



December 3, 2013

Ms. Melissa D. Jurgens
Secretary
Commodity Futures Trading Commission
Three Lafayette Centre
1155 21st Street, NW
Washington, DC 20581

Mr. Robert E. Feldman
Executive Secretary
Attention: Comments
Federal Deposit Insurance Corporation
550 17th Street, NW
Washington, DC 20429

Mr. Robert deV Frierson
Secretary
Board of Governors of the Federal
Reserve System
20th Street and Constitution Ave., NW
Washington, DC 20551

Ms. Elizabeth M. Murphy
Secretary
Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549-1090

Office of the Comptroller of the Currency
250 E Street, SW
Mail Stop 2-3
Washington, DC 20219

Ladies and Gentlemen:

Re: Supplemental Material on the Notice of Proposed Rulemaking Implementing the Volcker Rule-Proprietary Trading

In connection with your continuing efforts to develop rules implementing the proprietary trading provisions of the Volcker Rule¹, the Securities Industry and Financial Markets Association (“SIFMA”) submits for your consideration two recently published documents containing commentary on the Volcker Rule’s proprietary trading provisions. The documents attached are:

1. “A Better Path Forward on the Volcker Rule and the Lincoln Amendment,” by James D. Cox, Jonathan R. Macey and Annette L. Nazareth and published by the Bi-Partisan

¹ 12 U.S.C. § 1851. The proposal implementing the Volcker Rule was originally published in Prohibition and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Private Equity Funds, 76 Fed. Reg. 68,846 (proposed Nov. 7, 2011) and Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Covered Funds, 77 Fed. Reg. 8332 (proposed Jan. 13, 2012).

- Policy Center (available online at <http://bipartisanpolicy.org/library/report/better-path-forward-volcker-rule-and-lincoln-amendment>); and
2. “Did Liquidity Providers Become Liquidity Seekers?” by Jaewon Choi and Or Shachar, Staff Report No. 650, October 2013 (Federal Reserve Bank of New York Staff Reports, available online at http://www.newyorkfed.org/research/staff_reports/sr650.pdf).

If you have any questions, please feel free to contact the undersigned at rtoomey@sifma.org or 212.313.1124.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert Toomey', with a stylized, cursive script.

Robert Toomey
Managing Director and Associate General Counsel



Economic Policy Program

Financial Regulatory Reform Initiative

A Better Path Forward on the Volcker Rule and the Lincoln Amendment

October 2013



BIPARTISAN POLICY CENTER



Economic Policy Program

Financial Regulatory Reform Initiative

ABOUT BPC

Founded in 2007 by former Senate Majority Leaders Howard Baker, Tom Daschle, Bob Dole, and George Mitchell, the Bipartisan Policy Center (BPC) is a nonprofit organization that drives principled solutions through rigorous analysis, reasoned negotiation, and respectful dialogue. With projects in multiple issue areas, BPC combines politically balanced policymaking with strong, proactive advocacy and outreach.

ABOUT THE FINANCIAL REGULATORY REFORM INITIATIVE

The Financial Regulatory Reform Initiative (FRRI) is co-chaired by Martin Baily and Phillip Swagel. Composed of five task forces, FRRI's goal is to conduct an analysis of Dodd-Frank to determine what is and what is not working along with recommendations to improve the system.

DISCLAIMER

This white paper is the product of the BPC's Financial Regulatory Reform Initiative. The findings and recommendations expressed herein do not necessarily represent the views or opinions of the Bipartisan Policy Center, its founders, or its board of directors.

AUTHORSHIP

This paper is authored by the co-chairs of the Capital Markets Task Force:

James D. Cox
Jonathan R. Macey
Annette L. Nazareth

The authors appreciate the work and input of the initiative co-chairs, fellow task force members, and BPC staff.

Table of Contents

Cover Letter on a Better Path Forward	5
Executive Summary	10
The Volcker Rule	10
The Lincoln Amendment.....	13
Introduction	15
Background on the Development of the Volcker Rule	16
The Group of Thirty Report	16
Treasury White Paper and Congressional Financial Reform Bills	16
The Implementation of the Volcker Rule.....	19
Proprietary Trading	19
Private Equity and Hedge Funds.....	20
Compliance	21
Reactions to the Proposed Regulation	21
A New, Better Alternative for Implementing the Volcker Rule	22
Recommendation 1: Gather Relevant Data	24
Recommendation 2: Identify Patterns by Activity and Product, then Assign and Monitor with Key Metrics	24
Selected Metrics in the Proposed Regulations	27
Fee Income and Expense, Spread Profit and Loss	27
Day-One Profit and Loss.....	28
Customer-Facing Trade Ratio.....	28
Inventory Aging	28
Value at Risk and Risk Management	29
Hedging Metrics	29
Defining Short-Term Trading and Near-Term Transactions	30
Recommendation 3: Differentiate Among Markets, Activities, and Asset Classes	30

One Size Does Not Fit All, or Even Most.....	30
Assessing Trading Patterns Holistically	32
Recommendation 4: Implement on a Phased-In Basis	33
Covered Funds.....	35
Recommendation 5: Update Iteratively as Needed to Account for Real-World Impacts	36
Recommendation 6: Adopt the Federal Reserve’s Approach in Regulation K to Extraterritorial Reach of the Volcker Rule	36
The Lincoln Amendment	39
Conclusion	41
Appendix A: Outreach Interview Form	42
Endnotes	44

Cover Letter on a Better Path Forward

By Martin Neil Baily and Phillip L. Swagel

It is inevitable that there will be another financial crisis. Since we do not know the form or nature of the next threat to financial stability, however, policymakers today must work to make the financial system more robust to shocks whatever the source. Following the recent crisis and the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank), regulators have increased capital requirements, proposed rules to improve liquidity management, and developed procedures to resolve large institutions without bailouts and without market disruption. This work is far from complete, and we will not truly know if these efforts are successful until the next crisis hits, but considerable progress has been made on making the financial system safer than it was before the crisis.

With the goals of improving stability and separating taxpayer support for the banking system from speculative trading activity with banks' own capital, the Dodd-Frank legislation included provisions to restrict proprietary trading by financial institutions. Proprietary trading occurs when a firm trades stocks, bonds, and currency, commodity, or other derivatives for its own account—that is to say using its own funds—rather than making a market on behalf of its customers or hedging its risk. While limits on proprietary trading were not included in the original financial reform proposals from the Treasury Department, the Obama administration eventually supported them in the form of the Volcker Rule and the Lincoln Amendment. The rationale for these provisions is that banks should not use their position as holders of FDIC-insured deposits or their ability to borrow at the Federal Reserve's discount window to generate funds for certain types of speculation—the idea being that proprietary trading is a different type of activity than lending by banks for, say, commercial real estate. The Volcker Rule, of course, applies to every affiliate in a banking organization, not just insured banks. In part, the Volcker Rule and the Lincoln Amendment reflect a concern that the 1999 bipartisan Gramm-Leach-Bliley financial deregulation legislation went too far in freeing large banks from the restrictions of the Glass-Steagall rules set in the 1930s.

The Volcker Rule and the Lincoln Amendment were controversial at the time of enactment and remain so today. Proponents claim that they will make the financial system safer. Critics argue that a financial institution that is diversified in its activities may actually be safer rather than riskier overall and that the two provisions could reduce market liquidity and thereby increase borrowing costs for end users, with a net drag on the economy. Indeed, the Volcker Rule carves out an exception for proprietary trading in U.S. Treasury securities, suggesting that drafters were concerned about the potential for reduced liquidity

to impose self-inflicted costs through increased Treasury yields. Other sovereign bonds, however, are not exempt.

In the end, however, these criticisms do not change the reality that the Volcker Rule and the Lincoln Amendment are the law of the land, and the challenge now is implementation. Little progress has been made in implementing the Lincoln Amendment so far, and crafting the final regulations to implement the Volcker Rule, in particular, has proven devilishly difficult and time-consuming.

The report that follows was written by the Financial Regulatory Reform Initiative's Capital Markets Task Force—co-chaired by James Cox, Jonathan Macey, and Annette Nazareth—with support from the Bipartisan Policy Center (BPC) staff. The report proposes a path toward implementation of the Volcker Rule in a way that achieves the legislation's intent while allowing capital markets to function efficiently. This could be a big step forward. The proposal in this paper further raises the possibility that a well-executed Volcker Rule would simultaneously accomplish the intended goal of the Lincoln Amendment in ensuring that insured depository institutions do not undertake proscribed activities. The goals of the Lincoln Amendment might then be subsumed into the Volcker Rule. The purpose of this preamble to the report is to discuss some of the economic issues around capital markets regulation.

The Problem of Complexity in the Volcker Rule

In testimony delivered before the Senate Banking Committee on December 7, 2011, Sheila C. Bair, the former head of the Federal Deposit Insurance Corporation (FDIC), praised the concept of the Volcker Rule, but also pointed out the inherent tension between the Volcker Rule and the modern regulatory structure:

The basic construct of the Volcker Rule is one that I strongly support. FDIC insured banks and their affiliates should make money by providing credit intermediation and related services to their customers, not by speculating on market movements with the firm's funds. [This is] ... at odds with Congress' 1999 repeal of Glass-Steagall, which allowed insured banks to affiliate with securities firms, and—let's be honest—making money off market movements is one of the things that securities firms have long done.¹

Congress has given bank regulators a difficult task, requiring them to set rules that prevent proprietary trading while allowing sufficient exceptions to permit banks to undertake market-making activity and hedging, and to meet the needs of their customers. As a result, the initial proposed implementing rules were overly complex, as Bair noted:

I fear that the recently proposed regulation to implement the Volcker Rule is extraordinarily complex and tries too hard to slice and dice these exceptions in a way that could arguably permit high risk proprietary trading in an insured bank while restricting legitimate market making activities in securities affiliates.²

Paul Volcker himself has expressed frustration with the implementation process, arguing that his idea for the rule is a simple one and that good regulators should know proprietary trading when they see it and go after the banks that do it. He believes a short, simple rule is called for.³

The problem for regulators, however, is turning that sentiment into clear guidance for securities firms engaged in trading activities. Regulators cannot be expected to make a determination that a firm has violated the rules if those rules are not clearly specified. Many of the activities that securities firms carry out to make markets in securities or to help their customers raise capital or manage portfolios of financial assets could be construed as proprietary trading. Moreover, efforts by regulators to prevent firms from undertaking speculative trading in complex securities such as collateralized debt obligations (CDOs) could inadvertently affect the smooth and efficient working of legitimate markets that rely on derivatives to hedge and manage risk.

Getting to the Right Volcker Rule

Rather than fighting the complexity of the Volcker Rule, it is better to acknowledge or even embrace that complexity by recognizing that it will take time and a serious effort of data analysis to get the rules right.

As the report points out, a financial institution may buy assets in the expectation that these will be demanded by its clients and sold off quickly. If market conditions change, however, the institution may end up holding the assets for an extended period of time before they are all allocated to its clients. On average, the institution expects to make a profit on its buying and selling of assets, but that means that sometimes it may lose and other times it may win. Someone might conclude by looking at individual transactions that this activity is proprietary trading because the bank is risking its own funds and either making or losing money on a deal. The challenge is to discern where the firm is simply engaged in market-making activity and when it is not. Discerning between these situations might require every trading desk to be able to explain to regulators the rationale and financial impact behind each transaction. While obviously an overstatement, this highlights the dilemma of implementing the Volcker Rule and the Lincoln Amendment.

Another reason for real complexity is that the markets for financial assets vary significantly. Some are thick, with a considerable volume of trading and billions of dollars changing hands on a daily basis. Other markets are thin with low levels of daily trading where a broker-dealer may have to hold a significant position in an asset over time in order to serve a client who, for example, wants to tap the capital markets for funds to invest.

The report makes clear that the way to deal with the complexity of markets is to combine data and metrics to understand how the different asset markets vary, and use a similar process for different activities. In doing so, the relevant regulators would build a database to develop these metrics and then use them to monitor institutions for compliance with the

Volcker Rule. Institutions must be able to track their own activities and know when they are approaching the line of proprietary trading and how to adjust their activities to avoid violations.

There is already much controversy around the length of time it is taking to implement Dodd-Frank rules. To many critics of the regulators or the industry, the delays are symptomatic of foot dragging and an unwillingness to take the necessary steps to properly protect the financial system. The concern is that too much delay will ultimately mean that some of the Dodd-Frank rules will never be implemented. This is a legitimate concern. Indeed, it is appropriate to be concerned about “regulatory capture”—in which regulators identify with the institutions they are regulating. Nonetheless, there are some cases in which taking the time to get it right is entirely appropriate. The Volcker Rule is one of those cases. It simply will take time to craft the regulations to implement the Volcker Rule in the right way. Regulators should be willing to take the time to get it right—but not a minute more than that.

The costs of a poorly implemented Volcker Rule would be high. Such a rule could reduce liquidity in financial markets and thus raise costs and reduce investment in the broader economy. Indeed, the fact that trading in Treasury securities has been made exempt from the rule illustrates the potential downside. Removing this activity from large financial institutions could have had a meaningful negative impact on demand for Treasury securities and thus lead to increased yields and higher costs for public borrowing. The same concern applies to other activities that will be affected by the rule. All investors and savers will be affected. Investors and savers are not just large, complex financial institutions, but include workers whose pension funds and 401(k)s invest in these securities. A poorly implemented Volcker Rule would mean that families have less access to credit and thus less ability to buy homes and cars and put children through college. Businesses will find it harder to borrow, which will make it harder for them to do research and development, make capital investments, and create jobs. Asset prices will be pushed down, which will punish investors and savers and ultimately weaken the economy. The Volcker Rule and the Lincoln Amendment are the law and must be implemented. But, it is vital to get them right.

Conclusion

From the outset, BPC’s Financial Regulatory Reform Initiative has taken the view that the regulatory regime established under Dodd-Frank is a fact of life and that its goal of making the financial system more stable was and is a critical one. The purpose of the initiative is to assess what is working, what is not working, and what may need adjustment or fine-tuning. Neither the Volcker Rule nor the Lincoln Amendment is working because neither has been implemented, though many institutions have taken steps to divest dedicated proprietary trading operations that would be forbidden under any reasonable implementation of the Volcker Rule. The concerns voiced by the financial industry are one reason for this slowness, but the most important reason is that implementation is hard. It is important not to allow taxpayers to absorb the risks that financial institutions take while shareholders and

managers keep the profits. It is also important that financial markets work smoothly to provide the services a complex economy needs to invest and grow. It is our hope that the following report on the Volcker Rule and the Lincoln Amendment will be viewed as a significant step forward in getting this right.

Executive Summary

Two late additions to Congress's response to the financial crisis have proved to be among the most complex and challenging for U.S. financial regulators to put into place. The degree of difficulty these two rules present, their unknown impact on financial markets and the economy, and the lack of international coordination surrounding them have led to continued regulatory delay with promulgating these two rules. Accordingly, the Capital Markets Task Force of the Bipartisan Policy Center's (BPC) Financial Regulatory Reform Initiative recommends an improved alternative solution to the proposed Volcker Rule on proprietary trading and the Lincoln Amendment on "pushing-out" dealing on swaps. The task force recommends a different approach to facilitate the implementation of the Volcker Rule and also recommends delaying implementation of the Lincoln Amendment on swaps push-out until more real-world experience is gained with the Volcker Rule, however it is adopted.

The Volcker Rule

Implementing the Volcker Rule has proved to be one of the most challenging mandates of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank). The Volcker Rule is named for former Federal Reserve Board (FRB) Chairman Paul Volcker and is enacted in Section 619 of Dodd-Frank. In his January 2010 announcement proposing the Volcker Rule, President Obama said:

Banks will no longer be allowed to own, invest, or sponsor hedge funds, private equity funds, or proprietary trading operations for their own profit, unrelated to serving their customers. If financial firms want to trade for profit, that's something they're free to do. Indeed, doing so—responsibly—is a good thing for the markets and the economy. But these firms should not be allowed to run these hedge funds and private equities funds while running a bank backed by the American people.⁴

The 2011 report of recommendations from the Financial Stability Oversight Council (FSOC) on how to implement the Volcker Rule stated that the rule's purposes are to:

- 1) Separate federal support for the banking system from speculative trading activity with the banking entity's own capital;
- 2) Reduce potential conflicts of interest between a banking entity and its customers; and
- 3) Reduce risk to banking entities and nonbank financial companies designated for supervision by the [Federal Reserve] Board.⁵

The FSOC report continued:

The Volcker Rule prohibits banking entities, which benefit from federal insurance on customer deposits or access to the discount window, from engaging in proprietary trading and from investing in or sponsoring hedge funds and private equity funds, subject to certain exceptions.⁶

The federal financial regulatory agencies charged with implementing the rule have had trouble identifying clear lines between certain activities—such as impermissible proprietary trading (which, for simplicity, we call “proprietary trading” at times in this paper) and permissible market-making—because of the complexity of financial markets and the variety of financial activities in which banking organizations engage.⁷ It has been more than three years since the Volcker Rule was enacted, and final regulations have yet to be issued. The proposed regulations published by the federal financial regulatory agencies in late 2011 and early 2012⁸ received broad criticism from a wide variety of sources, including former Chairman Volcker himself, who said:

I don't like it, but there it is. ... I'd write a much simpler bill. I'd love to see a four-page bill that bans proprietary trading and makes the board and chief executive responsible for compliance. And I'd have strong regulators. If the banks didn't comply with the spirit of the bill, they'd go after them.⁹

Much of the complexity originates from attempting to differentiate permissible and impermissible activities. The proposed regulations set out several specific tests to determine whether an activity is one or the other, but their practical implementation depends on clearly identifying when a trade is being made for market-making or hedging purposes and when it is speculative.

Judging the intent of a trade in real-world situations is not an easy task. For example, for the purposes of market-making, a financial institution may buy securities that it reasonably expects its clients will want to purchase. If market conditions change or the institution simply misjudges, those securities may go unsold for longer than expected, which could resemble proprietary trading. A trade that starts as a hedge may later look speculative as the result of other trades within a portfolio. Some trades are even made for more than one purpose at a time.

Adding to the complexity, the proposed regulations envisioned a “one-size-fits-most” orientation where negative presumptions would appear to require a trade-by-trade approach to compliance. The proposed regulations generated significant input from stakeholders, with the Securities and Exchange Commission (SEC) receiving nearly 19,000 comment letters.¹⁰ While many supported the proposed regulations, or a more restrictive version,¹¹ others criticized the proposed regulations as overly complex. The agencies responsible for the rule's implementation are working to produce final regulations while facing increasing pressure from the administration to finish by year's end.¹²

It is imperative that the agencies get it right, because the regulations will have a significant impact on a wide variety of stakeholders. A Volcker Rule that lacks clarity could allow activities that Congress intended to be impermissible to continue to take place on one hand,

and chill legitimate market-making and hedging activity on the other, due to uncertainty about its application. A Volcker Rule that is overly rigid and proscriptive would be inefficient and potentially shut out market activities that Congress intended to be permissible. A rigid rule could also, depending on its formulation, technically allow activities that are not within the spirit of the Volcker Rule.

In contrast, a well-crafted Volcker Rule will build on other provisions in Dodd-Frank that protect taxpayers, investors, and corporate issuers from the risk of having to pay—directly or indirectly—for speculative bets made by insured depository institutions or their affiliates. It will be effective in limiting proprietary trading while avoiding limitations on positive and necessary financial activities such as hedging and market-making. And, it will achieve its ends without compromising market integrity, unduly restricting liquidity and capital formation, or harming the U.S. economy or the competitive market position of U.S. firms.

Because of the complexity of this issue, the difficulty regulators have had in producing final regulations, and the significance of the rule’s potential impact, BPC’s Capital Markets Task Force proposes that the agencies adopt a new and improved approach that will distinguish between permissible market-making and hedging, and impermissible proprietary trading. This approach will allow regulators to move quickly beyond their current gridlock and implement a workable and effective Volcker Rule. Specifically, the task force recommends that regulators take the following six steps to implement Section 619 of Dodd-Frank:

- 1. Gather relevant data:** Financial regulators should gather a robust set of data about trading activities to allow themselves the opportunity to clearly identify relevant patterns. Good judgment about the proper application of the Volcker Rule and how to separate permissible from impermissible activities requires gathering real-world trading data from market participants for each trading activity and asset class.
- 2. Identify patterns by activity and product, then assign and monitor with key metrics:** Regulators should analyze collected data to identify relevant patterns of trading activity to assign one or more metrics that are relevant to defining what constitutes proprietary trading. Examples of metrics that might be considered are day-one profit and loss, spread profit and loss, customer-facing trade ratio, and value at risk.
- 3. Differentiate among markets, activities, and asset classes:** Regulators should identify an appropriate set of metrics holistically in a way that best fits each asset class, product, and market. The usefulness of any given metric will vary depending on asset class, liquidity of financial instruments, and other specific market characteristics. For example, a metric that relies on bid-ask spreads is unlikely to be as effective in relatively illiquid markets where trading is infrequent than in more liquid markets.
- 4. Implement on a phased-in basis:** Financial regulators should sequence compliance with the final regulations to allow agencies time to monitor for unanticipated effects and to make any appropriate modifications based on the

metrics and unique characteristics of each individual market and product. It is likely that the agencies can identify some products and markets where regulation can be implemented with greater ease and speed than for other products and markets due to their differing complexities. Therefore, this new approach would give agencies the option to implement the rule on a phased-in basis rather than universally at one time.

5. Update iteratively as needed to account for real-world impacts: Financial regulators should adopt a methodology that collects and analyzes data before proprietary trading is defined and that relies on a phased-in implementation to allow regulators to learn as they go. Moreover, it is important that regulators continually analyze the real-world impacts of the Volcker Rule after it is implemented. Doing so will allow agencies to improve the rule's effectiveness over time without negative effects on financial markets or the economy.

6. Adopt the Federal Reserve's approach in Regulation K to address extraterritorial reach: Financial regulators should adopt the Federal Reserve's approach in its existing Regulation K to address the extraterritorial problems of the Volcker Rule with respect to foreign banking organizations and what activities occur "solely outside the United States."

The Lincoln Amendment

Section 716 of the Dodd-Frank Act, also known as the Lincoln Amendment, or the "swaps push-out rule," was, like the Volcker Rule, intended to protect taxpayer funds by prohibiting federal assistance from being given to entities engaged in swaps.¹³ The effect of this provision is that insured banks must "push out" their swaps business to nonbank affiliates that are not eligible for deposit insurance or access to the Federal Reserve's discount window.

Once the final regulations implementing the Volcker Rule have been issued, policymakers will be in a better position to assess whether the initial rationale for the Lincoln Amendment remains persuasive and, if so, how best to address those concerns. The Volcker Rule may well achieve the goals of Section 716 in a more comprehensive manner. Bank regulators already have permitted delays in complying with the Lincoln Amendment for up to two years past the July 2013 effective date as they continue to determine how it can be implemented while avoiding significant unintended consequences. Indeed, Chairman Volcker, Federal Reserve Chairman Ben Bernanke, and former FDIC Chairman Sheila Bair have all expressed concerns about the Lincoln Amendment.¹⁴

Thus, the task force recommends a wait-and-see approach regarding the Lincoln Amendment until more experience can be gained from the Volcker Rule in the amended form the task force proposes. If Congress is satisfied with regulators' implementation of the Volcker Rule—as the task force believes they should be under its alternative proposal—then

the Lincoln Amendment could be repealed without any negative effect on the safety and soundness of the U.S. financial system.

Introduction

This white paper offers a new, improved alternative approach to the effective implementation of the Volcker Rule, a provision of the Dodd-Frank Act named for former Federal Reserve Board Chairman Paul Volcker. The Volcker Rule was included in Dodd-Frank because many lawmakers believed that some commercial banks and their affiliates that had access to federal safety-net features such as deposit insurance were engaged in risky, speculative bets to increase their profits. A 2009 report from the Group of Thirty,¹⁵ for which Chairman Volcker chaired the committee on financial reform, stated:

Recent experience in the United States and elsewhere has demonstrated instances in which unanticipated and unsustainably large losses in proprietary trading, heavy exposure to structured credit products and credit default swaps, and sponsorship of hedge funds have placed at risk the viability of the entire enterprise and its ability to meet its responsibilities to its clients, counterparties, and investors.¹⁶

However, others have argued that the Volcker Rule was unnecessary because proprietary trading had little if anything to do with the 2007–2008 financial crisis. The original reform proposals by the Obama administration, House, and Senate did not contain any provision similar to the Volcker Rule. Critics also have contended that the rule is needlessly complicated and onerous to market participants. They argue that it does not accurately take into account how financial trading is done in the real world. Some observers say that certain aspects of the proposed Volcker Rule regulations are fundamentally impossible to implement without significant unintended consequences.

