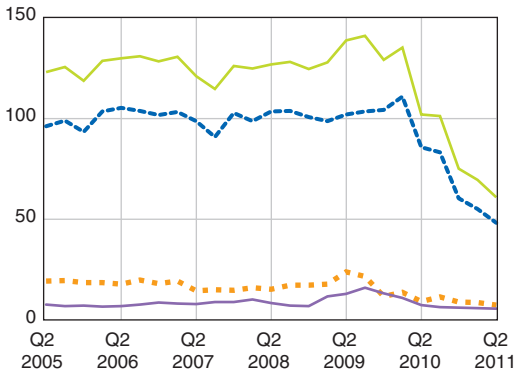
Chart 8
Correlations between sovereign and bank CDS spreads for selected nationalities[a)]



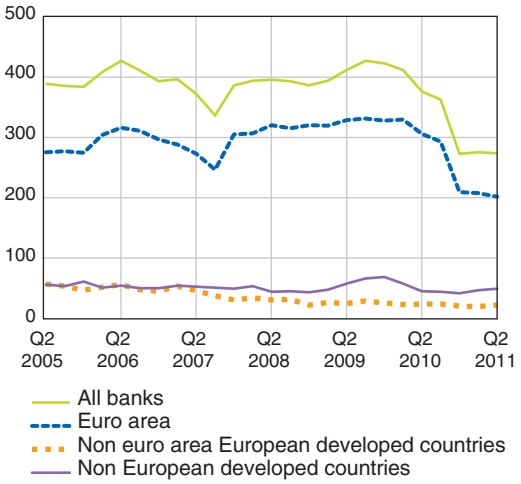
a) 90-day rolling window correlations between daily changes in five-year on-the-run sovereign CDS spreads and daily changes in equally weighted averages of senior five-year CDS spreads for a sample of domestic financial institutions.
Source: Markit.

Chart 9
Foreign claims on selected countries' public sectors
(in billions of euros, by bank nationality)

a) Greece, Ireland, Portugal



b) Italy, Spain



Source: BIS consolidated banking statistics (ultimate risk basis).

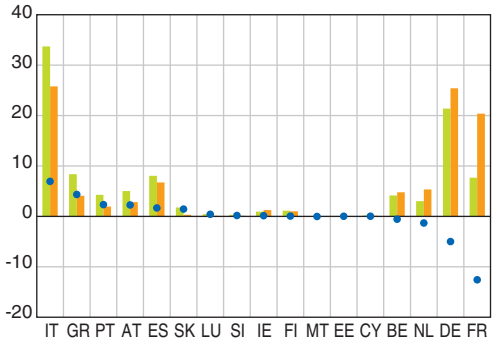
may have sold some of their foreign government debt securities, including to the home banks of the sovereign and to the ECB.

It is impossible to quantify the exact contributions of each of the above factors using the breakdowns currently available in the BIS consolidated banking statistics. However, a substantial part of the decline in claims on the public sectors of Greece, Ireland and Portugal (EUR 79 billion or 56%) may well be accounted for by ECB purchases under the Securities Markets Programme made between the end of the first quarter of 2010 and the end of the first quarter

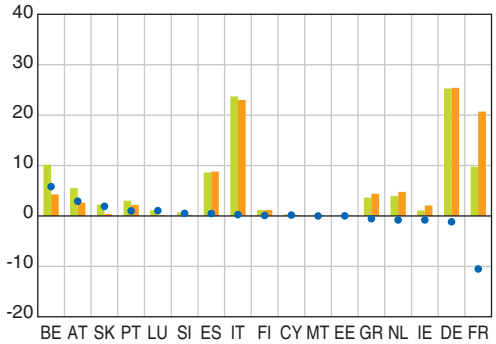
Chart 10
Weights in the euro area foreign public sector portfolios of euro area banks versus shares of outstanding euro area government debt

(in percentage points)

a) Q2 2008



b) Q2 2011



Weights in the euro area foreign public sector portfolios of euro area banks
Shares of outstanding euro area government debt
• Difference

AT = Austria; BE = Belgium; CY = Cyprus; DE = Germany; EE = Estonia; ES = Spain; FI = Finland; FR = France; GR = Greece; IE = Ireland; IT = Italy; LU = Luxembourg; MT = Malta; NL = Netherlands; PT = Portugal; SI = Slovenia; SK = Slovakia.

Source: BIS consolidated banking statistics (ultimate risk basis).

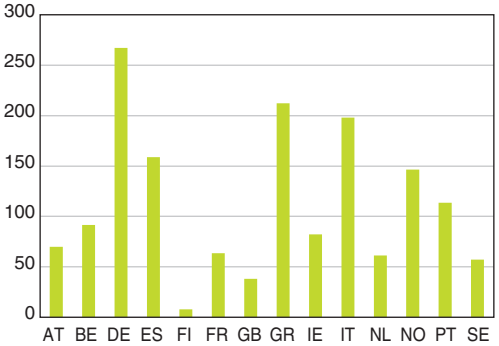
of 2011 (EUR 78 billion). This factor, of course, cannot explain the decrease in claims on the public sectors of Italy (EUR 144 billion or 42%) and Spain (EUR 10 billion or 12%), as ECB purchases of these debts only began in the third quarter of 2011.