Regulators have heard from both sides as they have conducted their rule-writing process. The five agencies responsible for writing the rule have been working on implementing regulations for more than three years, reflecting the difficulty and complexity of clearly defining the differences between permissible activities, such as market-making and hedging, and impermissible proprietary trading. The delay also underscores how important it is that the agencies get the final rule right. A Volcker Rule that is either too rigid or too permissive could be damaging to stakeholders and to the U.S. economy.

Because of the difficulty and delay in finalizing and implementing the Volcker Rule regulations as proposed, the task force proposes an improved alternative approach consisting of five specific recommendations to implement the Volcker Rule in a way that maximizes its benefits to all stakeholders. Instead of a “one-size-fits-most” approach, the agencies should adopt a functional, iterative, and product-based approach to distinguish between permissible and impermissible activities—an approach that not only is informed by data, but also recognizes differences across markets, instruments, and asset classes. Under this functional model, regulators would collect data and develop quantitatively based metrics to develop definitions of which activities in each relevant market and each product

type are permissible for banking organizations. It would distinguish those activities from impermissible proprietary trading. By using metrics and examining individual products and markets, regulators would identify and clearly define impermissible activities. Metrics also would be developed to identify, in appropriate cases, safe harbors for certain trading activities for banking organizations to ensure adequate liquidity and the ability to meet customer needs.

The task force recommends that the regulators adopt its alternative approach—which is both better and easier to implement in the real world without potentially disrupting financial markets or causing unintended consequences for the economy—and modify the proposed Volcker Rule implementing regulations accordingly.

Background on the Development of the Volcker Rule

THE GROUP OF THIRTY REPORT

During the financial crisis, the Group of Thirty report highlighted proprietary trading by a limited number of large banking organizations. The Group of Thirty report recommended that:

Large, systemically important banking institutions should be restricted in undertaking proprietary activities that present particularly high risks and serious conflicts of interest. Sponsorship and management of commingled private pools of capital (that is, hedge and private equity funds in which the banking institutions own capital is commingled with client funds) should ordinarily be prohibited and large proprietary trading should be limited by strict capital and liquidity requirements.¹⁷

TREASURY WHITE PAPER AND CONGRESSIONAL FINANCIAL REFORM BILLS

Many of the provisions in Dodd-Frank were originally proposed by the Treasury Department in a white paper titled “Financial Regulatory Reform: A New Foundation.”¹⁸ That paper recommended heightened supervision of proprietary trading and investments in hedge funds by banking organizations. Specifically, the paper called for the Federal Reserve Board and other federal banking agencies to “tighten the supervision and regulation of potential conflicts of interest generated by the affiliation of banks and other financial firms, such as proprietary trading units and hedge funds.”¹⁹

The financial reform bill that was subsequently approved by the House of Representatives took Treasury’s recommendation a step further. It empowered the Federal Reserve Board to prohibit certain financial companies from engaging in proprietary trading if the Board determined that such activities posed “an existing or foreseeable threat to the safety and soundness of such company or to the financial stability of the United States.”²⁰

In early 2010, after the House of Representatives passed its version of financial reform and before Senate Banking Chairman Christopher Dodd (D-CT) introduced his version of the legislation, President Obama and former Chairman Volcker called upon Congress to require regulators to ban proprietary trading and investments in hedge funds by banking

organizations. President Obama referred to this proposal as “the Volcker Rule.”²¹ Chairman Volcker later expanded upon the proposal, explaining that these activities “present virtually insolvable conflicts of interest with customer relationships,” as they place “bank capital at risk in the search of speculative profit rather than in response to customer needs.”²²

The merits of the proposed Volcker Rule were debated in hearings before the Senate Banking Committee. At one of those hearings, the Treasury Department explained its endorsement of the Volcker Rule:

[W]e have come to the conclusion that further steps are needed: that rather than merely authorize regulators to take action, we should impose mandatory limits on proprietary trading by banks and bank holding companies, and related restrictions on owning or sponsoring hedge funds or private equity funds, as well as on the concentration of liabilities in the financial system. These two additional reforms represent a natural—and important—extension of the reforms already proposed.²³

Chairman Volcker made his case for the rule:

[The] proposal, if enacted, would restrict commercial banking organizations from certain proprietary and more speculative activities. In itself that would be a significant measure to reduce risk.²⁴

However, then-Ranking Member Senator Richard Shelby (R-AL) expressed concerns about the ability of regulators to implement the proposed legislation:

Unfortunately, the manner in which the Administration’s proposals will accomplish that objective remains elusive. With respect to placing limitations on the proprietary trading activities of banks, Chairman Volcker and [Deputy Secretary of the Treasury Neal] Wolin seem conflicted on how regulators could, in practice, distinguish proprietary trades from trades made by banks to help fulfill customer needs.²⁵

Senator Bob Corker (R-TN) also questioned the rationale for the provision in the context of the financial crisis:

[N]ot a single organization that was a bank holding company or a financial holding company that had a commercial bank had any material problems at all with proprietary trading.²⁶

During the Senate hearings, Treasury acknowledged that, “regulators will have to deal with some definitional issues as they implement the basic principle if it were to be lodged in statute.”²⁷

The advocates of the Volcker Rule succeeded in including a version of it in the legislation approved by the Senate Banking Committee. The committee-passed bill prohibited banking organizations from engaging in proprietary trading and investing in hedge funds and private equity funds.²⁸

When the committee-passed financial reform bill was considered on the Senate floor, Senators Jeff Merkley (D-OR) and Carl Levin (D-MI) proposed a more comprehensive

version of the rule based upon the PROP Trading Act, which they had co-sponsored.²⁹ That amendment was never voted upon by the Senate, but subsequently was adopted by the Conference Committee, which produced the final legislation.³⁰

The final legislative text in Section 619 of Dodd-Frank differs from the PROP Trading Act in several respects. For instance, the PROP Trading Act would have largely codified its prohibitions in statute, avoiding the need for a heavy reliance on regulatory interpretation by federal agencies. Additionally, a compromise in the final legislation allowed for “de minimis” investments (up to 3 percent of Tier 1 capital) in sponsored hedge funds or private equity funds for financial institutions. Further, the Merkley-Levin provisions were modified to extend the time period for compliance with these new requirements and to increase the number of agencies responsible for writing the rule from two—the FDIC and the FRB—to five, adding the the Commodity Futures Trading Commission (CFTC), the Office of the Comptroller of the Currency (OCC), and the SEC. Dodd-Frank made the FSOC chairman responsible for coordination of the regulations issued by the five agencies and required the FSOC chairman to study and make recommendations on implementing the Volcker Rule. However, it did not require the FSOC to vote on the Volcker Rule, leaving implementation up to the five regulators.

Thus, Senators Merkley and Levin are recognized as key authors of the statutory text of the Volcker Rule.³¹ After the adoption of their amendment by the conferees, Senators Merkley and Levin said:

The inclusion of a ban on proprietary trading is a victory. If implemented effectively, it will significantly reduce systemic risk to our financial system and protect American taxpayers and businesses from Wall Street’s risky bets. This is an important step forward from the current system that has placed few limits on speculative trading by either banks or other financial firms. Now banks will be prohibited from doing these trades and other financial giants will have to put aside the capital to back up their bets.³²

The Implementation of the Volcker Rule

As noted previously, the treasury secretary, in his role as FSOC chair, was given the job of coordinating the promulgation of Volcker Rule regulations by the five agencies.³³ Congress directed the FSOC to conduct a study on the Volcker Rule and to make recommendations to the agencies. That study, which was released in January 2011, proposed some general principles to guide the regulators in drafting regulations and acknowledged the challenge they faced, especially in connection with the prohibition on proprietary trading:

The challenge inherent in creating a robust implementation framework is that certain classes of permitted activities—in particular, market making, hedging, underwriting, and other transactions on behalf of customers—often evidence outwardly similar characteristics to proprietary trading, even as they pursue different objectives. In addition, characteristics of permitted activities in one market or asset class may not be the same in another market (e.g., permitted activities in a liquid equity securities market may vary significantly from an illiquid over-the-counter derivatives market).³⁴

Four of the agencies issued a proposed regulation in October 2011, with the CFTC adopting a nearly identical proposal in January 2012.³⁵ Consistent with the terms of the statute, the proposed rule had two main components: prohibition of proprietary trading, and restrictions on relationships with private equity and hedge funds, which are summarized below.

Proprietary Trading

The proposed regulation bans “proprietary trading” activities by banking entities, which include not only banks but all of their affiliates and subsidiaries.³⁶ “Proprietary trading” is prohibited in “covered financial products,” which include securities, futures, and derivatives, subject to exceptions for repurchase agreements and certain other contracts. The agencies define proprietary trading as engaging as principal in acquiring or taking financial positions for the purpose of short-term resale, benefitting from actual or expected short-term price movements, realizing short-term arbitrage profits, or hedging any of these positions.³⁷

There are a few exemptions from this definition for activities including liquidity management. In addition, under the proposed regulations, a trade would be permissible if it is within the scope of a “permitted activity,” which is, in essence, an exemption. Those exemptions include bona fide market-making, securities underwriting, and risk-mitigating hedging activities, among others. To qualify for an exemption, a banking organization would be required to demonstrate that the activity meets certain criteria. Under this “negative presumption,” the proposed regulation presumes that a trade is impermissible unless the

criteria are satisfied. For example, a market-making trade would be prohibited under the proposed regulation unless, among other conditions:

- The entity “holds itself out as willing to buy or sell, including through entering into long and short positions in, the covered financial position for its own account on a regular and continuous basis”;
- The entity is registered as a dealer for the appropriate instrument (or is exempt from such registration) and has an internal compliance program that addresses the features and risks unique to the particular activity;
- The trade is reasonably designed to meet the near-term demands of customers;
- The trade generates income for the entity primarily through fees, commissions, and spreads and not from the position’s increase in value; and
- The compensation of the person performing the trade does not reward proprietary risk-taking.³⁸

Additionally, the trade could not represent a conflict of interest, expose the organization to a high-risk asset or trading strategy, or pose a threat to the safety and soundness of the banking entity or to U.S. financial stability.³⁹

Private Equity and Hedge Funds

The proposed regulation would also prohibit a banking organization from acquiring or retaining an ownership interest in a “covered fund,” which the agencies define to mean a broad set of entities that rely on certain exemptions imported from the registered mutual fund regulatory regime, or that are commodity pools, including private equity and hedge funds.⁴⁰ Again, certain exemptions would apply to this prohibition.

The proposed regulation also would prohibit banking organizations from sponsoring covered funds. This includes serving as a general partner, managing member, commodity pool operator, or trustee for the fund; sharing a name with the fund; or selecting or controlling a majority of the fund’s management.⁴¹ Under the proposed regulation, a banking organization could sponsor and hold ownership interest in a covered fund if it is partaking in an exempt activity for the fund. Exemptions listed in the proposed regulation include:

- Asset management if the banking organization’s interest is a de minimis amount and certain other restrictive conditions are met;
- Hedging, if the bank is hedging an interest in that same fund that arises out of a transaction for a customer or a performance compensation agreement and the trade does not expose the bank to significant risk; and
- Investment in foreign covered funds by foreign banking entities where the activity is solely outside the United States.⁴²

Even if a banking organization acting under one of the above exemptions is allowed to sponsor or hold an interest in a covered fund, the activity is only permissible if it could not cause a conflict of interest, expose the entity to a high-risk asset or trading strategy, or pose a threat to the safety and soundness of the banking entity or to U.S. financial stability.⁴³

Compliance

In addition to the prohibitions and restrictions outlined above, the agencies proposed a reporting and compliance regime to enforce the Volcker Rule.⁴⁴ While the specifics of the compliance program are complex, the agencies proposed that all banking entities have a basic preventative compliance program. Banking entities with \$1 billion or more in trading assets and liabilities would be required to establish a comprehensive compliance regime that would include documenting, describing, and monitoring possible violations; making senior and intermediate managers responsible for the compliance plan; and providing periodic reports to regulators containing a wide range of data, in the form of “metrics,” including value-at-risk, profit and loss, inventory aging, fee income and expenses, and others. For banking entities with \$5 billion or more in trading assets and liabilities, the agencies proposed an even larger suite of reporting and compliance standards.

Reactions to the Proposed Regulation

The proposed regulations generated substantial interest from outside stakeholders. More than 16,000 comments were filed in support of the rule (most were form letters), while 2,200 letters included substantive criticisms. The proposed regulations were criticized by both the proponents and the opponents of the original Volcker Rule.⁴⁵ The chief congressional sponsors of the Volcker Rule, Senators Merkley and Levin, called the proposed regulation “too tepid” and stated that it “does not fulfill the law’s promise.”⁴⁶ Likewise, public-interest groups argued that overly broad definitions of permitted activities and the various exemptions ensured that the regulations would not be effective in controlling proprietary trading or limiting systemic risk.⁴⁷ Federal Reserve Board Governor Sarah Bloom Raskin, who dissented in the vote to approve the proposed regulations, generally echoed these views, saying that the safeguards they placed to protect the integrity of the banking system were, “insufficient,” and, “could be subject to significant abuse—abuse that would be very hard for even the best supervisors to catch.”⁴⁸ On the other hand, many affected banking organizations, foreign central bankers, and other stakeholders found that the proposal failed to strike the appropriate balance between proscribing proprietary trading while protecting financial markets and market participants and criticized the covered fund provisions as well.⁴⁹ As mentioned above, even Chairman Volcker was quoted in the press as saying, in effect, that the proposed regulations were too complex as a result of the various exceptions and exemptions.⁵⁰

A New, Better Alternative for Implementing the Volcker Rule

The critical response to the proposed regulations highlights the difficult task the agencies face in crafting regulations to implement the Volcker Rule. The agencies have a statutory mandate to produce a final rule, and it is imperative that they get final regulations right. However, it is often not easy to distinguish permissible market-making and risk-mitigating hedging from impermissible proprietary trading.

Getting the regulations right requires the agencies to adopt a functional, iterative approach that relies on gathering data for each asset class, identifying trading patterns, and using the knowledge thereby gained to define proprietary trading. This functional, data-driven model would represent a fundamental shift away from the “one-size-fits-most” approach taken in the proposed regulations—in which market-making activities would be determined largely through the lens of highly liquid equity trading despite the significant differences among product categories and asset classes, and negative presumptions would compel a trade-by-trade approach to compliance.

The framework adopted by the agencies in the proposed regulations is that activities are prohibited, unless there is a clear showing that they do not fall into prohibited categories. For example, the proposed regulations ban all short-term principal trading activity unless the activity meets all of the criteria of certain narrowly defined permitted activities, such as market-making-related activities and risk-mitigating hedging.

The negative-presumption approach as proposed is needlessly complex and may well preclude legitimate activity, perhaps on a significant scale. This would occur if banking organizations were to avoid activities with respect to which there is any doubt about the success of rebutting the presumption. For example, a comment letter submitted on the proposed rule by the American Bankers Association, the Clearing House, the Financial Services Roundtable, and the Securities Industry and Financial Markets Association noted that many illiquid markets could fail to meet negative-presumption tests, because they often do not have readily available bid-ask spread data that the agencies listed as a requirement for being designated a permissible market-making activity.⁵¹

The aggregate impact of banking organizations pulling back from legitimate principal activities could harm financial markets. A decrease in risk-mitigating hedging activity would jeopardize the effectiveness of a banking organization’s risk management, which in turn would pose risks for the financial system and broader economy. If legitimate hedging

opportunities were avoided because of an inability to rebut the proposed regulations' negative presumption, large financial firms may hedge less and become inherently more risky. This would reduce or negate a fundamental purpose of the Volcker Rule, which was to reduce taxpayer exposure to risky behavior by financial institutions. In addition, reduced market-making activity would lead to decreased liquidity and, consequently, to higher borrowing costs for corporations and higher trading costs and greater price volatility for investors.

Because of the complexity of this issue, the difficulty regulators have had in producing final regulations, and the significance of the potential impact of the regulations, the task force recommends that the agencies adopt a different approach to distinguish between permissible market-making and hedging and impermissible proprietary trading. This approach will allow regulators to move quickly beyond their current gridlock and implement workable and effective regulations. Specifically, regulators should take the following six actions to implement Section 619 of Dodd-Frank:

- 1. Gather relevant data:** Financial regulators should gather a robust set of data about trading activities to allow regulators the opportunity to clearly identify relevant patterns. Good judgment about the proper application of the Volcker Rule and how to separate permissible from impermissible activities requires gathering real-world trading data from market participants for each trading activity and asset class.
- 2. Identify patterns by activity and product, then assign and monitor with key metrics:** Regulators should analyze collected data to identify relevant patterns of trading activity to assign one or more metrics that are relevant to defining what constitutes proprietary trading. Examples of metrics that might be considered are day-one profit and loss, spread profit and loss, customer-facing trade ratio, and inventory risk turnover.
- 3. Differentiate among markets, activities, and asset classes:** Regulators should identify an appropriate set of metrics holistically in a way that best fits each asset class, product, and market. The usefulness of any given metric will vary depending on asset class, liquidity of financial instruments, and other specific market characteristics. For example, a metric that relies on bid-ask spreads is unlikely to be as effective in relatively illiquid markets where trading is infrequent than in more liquid markets.
- 4. Implement on a phased-in basis:** Financial regulators should sequence compliance with the final regulations to allow agencies time to monitor for unanticipated effects on markets and the economy, and to make any appropriate modifications based on the metrics and unique characteristics of each individual market and product. It is likely that the agencies can identify some products and markets where regulation can be implemented with greater ease and speed than for other products and markets due to their differing complexities. Therefore, this new

approach would give agencies the option to implement the rule on a phased-in basis rather than universally at one time.

5. Update iteratively as needed to account for real-world impacts: Financial regulators should adopt a methodology that collects and analyzes data before proprietary trading is defined and that relies on a phased-in implementation to allow regulators to learn as they go. Moreover, it is important that regulators continually analyze the real-world impacts of the Volcker Rule after it is implemented. Doing so will allow agencies to improve the rule's effectiveness over time without negative effects on financial markets or the economy.

6. Adopt the Federal Reserve's approach in Regulation K to address extraterritorial reach: Financial regulators should adopt the Federal Reserve's approach in its existing Regulation K to address the extraterritorial problems of the Volcker Rule with respect to foreign banking organizations and what activities occur "solely outside the United States."

Recommendation 1: Gather Relevant Data

Under this functional approach, regulators would begin collecting data from market participants before making the regulations effective. The agencies would use these data to better understand and regulate how permitted market-making, risk-mitigating hedging, and other types of permissible activities differ from proprietary trading in each relevant asset class, market, and product type.

It is important that regulators have access to a robust set of data that will allow them to define and detect impermissible proprietary trading, and that they have the resources available to adequately analyze the data collected. Of course, it is also important that regulators only collect what they are able to analyze and is useful for the purposes described.

Recommendation 2: Identify Patterns by Activity and Product, then Assign and Monitor with Key Metrics

The value provided by data-informed metrics has been recognized by the regulators. In the proposed regulation, the agencies indicated that data would help them to better understand and assess the trading activities of banking organizations, including the scope, type, and profile of the activities and the context in which they occur, for purposes of ensuring compliance with the regulations. The task force supports the regulators' use of data to gain such an understanding and to introduce greater certainty into the supervisory process, as well as the regulators' incorporation of quantitative metrics into the regulatory toolbox. However, the agencies can benefit from an even *greater* reliance on the metrics. The agencies should also use metrics to establish the framework for compliance with the Volcker

Rule *before* metrics are used to supervise banking entities and their activities against that framework.

In other words, metrics should be used at the beginning as a sorting mechanism to differentiate the functions of trading units and to identify clear and definitive bands of permissible activity based on the analysis of the data. These quantitative metrics would serve to elucidate what constitutes the statutorily permitted activities in a variety of markets in which institutions engage in market-making-related activities. In a sense, activity that occurs within the band would be treated as within a safe harbor, and activity outside the band would serve as a signal that further inquiry may be warranted rather than as *prima facie* evidence of a violation.

Thus, the approach the task force envisions is a prohibition of proprietary trading accompanied by data-informed safe harbors. Activity that occurs outside these safe harbors would not necessarily be impermissible, but rather would require further analysis by regulators and their supervised entities. For example, there would be a determination of what would be deemed as market-making for a specific financial product, such as a credit default swap. The proprietary trading prohibition would, in addition to being accompanied by a safe harbor, be informed by criteria and factors that would be used by regulators as a guide for determining whether a given conduct outside of the safe harbor constitutes impermissible proprietary trading. These more relevant and useful metrics should be given greater, although not dispositive, weight as regulators refine the contours of permissible trading activity.

The use of metrics that represent varying levels of aggregation and granularity would help illuminate the different forms that market-making-related activities functionally take with respect to a number of representative markets.

This process would be iterative in many cases, as initial data analyses reveal that some metrics are more relevant and useful than others, depending upon the particular asset class, activity, and market. In addition, over time, regulators will revisit their earlier articulations of safe harbors, and criteria and factors for judging whether conduct constitutes proprietary trading. Thus, the initial and ongoing regulations would be iterative. Based on the patterns that emerge from the analyses of these metrics, regulators could appropriately tailor the parameters for permissible trading activity in particular markets.

Safe harbors are important to the regulatory approach, but they cannot provide all the relief that is needed. The task force's approach would involve rigorous data-driven analysis in order to better interpret whether activity was permissible or not when it is outside of the safe harbor.

Under a functional, metrics-based approach, engaging in trading that falls within the parameters of the permitted activities, as evidenced by their reported metrics, would be presumed to be acting permissibly. Likewise, the metrics would serve as an early warning system of impermissible, non-market-making activity by highlighting potentially problematic patterns of behavior and outlier incidents, thus signaling that further investigation may be

warranted. In addition, the systematic use of metrics in supervision would facilitate an efficient focus on areas of supervisory priority as well as informative comparisons across institutions and markets. Darrell Duffie, in a paper otherwise critical of the initial approach proposed by the regulators, supported the use of metrics, saying:

The collection and use by regulators of these and other risk measures for supervisory purposes, if done broadly across bank and non-bank financial firms, could improve the ability of regulators to detect and mitigate risks to individual institutions and to the financial system as a whole.⁵²

The use of metrics to analyze data can illuminate differences in markets and products—and how these differences can shape the way in which market-making operates in a given market. Market-making involves holding oneself out as willing both to buy and sell financial instruments. Yet, this pattern can have a different appearance from market to market. For example, there are substantial differences in the level of liquidity and the nature of risk among different markets and products, which in turn affect how market-making operates in a particular context. Not only are there divergences among asset classes—equities are far more liquid than corporate bonds, for instance—but even a single asset class can encompass significant variations.

Consider, for example, how metrics could be applied to exchange-traded funds (ETFs). Institutions that create and administer ETFs generally trade actively in the market to ensure that ETF pricing stays close to the value of underlying securities. The use of quantitative metrics, developed and refined through an iterative process, could help regulators to distinguish when such trading activity has a market-making-related function from when it potentially operates as proprietary trading such that further inquiry is warranted. A particular institution's metrics relating to ETFs falling outside the established thresholds would signal to regulators the need to examine the activity more closely and determine whether it is consistent with a permitted activities exemption.

The use of well-defined metrics, both for a safe harbor and for assessing conduct that falls outside a safe harbor, will help banking agencies and outside watchdogs make sure that regulators are continuing to enforce regulations and protect taxpayers. Regulators should publish the metrics they are using and the general guidelines they are applying to track permissible activity. By publishing metrics, financial companies and outside advocates will have the ability to opine on concrete, identifiable factors. Regulators will benefit from this continued public dialogue; while those who believe that the system has built up risk will be able to point to hard data to make their case.

While appropriate metrics are the key to the approach the task force recommends, they will not be sufficient for successful implementation of the Volcker Rule. High-quality, robust supervision will continue to be necessary to ensure that potential impermissible trading activity is identified.

Selected Metrics in the Proposed Regulations

As noted above, the regulations proposed by the agencies described certain metrics that the agencies could use in evaluating particular activities. A number of these metrics would be useful in establishing the framework for the functional, data-driven approach that the task force is proposing. In brief, regulators would use the data they collect to identify patterns of trading activity for all asset classes, products, and markets that fall under the Volcker Rule. These patterns would suggest one or more metrics that would be useful in tracking the kinds of trades in which firms engage for whether or not they are permissible.

For example, most equities are highly liquid and transparent, and it is relatively simple for trading entities to predict the amount of inventory they should hold for their customers. For such products, data collected may suggest that “inventory aging” and “first-day profit and loss” would be effective metrics to determine whether trading activity is being done for market-making or proprietary purposes. These and several other of the metrics identified in the proposed regulation that could be useful in a functional approach are discussed below.

FEE INCOME AND EXPENSE, SPREAD PROFIT AND LOSS

With appropriate modifications, several other metrics proposed by the agencies also could perform a useful role in the functional approach that the task force recommends. The task force supports placing “fee income and expense” as well as “spread profit and loss” (P&L) among the factors that could distinguish permitted activities from prohibited proprietary trading. After all, market-making businesses generally make money on fees, commissions, and spreads; in contrast, these items are expenses for proprietary businesses. Although these two metrics are described separately in the proposed regulation, they could logically be considered together, because they are both measures of customer revenues and, in practice, may function as substitutes for each other. For example, in certain commission-based equity trading businesses, a trading unit often loses money on the price of a customer trade (negative spread P&L), but that loss may be more than offset by direct commissions from customers (positive fee income and expense). In such a case, looking only at spread P&L would not reveal that the trading unit generally makes a profit on customer trades. This example also highlights the need for regulators to be mindful of how certain combinations of metrics may be particularly useful or illuminating, which can be discovered through the functional approach’s iterative metric development process.

Calculating a meaningful way to measure spread P&L will be challenging in the absence of a continuous bid-ask spread, which does not exist in many markets. It will be critical for regulators to work with market participants to determine the appropriate proxies for spreads based on different asset classes, trading sizes, and trading units. For example, institutions could report an estimate in the form of an end-of-day spread proxy, historical-data spread proxy, or other appropriate proxy. Regulators could then average these spreads together across the institutions they regulate for the same or nearly identical products.

DAY-ONE PROFIT AND LOSS

“Day-one P&L” may be another helpful indicator, because market-making trades generally make a higher share of their profits up front for the services of trading firms, since they are not seeking to profit from rising or falling asset prices. Viewed over time, not through a transaction-by-transaction analysis, a day-one P&L could indicate whether a trading unit is in general providing liquidity, as reflected by an overall positive day-one P&L, or whether its general orientation is more speculative, as shown by an overall negative day-one P&L. Considering this metric in combination with the spread P&L and fee income and expense metrics would provide a fuller picture of whether activities are market-making or proprietary trading. A trading unit that frequently provides a day-one loss should be quickly flagged and examined for impermissible activity.

CUSTOMER-FACING TRADE RATIO

The “customer-facing trade ratio” compares the number of transactions that includes a trading unit’s customers with transactions that do not. As permissible activity is driven by customer demand, the ratio provides insight into whether a trading unit’s transactions are driven by its customers. An appropriately defined customer-facing trade ratio metric could also be useful for distinguishing prohibited proprietary trading from market-making since market makers have a mix of customer and dealer flows, whereas other proprietary traders generally do not have “customers” as defined in the proposed regulation.⁵³ However, the proposed metric as currently formulated places an undue emphasis on the number of transactions with customers versus other counterparties and does not account for the size of transactions or the amount of risk that market makers undertake for customers. For example, a single trade for a customer could be split into multiple, smaller trades for the purposes of hedging that trade even though the trade would have the same aggregate totals on each side. In such cases, the customer-facing trade ratio would overestimate the amount of trading being done for non-customers. Similarly, in the example provided above, a notional-based or risk-based ratio close to one would indicate that the market maker traded approximately as much with non-customers as with customers, because that was the amount of trading that was necessary to lay off the risk from the customer trade. This approach would tell the story of the trading activity more accurately than the number of trades. Finally, regulators should clarify whether interdealer trading done for the purpose of providing market-making liquidity will be considered permitted activity.

INVENTORY AGING

“Inventory aging” is a measure of a trading unit’s assets and liabilities, and how long they have been held. In general, assets acquired for speculative trading purposes are held longer than those purchased for market-making. Assets for market-making purposes are purchased in line with expected customer demand and can therefore be expected to be sold relatively quickly, whereas assets bought as proprietary trades will be kept longer to benefit from asset price changes. This metric is more useful for regulators in more liquid markets, because more illiquid financial instruments are by definition held for longer periods. However, even in illiquid markets, inventory aging can be used to some degree to identify trading patterns.

Moreover, swap “inventory” is of a fundamentally different nature than, for example, an inventory of securities. Derivatives traded over-the-counter are ongoing contracts that cannot be simply sold as a securities position can; a dealer is obligated to uphold swaps contracts and cannot trade out of the obligations without counterparty consent. Thus, the metric is much less useful for defining impermissible activity for derivatives.

VALUE AT RISK AND RISK MANAGEMENT

“Value at risk” (VaR) measures the percentage chance that a portfolio will suffer a specified loss of value in a specified time frame. It is one of several metrics in the proposed regulations to help manage portfolio risk and is already used by many financial institutions. VaR should help those institutions, and regulators, to identify when risk is higher than it should be at a trading unit.

However, the financial crisis demonstrated that there is substantial model risk with VaR, as models necessarily involve assumptions about the future, usually relying on historical experience. Static models and assumptions weighted toward recent experience, especially for new asset classes, can be significantly flawed. This highlights the need for regulators to think of risk as differing by asset class, product, and market.

Regulators should work with each other, institutions, and academic experts to develop a robust set of transparent calculations to allow for risk to be calculated in a way that is able to be easily implemented and tracked by both regulators and financial institutions. Regulators should also refine their methodology with the iterative process the task force advocates to most accurately capture the risk present at these institutions.

Finally, regulators should consider the total size of the risk of the trading inventory for each institution. Monitoring the absolute size of risk in a portfolio can give regulators some indication of how much damage could be done by a sudden, unexpected price movement, and provide context on whether observed risk size should be considered a red flag that warrants a more detailed examination.

HEDGING METRICS

An individual or institution hedges trades to reduce the risk to which they are exposed. To oversimplify somewhat, if a position rises or falls by \$100, the hedge that was taken out to reduce the risk of the initial position should generally move in the opposite direction by a similar, though not necessarily equal, amount.

This is relevant to the case of the so-called “London Whale,” in which a unit within JPMorgan Chase engaged in a series of highly speculative trades that cost the bank more than \$6 billion, despite the fact that the unit was not “intended to function as a proprietary trading desk, but as insurance or a ‘hedge’ against credit risks confronting the bank.”⁵⁴ A consistent pattern of hedge trades that result in profits for a firm may be a red flag for regulators to determine whether some portion of the trades are actually impermissible proprietary trading. Regulators should also ensure that compensation arrangements are not designed—intentionally or unintentionally—to reward proprietary risk taking.

Regulators should use the data they collect to assess whether one or more metrics, based on such patterns, would be useful for their oversight of the Volcker Rule.

DEFINING SHORT-TERM TRADING AND NEAR-TERM TRANSACTIONS

The Volcker Rule prohibits “short-term” proprietary trading by limiting the definition of “trading account” to “near-term” transactions, or those that involve short-term price movements.⁵⁵ In their comment letter, Senators Merkley and Levin wrote that the proposed rule takes “an overly narrow view of the concept of ‘short-term,’ essentially defining it as a period of 60 days or less.” The letter further contends that, “some of the most dangerous proprietary trading positions were held beyond a 60-day window.”⁵⁶

Consistent with the theme of this paper, the task force believes that defining “short term” and “near term” for the purposes of Volcker Rule trading should not be a rigid number—like 60 days, which is the amount provided as a rebuttable presumption of short-term trading in the proposal—and should be informed by initial data that is collected. For some asset classes, products, and markets, 60 days may be a good guideline for separating near-term transactions from those that are longer-term. For other, highly liquid assets, a shorter timeframe may be appropriate. Still, for others, such as trades in more illiquid markets, a longer term may be better. Regulators should collect data about trading activities and analyze the data for patterns *before* determining what constitutes near-term transactions or short-term price movements. They should then set holding window parameters to reflect the specific circumstances of each market situation.

Recommendation 3: Differentiate Among Markets, Activities, and Asset Classes

ONE SIZE DOES NOT FIT ALL, OR EVEN MOST

Throughout the proposed regulations, the agencies generally use a “one-size-fits-most” approach to define permitted and prohibited activities. This lack of a nuanced recognition of the critical differences across markets, instruments, and asset classes is most apparent in the definition of market-making-related activities. The market-making-related activity provisions in the proposed regulations consistently refer to certain factors, such as revenue generation primarily through bid-ask spreads and customer fees, to distinguish prohibited from permitted activities. These identified factors, however, do not fully reflect the reality of market-making in most markets and instruments. Applying this single template of market-making to the great variety of financial markets would make it difficult for banking organizations to intermediate in a number of instruments and asset classes, and thus is likely to impair liquidity and capital formation. The FSOC report on proprietary trading recognizes this issue and recommends that: “The regulations and supervision [of the final regulations] should be sufficiently robust to account for differences among asset classes as necessary.”⁵⁷

The U.S. corporate bond market is an example of an important market that does not follow the proposal's implicit market-making paradigm and, as such, is jeopardized by the proposed permitted activity framework. Because the structure of this market differs significantly from that of highly liquid equities markets, its market makers function in different ways. The corporate bond market is much more fragmented than the listed equities market, and many individual bonds have little or no trading activity. For example, Oliver Wyman has reported that there were approximately 37,000 corporate bond securities with a total market value of \$7 trillion outstanding at the end of 2009 (an average of \$189 million per bond), compared with 5,000 listed equity securities with a total market value of \$15 trillion (an average of \$3 billion per equity security).⁵⁸ In addition, average daily trading volume in 2009 for corporate debt was \$17 billion, while the daily trading volume for equities was \$100 billion.⁵⁹

As these statistics indicate, individual corporate bonds are generally far less liquid than individual listed equities. In serving as a market maker in the corporate bond market, an institution buys a bond from a customer with the knowledge that there may be little chance of rapidly reselling the bond and a high likelihood that it must hold the bond for a significant period of time. The market maker thus becomes exposed, as principal, to the risk of the market value of the bond in a way that a market maker in liquid equity security, who often is able to buy and sell nearly contemporaneously, is not. In many instances, the changes in the bond's market value may constitute a significant portion of the trading unit's profit or loss on the position, even though the institution entered into the position to further the goal of serving customers.

The markets for derivatives, securitized products, and emerging market securities, among many others, are characterized by even less liquidity and less frequent trading than the U.S. corporate bond market. As a result, market-making in these markets almost inevitably involves taking principal positions for longer periods of time. Thus, the market-making approach that prevails in listed equities markets may be the exception. Relying upon it as the general rule would offer a poor reflection of the inherent realities of trading in such markets and would therefore be ill-advised.

In addition, the proposed regulations' reliance upon an equities-oriented market-making model is reflected in the interpretation of the term "block positioner."⁶⁰ Although the proposal does not define "block positioner," it seems through reference to Rule 3b-8(c) to require, among other things, that the block positioner determine that the block could not be sold to or purchased from others on equivalent or better terms, and sell the shares comprising the block as rapidly as possible commensurate with the circumstances.⁶¹

Rule 3b-8(c) applies to equity blocks, so it would need to be revised before it can serve as an effective standard for purposes of the Volcker Rule. For example, block positioners in less liquid markets would likely have difficulty determining that a block could not be sold to or purchased from others on equivalent or better terms. Market makers often do not have access to robust pricing information in less liquid, less transparent markets.

In addition, although the requirement to dispose of a block as quickly as possible given the circumstances is not necessarily inconsistent with a longer unwind of a block position in less liquid instruments, the equity orientation of the block-positioning standard and the lack of explicit recognition of how block-positioning functions in other markets create uncertainty about whether, and under what specific circumstances, a longer unwind would be permissible. Larger dealers are often the only sources of liquidity for block positions, which mutual funds and pension funds buy or sell to meet redemptions and payment obligations or to rebalance their portfolios in response to changing market conditions. Executing a block trade requires market makers to prudently manage their inventory to reflect prevailing market liquidity, avoid disrupting the market, and protect the customers' trading strategies. A requirement or regulatory pressure to sell the instruments comprising the block as rapidly as possible is far more damaging in less liquid markets, as the rapid disposition of assets can lead to fire sales that significantly reduce the price of the assets. If market participants are uncertain about the permissibility of accumulating and disposing of these blocks in a gradual manner, they will provide less favorable size and pricing terms to customers or may even decline to execute certain block trades at all.

In summary, the proposal's block-positioner provision would need to be modified to more adequately reflect the context and constraints on block-positioning in non-equities markets, so that potential block positioners are able to exercise prudent inventory management and so that institutional customers and commercial end users are able to find institutions that are able to facilitate their need to trade in size at a price reasonably related to the market.

In contrast to the proposal's overall approach, there has long been congressional and regulatory recognition of the need for statutory provisions and rules to vary depending on markets, trading structures, and asset classes. For example, there are separate regulatory regimes for securities, futures, and swaps even though these three types of instruments are closely related. Yet, all three are considered together under the Volcker proposed rule framework. Within the securities framework, different rules commonly apply to debt and equity classes. On the swaps side, foreign exchange swaps and forwards have been carved out for distinctive regulatory treatment. The final Volcker Rule regulations should continue this nuanced and flexible approach to financial regulation with appropriate recognition of critical differences among markets and asset classes, particularly in setting the parameters of permitted activities such as market-making, defining key terms and concepts, and establishing relevant metrics for compliance.

ASSESSING TRADING PATTERNS HOLISTICALLY

The proposed regulation evaluates principal trading against the statutorily permitted activities largely according to transaction-by-transaction tests, focusing on the specific action taken for a particular financial position. This approach, however, is not consistent with the intent of Congress, as reflected in the statute's repeated references to "activities" rather than a narrower term such as "transactions." It is also at odds with the realities of modern trading operations and portfolio strategies, where an individual transaction may serve multiple functions or may be a single component that, combined with other positions,

forms a larger strategy. An individual position may not fit squarely within the parameters of a permitted activity as drawn by the proposal, but may be part of a pattern of market-making-related activity that does. Attempting to view such a transaction discretely and in isolation will yield a distorted picture of the activity in a real-world setting.

For example, the proposed regulations' conceptual statement that market makers generally make, rather than take, liquidity holds true when applied at an overall business activity level. That statement, however, may not necessarily be accurate in the context of any particular transaction. As part of bona fide market-making-related activity, market makers must often take liquidity from another market maker in a particular transaction, for purposes such as understanding market pricing, ensuring that prices remain in line, or building inventory. In other words, it appears as though the agencies have lost sight of the fact that the permitted activity established by Congress is for "market-making-related activities," rather than just for market-making positions.

An approach that views individual transactions or positions as "market-making" or "non-market-making" involves the implicit, but inaccurate, assumption that an institution enters into a transaction for a single purpose and that market-making activities are severable and separately identifiable. Particularly with the prevalence of portfolio trading based on computational and mathematical models, a position that is entered into as part of market-making-related activities may serve multiple functions. It may, for example, simultaneously be responsive to customer demand, hedge a risk, and build a market maker's inventory.

In light of the inadequacy of a transaction-by-transaction approach, regulators should instead focus on patterns of activity to identify market-making, hedging, or other types of permitted or prohibited activities and do so within distinct asset classes or perhaps activity groups. Regulators should also make comparisons across the industry to allow them to identify areas where the trading patterns of one or more financial institutions differ significantly from others for the same asset class, product, or market. This holistic approach should be explicitly carried through to other parts of the proposal, such as the definition of "trading unit," and to supervisory efforts. For example, compliance should be assessed through metrics that aggregate transactions at an overall business-line activity level rather than at a transaction-by-transaction level. It is important to recognize that the appropriate level of granularity for the metrics may vary depending on the structure of the institution, the type of activity, and particular asset class.

Recommendation 4: Implement on a Phased-In Basis

Under the proposed regulations, universal compliance with the regulations would be required immediately upon the end of the conformance period (or at the end of any extension granted by the FRB). Flipping the switch on a new regulatory regime of this magnitude poses a considerable risk of disruption to the financial markets and the operations of market participants, with potentially negative effects for the economy. Because the Volcker Rule applies to a range of highly complex and variable trading

operations, it will take substantial time for the agencies to develop a full understanding of how to apply its requirements to different asset classes and markets. It will also take time for banking entities to build the necessary compliance infrastructure.

A more prudent approach would involve enforcing immediate global compliance with certain clear statutory provisions and bright-line rules, such as the prohibition on clearly speculative prohibited proprietary trading, while phasing in other segments of the rules based on asset class, line of business, type of market participant, or a combination of these factors. Not only would this sequencing help to minimize market disruptions, but it also would allow regulators and market participants to gain important insights from the early stages of implementation—particularly in terms of identifying and addressing unanticipated consequences—and to incorporate those lessons learned into the later phases when the regulations are applied more comprehensively.

More specifically, a phased-in approach could include stages such as eliminating any remaining dedicated bright-line proprietary trading units; creating policies, procedures, and trading unit mandates; gradually rolling out a subset of metrics across trading units before implementing the full range of metrics that are adopted in the final rule; or implementing metrics for one trading unit at a time. The most efficient and effective means of implementation and supervision may be through a pilot program in which certain designated trading activities come into compliance on a more accelerated schedule than others. This process would still require banking entities to begin developing the necessary infrastructure and to work steadily toward full compliance during the relevant conformance period. It would also allow banking entities and their regulators to obtain valuable experience with the practical workings of the Volcker Rule and to address technological, logistical, interpretive, and other issues that may arise on a smaller and more controlled scale. And, this would afford time for compliance and government-monitoring programs to be introduced in an informed and orderly basis.

Federal agencies have previously used a phased-in approach for large-scale regulatory changes with significant market impacts. For example, Regulation NMS⁶² was implemented through five separate, phased-in compliance dates for different stocks over several years in order to allow the SEC and the industry to monitor for unintended consequences on the markets before the rule applied to all stocks and for the SEC to revise the regulations as appropriate.

Another precedent for a gradual and deliberate implementation of a complex new regulatory requirement was the implementation of the trade reporting and compliance engine (“TRACE”) for fixed-income trades by the Financial Industry Regulatory Authority. TRACE requires prompt reporting of information about over-the-counter transactions. Before TRACE could become fully effective, market participants had to develop the infrastructure to report trade information and adjust to the effects that the availability of new information would have on trading in fixed-income markets. TRACE was initially implemented in three phases over approximately two and a half years, starting with the most liquid bonds, which represented the “easiest” case for implementation, and subsequently expanding to high-

yield and less liquid instruments. This multistage approach helped to mitigate any harm to liquidity or orderly trading in fixed-income markets before the consequences of the new regulatory regime were fully understood and absorbed by regulators and market participants. The scope and potential effects of the Volcker Rule likewise counsel following this precedent.

COVERED FUNDS

An example of the benefits of a phased-in implementation is the conformance period under the Volcker Rule. When the Federal Reserve issued its Final Rule on the Conformance Period for Entities Engaged in Proprietary Trading or Private Equity Fund or Hedge Fund Activities in February of 2011, few would have predicted that final regulations would not be adopted almost three years later. The Final Rule generally provides that a banking entity must bring its activities and investments into compliance with the Volcker Rule no later than two years after the earlier date of (i) July 21, 2012; or (ii) twelve months after the date on which final Volcker Rule regulations are adopted. The Final Rule also provides that the Federal Reserve may extend the conformance period for not more than three separate one-year periods. There are also provisions for an extended transition period for illiquid funds, subject to certain conditions that make it difficult to qualify for an extension. Among other requirements, any banking entity that seeks approval for an extension of the conformance period must submit a request in writing to the Federal Reserve at least 180 days prior to the expiration of the applicable conformance period, and it must provide a detailed explanation of the reasons why an extension should be granted, as well as a detailed explanation of the banking entity's plan for divesting or conforming the activity or investments.

Given the extensive uncertainty about the scope and content of final regulations and the illiquidity of some of their investments, many banking entities may not be able to divest or conform all of their investments by July 21, 2014, the last day of the initial conformance period. Absent further action by the Federal Reserve, they will need to request an extension of the initial conformance period. However, there are at least two reasons why it may not be possible to submit extension requests by January 22, 2014, the 180th day before the end of the initial conformance period. First, the agencies have not yet issued a final regulation defining the terms proprietary trading or covered fund. One of the most frequent observations made in the comment letters on the proposed rules was that the proposed definitions were overbroad or overly vague, or both. Until the agencies issue final definitions of these terms, banking entities cannot be sure which activities and investments will be permissible and which will need to be divested or conformed. Second, the Federal Reserve has not provided any guidance on what sort of information would be required to satisfy the "detailed explanation" conditions in an extension request. In particular, the Federal Reserve has not clarified whether the "detailed explanations" must be given desk-by-desk or fund-by-fund or whether "detailed explanations" related to the overall activities or investments will do.

The task force urges the Federal Reserve to consider these timing issues and to either extend the initial conformance period by one year or for such period of time as will afford

banking entities sufficient time to apply for relief. This would be an appropriate step in light of the uncertainties with the proposed regulations and the timing of the final regulations.

Recommendation 5: Update Iteratively as Needed to Account for Real-World Impacts

The 2011 FSOC report on proprietary trading stated:

The regulations and supervision should be dynamic and flexible so Agencies can identify and eliminate proprietary trading as new products and business practices emerge.⁶³

The iterative model the task force recommends offers a regular review of the implementation of the Volcker Rule to allow for adjustments as conditions change and more knowledge about covered trading becomes available. It also accounts for inevitable shifts in the landscape of trading—such as changes in liquidity or popularity of markets, asset classes, or products—and financial innovation. Regulators should use the knowledge thereby gained as an opportunity to continually improve their regulations and supervision.

As an additional step toward ensuring that the implementation of the rule remains appropriate under changing circumstances, the task force recommends that the implementing agencies be required to submit every two years a joint report to Congress that assesses the impact of the Volcker Rule on all stakeholders, the U.S. economy, and the financial system as a whole. A mechanism should also be put in place to formally and regularly—perhaps every two or three years—review the impact of the Volcker Rule on all stakeholders affected by it. Such a review will further inform the process of improving the implementation of the Volcker Rule over time.

Recommendation 6: Adopt the Federal Reserve's Approach in Regulation K to Extraterritorial Reach of the Volcker Rule

Much controversy has been generated over how the Volcker Rule will be applied to non-U.S.-based financial institutions. Generally stated, the provision's prohibition on proprietary trading and relationships with private equity and hedge funds applies to all subsidiaries and affiliates, worldwide, of any bank that is established in the U.S. or that has a U.S. branch, agency, or certain commercial lending subsidiaries. While the Volcker Rule provides an exception for proprietary trading that occurs "solely outside the United States," how that term is interpreted in the Volcker Rule regulations is important.

Under the proposed regulations, in order to rely on the "solely outside the United States" exception, a banking entity must satisfy requirements related to both the banking entity

itself and to the specific transaction or investment in question. With respect to the banking entity, the “solely outside the United States” permitted activity is available only if:

- the banking entity is not itself, and is not directly or indirectly controlled by an entity that is, organized under U.S. law;
- where the banking entity is a foreign banking organization (FBO), it is conducting the activity in compliance with subpart B of the Federal Reserve’s Regulation K; and
- where the banking entity is not an FBO, it meets tests relating to total assets, revenues, and/or net income held or derived from outside the United States.

In addition, the “solely outside the United States” exception is only available if no party to the transaction is a “resident of the United States,” no personnel or affiliate of the banking entity involved in the activity (other than those engaged in purely administrative, clerical, or ministerial functions) is physically located or incorporated in the United States. The definition of “resident of the United States” under the proposed regulations is similar in many ways to the definition of “U.S. person” under the SEC’s Regulation S, but it is more expansive.

The manner in which the United States interprets the extraterritorial reach of the Volcker Rule will affect not only foreign banks. U.S. banking entities will be affected as well, since it is likely to impact the reaction of foreign regulators as they interpret the reach of similar provisions to U.S. banking entities operating abroad. These effects may also negatively impact the planning ability of the business and consumer customers of these international financial institutions. Reactions of this type could lead to a negative feedback loop of retaliatory moves by regulators in multiple countries.

Such an outcome has already been hinted at in the case of the Federal Reserve’s proposed rules to implement Section 165 of Dodd-Frank.⁶⁴ The proposed rule, which addresses enhanced prudential standards and early remediation requirements on foreign banking organizations, includes provisions that have generated consternation among other countries’ financial regulators, who believe the proposed rule puts foreign banks at a competitive disadvantage to U.S. banks. Michel Barnier, financial services chief of the European Union, warned Federal Reserve Chairman Ben Bernanke that implementing the proposed FBO rule “could spark a protectionist reaction from other jurisdictions, which could ultimately have a substantial negative impact on the global economic recovery.”⁶⁵ It is incumbent upon U.S. regulators to fulfill the spirit and letter of the Volcker Rule while avoiding conflicts with international jurisdictions that will negate the benefits of its implementation. And, given the proposal to regulate through FBO, it would be appropriate to implement the Volcker Rule in a way that is consistent with FBO.