Despite the overall decline in exposures to the riskiest euro area sovereigns observed in 2010-11, banks still own sizeable amounts of domestic and foreign sovereign debt. As of June 2011, BIS reporting banks' exposures to foreign public sectors ranged from close to 80% of Tier 1 capital for Italian, US and German banks to over 240% for Swiss, Belgian and Canadian banks. Foreign exposure vis-à-vis the countries most severely affected by the sovereign debt tensions (i.e. Greece, Ireland, Italy, Portugal and Spain) was significantly smaller, but often substantial. For instance, German, French and Belgian banks' combined exposures were equal to approximately 38% of their Tier 1 capital.

Furthermore, the foreign public sector portfolios of euro area banks remain geared towards the riskier euro area sovereigns (Chart 10b). Relative to the average shares of euro area government debt outstanding, euro area banks continue to underweight the safest sovereigns (i.e. Germany and France) and overweight some of the riskier ones (Belgium, Portugal, Italy, Spain). Nevertheless, their bias towards overweighting the debt of riskiest euro area public sectors has decreased since mid-2008, when Italy, Greece, Portugal and, to a somewhat smaller extent, Spain loomed larger (Chart 10a).[3]

Chart 11
Bank exposures to domestic public sectors, by bank nationality

(as a percentage of core Tier 1 capital, end-December 2010)



AT = Austria; BE = Belgium; DE = Germany; ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; NL = Netherlands; NO = Norway; PT = Portugal; SE = Sweden.

Note: Exposures to domestic public sectors are based on data released by the European Banking Authority (EBA) as a part of the stress test results published in July 2011. Inclusion of banks in the EBA stress test varied by country and, as a result, comparisons of exposures across countries should be interpreted with caution.
Source: EBA.

3 *For further discussion, see Bolton and Jeanne (2011).*

In addition, European banks continue to hold large amounts of debt issued by their own sovereigns. Data released by the European Banking Authority in July 2011 as part of its EU-wide stress test results suggest that the domestic sovereign debt holdings of many European banking systems exceeded 100% of their Tier 1 capital as of the end of 2010 (Chart 11). This was true for banks in countries with solid public finances (Germany and Norway) as well as banks in countries experiencing serious fiscal problems (Greece, Italy, Spain and Portugal).

5| A WAY FORWARD

The global financial crisis has once again highlighted the fact that global financial stability depends critically on the two-way link between banks and sovereigns. On the one hand, the fiscal soundness of sovereigns is one of the most important prerequisites for the smooth and efficient functioning of the international financial system. On the other hand, a solid global financial system is crucial for the fiscal health of sovereigns around the world. Weaknesses in either of the two sectors can spread to the other via a number of channels, setting off a dangerous chain reaction. With the global financial system becoming more and more integrated, such a chain reaction can quickly extend across national borders. In order to prevent this from happening, appropriate buffers should be built up in good times – fiscal buffers would ensure that the risk-free status of the sovereign is maintained, while capital and liquidity buffers would underpin the soundness of the financial system.

The main conclusion that policymakers should draw from the crisis is that the interconnectedness of the global financial system makes the prudential approach to policymaking, as it relates to both government finances and financial stability, more important than ever before. What policymakers do in any given jurisdiction affects economic and financial developments elsewhere. As a result, when making their decisions, they should also take these spillover effects into consideration. And they should do so even from a narrow national perspective: any action they take is likely not only to affect the global financial system, but also to set off a chain reaction that may eventually come back and burn them.

The most urgent task facing policymakers today is restoring the risk-free status of sovereigns, together with the confidence it engenders. We are used to living in a world in which the obligations of most governments in the developed world are regarded as risk-free. As a result, the usual practice has been to assign a risk weight of zero to sovereign debt. However, if the deterioration in the credit quality of sovereigns is not stopped and reversed, it will be impossible to avoid the difficult task of reassessing sovereign risk.

Contrary to what is sometimes stated, both Basel II and Basel III require banks to analyse and to discriminate among sovereign risks. The internal ratings-based approach for calculating the amount of capital to be held against credit risk does not imply a zero risk weight. Instead, it calls for a granular approach that allows for a meaningful differentiation of sovereign risk. Moreover, the 3% leverage ratio in Basel III in effect sets a floor on the capital backing of sovereign holdings. That said, assessing sovereign risk and the capital that needs to be held against it is not easy, given the lack of defaults among the better sovereign credits.

This makes it even more critical that governments earn back investors' confidence in the risk-free status of their debt. This complex task calls for a sustained effort, a multi-pronged approach and a strategy that bridges the seemingly contradictory short and long-run goals.

In the long run, a key role for the government budget is to provide a countercyclical policy instrument, be it through automatic stabilisers or discretionary actions, such as providing support for the financial system. A precondition for implementing such a policy is for the government to remain creditworthy at times of stress. This requires it to build up financial buffers in good times. Fiscal profligacy in a boom is doubly damaging. It feeds excesses in private sector behaviour and undermines the capacity of the government to act as a stabiliser during the bust.

In the short run, governments need to address the high levels of indebtedness by designing credible plans for fiscal consolidation and structural reforms that convince market participants that adjustment will occur and that sustainability will follow. Financing backstops will be needed during the adjustment phase. In this process, time is of the essence, and it is vital that the necessary measures are adopted in the correct sequence.

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