In defining what activities are “solely outside of the United States,” the task force recommends that the financial regulators adopt an approach similar to what has traditionally been contained in the Federal Reserve’s Regulation K. Under that traditional approach, the activities and investments of foreign banks are considered to be solely

outside the United States unless they are conducted or made through an office or subsidiary in the United States. This approach would effectively ring-fence U.S. jurisdiction in a manner that would be consistent with the intent of the Volcker Rule statute—i.e., to protect U.S. banks and the U.S. financial system and to avoid the use of U.S. taxpayer dollars in so doing. The task force also believes that “solely outside of the United States” should not be defined by the location of the execution facility, clearinghouse, or agent, as the location of these entities are likewise not relevant to the statutory intent of the Volcker Rule to restrain the activities of banking entities.

The Lincoln Amendment

Named after its principal proponent, former Senator Blanche Lincoln (D-AR), the Lincoln Amendment to the Dodd-Frank Act prohibits banks that have access to federal deposit insurance or Federal Reserve credit facilities from engaging in specific swap trading activities.⁶⁶

The Lincoln Amendment was not part of either the House-passed version of the financial reform bill⁶⁷ or the version introduced in the Senate.⁶⁸ The concept was first proposed as part of derivatives legislation introduced in April 2010 by Senator Lincoln (D-AR), who was then chair of the Senate Agriculture Committee. The provision was added to the Senate's version of the financial reform bill before that bill was passed by the Senate. In the House-Senate conference, the language was modified to apply prospectively, the effective date was delayed, and certain exclusions were added.

Proponents of the Lincoln Amendment argue that this provision puts "sensible risk limits on activities in the derivatives markets" and that the provision correctly prohibits public subsidizing of derivatives businesses.⁶⁹ In other words, like the Volcker Rule, the Lincoln Amendment was intended to separate certain securities-related activities from traditional banking activities.

On the other hand, current and former federal financial regulators have expressed reservations about the need for the Lincoln Amendment. Former Chairman Volcker stated that the "understandable concerns about commercial bank trading in derivatives are reasonably dealt with in [the Volcker Rule]."⁷⁰ Federal Reserve Chairman Ben Bernanke argued that the Lincoln Amendment "would make the U.S. financial system less resilient and more susceptible to systemic risk."⁷¹ Additionally, then-FDIC Chairman Sheila Bair told Congress that the Volcker Rule would accomplish the goals of the Lincoln Amendment.⁷²

With the proper implementation of the Volcker Rule—as the task force proposes—the rationale for the Lincoln Amendment may no longer apply. The Volcker Rule is a more comprehensive approach to addressing speculative trading by banking entities, with market-making and hedging exceptions to distinguish permissible from impermissible activity. Also, the Lincoln Amendment would have unintended, negative consequences in bank resolutions. It would complicate resolutions by forcing banks to establish separate subsidiaries to engage in swaps activities, and those subsidiaries would not enjoy the temporary stay on the unwinding of contracts that applies to banks under FDIC resolution procedures. Rapid termination of such contracts in the event of a bank failure would have a disruptive impact on financial markets.

In recognition of these problems, bills have been introduced in the House and Senate to significantly narrow the scope of the Lincoln Amendment.⁷³ In addition, the agencies have

begun granting transition-period requests from banking institutions to delay compliance with the provision until 2015.

Given the more comprehensive Volcker Rule and the unintended consequences of the Lincoln Amendment in the event of bank failures, the task force recommends that, at a minimum, implementation of the Lincoln Amendment be delayed so that any potential benefits and burdens can be carefully assessed in light of the experience gained from the full implementation of the Volcker Rule, however it is adopted.

Conclusion

It is important that the agencies responsible for implementing the Volcker Rule get it right. The final regulations must protect taxpayers, depositors, and financial institutions. The agencies also need to ensure that the regulations provide clarity to market participants and avoid unnecessarily harming the economy as consumers, workers, investors, savers, and businesses face higher borrowing costs and less liquid markets. To be effective, the regulations must be operationalized in a manner that is practical and achievable.

The task force's recommendations avoid a "one-size-fits-most" approach to implementation that focuses on individual transactions and presumes trading to be proprietary and impermissible. Instead, the task force's recommendations stress the importance of a functional, data-driven model that takes account of the significant differences across asset classes, products, and markets. This approach focuses on tailored, data-driven metrics to help define what constitutes impermissible proprietary trading as well as the use of safe harbors to promote clarity regarding clearly permissible activity. An iterative, phased-in approach with access to a robust set of data maximizes the ability of regulators to fine-tune implementation and to continue to adjust in the future.

In line with the task force's view that regulators should take an informed and nuanced approach to proprietary trading under the Volcker Rule, the agencies should do the same with regard to applying the rule in a multinational context, focusing on protecting U.S. jurisdiction consistent with the intent of the legislation and avoiding an overbroad application of the Volcker Rule regulations to non-U.S. entities.

Finally, the task force believes its model may allow regulators to achieve the goals of the Lincoln Amendment and thus eliminate the need for this provision. The task force therefore recommends a wait-and-see approach on implementing the Lincoln Amendment until more experience can be gained from observing the Volcker Rule in the amended form the task force proposes.

Taken together, the recommendations in this report would achieve the balance necessary to realize positive outcomes for all stakeholders.

Appendix A: Outreach Interview Form

BPC's Financial Regulatory Reform Initiative's Capital Markets Task Force List of Questions

EXTRATERRITORIALITY

Many developed countries have taken steps to reform financial regulation following the nation's most recent crisis. New and evolving regulatory schemes have caused friction as countries struggle to harmonize their approaches and avoid ring-fencing and other practices that could exacerbate future crises.

1. In what areas do you see the most potential for extraterritorial problems? In what areas have you seen successes in harmonizing approaches?
2. What is the proper role for a host regulator vs. a home regulator?
3. People have argued for various approaches to cross-border regulation, including mutual recognition, substituted compliance, or that the United States should insist to some degree that its domestic standards be followed in other countries. What is the best way to address these issues?
4. How should the United States negotiate toward regulatory agreements with other countries? (Examples: delay implementation until agreements are reached, go ahead with implementation and later apply exemptions based on the results of negotiations, create incentives for negotiators to reach agreements.) What should be our primary goal(s)? Is the Bank of England–FDIC agreement on single-point-of-entry resolution a good model?
5. There is risk that two or more U.S. agencies will issue rules or guidance that is at odds with each other regarding their approach to extraterritorial issues. Two examples include the difference in how the CFTC and SEC approach the definition of "U.S. person" and security-based swap rules. Are these major problems and, if so, how should they be addressed?
6. How should regulators handle, and avoid, regulatory arbitrage—on the distinction between branches and subsidiaries of financial institutions in other countries?
7. Should international agreements allow for "gold-plating" rules—that is, that jurisdictions can have "stronger" regulations than those that are mutually agreed upon?

8. What will be the impact of the proposed Basel III rules? How will they impact systemic risk, resolvability of institutions, economic growth, and other factors?

VOLCKER RULE

1. What will be the likely impact of a finished and implemented Volcker Rule on the safety and soundness of the financial system, and on the economy?
2. One suggestion for improving the Volcker Rule is to switch from a negative presumption—where there is rebuttable presumption on a transaction-by-transaction basis that activities are prohibited—to a principles-based model where metrics could identify patterns in aggregate transactions and help regulators define the parameters of permissible activities. What are your views on both of these approaches? Do you prefer one or the other, or a third model?
3. What metrics would be useful in helping regulators to describe prohibited and permissible activities?
4. Should safe harbors be set up that would describe allowable activities? If so, what should they be?
5. How should agencies implement the Volcker Rule? Do you favor rules taking effect immediately, phasing in, or a combination of both?
6. Are there other ways you think the Volcker Rule could be improved?
7. If Basel III, single-point-of-entry, and other recent reforms function well, would that justify any changes to the Volcker Rule?

LINCOLN AMENDMENT

1. What do you consider to be the pros and cons of the Lincoln Amendment? How will it impact systemic risk?
2. Would it be most useful to move toward implementation as the amendment is, repeal it, or make changes to it (for example, equalizing treatment for U.S. branches and agents of foreign banks)?

Finally, are there any other questions we should ask you?

Endnotes

¹ Sheila C. Bair, "A New Regime for Regulating Large, Complex Financial Institutions," Testimony of Sheila C. Bair before the S. Comm. on Banking, Hous., and Urban Affairs, 112th Cong., 2011. Available at: http://www.banking.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=29da74f2-85f9-479e-8c23-836a718fd1e9.

² Ibid., p.13.

³ *The New York Times*, "Volcker Rule, Once Simple, Now Boggles," October 11, 2011. Available at: <http://www.nytimes.com/2011/10/22/business/volcker-rule-grows-from-simple-to-complex.html?pagewanted=all&r=1&>.

⁴ Barack Obama, "Remarks By the President on Financial Reform," January 21, 2010. Available at: <http://www.whitehouse.gov/the-press-office/remarks-president-financial-reform>.

⁵ Financial Stability Oversight Council, "Study & Recommendations on Prohibitions on Proprietary Trading & Certain Relationships with Hedge Funds & Private Equity Funds," January 2011, p.15. Available at: <http://www.treasury.gov/initiatives/documents/volcker%20sec%20%20619%20study%20final%201%2018%2011%20rg.pdf>.

⁶ Ibid., p.1.

⁷ The agencies responsible for implementing the Volcker Rule are the Commodity Futures Trading Commission (CFTC), Federal Deposit Insurance Corporation (FDIC), Federal Reserve Board (FRB), Office of the Comptroller of the Currency (OCC), and Securities and Exchange Commission (SEC).

⁸ There were two separate proposed rule-makings for the Volcker Rule. On October 11, 2011, the FDIC, FRB, OCC, and SEC jointly issued proposed regulations, while the CFTC issued its proposed regulations on January 11, 2012. The CFTC's proposal largely followed the earlier joint proposal except that it did not include Subpart E of the original proposal, which addressed conformance periods for entities supervised by the Federal Reserve (see <http://www.skadden.com/insights/cftc-proposes-regulations-implement-volcker-rule>). Throughout this paper, references to the proposal or proposed rule are to the initial, jointly proposed regulations. FDIC release available at: <http://www.fdic.gov/news/news/press/2011/pr11160.html>. FRB release available at: <http://www.federalreserve.gov/newsevents/press/bcreg/20111011a.htm>. OCC press release available at: <http://www.occ.gov/news-issuances/news-releases/2011/nr-occ-2011-126.html>. SEC release available at: <http://www.sec.gov/news/press/2011/2011-204.htm>.

⁹ *The New York Times*, "Volcker Rule, Once Simple, Now Boggles," October 11, 2011. Available at: <http://www.nytimes.com/2011/10/22/business/volcker-rule-grows-from-simple-to-complex.html?pagewanted=all&r=1&>. Volcker added that, broadly speaking, managers and boards responsible for compliance with the rule were to blame for its complexity because of the exceptions and nuance they demanded.

¹⁰ Mary Jo White, "Mitigating Systemic Risk in the Financial Markets through Wall Street Reforms," Hearing Before the Senate Banking, Housing, and Urban Affairs Committee, July 30, 2013. Available at: http://www.sec.gov/News/Testimony/Detail/Testimony/1370539733678#.UI_8E1A_tVI.

¹¹ As of October 17, 2013, the SEC reports having received 15,839 letters urging tough enforcement of the rule; 1,737 urging the agencies to close purported loopholes in the proposed regulation to allow for strict enforcement; and 608 urging agencies to stand firm against attempts by the financial industry to sway them to make the rule more lenient. See: U.S. Securities and Exchange Commission, "Comments on Proposed Rule: Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Private Equity Funds." Available at: <http://www.sec.gov/comments/s7-41-11/s74111.shtml>.

¹² *Bloomberg*, "Volcker Rule Costs Tallied as U.S. Regulators Press Deadline," September 30, 2013. Available at: <http://www.bloomberg.com/news/2013-09-30/volcker-rule-costs-tallied-as-u-s-regulators-press-deadline.html>.

¹³ A swap is a kind of derivative where cash flows from one or more financial instruments are traded among parties. For example, an entity may exchange the cash flows from a bond with a variable coupon (interest payment on the bond) for one with a fixed coupon in order to hedge its risks against changes to interest rates.

¹⁴ Letter from Paul A. Volcker to Christopher Dodd, May 6, 2010; letter from Ben Bernanke to Christopher Dodd, May 13, 2010; letter from Sheila C. Bair to Christopher Dodd and Blanche Lincoln, April 30, 2010.

¹⁵ "The Group of Thirty, established in 1978, is a private, nonprofit, international body composed of very senior representatives of the private and public sectors and academia. It aims to deepen understanding of international economic and financial issues, to explore the international repercussions of decisions taken in the public and

private sectors, and to examine the choices available to market practitioners and policymakers.” See www.group30.org.

¹⁶ Group of Thirty, “Financial Reform: A Framework for Financial Stability,” Working Group on Financial Stability, 2009, p.27. Available at: http://www.group30.org/images/PDF/Financial_Reform-A_Framework_for_Financial_Stability.pdf.

¹⁷ Ibid., p.28.

¹⁸ U.S. Department of the Treasury, “Financial Regulatory Reform: A New Foundation: Rebuilding Financial Supervision and Regulation,” 2009.

¹⁹ Ibid., p.32.

²⁰ H.R. 4173, 111th Cong. § 1117(a), as passed by the House, December 12, 2009.

²¹ Barack Obama, “Remarks on Financial Reform,” January 21, 2010.

²² Paul A. Volcker, “How to Reform Our Financial System,” *The New York Times*, January 30, 2010.

²³ Neal S. Wolin, prepared statement, “Prohibiting Certain High-Risk Investment Activities by Banks and Bank Holding Companies,” Hearing Before the S. Comm. on Banking, Hous., and Urban Affairs, 111th Cong., 2010.

²⁴ Paul A. Volcker, prepared statement, Hearing before the Senate Banking, Housing, and Urban Affairs Committee, February 2, 2010. Available at: <http://www.gpo.gov/fdsys/pkg/CHRG-111shrg57709/html/CHRG-111shrg57709.htm>.

²⁵ Richard C. Shelby, prepared statement, “Prohibiting Certain High-Risk Investment Activities by Banks and Bank Holding Companies,” Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs, 111th Cong., February 2, 2010.

²⁶ Bob Corker, prepared statement, “Prohibiting Certain High-Risk Investment Activities by Banks and Bank Holding Companies,” Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs, 111th Cong., February 2, 2010.

²⁷ Neal S. Wolin, prepared statement, “Prohibiting Certain High-Risk Investment Activities by Banks and Bank Holding Companies,” Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs, 111th Cong., February 2, 2010.

²⁸ S. 3217, 111th Cong. § 619 (2010).

²⁹ S. 3098, 111th Cong. (2010).

³⁰ Dodd-Frank Wall Street Reform and Consumer Protection Act § 619, 12 U.S.C. § 1851 (2012).

³¹ Jeff Merkley and Carl Levin, “Dodd-Frank Act Restrictions on Proprietary Trading and Conflicts of Interest: New Tools to Address Evolving Threats,” *Harvard Journal on Legislation*, Vol. 48, No. 2. 2011.

³² Jeff Merkley and Carl Levin, “Ban on High Risk Trades Victory for Workers and Businesses,” June 25, 2010.

³³ 12 U.S.C. § 1851 (b) (2) (B) (iii) (2010).

³⁴ Financial Stability Oversight Council, “Study & Recommendations on Prohibitions on Proprietary Trading & Certain Relationships with Hedge Funds & Private Equity Funds,” 2011.

³⁵ 76 Fed. Reg. at 68,846 (to be codified at 12 C.F.R. pts. 44, 248, 351, and 17 C.F.R. pt. 255).

³⁶ 76 Fed. Reg. at 68,945.

³⁷ Ibid.

³⁸ 76 Fed. Reg. at 68,947-48.

³⁹ 76 Fed. Reg. at 68,949.

⁴⁰ 76 Fed. Reg. at 68,950.

⁴¹ Ibid.

⁴² 76 Fed. Reg. at 68,951-53.

⁴³ 76 Fed. Reg. at 68,955.

⁴⁴ 76 Fed. Reg. at 68,955-56.

⁴⁵ U.S. Securities and Exchange Commission, “Comments on Proposed Rule: Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Private Equity Funds.” Available at: <http://www.sec.gov/comments/s7-41-11/s74111.shtml>.

⁴⁶ Letter from Senators Jeff Merkley and Carl Levin to OCC, FRB, FDIC, SEC, and CFTC, February 13, 2012.

⁴⁷ Letter from Americans for Financial Reform, the American Federation of Labor-Congress of Industrial Organizations, and the Federation of State Public Interest Research Groups to OCC, FRB, FDIC, SEC, and CFTC, February 13, 2012.

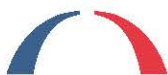
- ⁴⁸ Sarah Bloom Raskin, "How Well is Our Financial System Service Us? Working Together to Find the High Road," speech at the Graduate School of Banking at Colorado, Boulder, CO, July 23, 2012. Available at: <http://www.federalreserve.gov/newsevents/speech/raskin20120723a.htm>.
- ⁴⁹ Letter from the Securities Industry and Financial Markets Association, the American Bankers Association, The Financial Services Roundtable, and The Clearing House Association to OCC, FRB, FDIC, SEC, and CFTC, February 13, 2012.
- ⁵⁰ *The New York Times*, "Volcker Rule, Once Simple, Now Boggles," October 11, 2011. Available at: http://www.nytimes.com/2011/10/22/business/volcker-rule-grows-from-simple-to-complex.html?pagewanted=all&_r=1&.
- ⁵¹ Comment Letter on the Notice of Proposed Rulemaking Implementing the Volcker Rule–Proprietary Trading, ABA, Clearing House, Financial Services Roundtable, and SIFMA, February 13, 2012. Letter available at: <http://online.wsj.com/public/resources/documents/SIFMAletter21312.pdf>.
- ⁵² Darrell Duffie, "Market Making Under the Proposed Volcker Rule," Stanford University, January 16, 2012, p.26. Available at: http://www.gsb.stanford.edu/news/packages/PDF/Volcker_duffie_011712.pdf.
- ⁵³ 76 Fed. Reg. at 68,596, Appendix A. Available at: <http://www.gpo.gov/fdsys/pkg/FR-2011-11-07/pdf/2011-27184.pdf>.
- ⁵⁴ U.S. Senate Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, "JPMorgan Chase Whale Trades: A Case History of Derivatives Risks and Abuses," Majority and Minority Staff Report, March 15, 2013, hearing, p.4. Available at: <http://www.hsgac.senate.gov/download/report-jpmorgan-chase-whale-trades-a-case-history-of-derivatives-risks-and-abuses-march-15-2013>.
- ⁵⁵ William J. Sweet Jr., Brian D. Christiansen, and Collin P. Janus, "The Volcker Rule," Skadden, Arps, Slate, Meagher & Flom LLP & Affiliates, Newsletter, July 9, 2010. Available at: http://www.skadden.com/newsletters/FSR_The_Volcker_Rule.pdf.
- ⁵⁶ Jeff Merkley and Carl Levin, comment letter to the OCC, Federal Reserve Board of Governors, FDIC, SEC, and CFTC on proposed Volcker Rule regulations, February 13, 2012, p.8. Available at: http://www.federalreserve.gov/SECRS/2012/February/20120216/R-1432/R-1432_021412_104998_542080912901_1.pdf.
- ⁵⁷ Financial Stability Oversight Council, "Study & Recommendations on Prohibitions on Proprietary Trading & Certain Relationships with Hedge Funds & Private Equity Funds," January 2011, p.4. Available at: <http://www.treasury.gov/initiatives/documents/volcker%20sec%20%20619%20study%20final%201%2018%2011%20rg.pdf>.
- ⁵⁸ Oliver Wyman, "The Volcker Rule: Considerations for Implementation of Proprietary Trading Regulations," December 22, 2010, p.6. Available at: <http://www.sifma.org/workarea/downloadasset.aspx?id=22888>.
- ⁵⁹ *Ibid.*, p.29.
- ⁶⁰ Block positioners are traders willing to take on market-making functions for large blocks of securities. They normally attempt to hedge the significant risk they take on from such large trades in a single direction.
- ⁶¹ 12 C.F.R. Section 240.3b-8(c)(4)(iii).
- ⁶² Regulation NMS, 17 C.F.R. pts. 200, 201, 230, 240, 242, 249, and 270 (combining the national market system rules, and modernizing and strengthening the regulatory structure of the U.S. equity markets).
- ⁶³ Financial Stability Oversight Council, "Study & Recommendations on Prohibitions on Proprietary Trading & Certain Relationships with Hedge Funds & Private Equity Funds," January 2011, p.4. Available at: <http://www.treasury.gov/initiatives/documents/volcker%20sec%20%20619%20study%20final%201%2018%2011%20rg.pdf>.
- ⁶⁴ FRB Proposed Rule, "Enhanced Prudential Standards and Early Remediation Requirements for Foreign Banking Organizations and Foreign Nonbank Financial Companies," December 14, 2012, at 76631. Available at: <http://www.gpo.gov/fdsys/pkg/FR-2012-12-28/pdf/2012-30734.pdf>. The preamble mentions that some foreign jurisdictions have either modified, or considered proposals to modify, their regulation of foreign banks operating within their jurisdictions.
- ⁶⁵ Letter from Michel Barnier to Ben Bernanke, April 18, 2013. Available at: http://www.federalreserve.gov/SECRS/2013/April/20130422/R-1438/R-1438_041913_111076_515131431183_1.pdf.
- ⁶⁶ Dodd-Frank Wall Street Reform and Consumer Protection Act § 716, 15 U.S.C. § 8305 (2012).
- ⁶⁷ H.R. 4173, 111th Cong. (as passed by House, Dec. 12, 2009).
- ⁶⁸ S. 3217, 111th Cong. (as introduced in the Senate, Apr. 15, 2010).
- ⁶⁹ Wallace C. Turbeville, prepared statement on behalf of Americans for Financial Reform, "Examining Legislative Improvements to Title VII of the Dodd-Frank Act," Hearing Before the H. Comm. on Agric., 113th Cong., 2013.

⁷⁰ Letter from Paul A. Volcker to Christopher Dodd, May 6, 2010.

⁷¹ Letter from Ben Bernanke to Christopher Dodd, May 13, 2010.

⁷² Letter from Sheila C. Bair to Christopher Dodd and Blanche Lincoln, April 30, 2010: "To be sure, there are certain activities, such as speculative derivatives trading, that should have no place in banks or bank holding companies. We believe the Volcker rule addresses that issue."

⁷³ See, e.g., Swaps Regulatory Improvement Act, H.R. 922, 113th Cong. (2013); Swaps Regulatory Improvement Act, S. 474, 113th Cong. (2013).



BIPARTISAN POLICY CENTER

1225 Eye Street NW, Suite 1000
Washington, DC 20005
(202) 204-2400

WWW.BIPARTISANPOLICY.ORG

Federal Reserve Bank of New York
Staff Reports

Did Liquidity Providers Become Liquidity Seekers?

Jaewon Choi
Or Shachar

Staff Report No. 650
October 2013



This paper presents preliminary findings and is being distributed to economists and other interested readers solely to stimulate discussion and elicit comments. The views expressed in this paper are those of the authors and are not necessarily reflective of views at the Federal Reserve Bank of New York or the Federal Reserve System. Any errors or omissions are the responsibility of the authors.

Did Liquidity Providers Become Liquidity Seekers?

Jaewon Choi and Or Shachar

Federal Reserve Bank of New York Staff Reports, no. 650

October 2013

JEL classification: G12, G01

Abstract

The misalignment between corporate bond and credit default swap (CDS) spreads (i.e., CDS-bond basis) during the 2007-09 financial crisis is often attributed to corporate bond dealers shedding off their inventory, right when liquidity was scarce. This paper documents evidence against this widespread perception. In the months following Lehman's collapse, dealers, including proprietary trading desks in investment banks, provided liquidity in response to the large selling by clients. Corporate bond inventory of dealers rose sharply as a result. Although providing liquidity, limits to arbitrage, possibly in the form of limited capital, obstructed the convergence of the basis. We further show that the unwinding of precrisis "basis trades" by hedge funds is the main driver of the large negative basis. Price drops following Lehman's collapse were concentrated among bonds with available CDS contracts and high activity in basis trades. Overall, our results indicate that hedge funds that serve as alternative liquidity providers at times, not dealers, caused the disruption in the credit market.

Key words: CDS-bond basis, limits to arbitrage, credit default swaps, liquidity, corporate bonds, Volcker rule

Choi: University of Illinois at Urbana-Champaign (e-mail: jaewon.choi@illinois.edu). Shachar: Federal Reserve Bank of New York (e-mail: or.shachar@ny.frb.org). The authors thank Viral Acharya, Itamar Drechsler, Robert Engle, Joel Hasbrouck, and seminar participants at the Early Career Women in Finance Conference 2013 and at the University of Illinois for helpful comments and discussions. They also thank Peter Axilrod, Marisol Collazo, Michael Kopcak, and Gary Kotlyar of the Depository Trust and Clearing Corporation for providing the data and explaining their features. The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

1 Introduction

In the months following Lehman Brothers’ bankruptcy in 2008, the previously close relationship between corporate bond and CDS spreads, i.e. the CDS-bond basis, broke down. As the mispricing widened, many questioned the role of dealers in the corporate bond market (e.g., [Duffie \(2010\)](#), and [Bai and Collin-Dufresne \(2010\)](#)). As market-makers, corporate bond dealers are supposed to “lean against the wind” by absorbing liquidity shocks and providing immediacy to liquidity demanders ([Weill \(2007\)](#)). Whether dealers performed their role as liquidity providers during the crisis is an open empirical question.

Both academics and regulators point fingers at dealers for not providing liquidity and even destabilizing the corporate bond and CDS markets. In particular, they argue that the unwinding of arbitrage trading by dealers was one of the main causes of the large negative basis. For example, [Mitchell and Pulvino \(2012\)](#) suggest that investment banks, typically being dealers in these over-the-counter (OTC) markets, were forced to sell large amounts of corporate bonds and unwind CDS positions, which led to the large negative CDS-bond basis. In addition, the aggregate holdings of primary dealers published by the Federal Reserve Bank of New York (see [Figure 6.1](#)) are taken by various studies, for example, [Bai and Collin-Dufresne \(2010\)](#), as evidence of the excessive risk-taking of dealers followed by deleveraging, leading to dealers failure to provide liquidity.

Given this backdrop, regulators under the Volcker rule are beginning to rein in dealers’ risk taking in OTC markets. The rule prohibits proprietary trading by banks except for market-making activities. As [Duffie \(2012\)](#) and [Acharya and Richardson \(2009\)](#) point out, however, the proposed rule would reduce the liquidity provision capacity of market-makers, and, eventually, other institutional investors will fill the void. Whether such market-making by non-dealer institutional investors would result in a more stable financial system is unclear.

We tackle this issue in this paper. Employing unique databases for CDS and corporate bond trades, we examine dealers’ concurrent trading in these markets during the 2007-2009 financial crisis when demand for liquidity was supposedly very high. In particular,

we ask the following questions: Were dealers in the OTC markets seeking rather than providing liquidity and thereby exacerbating the CDS-bond basis? Did deleveraging by corporate bond dealers drive the large negative basis in the aftermath of Lehman Brothers bankruptcy? Who or what were then driving the negative basis? These questions are important in light of the recent regulatory debate over whether dealers should be given less discretion in liquidity provision.

First, we show that dealers in the corporate bond market were indeed deleveraging at the onset of the financial crisis until the fall of Bear Stearns. However, contrary to the common perception that dealers were unloading corporate bonds following liquidity shocks due to the Lehman Brothers collapse, we find that the unloading of bonds came to an end and dealers actually tended to increase their corporate bond holdings in 2008. During the period following the collapse of Lehman Brothers, when corporate bond prices were severely distressed, dealers' bond inventory increased sharply. The evidence suggests that dealers were performing their customary role as liquidity providers when their clients were demanding liquidity.

We then formally examine whether dealers provided liquidity when corporate bond and CDS prices deviated from no-arbitrage pricing levels. Our empirical results provide very strong evidence for liquidity provision by corporate bond dealers. Specifically, dealers' trades are negatively associated with corporate bond price changes, an indication that bond dealers provided liquidity by trading against the tide when other traders drove prices away from no-arbitrage pricing. Liquidity provision by corporate bond dealers was strong, especially after Lehman Brothers' collapse, when clients were desperately dumping bonds in the market and seeking liquidity. These results contrast with the common notion that dealers dumped their cash bond positions after the collapse, as suggested by [Mitchell and Pulvino \(2012\)](#) and [Bai and Collin-Dufresne \(2010\)](#).

Next, we investigate dealers' liquidity provision in greater depth. Although clients demanded liquidity following the Lehman collapse, it is possible that this demand was due to convergence trading, which closes price gaps between CDSs and bonds. For example, clients could have bought and pushed up bond prices when bonds were cheap relative to

CDSs and, as a result, the price gap between the bonds and CDSs would have shrunk. In our regression analysis, however, we do not find evidence that clients engaged in convergence trading following the collapse of Lehman. Rather, clients widened the price gaps, especially when the basis was large and negative.

Although corporate bond dealers provided liquidity, the level of provision was insufficient, as evidenced by the large price changes associated with clients' net order flows. Also, we do not find that dealers traded aggressively to close the price gaps when bond prices fell significantly, possibly because financial intermediaries lacked sufficient capital, as noted by [Brunnermeier and Pedersen \(2009\)](#) and [Duffie \(2010\)](#).

Having shown that dealers were engaged in liquidity provision, we address the following question: who or what drove the negative basis? Proprietary trading desks at investment banks are unlikely to be the main culprit, since our measure of dealers' trades includes those of proprietary trading desks by the same dealer banks. We hypothesize that the unwinding of CDS-bond basis trading by other highly levered traders, e.g. hedge-funds, was the driver.¹ In a so-called negative basis trade, arbitrageurs buy relatively cheap cash bonds with funding and hedge the long position with CDSs. Simultaneous exits of arbitrageurs following the Lehman Brothers collapse might have caused massive selling pressure in the corporate bond market. If that had occurred, we should observe that liquidity demand and price declines were greater for bonds with actively traded CDS contracts.

We find evidence consistent with the hypothesis that the unwinding of basis trades by non-dealer arbitrageurs drove the negative basis following the Lehman collapse. We find that dealers' corporate bond inventories rose sharply for bonds with traded CDS contracts, compared with bonds without traded CDS. Hedge funds unwound their long CDS positions substantially, while dealers increased long CDS positions. Other institutional investors did not, however, exhibit strong liquidity demand following the collapse. For example, insurance companies' liquidity demand did not exacerbate the negative basis. Mutual

¹ [Mitchell and Pulvino \(2012\)](#) describes how the deleveraging of highly levered hedge funds, instigated by the failure in the rehypothecation lending market, could be a reason for liquidity demand in the corporate bond market, following the Lehman collapse.

funds sold bonds without associated traded CDS instead of bonds with traded CDS.

More importantly, we find that prices of bonds with available CDS contracts declined more than non-CDS bonds. Specifically, returns of bonds with traded CDS contracts were 8% lower on average in September of 2008. Moreover, both for bonds with more negative basis and for supposedly easier-to-arbitrage bonds we find that prices fell more at the end of August 2008, the month before the Lehman Brothers collapse. We proxy the ease of basis trading using the maturity of bonds at that time. Since five-year maturity CDS contracts are the most prevalent, if a bond maturity was close to five years at the end of August 2008 and its basis was also large and negative, it was more likely that active basis trading was involved with the bond. Following the negative funding shock in September 2008, price declines would have been concentrated for those bonds, which we confirm in our empirical analysis. These results combined suggest that the large negative basis was driven by non-dealer arbitrageurs. The results are also consistent with the findings of [Franzoni and Plazzi \(2013\)](#), which document liquidity demand by hedge funds in the equity market during the financial crisis.

Our empirical evidence strongly suggests that the disruption in the cash market was due to excessive arbitrage trading by hedge-funds that was enabled by the presence of derivative contracts. This reveals a new aspect such that the CDS market can affect the cash market and adds to the growing literature on the impact of CDS on the real economy. For example, [Bolton and Oehmke \(2011\)](#) show the implications of the empty creditor problem when debtors have access to CDS contracts, and [Kim \(2013\)](#) provides some empirical evidence regarding the ex-ante impact of empty creditors on corporate debt contracting. [Saretto and Tookes \(2013\)](#) show that firms have lower financing costs and can lengthen debt maturity when there are available CDS contracts. [Subrahmanyam et al. \(2012\)](#) show that CDS contracts can exacerbate the credit risk of the reference entity. We add to this literature by providing novel evidence that the existence of derivative contracts can disrupt the underlying cash market.

Our overall result has an important implication for the Volcker rule, the implementation of which is underway and which is to rein in dealers' risk-taking in the OTC market.

The rule prohibits proprietary trading by banks except for market-making activities. As [Duffie \(2012\)](#) points out, however, once the proposed rule is implemented, market-makers' capacity to provide liquidity will be reduced. Eventually, other institutional investors, including hedge funds, will fill the void. This is not a very desirable outcome, because our evidence points out that the unwinding of arbitrage positions can be detrimental to the cash market, and thus to the funding costs of corporations. Since dealers are typically banks that are regulated by capital requirements, they would be in a better position to provide liquidity. They also have incentives to provide liquidity even in the worst liquidity crisis to maintain their reputation as market-makers.

Our paper is organized as follows. Section [2](#) describes the main datasets and the sample construction. Section [3](#) shows that, although dealers de-levered on aggregate in the period leading to the crisis, the delevering paused in the period immediately after the Lehman debacle and dealers actually increased their corporate bond holdings sharply. Section [4](#) examines more formally whether dealers provided liquidity throughout the financial crisis. In Section [5](#) we propose an explanation for the existence of the large negative basis in the autumn of 2008. Section [6](#) concludes.

2 Data Description and Variable Construction

In this section, we first describe the corporate bond and single-name CDS datasets that provide traded prices and quantities for our analysis. We then describe the construction of key variables in our analysis, particularly for dealer flows and the bond-CDS basis.

2.1 Corporate Bond and CDS Data

Corporate bond prices and volumes are obtained from an enhanced version of the Trade Reporting and Compliance Engine (TRACE). The enhanced TRACE specifies whether a trade is carried out between two dealers, or between a customer and a dealer, as well as indicating the customer's trading direction. The dataset also includes untruncated

volumes, information previously not disseminated to the public. These enhanced features allow us to track interdealer and dealer-client flows as well as the associated traded prices.

To obtain daily prices and volumes, we eliminate duplicate records and reversed and canceled trades, as described in [Dick-Nielsen \(2009\)](#). We also eliminate potential influential outliers in terms of price and/or trade size that deviate from the surrounding reports. These outliers usually result from manual errors in which the decimal point was entered incorrectly. After these filters, we construct daily bond prices by weighting each trade by its size after eliminating retail trades (trade size less than \$100,000), following the recommendation of [Bessembinder et al. \(2009\)](#).²

The Mergent FISD provides bond characteristics as well as issuance and redemptions information on publicly traded corporate bonds in the United States. We obtain the terms and conditions, amount outstanding, ratings, and other relevant information of corporate bonds from this database.

The CDS spread data are provided by the Markit Group. We use CDS spreads on quoted modified restructuring clauses.³ We exploit the full-term structure of CDS spreads in our calculation of the basis. Since the basis calculation requires the price difference between bonds and CDSs on the same underlying company, we carefully match each single-name CDS contract to bonds issued by the same reference entities. Bonds issued by subsidiaries are matched to their own CDS contracts if they have CDS contracts available. If not, they are matched to CDS contracts on the parent company.

For a subset of CDS contracts in the main sample we also use a unique transaction-level dataset, provided by the Depository Trust & Clearing Corporation (DTCC). The reference entities in this database are all financial firms for the period between February 2007 and June 2009. The database provides information on volumes and types of institutional investors (dealers, hedge funds, insurance companies, and so on) for each buy and sell CDS transaction. We use these transactions to construct the CDS positions of dealers

²[Bessembinder et al. \(2009\)](#) recommend this procedure for the construction of daily bond prices to minimize the effect of large bid-ask bounce associated with small trades.

³We use the modified restructuring clause as it was the most commonly traded until April 2009, which is the heart of our sample period and also minimizes the impact of the cheapest-to-deliver option.

and hedge funds on those financial reference entities.⁴

We obtain our main dataset by merging the aforementioned databases. Our sample period runs from July 2007 through June 2009, the period spanning the financial crisis.

2.2 Construction of Key Variables

2.2.1 Net Flows and Inventory

We construct the net order flow of corporate bond dealers, using the enhanced TRACE with untruncated trade size. Since each transaction identifies whether the reported trade is a buy, a sell, or an interdealer trade, we define the net order flow of bond issue i at day t as:

$$q(\text{Bond}, i, t) := \sum_{n=1}^{N_t} (\text{Buy}(\text{Bond}, i, n) - \text{Sell}(\text{Bond}, i, n)) \quad (2.1)$$

where the buy and sell orders reflect the dealer perspective and N_t is the total number of transactions on day t . Using the daily net flow, we then construct the dealers' inventories at the bond issue level:

$$I(\text{Bond}, i, t) := I(\text{Bond}, i, 0) + \sum_{\tau=1}^t q(\text{Bond}, i, \tau) \quad (2.2)$$

where $I(\text{Bond}, i, 0)$ is the initial inventory of bond i , before the existence of the TRACE system. Since we do not observe $I(\text{Bond}, i, 0)$, our analyses later focus on the variation in dealer inventories. Note also that our measure of dealers' net flows include those of proprietary trading desks or investment management subsidiaries in investment banks.⁵

Similarly, on the CDS market front, we calculate net order flows and inventories of

⁴For further details on the dataset, see [Shachar \(2013\)](#).

⁵FINRA member subsidiaries of registered dealers are subject to the dual-side reporting obligation under the Rule 6700 as any other FINRA member firm. See <http://www.finra.org/Industry/Compliance/MarketTransparency/TRACE/FAQ>.

dealers for the sub-sample of financial firms. More formally, we define:

$$q(\text{CDS}, i, t) := \sum_{n=1}^{N_t} (\text{Buy}(\text{CDS}, i, n) - \text{Sell}(\text{CDS}, i, n)) \quad (2.3)$$

$$I(\text{CDS}, i, t) := I(\text{CDS}, i, 0) + \sum_{\tau=1}^t q(\text{CDS}, i, \tau) \quad (2.4)$$

where $I(\text{CDS}, i, 0)$ is the initial position of CDS i before it was reported to DTCC.

2.2.2 The CDS-Bond Basis

The CDS-bond basis at time- t is defined as the difference between the CDS premium, $\text{CDS}(t)$, and the bond credit spread, $\text{CS}(t)$: $\text{basis}(t) = \text{CDS}(t) - \text{CS}(t)$. In calculating the basis, we follow the par-equivalent CDS spread (PECS) methodology of J.P. Morgan, which is also used in other studies (e.g. [Bai and Collin-Dufresne \(2010\)](#)).⁶

The PECS is essentially a bond credit spread that is consistent with the term structure of default probabilities priced in the CDS contracts of the issuer. Specifically, we apply a parallel shift to the survival probability curve from the CDS contracts to match the bond with the present value of cash flows. Once we match the bond price, we use the new survival probabilities to calculate implied CDS spreads, which are the abovementioned PECS. The detailed procedures for the PECS calculation is provided in [Appendix A](#).

Consistent with common practice in the literature, we exclude from the basis calculation bonds with embedded options or special pricing conditions such as convertible, callable or puttable bonds, and bonds with sinking funds provisions in order to eliminate pricing impacts from contractual differences. Since we calculate the basis for the most liquid five-year CDS contract, we include only bonds with 3-10 remaining years until maturity in the PECS calculation.

⁶There are several metrics that can be used to calculate the bond spread, including the Z-spread, par asset swap spread, and PECS. [Blanco et al. \(2005\)](#) and [Fontana \(2011\)](#) simply use the difference between the CDS price and the credit spread, which is calculated as the difference between the interpolated 5-year yield on risky bonds and the 5-year swap rate

3 Corporate Bond Position of Dealers during the Financial Crisis

It is commonly hypothesized that dealers accumulated highly levered positions in the cash market during the credit boom period before the financial crisis and subsequently de-levered significantly over the course of the financial crisis (e.g., [Adrian and Shin, 2010](#), [Acharya and Viswanathan, 2011](#), [Acharya and Richardson, 2009](#)). This argument is supported by the data on the aggregate holdings of primary dealers, published by the Federal Reserve Bank of New York, which we reproduce in Figure 6.1 (dotted line). However, these holdings data also include bonds issued by non-federal agencies (e.g. GSEs) and thus disguise the distinct trend of corporate bond holdings by dealers.⁷

Although dealers' holdings in corporate bonds have not been examined empirically yet, the potential accumulation and subsequent deleveraging of such bonds by dealers have been identified as one of the main drivers of the negative basis during the financial crisis ([Bai and Collin-Dufresne, 2010](#), [Mitchell and Pulvino, 2012](#), and [Fontana, 2011](#)). Large negative shocks can force levered financial institutions including dealers to unload bond positions. Given initially high long positions, the unwinding of corporate bonds by dealers might have placed heavy selling pressure during the period in which many investors were selling and demanding liquidity. If dealers who are supposed to lean against the wind also sell during this period, bond prices will drop significantly and potentially deviate from no-arbitrage pricing. This mechanism is often pointed out as the main reason for the large negative basis of non-AAA bonds during the financial crisis, as plotted in Figure 6.2.

Using our database, we document evidence against this widespread perception. The advantage of our database is that we can analyze dealers' corporate bond positions throughout the financial crisis period, whereas the data published by the Federal Reserve Bank of New York is based largely on the aggregate bond positions, including MBSs issued by non-federal agencies and GSEs.

⁷The Federal Reserve Bank of New York began collecting primary dealers' holdings of corporate bonds as a separate asset class only after April 3rd 2013. Thus, the data from the Federal Reserve Bank do not provide the exact corporate bond holdings of dealers, because the Fed extrapolates the corporate bond positions for the period leading up to April 3rd 2013 using the composition of corporate bond holdings on that date.

In Figure 6.1, we plot the time series for the corporate bond inventory of dealers by cumulating dealer transactions from the TRACE database (solid line). Since the dealers' initial position in corporate bonds is unavailable, we begin the plot at zero in Figure 6.1. Consistent with the notion that dealers accumulated cash bond positions, we find that the dealers' corporate bond inventory increases substantially (by around 80 billion dollars) until the summer of 2007, the period leading to the financial crisis.

After the summer of 2007, we observe a large decline in dealers' corporate bond holdings, again consistent with the deleveraging hypothesis. However, the unloading of corporate bonds suddenly ceases around the time when Bear Stearns collapsed. The dealers' positions remain within that range until the collapse of Lehman Brothers. After the Lehman Brothers collapse, the corporate bond positions start to increase rapidly and continue to do so until the end of 2008. It was during this period, from Lehman Brothers' collapse (September 2008) through the end of 2008, that the negative basis was the most severe for non-AAA investment grade bonds, as plotted in Figure 6.2. Dealers were buying bonds when bond prices were the most distressed as indicated by the negative basis.

This pattern in dealers' positions suggests that, contrary to the common notion that dealers demanded liquidity during the financial crisis, dealers in fact provided liquidity when corporate bond prices were in the state of greatest distress. It was clients, not dealers, who sold large quantities of corporate bond and demanded liquidity. We examine dealers' liquidity provision in greater depth in the next section.

4 Liquidity Provision by Dealers during the Financial Crisis

The results reported in the previous section show that corporate bond dealers increased inventory sharply after the Lehman collapse, suggesting that dealers provided liquidity when there was massive selling in the corporate bond market. In this section, we examine dealers' liquidity provision more formally.

We take our notion of liquidity provision and demand from the literature on the limits of arbitrage.⁸ For example, in [Brunnermeier and Pedersen \(2009\)](#), liquidity providers are arbitrageurs who smooth price fluctuations when the price and fundamental values diverge due to liquidity shocks. Thus, liquidity providers tend to trade against price changes (lean against the wind). They buy low when prices fall and sell high when prices rise. Liquidity demanders, on the other hand, demand immediacy in trading and move prices in the direction of their trades. [Keim and Madhavan \(1997\)](#), [Puckett and Yan \(2011\)](#), and [Campbell et al. \(2009\)](#) also employ a similar notion of liquidity provision in interpreting transaction costs. In a recent paper, [Franzoni and Plazzi \(2013\)](#) employ the same notion of liquidity provision in examining liquidity provision by hedge funds.

Following this notion of liquidity provision, we examine how dealers' daily net flow in the CDS and bond markets are associated with daily changes in CDS and bond prices and in the basis. Specifically, we examine dealers trading against price pressure, which drives corporate bond and CDS prices away from each other. Liquidity provision is identified as negative association of price changes and net order flow.

4.1 Baseline Regression

4.1.1 Specification

The baseline model regresses daily changes in bonds' PECS and CDS spread on net order flows by dealers. Specifically, we consider the following specifications:

$$\Delta p(\text{Bond}, t) = c_1 + \beta_1(-q(\text{Bond}, t)) + \text{ctrls} + \varepsilon_{1t} \quad (4.1)$$

$$\Delta p(\text{CDS}, t) = c_2 + \beta_2 q(\text{CDS}, t) + \text{ctrls} + \varepsilon_{2t} \quad (4.2)$$

$$\Delta \text{basis}(t) = c_3 + \gamma_3 q(\text{Bond}, t) + \delta_3 q(\text{CDS}, t) + \text{ctrls} + \varepsilon_{3t} \quad (4.3)$$

where $p(\text{Bond}, t)$ is the PECS of a bond, $p(\text{CDS}, t)$ is the CDS spread of the same firm, and $\text{basis}(t)$ is the difference between the CDS and the par-equivalent bond spreads, $p(\text{CDS}, t) - p(\text{CS}, t)$. Since the five-year maturity CDS is the most liquid, we use five-year

⁸[Shleifer and Vishny \(1997\)](#), [Vayanos and Gromb \(2010\)](#) and many others.

maturity PECS and CDS spreads. $q(\text{Bond}, t)$ is the corporate bond net order flow of dealers and $q(\text{CDS}, t)$ is the CDS net order flow of dealers on day t .

The first two specifications (4.1) and (4.2) allow us to analyze whether dealers' trades provide or seek liquidity in each market. Negative signs on β_1 and β_2 imply that dealers trade to "lean against the wind," indicating liquidity provision. In (4.1), for example, a negative value for β_1 implies that dealers' buys are associated with an increase in credit spreads (because of the negative sign in front of $q(\text{Bond}, t)$), which in turn means that dealers tend to buy when bond prices fall. In (4.2), a negative β_2 implies that CDS spreads decrease when dealers buy, also signaling that dealers tend to trade against price movements.

The third regression specification, (4.3), reveals whether dealers provide liquidity when prices deviate from relative pricing, implied by the no-arbitrage principle between CDS and corporate bonds. As in Equations (4.1) and (4.2), negative signs on γ_3 and δ_3 imply that dealers provide liquidity in the bond and CDS market, respectively. Examining basis changes enables us to examine whether dealers were acting differently when prices deviated from the no-arbitrage relationship.

We include control variables, *ctrls*, which include changes in Libor-OIS and Repo-Treasury spreads (3 months) for uncollateralized and collateralized funding conditions, respectively, as well as the change in VIX to capture aggregate uncertainty. We also include a lagged basis to capture the idea that CDS and bond prices are cointegrated (Blanco et al., 2005). Prices could deviate from equilibrium, and the error correction (or convergence) will depend on how far prices are from relative pricing. Even without trading volumes, prices can adjust to the equilibrium level, because dealers will adjust their quotes accordingly. This error correction, or the lagged basis term, captures this convergence effect.

To examine liquidity provision throughout the successive phases of the financial crisis, we divide the sample period into three sub-periods. The first sub-period, *Crisis 1*, runs from July 1st 2007 through September 15th 2008 when Lehman Brothers' collapsed. This period marks the beginning of the meltdown of the financial market and includes the

collapse of Bear Stearns. Although volatility was elevated, the CDS-bond basis was in a moderate range. The second period, *Crisis 2*, is the period from the Lehman collapse when the basis was large and negative. The third period, *Crisis 3*, is the recovery period running from February 2009 through June 2009, during which large gaps in basis started to narrow.

4.1.2 Baseline Regression Results

We first provide statistics on dealer volumes and trades in Table 1. We report averages and standard deviations for the basis, CDS spreads, PECS, and dealers' buy and sell quantities in both the bond and CDS markets. On average, bond dealers buy \$3-\$5 million dollars worth of bonds at face value each day. Corporate bond dealers tend to sell more in periods other than *Crisis 2*, which is consistent with the idea of deleveraging. However, in the *Crisis 2* period, buy quantities in non-AAA bonds are greater than sell quantities, indicating that bond dealers were providing liquidity during the post-Lehman period.

In Table 2, we report the liquidity provision results from regressions (4.1), (4.2), and (4.3) for each sub-period. The results show liquidity provision by dealers, especially in the bond market. In the first columns of each panel of the sub-periods ($\Delta p(\text{Bond})$ and $\Delta p(\text{CDS})$), bond dealers' trades are always negatively associated with bond price changes. The large negative coefficients imply that bond dealers provide liquidity to non-dealer traders but market liquidity is scarce. The economic magnitudes of the coefficients are sizable. During the peak of the financial crisis, a one standard deviation change in dealer trades is associated with a six basis points change in bond prices. In the CDS market, CDS quantities do not have large negative coefficients except in the *Crisis 3* period, implying that CDS dealers tend to absorb the demand and the market is relatively liquid.

We move on to the next two columns (titled $\Delta basis$) in each sub-period panel to investigate dealers' liquidity provision when prices deviate from relative pricing. Similar to the previous results, bond dealers provide liquidity when bond prices fall or rise relative to CDS prices, which can be seen from the negative coefficients on net bond order flows.

This indicates that dealers serve as an important liquidity provider when there are large changes in bond prices. The flip side of this result is that other traders in the bond markets were driving prices away, or widening the basis. Overall, the results are inconsistent with the common belief that bond dealers were driving the basis.

In contrast to the bond market results, we find no indication that CDS trades are associated with basis changes, and thus CDS dealers' trades were not particularly associated with liquidity provision. In the basis regressions, shown in the fourth columns, we find that dealers' trades are not statistically significant in all sub-periods.

4.2 Stabilizing vs. Destabilizing Liquidity-Seeking

Depending on the sign of the basis, liquidity seeking does not necessarily widen the bond-CDS price gaps. For example, when the basis is negative, liquidity-seeking sell orders in bonds will drive bond prices further down, which can be seen as destabilizing liquidity-seeking in the sense that it exacerbates the breakdown of the law of one price. In contrast, if clients buy bonds and drive prices up when the basis is negative, this liquidity demand of clients can be viewed as stabilizing-liquidity seeking, because clients' trades move prices back to their parity relationship.

Although dealers provide liquidity on average, it is possible that they are engaged in destabilizing liquidity-seeking and thereby drive the basis deeper into negative territory. To investigate this possibility, we divide the sample into positive and negative basis cases and examine how dealers' buy and sell quantities are associated with price changes. Specifically, we investigate the following regression specification, separately for cases in which the lagged basis $\text{basis}(t-1)$ is positive and negative:

$$\begin{aligned} \Delta \text{basis}(t) = & c + \beta_1 q(\text{CDS, buy}, t) + \beta_2 q(\text{CDS, sell}, t) \\ & + \gamma_1 q(\text{Bond, buy}, t) + \gamma_2 q(\text{Bond, sell}, t) + \text{ctrls} + \varepsilon_t \end{aligned} \quad (4.4)$$

The buy and sell flows are defined as positive and negative quantities: $q(\text{buy}, t) \equiv q(t) 1_{q(t) \geq 0}$ and $q(\text{sell}, t) \equiv q(t) 1_{q(t) < 0}$. Similar to the previous specifications, the negative

signs on the coefficients indicate that dealers trade to provide liquidity when clients seek liquidity. For example, negative coefficients on β_1 and β_2 indicate that dealers' CDS buys are associated with a decline in the basis (CDS spreads are cheap relative to bond spreads) and their CDS sells are associated with an increase in the basis (CDS spreads are expensive relative to bonds). Similarly, a positive γ_1 indicates that dealers' bond buys are associated with a decline in the basis (bonds are cheap relative to CDS) and their bond sells are associated with an increase in the basis (bonds are expensive relative to CDS).

Table 3 provides the results of regression (4.4). Throughout the financial crisis, bond dealers were providing liquidity whether the basis was positive or negative. Dealers did not demand liquidity or widen the price gaps. For example, in *Crisis 2* when the basis is negative, dealers' buy volume shows strong liquidity provision with a highly statistically significant coefficient of -12.09 . When bond prices were severely distressed and the basis widened to a large negative number following the collapse of Lehman Brothers, clients dumped corporate bonds and drove the basis even farther into negative territory, while dealers tended to stabilize the market by providing liquidity. In comparison, dealers' sells are not associated with strong liquidity provision except in the case of a negative basis case in the *Crisis 3* period. In that period, the coefficient of the sell net flow is -5.86 and is statistically significant at the 1% level. This provides only weak evidence of stabilizing liquidity-seeking by clients, who were presumably correcting the negative basis by buying bonds aggressively.

For the CDS market, we find some evidence of destabilizing liquidity-seeking by dealers. For example, in the *Crisis 3* period when the basis is negative, CDS dealers' sell net flow has a coefficient of 5.41 with statistical significance at the 1% level. These sell trades by dealers narrowed CDS spreads, which might have exacerbated the negative basis.

4.3 Liquidity Provision when Mispricing is Large

In this section, we investigate whether dealers provide liquidity when the market needs it most or when the price gap between CDS and bonds is wide. Given large selloffs in the bond market and a large negative basis, dealers could have suffered from reduced funding

liquidity and started selling bonds in the market, similar to the liquidity spiral channel of [Brunnermeier and Pedersen \(2009\)](#). This mechanism implies that, although dealers tend to provide liquidity, they might seek liquidity when the basis is very negative. To that end, we interact a lagged absolute basis with volumes:

$$\begin{aligned}\Delta\text{basis}(t) = & (\beta_1 + \beta_2 \cdot |\text{basis}(t-1)|) q(\text{CDS, buy}, t) + (\beta_3 + \beta_4 \cdot |\text{basis}(t-1)|) q(\text{CDS, sell}, t) \\ & + (\gamma_1 + \gamma_2 \cdot |\text{basis}(t-1)|) q(\text{Bond, buy}, t) + (\gamma_3 + \gamma_4 \cdot |\text{basis}(t-1)|) q(\text{Bond, sell}, t) \\ & + \text{ctrls} + c + \varepsilon_t\end{aligned}\tag{4.5}$$

If liquidity provision is stronger when the basis is larger, we expect the coefficients of the interaction terms (β_2 , β_4 , γ_2 , and γ_4) to be negative.

The results are provided in Table 4 and indicate that bond dealers' liquidity provision is stronger when the basis is wider, especially when the basis is negative. For example, in the *Crisis 2* period when liquidity is supposedly is scarcest, the coefficient on the interaction of the bond buy with $|\text{basis}(t-1)|$ is -8.92 , which is statistically significant at the 1% level. Also in *Crisis 3*, we observe a coefficient on the interaction term of -14.20 , which is also statistically significant at the 1% level. These results indicate that bond dealers were providing liquidity when bond prices were very distressed, a period during which the market was in a great need for liquidity.

However, the results also exhibit interesting liquidity-seeking on the part of corporate bond dealers. We find that dealers seek liquidity in some cases when the basis is large. The first case is when the lagged basis is negative in *Crisis 1*. The coefficient is 19.35 , showing that dealers were buying to drive bond prices up. This can be viewed as stabilizing liquidity-seeking by bond dealers when the basis is negative (bonds are cheap relative to CDS). During the *Crisis 1* period, when dealers have relatively greater flexibility, they try to narrow the pricing gaps. Additional interesting liquidity-seeking cases occur during *Crisis 2* and *Crisis 3* when the lagged basis is positive, possibly representing a flight-to-quality by dealers. Note that the positive basis is concentrated in AAA bonds. Dealers were also chasing these AAA bonds along with other traders. Since AAA bonds were

coveted, there was little selling pressure for AAA bonds, and thus even when dealers were buying them prices went up.

In the CDS market, we find weaker results for liquidity-seeking, similar to results shown in previous tables. We find that CDS dealers seek liquidity during the *Crisis 2* period. This liquidity-seeking occurs when the basis is negative and dealers buy CDS, which narrows the price gaps and thus stabilizes the market. The overall results again suggest that dealers in both the markets tend to provide liquidity when the market needed it most, except for the possible flight-to-quality cases for AAA bonds.

4.4 Liquidity-Seeking by Insurance Companies

The results so far demonstrate that, contrary to the common perception, dealers in the corporate bond markets provided liquidity when their counterparties were seeking liquidity. Who are these counterparties who seek liquidity?

Insurance companies, pension companies, mutual funds, and hedge funds are major investors in the corporate bond market. Regarding these players, we investigate the daily trading behavior of insurance companies, using their secondary market trading volumes as recorded in the NAIC database. Figure 6.3 depicts buy (positive) and sell (negative) flows by insurance companies. At the daily volume level, the trading activity of insurance companies is highly volatile. We find some weak evidence for a sell-off following the Bear Stearns and Lehman Brothers' collapses, although one that is not very pronounced.

In Table 5, we formally investigate liquidity demand by insurance companies by estimating Equation (4.4). We find, on aggregate, that insurance companies are liquidity seekers on average, as reflected by the positive coefficients of their sell net flows. Their trades, however, are not associated with price declines in *Crisis 2* in a statistically significant way. This is an indication that insurance companies, along with dealers, did not drive the large negative basis following the Lehman collapse.

5 The CDS Market and the Negative Basis During the Financial Crisis

The results discussed in the previous section show strong liquidity demand by non-dealer corporate bond traders. Still, these results do not answer the question as to what drove the negative basis during the financial crisis. Several studies have tackled this question, for example, [Gârleanu and Pedersen \(2011\)](#), [Augustin \(2012\)](#), [Fontana \(2011\)](#), [Duffie \(2010\)](#), and [Bai and Collin-Dufresne \(2010\)](#). Although the conclusions of the papers differ slightly, the common theme is that many factors that might have driven the basis were not able to resolve the question completely.

In this section, we propose a new channel that can help explain the large negative basis during the financial crisis. We focus on the role of CDS-bond arbitrage trading. Specifically, we show that the high level of liquidity-seeking in the corporate bond market was concentrated on bonds with available CDS contracts. For these bonds, highly levered non-dealer players in the market, most likely to be hedge funds, had to de-lever their corporate bond positions following Lehman Brothers' collapse, and as a result, corporate bond dealers had to provide liquidity by buying the bonds dumped by CDS-bond basis traders. In contrast, bonds with no CDS contracts available might not have experienced heavy selling pressure from non-dealer clients and the corresponding price declines might not have been severe. We provide results supporting this hypothesis.

5.1 Dealers' Inventory of Bonds with CDS Available vs. those with no CDS Available

In [Figure 6.4](#), we show the difference between dealers' holdings of corporate bonds with available CDS and those without available CDS. The pattern in the figure indicates clearly that dealers increased inventory only for bonds with available CDS in the period immediately after Lehman Brothers' collapse, which in turn means that clients sold bonds with CDS available. The pattern is also consistent with the hypothesis that high liquidity de-

mand and also wide basis deviation during the financial crisis resulted from the unwinding undertaken by bond-CDS arbitrageurs.

In Figure 6.5, we examine the holdings of corporate bonds by open-end domestic mutual funds, as provided in the MorningStar database. Specifically, we plot mutual funds' holdings of bonds with CDS available vs. those with CDS unavailable. We find that mutual funds did not significantly change holdings of bonds with CDS contracts available. Rather, they sold non-CDS bonds, indicating that mutual funds are unlikely to have driven the large negative CDS basis following the Lehman collapse.

In sum, the evidence suggests that bonds with CDS contracts available were sold in great volumes after the Lehman Brothers collapse and were sold by non-dealer, non-insurance companies, and non-mutual fund investors. Who were those liquidity-demanding investors? The overall evidence suggests they were non-dealer basis arbitrageurs. Typically, arbitrageurs are dealers, proprietary trading desks in investment banks, or hedge-funds. Our measures for dealer trades available in the TRACE includes those made by proprietary trading desks in investment banks, which leaves hedge-funds as the most likely liquidity demanders during the months following the Lehman collapse. [Mitchell and Pulvino \(2012\)](#) demonstrates in greater detail how hedge funds demanded liquidity.

Another piece of compelling evidence pointing towards hedge funds comes from Figure 6.6, in which we plot the aggregate positions in CDS held by dealers, hedge funds, and insurance companies, which available in the DTCC database. We find CDS positions of hedge funds are almost the mirror image of those of the dealers, indicating that, at least in the CDS market, hedge funds are the major counterparty to dealers. More importantly, hedge funds' CDS positions decline significantly after the Lehman Brothers collapse, which is also consistent with the idea that CDS-bond basis arbitrage unwinding was the cause of the large negative basis.

5.2 Bond Returns Following Lehman Brothers' Collapse

We compare corporate bond returns on bonds with CDS available with those with CDS unavailable following the Lehman Brothers collapse. According to our hypothesis that the

unwinding of the basis arbitrage drove the negative basis, declines in bond prices should be more severe for the bonds with CDS contracts available following the collapse. Our measure for CDS availability is based on [Saretto and Tookes \(2013\)](#), who assume that a CDS exists if they find a quote in Bloomberg.

In addition, we also employ a measure for basis arbitrage activity. If the unwinding of basis arbitrage triggers the sell-off, then the greater the arbitrage activity is, the stronger is the selling pressure on corporate bonds. We use the maturity of the bonds multiplied by the basis as a proxy for basis trading activity. CDS contracts with five-year maturity are the most prevalent ones. If the bond maturity is five-years at the end of August 2008 and the basis is also large and negative, it is more likely that basis arbitrage trading was involved with the bond and the subsequent exits by arbitrageurs might have been more severe.

We first plot cumulative returns through 2008 for corporate bonds with available CDS and unavailable CDS. Figure [6.7](#) shows that bond prices fell dramatically following the Lehman Brothers collapse. Moreover, consistent with our hypothesis, the decline in bond price is more severe for bonds with CDS contracts, by almost 8%. Around the end of January of 2009, the bond prices rebound, and the recovery is stronger for bonds with CDS available.

To examine bond returns more formally, we run the following regression:

$$\text{Ret}(t) = c_1 + \beta_1 \text{CDS}^{\text{exists}} + \beta_2 \text{basis}(\text{Aug})\text{Mat5Y}(\text{Aug}) + \text{Controls} + \varepsilon_t \quad (5.1)$$

where $\text{Ret}(t)$ is monthly bond returns constructed from TRACE; $\text{CDS}^{\text{exists}}$ is a dummy variable that equals 1 if the bond has a CDS contract with a quote in Markit from 2002 to 2009, and zero otherwise; and $\text{basis}(\text{Aug})\text{Mat5Y}(\text{Aug})$ is the basis level at the end of August of 2008 times an indicator variable that takes the value of 1 if the bond's maturity at the end of August of 2008 is in the range of 4.5 to 5.5 years and zero otherwise. As control variables, we include bond-specific variables including time-to-maturity and the illiquidity measures of [Amihud \(2010\)](#) and [Bao et al. \(2011\)](#). For firm-specific measures,

we include market leverage, stock returns, and monthly stock volatility. Since these firm-specific variables are available only for public firms, the sample shrinks substantially when we include them. For macro variables, we include change in VIX and repo rates. We also include bond-level rating dummy variables. We run the regression for the period running from September 2008 through December 2008, since that was the period when bond prices experienced the heaviest selling pressure following Lehman Brothers’ bankruptcy.

Table 6 details the regression results. Consistent with our hypothesis that the unwinding of basis trading caused the severe negative basis following the Lehman collapse, we find that bonds with available CDS contracts experience much lower returns in September and October of 2008. Specifically, we find that monthly returns on bonds are 2% lower monthly if the bond has available CDS contracts (see the first column of Table 6). The coefficient is statistically significant at the 1% confidence level.

Furthermore, we find a positive and highly statistically significant coefficient for the interaction term $\text{basis}(\text{Aug})\text{Mat5Y}(\text{Aug})$, which also strongly support our hypothesis. The coefficient implies that bond returns are lower if the bonds’ maturity is close to five years at the end of August 2008 and they have a more negative basis, in which case there are supposedly active basis arbitrage trading immediately before Lehman Brothers’ collapse. Given the negative shock at the default, there might have been dramatic unwinding of basis trading, which could have caused massive selling in corporate bonds. Overall, the results support the hypothesis that the unwinding of basis trading caused the large negative basis during the financial crisis.

In Table 7, we perform the regression separately for each month from August 2008 through February 2009. Before the Lehman Brothers collapse (August), there is no effect of CDS availability on bond returns ($\text{CDS}^{\text{exists}}$). Arbitrage activity ($\text{Mat5Y}(\text{Aug})$) is negatively related to bond returns, meaning more basis trading is associated with higher bond returns.

Moving on to subsequent months, however, we find that the presence of CDS contracts and proxy CDS arbitrage activity are strongly associated with bond returns. In September, for example, bonds with CDS available yield on average 8% lower returns than bonds

with CDS unavailable. Furthermore, bonds with heavy negative basis trading experienced large price declines. In the following months, as the selling pressure calms down, we do not find significant negative returns for bonds with available CDS contracts, except for February. In October, bonds with heavy basis trading yield higher returns, suggesting the possible return of arbitrageurs to the bond market.

The overall results suggest that the severe negative basis was due to the exits from excessive arbitrage trading. Although we cannot pinpoint exactly who these arbitrageurs were, it is likely that they were mostly hedge funds. In the bond market, dealers including prop trading desks on aggregate did not seek liquidity, nor did mutual funds and insurance companies. In the CDS market, hedge funds were the typical counterparties of dealers and also unwound long CDS positions significantly. Moreover, bond price declines were concentrated on bonds with CDS and supposedly high arbitrage activities.

6 Conclusion

In this paper we examine liquidity provision by dealers in the corporate bond and CDS markets during the 2007-2009 financial crisis. We use unique corporate bond and CDS transactions datasets to construct the positions of dealers in both markets over time as well as the positions of hedge funds in the CDS market. We find that, contrary to the common perception, dealers were engaged in liquidity provision in the corporate bond market throughout the financial crisis. Also, we find evidence that declines in bond prices are concentrated on bonds with available CDS contracts and high levels of activity in basis trades, indicating that the exits of arbitrageurs from pre-existing basis trades triggered the large negative basis following Lehman Brothers' collapse.

Our results have an important implication for the Volcker rule. Once the proposed rule is implemented, market-makers' capacity to provide liquidity will be reduced. Given that market-making is a profitable business, other institutional investors, who are typically arbitrageurs, will potentially fill the void. We doubt whether this is a desirable outcome, because our evidence points out that the unwinding of arbitrage positions by these insti-

tutional investors can be detrimental to the cash market, and thus to the funding costs of corporations.

Our paper also adds to the literature on the role of CDS contracts in the real economy. Our empirical evidence suggests that the disruption in the cash market was enabled by the presence of derivative contracts. This reveals a new aspect such that the CDS market can affect the underlying market when arbitrageurs exit at the same time.

References

- Acharya, V. V. and M. Richardson (2009). Prologue: A Bird’s-Eye View: The Financial Crisis of 2007–2009: Causes and Remedies. In *Restoring Financial Stability*, pp. 1–56.
- Acharya, V. V. and S. Viswanathan (2011). Leverage, Moral Hazard, and Liquidity. *The Journal of Finance* 66(1), 99–138.
- Adrian, T. and H. S. Shin (2010). Liquidity and Leverage. *Journal of Financial Intermediation* 19(3), 418–437.
- Amihud, Y. (2010). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets* 5(1), 31–56.
- Augustin, P. (2012). Squeezed Everywhere: Can We Learn Something New From the CDS-Bond Basis? *Working Paper*.
- Bai, J. and P. Collin-Dufresne (2010, November). The Determinants of the CDS-Bond Basis During the Financial Crisis of 2007-2009.
- Bao, J., J. Pan, and J. Wang (2011). The illiquidity of corporate bonds. *The Journal of Finance* 66(3), 911–946.
- Bessembinder, H., K. M. Kahle, W. F. Maxwell, and D. Xu (2009). Measuring Abnormal Bond Performance. *Review of Financial Studies* 22(10), 4219–4258.
- Blanco, R., S. Brennan, and I. W. Marsh (2005). An Empirical Analysis of the Dynamic Relation between Investment-Grade Bonds and Credit Default Swaps. *The Journal of Finance* 60(5), 2255–2281.
- Bolton, P. and M. Oehmke (2011). Credit Default Swaps and the Empty Creditor Problem. *Review of Financial Studies* 24(8), 2617–2655.
- Brunnermeier, M. K. and L. H. Pedersen (2009). Market Liquidity and Funding Liquidity. *Review of Financial Studies* 22(6), 2201–2238.

- Campbell, J. Y., T. Ramadorai, and A. Schwartz (2009). Caught on tape: Institutional trading, stock returns, and earnings announcements. *Journal of Financial Economics* 92(1), 66–91.
- Dick-Nielsen, J. (2009). Liquidity Biases in TRACE. *The Journal of Fixed Income* 19(2), 43–55.
- Duffie, D. (2010). Presidential Address: Asset Price Dynamics with Slow-Moving Capital. *The Journal of Finance* 65(4), 1237–1267.
- Duffie, D. (2012). Market Making Under the Proposed Volcker Rule. *Rock Center for Corporate Governance at Stanford University Working Paper* (106).
- Fontana, A. (2011). The Negative CDS-Bond Basis and Convergence Trading during the 2007/09 Financial Crisis. *Working Paper*.
- Franzoni, F. and A. Plazzi (2013, July). Do Hedge Funds Provide Liquidity? Evidence From Their Trades. *Working Paper*.
- Gârleanu, N. and L. H. Pedersen (2011). Margin-based Asset Pricing and Deviations from the Law of One Price. *Review of Financial Studies* 24(6), 1980–2022.
- Keim, D. B. and A. Madhavan (1997). Transactions costs and investment style: an inter-exchange analysis of institutional equity trades. *Journal of Financial Economics* 46(3), 265–292.
- Kim, G. H. (2013, March). Credit Default Swaps, Strategic Default, and the Cost of Corporate Debt. *Working Paper, University of Warwick*.
- Mitchell, M. and T. Pulvino (2012). Arbitrage Crashes and the Speed of Capital. *Journal of Financial Economics* 104(3), 469–490.
- Puckett, A. and X. S. Yan (2011). The interim trading skills of institutional investors. *The Journal of Finance* 66(2), 601–633.

- Saretto, A. and H. E. Tookes (2013). Corporate Leverage, Debt Maturity, and Credit Supply: The Role of Credit Default Swaps. *Review of Financial Studies* 26(5), 1190–1247.
- Shachar, O. (2013). Exposing The Exposed: Intermediation Capacity in the CDS Market. *Working Paper*.
- Shleifer, A. and R. Vishny (1997). The Limits of Arbitrage. *Journal of Finance* 52(1), 28–55.
- Subrahmanyam, M. G., T. D. Yongjun, and S. Q. Wang (2012). Does the Tail Wag the Dog? The Effect of Credit Default Swaps on Credit Risk. *Working Paper*.
- Vayanos, D. and D. Gromb (2010). Limits of Arbitrage. *Annual Review of Financial Economics* 2, 251–275.
- Weill, P.-O. (2007). Leaning Against the Wind. *The Review of Economic Studies* 74(4), 1329–1354.

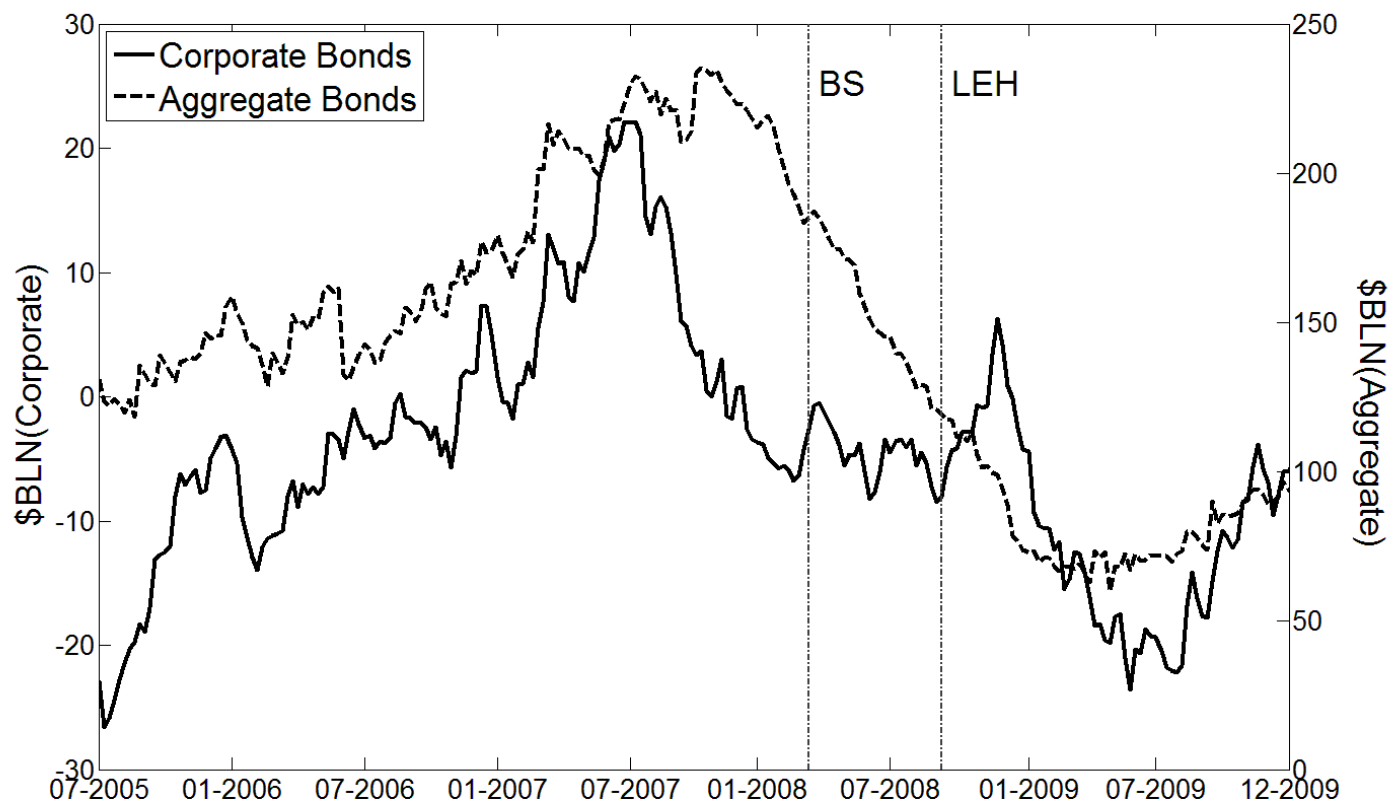


Figure 6.1: Long-Term Corporate Securities Position of Dealers

This figure plots primary dealers' aggregate positions in corporate securities with maturity greater than one year as reported in the Federal Reserve Bank of New York weekly survey (the y-axis on the right) and also plots FINRA member dealers' aggregate position in corporate bonds with maturity greater than one year as constructed from trades that are reported in the TRACE (the y-axis on the left). The aggregate position reported in the Federal Reserve Bank includes non-federal agency and GSE-issued MBS. The aggregate position constructed from TRACE includes only TRACE eligible corporate bonds.



Figure 6.2: CDS-Corporate Bond Basis

This figure depicts the CDS-bond basis for AAA and non-AAA grade (including high yield) bonds. The basis is defined as CDS spreads minus par-equivalent CDS spreads following the methodology by J.P. Morgan. Both the CDS and par-equivalent spreads are five-year maturity. We plot the weekly average values in basis points.

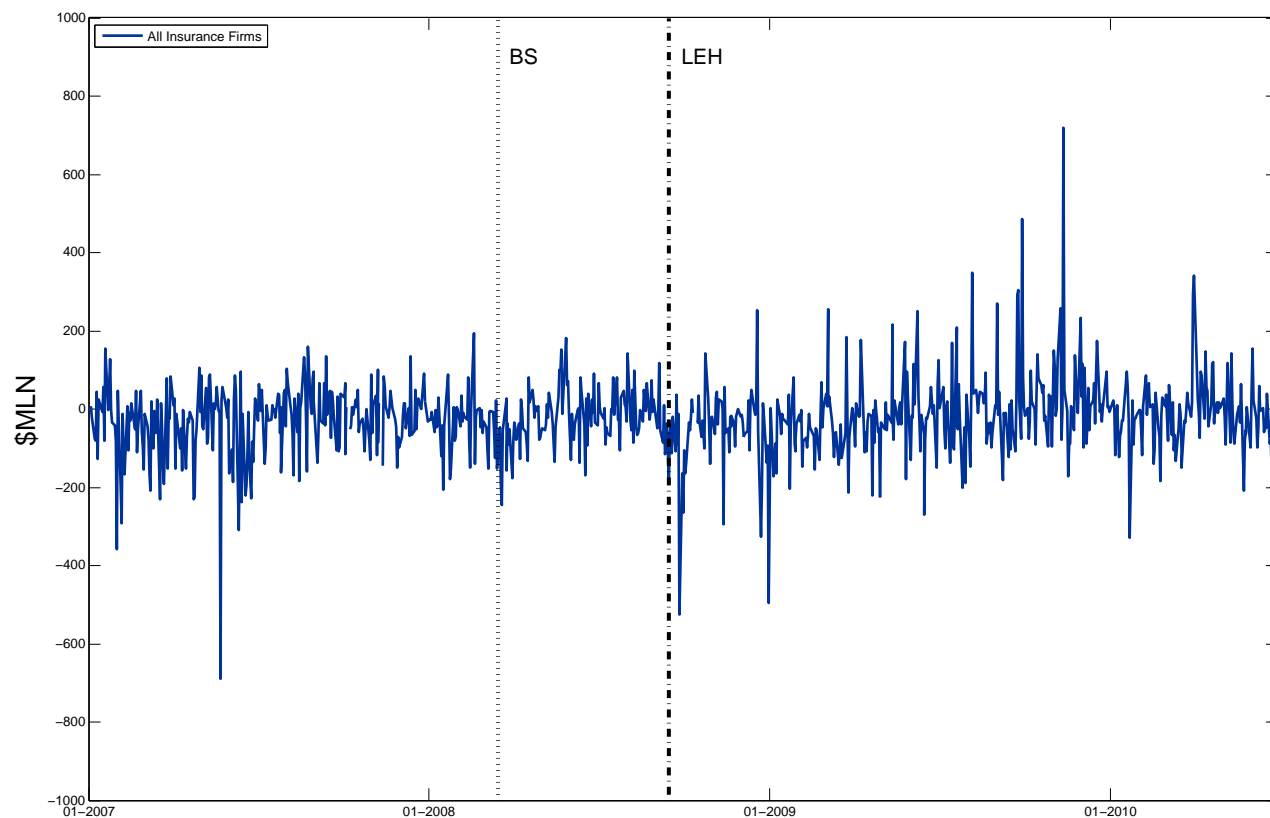


Figure 6.3: Flows by Insurance Companies

This figure shows aggregate corporate bond daily net flows by US insurance companies, as reported to the National Association of Insurance Commissioners (NAIC). The net flow is total daily buy volume minus sell volume by insurance companies excluding transactions related to corporate actions.

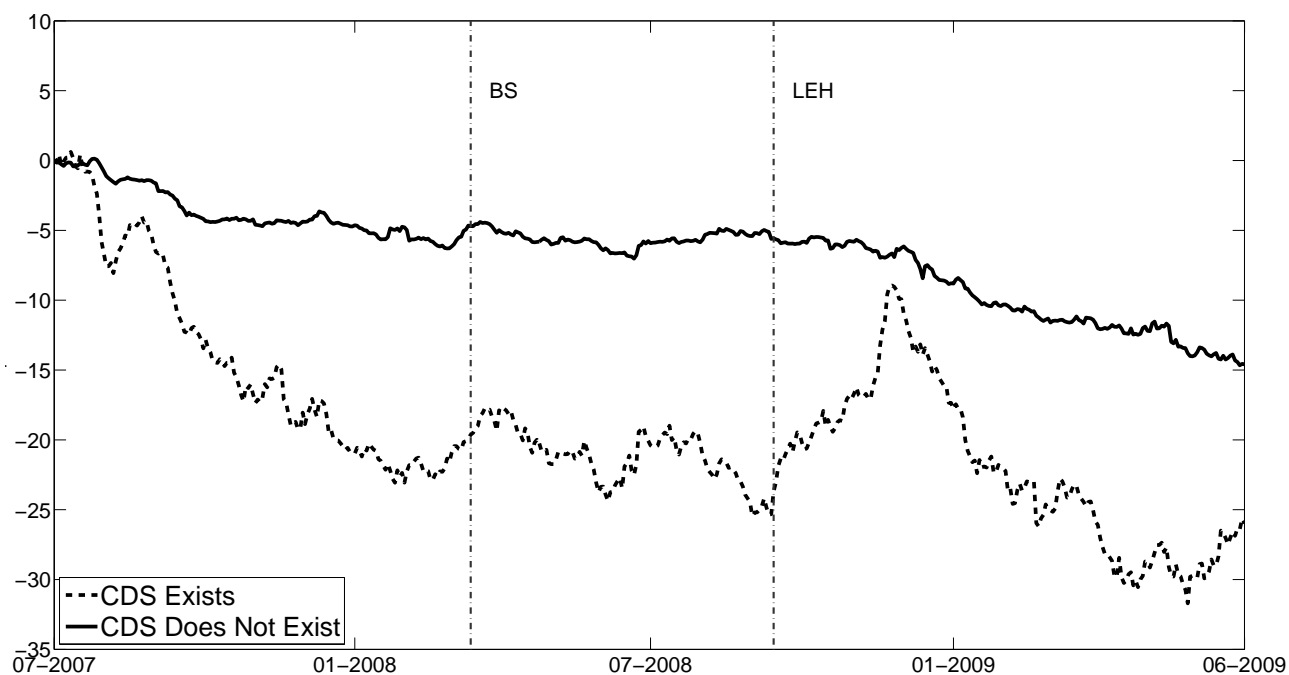


Figure 6.4: Inventory of Corporate Bonds with Available CDS vs. Corporate Bond without Available CDS

This figure plots the aggregate inventories of dealers both for bonds with available CDS and bonds without available CDS. The availability of CDS is determined by the presence of a CDS spread quote for the period from January 2002 through June 2009 in the Markit database.

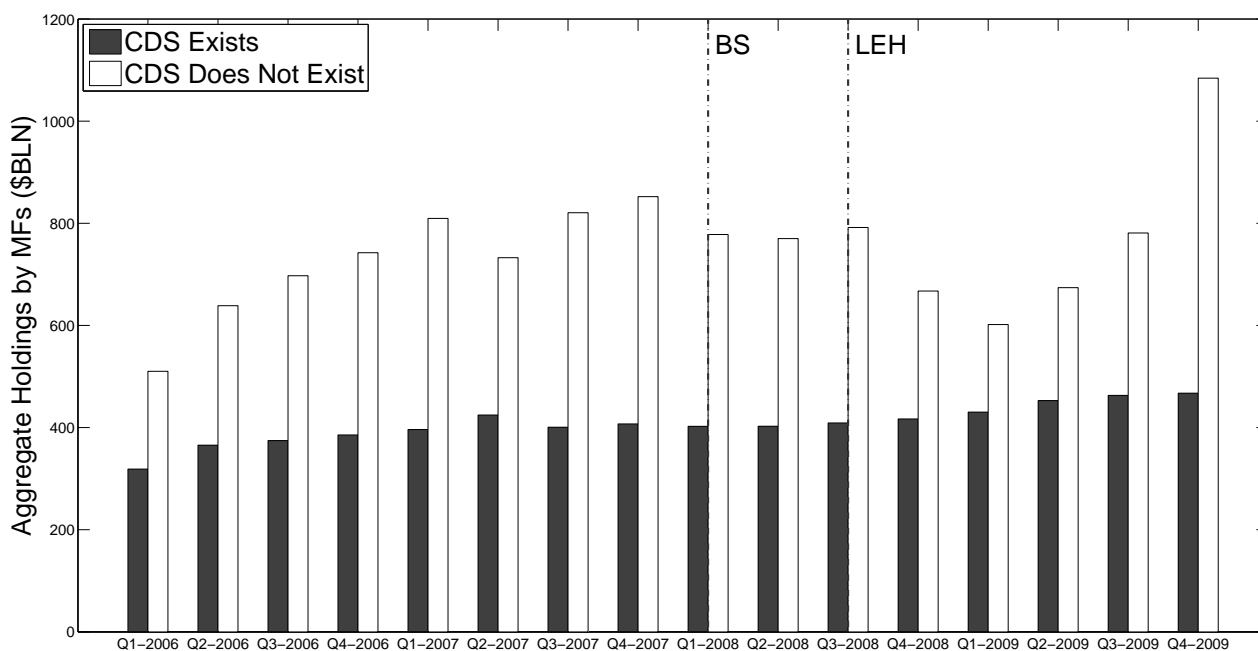


Figure 6.5: Mutual Funds' Holdings of Corporate Bonds with Available CDS vs. Corporate Bond without Available CDS

This figure shows the holdings of mutual funds in corporate bonds as reported in the MorningStar database. The figure contrasts the inventory of corporate bonds with available CDS with the inventory of corporate bonds without available CDS. The availability of a CDS is determined by the existence of a quote in Markit. The availability of a CDS is determined by the existence of a quote in Markit for the period from 2002 to 2009.

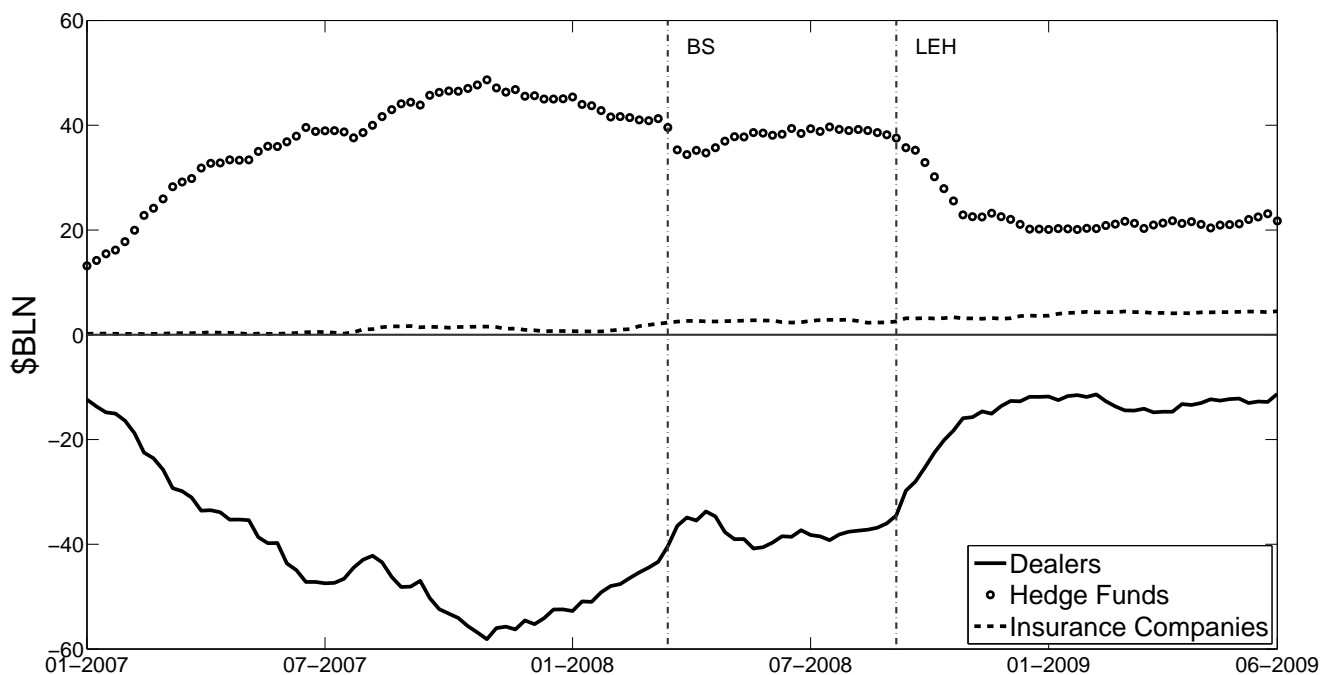


Figure 6.6: Aggregate CDS Positions by Dealers, Insurance Companies, and Hedge Funds

This figure shows the long positions in CDS held by dealers, insurance companies, and hedge funds, as reported in DTCC. We plot aggregate holdings of single name CDS across all maturities. The underlying entities for CDS contracts are financial firms.

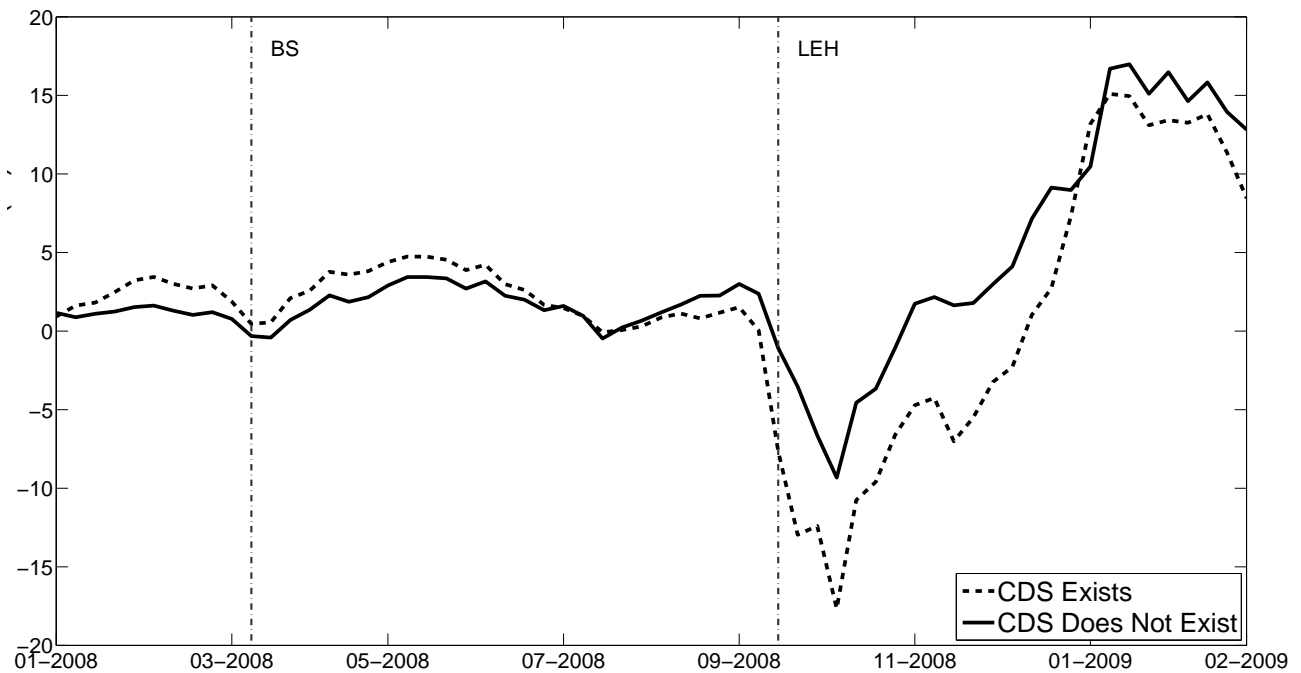


Figure 6.7: Cumulative Returns for Corporate Bonds With CDS Available vs. Unavailable

This figure plots cumulative weekly corporate bond returns available from the TRACE. We plot two return series based on the availability of CDS quotes in Markit. The availability of a CDS is determined by the existence of a quote in Markit for the period from January 2002 through June 2009.

Table 1
Summary Statistics

This table provides summary statistics for the following three periods: *Crisis 1* from July 2007 through Sep 14 2008, *Crisis 2* from Sep 15 2008 through Feb 28, 2009, and *Crisis 3* from March 2009 through June 2009. $basis \equiv p_{CDS} - p(\text{Bond})$ is the CDS-bond basis in basis points. $p(\text{CDS})$ is the CDS spread and $p(\text{Bond})$ is the par-equivalent CDS spread (PECS) in basis points. $q(\text{CDS}, \text{buy})$ and $q(\text{CDS}, \text{sell})$ are daily quantities (in million dollars) bought and sold by dealers in the CDS market, respectively. $q(\text{Bond}, \text{buy})$ and $q(\text{Bond}, \text{sell})$ are daily quantities (in million dollars) bought and sold by dealers in the corporate bond market, respectively.

Panel A: AAA									
	Crisis 1			Crisis2			Crisis3		
	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
<i>basis</i>	28.63	39.57	7,362	144.99	123.70	3,023	219.09	138.73	4,160
$p(\text{CDS})$	90.25	49.23	7,362	411.91	137.54	3,023	455.69	235.94	4,160
$p(\text{Bond})$	61.67	45.54	7,362	264.38	145.21	3,023	219.70	246.80	4,160
$q(\text{CDS}, \text{buy})$	47.04	55.09	6,418	100.21	130.46	2,585	43.52	62.01	3,733
$q(\text{CDS}, \text{sell})$	27.43	33.92	6,332	72.83	95.39	2,450	41.62	63.74	3,567
$q(\text{Bond}, \text{buy})$	3.35	10.17	7,362	5.85	17.51	3,023	8.12	22.75	4,160
$q(\text{Bond}, \text{sell})$	3.66	10.39	7,362	5.86	16.02	3,023	8.21	19.14	4,160
Panel B: Investment Grade exc. AAA									
	Crisis 1			Crisis2			Crisis3		
	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
<i>basis</i>	-30.91	124.59	50,188	-290.99	349.01	15,572	-199.50	330.65	19,321
$p(\text{CDS})$	146.84	166.12	50,188	362.65	425.39	15,572	382.76	389.83	19,321
$p(\text{Bond})$	179.13	240.60	50,188	699.03	932.52	15,572	583.84	658.56	19,321
$q(\text{CDS}, \text{buy})$	53.63	82.59	39,156	53.97	103.25	12,808	32.09	61.21	15,960
$q(\text{CDS}, \text{sell})$	59.80	86.28	34,268	61.13	93.85	10,578	38.07	67.91	13,908
$q(\text{Bond}, \text{buy})$	3.02	8.94	50,188	3.84	11.02	15,572	3.27	8.29	19,321
$q(\text{Bond}, \text{sell})$	3.16	8.69	50,188	3.75	10.49	15,572	3.42	9.78	19,321
Panel C: High Yield									
	Crisis 1			Crisis2			Crisis3		
	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
<i>basis</i>	-40.77	281.76	6,460	-1,113.26	720.71	1,926	-798.70	662.85	2,809
$p(\text{CDS})$	748.21	439.11	6,460	2,801.74	2,378.70	1,926	2,168.42	2,799.52	2,809
$p(\text{Bond})$	797.61	664.28	6,460	3,819.91	2,263.40	1,926	2,662.05	1,992.42	2,809
$q(\text{CDS}, \text{buy})$	42.18	63.38	3,059	35.09	41.35	799	14.69	28.13	1,400
$q(\text{CDS}, \text{sell})$	40.34	56.56	2,987	34.39	33.85	794	19.29	31.99	1,058
$q(\text{Bond}, \text{buy})$	3.74	8.40	6,460	5.14	16.48	1,926	3.45	7.18	2,809
$q(\text{Bond}, \text{sell})$	4.05	9.40	6,460	5.07	15.42	1,926	3.52	7.65	2,809

Table 2
Liquidity Provision by Dealers

This table provides the estimation results of the following regressions:

$$\begin{aligned}\Delta p(\text{Bond}, t) &= c_1 + \beta_1(-q(\text{Bond}, t)) + \text{ctrls} + \varepsilon_{1t} \\ \Delta p(\text{CDS}, t) &= c_2 + \beta_2 q(\text{CDS}, t) + \text{ctrls} + \varepsilon_{2t} \\ \Delta \text{basis}(t) &= c_3 + \gamma_3 q(\text{CDS}, t) + \delta_3 q(\text{Bond}, t) + \text{ctrls} + \varepsilon_{3t}\end{aligned}$$

where $p(\text{CDS}, t)$ and $p(\text{Bond}, t)$ are CDS and par-equivalent CDS spreads (PECS), respectively, and $\text{basis}(t)$ is $p(\text{CDS}, t) - p(\text{Bond}, t)$. Changes in CDS, PECS, and basis are at the daily frequency and are winsorized at the 0.25% both at the top and bottom. The control variables *ctrls* include: the lagged basis, $\text{basis}(t-1)$; lagged changes in CDS and PECS; changes in VIX, $\text{VIX}(t)$; changes in epo spread, *repo*, which is the difference between the 3-month general collateral repo rate and the T-bill rate; changes in overnight index swap (OIS) spreads, OIS, which is Libor minus OIS rates; and aggregate stock returns on primary dealers $\text{CP}^{\text{equity}}$. The sample sub-periods are: *Crisis 1* from July 2007 through Sep 14 2008, *Crisis 2* from Sep 15 2008 through February 2009, and *Crisis 3* from March 2009 through June 2009. The numbers in parentheses are standard errors clustered at the issuing firm level.

	Crisis 1			Crisis 2			Crisis 3		
	Dependent Variables			Dependent Variables			Dependent Variables		
	$\Delta p(\text{Bond}, t)$	$\Delta p(\text{CDS}, t)$	Δbasis_t	$\Delta p(\text{Bond}, t)$	$\Delta p(\text{CDS}, t)$	Δbasis_t	$\Delta p(\text{Bond}, t)$	$\Delta p(\text{CDS}, t)$	Δbasis_t
$q(\text{Bond})$	-2.43*** (0.42)		-2.58*** (0.44)	-6.26*** (1.48)		-5.95*** (1.42)	-3.26*** (0.93)		-2.91*** (0.90)
$q(\text{CDS})$		0.08 (0.21)			-1.99 (1.70)			-3.38*** (0.63)	
basis_{t-1}	0.03*** (0.01)	0.00 (0.00)	-0.03*** (0.01)	0.02** (0.01)	0.01 (0.00)	-0.02*** (0.01)	0.02*** (0.00)	0.00 (0.00)	-0.02*** (0.00)
$\Delta p(\text{CDS}, t-1)$	0.73*** (0.10)	0.22*** (0.03)	-0.54*** (0.10)	0.80*** (0.10)	0.16*** (0.04)	-0.62*** (0.08)	0.51*** (0.10)	0.18*** (0.05)	-0.38*** (0.09)
$\Delta p(\text{Bond}, t-1)$	-0.16*** (0.03)	0.02*** (0.01)	0.17*** (0.02)	-0.14*** (0.03)	0.02** (0.01)	0.17*** (0.03)	-0.14*** (0.02)	0.02*** (0.01)	0.17*** (0.02)
Δvix_t	0.14 (0.34)	0.88*** (0.31)	0.73** (0.35)	1.86*** (0.61)	1.81*** (0.34)	-0.02 (0.37)	-1.54*** (0.56)	-0.03 (0.32)	0.79 (0.61)
Δrepo_t	2.20 (3.57)	2.92 (2.24)	1.88 (2.81)	-15.74 (12.26)	-16.39*** (5.01)	1.52 (11.71)	29.07 (38.82)	74.73*** (18.41)	18.08 (28.14)
Δois_t	2.98 (4.04)	19.09*** (2.27)	12.35*** (3.84)	53.67*** (11.52)	43.06*** (9.07)	-15.79 (13.23)	128.96** (61.88)	120.44*** (32.62)	-22.60 (65.09)
$\text{ret}_{\text{dealer}, t}$	-133.48*** (35.30)	-128.69*** (17.07)	31.55 (25.91)	-14.49* (7.81)	-0.21 (4.29)	22.92** (10.13)	-162.56*** (32.81)	-190.19*** (18.93)	-17.13 (24.15)
R^2	0.078	0.142	0.059	0.069	0.114	0.058	0.053	0.118	0.049
N	64,287	47,321	64,287	21,065	15,726	21,065	28,009	20,908	28,009

Table 3
Liquidity Provision by Dealers when Basis is Positive vs. Negative

This table provides the estimation results of the following regressions for the positive lagged basis ($\text{basis}(t-1) > 0$) and negative lagged basis cases ($\text{basis}(t-1) < 0$) separately:

$$\Delta \text{basis}(t) = c + \beta_1 q(\text{CDS}, \text{buy}, t) + \beta_2 q(\text{CDS}, \text{sell}, t) + \gamma_1 q(\text{Bond}, \text{buy}, t) + \gamma_2 q(\text{Bond}, \text{sell}, t) + \text{ctrls} + \varepsilon_t$$

where $\text{basis}(t)$ is $p(\text{CDS}, t) - p(\text{Bond}, t)$ and $p(\text{CDS}, t)$ and $p(\text{Bond}, t)$ are CDS and par-equivalent CDS spreads (PECS), respectively. The buy and sell CDS volumes ($p(\text{CDS}, \text{buy})$ and $p(\text{CDS}, \text{sell})$) are defined as $q(\text{CDS}, \text{buy}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) > 0}$ and $q(\text{CDS}, \text{sell}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) < 0}$. The buy and sell bond volumes are defined similarly: $q(\text{Bond}, \text{buy}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) > 0}$ and $q(\text{Bond}, \text{sell}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) < 0}$. The control variables ctrls include: the lagged basis, $\text{basis}(t-1)$; lagged changes in CDS and PECS; changes in VIX, $\text{VIX}(t)$; changes in repo spread, repo , which is the difference between 3-month general collateral repo rate and T-bill rate; changes in overnight index swap (OIS) spreads, OIS , which is Libor minus OIS rates; and aggregate stock returns on primary dealers $\text{CP}^{\text{equity}}$. The sample sub-periods are: *Crisis 1* from July 2007 to Sep 14 2008, *Crisis 2* from Sep 15 2008 to Feb 28, 2009, and *Crisis 3* from March 2009 to June 2009. The numbers in parentheses are standard errors clustered at the issuing firm level.

	Crisis 1		Crisis 2		Crisis 3	
	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$
$q(\text{Bond}, \text{buy})$	-5.56*** (0.96)	-2.81*** (0.52)	-4.19* (2.48)	-12.09*** (2.83)	-0.12 (0.79)	-6.58*** (1.94)
$q(\text{Bond}, \text{sell})$	-0.75 (0.55)	-0.54 (0.37)	-0.31 (0.98)	-4.74** (2.37)	-0.79 (0.70)	-5.86** (2.28)
$q(\text{CDS}, \text{buy})$	-2.88* (1.73)	0.06 (0.91)	-7.41*** (1.56)	1.04 (2.21)	2.99 (3.62)	0.09 (1.68)
$q(\text{CDS}, \text{sell})$	0.94 (0.64)	0.94* (0.50)	-3.42 (4.57)	-2.40 (2.15)	-17.01** (8.59)	5.41* (2.85)
basis_{t-1}	-0.06*** (0.01)	-0.05*** (0.01)	-0.01 (0.04)	-0.04*** (0.01)	-0.05*** (0.01)	-0.03*** (0.00)
$\Delta p(\text{CDS}, t-1)$	-0.31*** (0.08)	-0.50*** (0.16)	-0.52** (0.22)	-0.70*** (0.09)	0.07 (0.19)	-0.50*** (0.09)
$\Delta p(\text{Bond}, t-1)$	0.24*** (0.03)	0.10*** (0.04)	0.14 (0.10)	0.19*** (0.03)	0.31*** (0.03)	0.16*** (0.02)
Δvix_t	1.50*** (0.54)	-0.20 (0.44)	0.50 (0.48)	-0.05 (0.46)	3.65*** (1.28)	1.96*** (0.69)
Δrepo_t	6.72* (3.57)	0.17 (5.00)	-8.32 (9.55)	-1.52 (18.51)	52.03 (57.31)	-19.94 (24.78)
Δois_t	23.91*** (5.67)	14.10** (7.11)	29.93 (21.92)	-18.88 (14.19)	125.38*** (44.14)	-78.96 (52.90)
$\text{ret}_{\text{dealer}, t}$	31.70 (33.98)	-35.27* (19.07)	-17.01** (7.14)	18.44** (8.48)	-32.95 (78.62)	42.29 (39.77)
R^2	0.079	0.057	0.064	0.080	0.114	0.059
N	19,842	27,479	3,095	12,631	6,158	14,750

Table 4
Liquidity Provision when basis is large

This table provides the estimation results of the following regressions for the positive lagged basis ($\text{basis}(t-1) > 0$) and negative lagged basis cases ($\text{basis}(t-1) < 0$) separately:

$$\begin{aligned} \Delta \text{basis}(t) &= \beta_1 q(\text{CDS}, \text{buy}, t) + \beta_2 q(\text{CDS}, \text{buy}, t) \cdot |\text{basis}(t-1)| + \beta_3 q(\text{CDS}, \text{sell}, t) + \beta_4 q(\text{CDS}, \text{sell}, t) \cdot |\text{basis}(t-1)| \\ &+ \gamma_1 q(\text{Bond}, \text{buy}, t) + \gamma_2 q(\text{Bond}, \text{buy}, t) \cdot |\text{basis}(t-1)| + \gamma_3 q(\text{Bond}, \text{sell}, t) + \gamma_4 q(\text{Bond}, \text{sell}, t) \cdot |\text{basis}(t-1)| \\ &+ c + \varepsilon_t \end{aligned}$$

where $\text{basis}(t)$ is $p(\text{CDS}, t) - p(\text{Bond}, t)$ and $p(\text{CDS}, t)$ and $p(\text{Bond}, t)$ are CDS and par-equivalent CDS spreads (PECS), respectively. The buy and sell CDS volumes ($p(\text{CDS}, \text{buy})$ and $p(\text{CDS}, \text{sell})$) are defined as $q(\text{CDS}, \text{buy}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) > 0}$ and $q(\text{CDS}, \text{sell}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) < 0}$. The buy and sell bond volumes are defined similarly: $q(\text{Bond}, \text{buy}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) > 0}$ and $q(\text{Bond}, \text{sell}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) < 0}$. The control variables *ctrls* include: the lagged basis, $\text{basis}(t-1)$; lagged changes in CDS and PECS; changes in repo spread, *repo*, which is the difference between the 3-month general collateral repo rate and the T-bill rate; changes in overnight index swap (OIS) spreads, *OIS*, which is Libor minus OIS rates; and aggregate stock returns on primary dealers $\text{CPE}^{\text{equity}}$. The coefficient estimates for the control variables are not reported here to save space. The sample sub-periods are: *Crisis 1* from July 2007 through Sep 14 2008, *Crisis 2* from Sep 15 2008 through Feb 28, 2009, and *Crisis 3* from March 2009 through June 2009. The numbers in parentheses are standard errors clustered at the issuing firm level.

	Crisis 1		Crisis 2		Crisis 3	
	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$
$q(\text{Bond}, \text{buy})$	-2.46*** (0.89)	-5.06*** (0.61)	-11.14** (5.06)	-7.28*** (2.68)	-4.98** (2.06)	0.99 (1.58)
$q(\text{Bond}, \text{buy}) \text{basis}_{t-1} $	-46.21*** (11.05)	19.35*** (4.46)	13.59** (6.62)	-8.92*** (2.92)	6.67*** (2.26)	-14.20*** (3.48)
$q(\text{Bond}, \text{sell})$	0.71* (0.41)	0.35 (0.67)	-1.76 (3.95)	-0.46 (1.85)	0.94 (0.93)	10.52*** (3.60)
$q(\text{Bond}, \text{sell}) \text{basis}_{t-1} $	-25.90*** (7.75)	-8.13 (5.97)	3.02 (6.26)	-6.22** (2.73)	-2.79*** (0.87)	-34.63*** (10.64)
$q(\text{CDS}, \text{buy})$	-0.44 (0.73)	-1.27 (1.02)	-7.79* (4.34)	-12.99*** (4.98)	3.03 (6.33)	-4.69 (5.32)
$q(\text{CDS}, \text{buy}) \text{basis}_{t-1} $	-25.09 (17.68)	12.88 (13.65)	1.60 (11.59)	35.33** (14.87)	1.59 (10.70)	6.34 (7.86)
$q(\text{CDS}, \text{sell})$	0.82 (0.76)	0.21 (0.74)	5.14 (13.58)	3.19 (2.18)	9.19 (6.13)	5.20 (5.99)
$q(\text{CDS}, \text{sell}) \text{basis}_{t-1} $	-0.76 (13.45)	7.32 (5.70)	-32.25 (41.55)	-9.47*** (3.03)	-53.51** (26.57)	1.37 (7.83)
R^2	0.085	0.066	0.065	0.090	0.118	0.081
N	19,842	27,479	3,095	12,631	6,158	14,750

Table 5
Liquidity Demand by Insurance Company

This table provides the estimation results of the following regressions for the positive lagged basis ($\text{basis}(t-1) > 0$) and negative lagged basis cases ($\text{basis}(t-1) < 0$) separately:

$$\begin{aligned} \Delta \text{basis}(t) = & c + \beta_1 q(\text{CDS}, \text{buy}, t) + \beta_2 q(\text{CDS}, \text{sell}, t) \\ & + \gamma_1 q(\text{Bond}, \text{buy}, t) + \gamma_2 q(\text{CDS}, \text{sell}, t) + \text{ctrls} + \varepsilon_t \end{aligned}$$

where $\text{basis}(t)$ is $p(\text{CDS}, t) - p(\text{Bond}, t)$, where $p(\text{CDS}, t)$ and $p(\text{Bond}, t)$ are CDS and par-equivalent CDS spreads (PECS), respectively. The buy and sell CDS volumes by insurance companies ($p(\text{CDS}, \text{buy})$ and $p(\text{CDS}, \text{sell})$) are defined as $q(\text{CDS}, \text{buy}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) \geq 0}$ and $q(\text{CDS}, \text{sell}, t) \equiv q(\text{CDS}, t)1_{q(\text{CDS}, t) < 0}$. The buy and sell bond volumes are defined similarly: $q(\text{Bond}, \text{buy}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) \geq 0}$ and $q(\text{Bond}, \text{sell}, t) \equiv q(\text{Bond}, t)1_{q(\text{Bond}, t) < 0}$. The control variables *ctrls* include: the lagged basis, $\text{basis}(t-1)$; lagged changes in CDS and PECS; changes in VIX, $\text{VIX}(t)$; changes in repo spread, *repo*, which is the difference between 3-month general collateral repo rate and T-bill rate; changes in overnight index swap (OIS) spreads, OIS, which is Libor minus OIS rates; and aggregate stock returns on primary dealers $\text{CP}^{\text{equity}}$. The coefficients of the control variables are not reported here to save space. The sample sub-periods are: *Crisis 1* from July 2007 to Sep 14 2008, *Crisis 2* from Sep 15 2008 to Feb 28, 2009, and *Crisis 3* from March 2009 to June 2009. The numbers in parentheses are standard errors clustered at the issuing firm level.

	Crisis 1		Crisis 2		Crisis 3	
	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$	$\text{basis}_{t-1} > 0$	$\text{basis}_{t-1} < 0$
$q(\text{Bond}, \text{buy})$	-2.98 (2.52)	-0.40 (0.48)	-5.78* (3.49)	2.39 (4.83)	0.92 (1.35)	0.40 (1.43)
$q(\text{Bond}, \text{sell})$	4.09*** (0.90)	5.90*** (1.61)	-4.58 (6.08)	8.93 (7.98)	8.31* (4.50)	0.04 (5.53)
$q(\text{CDS}, \text{buy})$	1.37 (1.20)	3.22 (4.02)	-1.96 (3.48)	1.21 (1.58)	0.75 (2.88)	-3.62 (5.24)
$q(\text{CDS}, \text{sell})$	-1.67 (1.57)	-2.85 (2.20)	60.51 (39.37)	0.81 (4.62)	35.64* (20.96)	7.25 (4.70)
R^2	0.171	0.271	0.082	0.191	0.135	0.053
N	1,891	2,884	323	1,153	683	1,469

Table 6
Returns of Corporate Bonds with Available CDS vs. Unavailable CDS After Lehman Brothers' Collapse

This table provides the regression results for the following model:

$$\text{Ret}(t) = c_1 + \beta_1 \text{CDS}^{\text{exists}} + \beta_2 \text{basis}(\text{Aug}) \text{Mat5Y}(\text{Aug}) + \text{Controls} + \varepsilon_t$$

where $\text{Ret}(t)$ is the monthly corporate bond returns constructed from TRACE using the last available daily price within a week from the end of the month, $\text{CDS}^{\text{exists}}$ is an indicator variable that takes the value of one if the bond has a CDS contract available in Markit prior to September 2009 and zero otherwise, $\text{basis}(\text{Aug})$ is the CDS-bond basis at the end of August 2008, and $\text{Mat5Y}(\text{Aug})$ is an indicator variable that takes the value of one if the maturity of the bond at the end of August 2008 is between 4.5 and 5.5 years and zero otherwise. The control variables *ctrls* include: time to maturity of bonds, *TTM*; changes in VIX, ΔVix ; changes in the repo spread, Δrepo , the difference between the 3-month general collateral repo rate and the T-bill rate; two illiquidity measures, *ILLIQ1* by Amihud (2010) and *ILLIQ2* by Bao et al. (2011); market leverage; equity returns of the issuers of the bonds, $\text{Ret}(EQ)$; and changes in monthly stock volatility estimated using daily stock returns, Δvol . We also include rating dummies (AAA, AA+, AA, ...). The numbers in parenthesis are standard errors clustered at the issuing firm level. The sample period is September 2008 from December 2008.

	Bond Return			
<i>CDS^{exist}</i>	-0.02*** (0.01)		-0.03** (0.01)	-0.03* (0.02)
<i>basis_{Aug}Mat_{Aug}</i>		1.60*** (0.73)	1.58* (0.81)	-0.18 (0.69)
<i>TTM</i>			0.00 (0.00)	-0.00 (0.00)
ΔVix_t			-0.00*** (0.00)	-0.00*** (0.00)
Δrepo_t			-0.06*** (0.02)	-0.04*** (0.01)
<i>ILLIQ1_{t-1}</i>			0.35 (0.27)	0.15 (0.18)
<i>ILLIQ1_{t-2}</i>			0.01*** (0.00)	0.00* (0.00)
<i>MktLev_{t-1}</i>				0.00*** (0.00)
$\text{Ret}(EQ, t)$				0.10*** (0.03)
$\text{MktLev}_{t-1} \cdot \text{Ret}(EQ, t)$				-0.00 (0.00)
Δvol_t				-0.29*** (0.10)
<i>R</i> ²	0.103	0.101	0.354	0.558
<i>N</i>	1,960	1,933	1,466	1,120
Rating Dummy	Yes	Yes	Yes	Yes

Table 7
Returns of Corporate Bonds with Available CDS vs. Unavailable CDS After Lehman
Brothers' Collapse: Month-by-Month

This table provides the regression results for the following model for each month from August 2008 to December of 2008:

$$\text{Ret}(t) = c_1 + \beta_1 \text{CDS}^{\text{exists}} + \beta_2 \text{basis}(\text{Aug}) \text{Mat5Y}(\text{Aug}) + \varepsilon_t$$

where $\text{Ret}(t)$ is the monthly corporate bond returns constructed from TRACE, $\text{CDS}^{\text{exists}}$ is an indicator variable that takes the value of one if the bond has a CDS contract available in Markit prior to September 2009 and zero otherwise, $\text{basis}(\text{Aug})$ is the CDS-bond basis at the end of August 2008, and $\text{Mat5Y}(\text{Aug})$ is an indicator variable that takes the value of one if the maturity of the bond at the end of August 2008 is between 4.5 and 5.5 years and zero otherwise. We include rating dummies (AAA, AA+, AA, ...). The numbers in parenthesis are standard errors clustered at the issuing firm level.

	Bond Return						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb
$\text{CDS}^{\text{exist}}$	-0.00 (0.00)	-0.08*** (0.03)	-0.01 (0.01)	-0.00 (0.01)	-0.00 (0.02)	0.00 (0.01)	-0.02** (0.01)
$\text{basis}_{\text{Aug}} \text{Mat}_{\text{Aug}}$	-0.30** (0.14)	4.63*** (1.75)	-3.30* (1.89)	0.66 (0.76)	-0.42 (1.38)	-7.55 (4.60)	0.86 (1.29)
R^2	0.096	0.221	0.382	0.377	0.054	0.126	0.139
N	567	503	539	529	362	453	635
Rating Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes

A Measuring the Bond-CDS Basis

The bond-CDS basis, which measures the credit risk pricing discrepancy between the two markets, is the difference between a CDS spread and a bond spread with the same maturity. While calculating CDS spread minus bond spread might seem as a simple difference calculation, bringing two different instruments to be comparable is a more intricate task in practice than what it may appear. CDS is already readily available at a spread form⁹ and a full term-structure is observable. Bond spreads, on the other hand, are a theoretical measure that needs to be backed out from a unique bond price. In this appendix we review two common spread measures for fixed-rate corporate bond, Z-Spread and Par Equivalent CDS Spread (PECS), and we then explain why we choose to use the latter as the benchmark specification in this paper.

A.1 Z-Spread Methodology

The Z-spread is the parallel shift, z , to the risk-free curve which gives the market value of the risky corporate bond. The price of a risk-free bond is equal to the present value of the cash flows, including the bond coupons plus the notional amount paid back at maturity. The price of a risky corporate bond is lower than the price of a risk-free bond as we might not receive all cash flows in case the firm does not survive. Hence, to equate the price of a risky corporate bond to the present value of the expected cash flows of the risk-free bond we need to move the risk-free discount curve by a constant amount z . So, the Z-spread is given as follows:

$$\text{Bond's Dirty Price} = \sum_{n=1}^N \frac{\frac{C}{f}}{\left(1 + \frac{r(0, t_n) + z}{f}\right)^n} + \frac{1}{\left(1 + \frac{r(0, t_N) + z}{f}\right)^N} \quad (\text{A.1})$$

⁹HY reference entities often are traded on an upfront basis but they can be converted to a running spread

where C is the coupon, and $r(0, t_n)$ is the discretely compounded zero rate, determined from the discount factor to time t_n , $Z(0, t_n)$:

$$Z(0, t_n) = \frac{1}{\left(1 + \frac{r(0, t_n)}{f}\right)^n}.$$

The basis will then be calculated as (CDS Spread $- z$). If the bond's maturity is exactly that of a quoted CDS spread, then it is clear which CDS spread to use for the basis calculation. If not, the choice is either to compare it with the CDS of closest maturity or to interpolated CDS spread for the bond maturity. While the latter gives a more accurate idea of the spread differential, it has the disadvantage that it is not an actual tradable security. Another choice that needs to be made is how to measure the bond spread using the unique price of that bond so it will be comparable with the whole curve of CDS spreads. In the course of converting bond's spread conversion, we also need to decide which risk-free rate to use, and which recovery rate to assume.

A.2 Par-Equivalent CDS Spread Methodology

The PECS, proposed by J.P. Morgan back in 2005, uses the market price of a bond to calculate a spread based on implied default probabilities. These default probabilities can then be transformed into an implied CDS spread, which is referred to as PECS. In other words, the PECS is the shift in the term structure of CDS spreads in order to match the price of the bond.

To get the PECS, we start with bootstrapping the default probabilities from the full CDS curve traded in the market. Then, we take as inputs the derived term-structure of default probabilities and assume some recovery rate (in this paper, we use a fixed recovery rate assumption at 40% as well as Markit's reported recovery assumption), and we calculate a CDS-implied bond price as follows:

$$\text{Bond Price} = C \sum_{n=1}^N (t_n - t_{n-1}) PS(t_n) Z(0, t_n) + PS(t_N) Z(0, t_N) + R \sum_{n=1}^N PD(t_{n-1}, t_n) Z(0, t_n)$$

where C is the bond coupon; $(t_n - t_{n-1})$ is the length of time period n in years; $PS(t_n)$ is the probability of survival to time t_n at time t_0 ; $PD(t_n)$ is the probability of default at time t_n at time t_0 ; $Z(0, t_n)$ is the risk-free discount factor to time t_n ; and, R is the recovery rate upon default assumed for pricing CDS contracts referencing the same firm.

The resulting CDS-implied bond price is going to differ from the traded dirty price of the bond. So, we apply a parallel shift to those default probabilities, while maintaining the recovery rate assumption, until we match to the market price of the bond. Given these bond-implied survival probabilities, we convert them back into a CDS spread using the usual CDS pricing equation:

$$S(N) = \frac{(1 - R) \sum_{n=1}^N PD(t_n) DF(t_n)}{\sum_{n=1}^N (t_n - t_{n-1}) PS(t_n) DF(t_n) + \text{Accrued Interest}} \quad (\text{A.2})$$

The resulted spread, $S(N)$, is the PECS, and the basis is CDS Spread – PECS. Note that unlike the Z-spread, which is one number, the PECS is an entire curve and we therefore able to calculate the basis at any maturity.

As it emerges from the calculations described above, the Z-spread accounts for the maturity of the bond and the term-structure of interest rates, while the PECS accounts for the assumed recovery rate and the term structure of default probabilities derived from the CDS market. The former measure implicitly assumes a flat term-structure of credit spreads and does not take into account the term-structure of default probabilities. Taking as given that the price of credit risk is less biased in the CDS market, the fact that the PECS takes advantage of the entire information encapsulated in the CDS curve adds value and is a key reason for why this measure is preferable.