



Statement of the U.S. Chamber of Commerce

**ON: Examining the Impact of the Volcker Rule on
Markets, Businesses, Investors, and Job Creation**

**TO: House Committee on Financial Services,
Subcommittee on Capital Markets, Securities, and
Investment**

**BY: Thomas Quaadman, Executive Vice President, Center
for Capital Markets Competitiveness, U.S. Chamber of
Commerce**

DATE: March 29, 2017

The U.S. Chamber of Commerce is the world's largest business federation, representing the interests of more than three million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations. The Chamber is dedicated to promoting, protecting, and defending America's free enterprise system.

More than 96% of Chamber member companies have fewer than 100 employees, and many of the nation's largest companies are also active members. We are therefore cognizant not only of the challenges facing smaller businesses, but also those facing the business community at large.

Besides representing a cross-section of the American business community with respect to the number of employees, major classifications of American business—e.g., manufacturing, retailing, services, construction, wholesalers, and finance—are represented. The Chamber has membership in all 50 states.

The Chamber's international reach is substantial as well. We believe that global interdependence provides opportunities, not threats. In addition to the American Chambers of Commerce abroad, an increasing number of our members engage in the export and import of both goods and services and have ongoing investment activities. The Chamber favors strengthened international competitiveness and opposes artificial U.S. and foreign barriers to international business.

Good morning Chairman Huizenga, Ranking Member Maloney and members of the Subcommittee on Capital Markets, Securities and Investments. My name is Tom Quaadman, executive vice president of the Center for Capital Markets Competitiveness (“CCMC”) at the U.S. Chamber of Commerce (“Chamber”). The Chamber is the world’s largest business federation, representing the interests of more than three million businesses and organizations of every size, sector, and region. I appreciate the invitation to testify today on behalf of the businesses that the Chamber represents.

It is an honor to be invited and testify at today’s hearing: ***Examining the Impact of the Volcker Rule on Markets, Businesses, Investors and Job Creation.*** This is the latest in a series of hearings on the impact of the Volcker Rule upon the financial system and the broader economy.

The Chamber opposed the Volcker Rule at the outset because of the foreseeable negative consequences of the rule, such as restricting market-making and underwriting activities, which in turn impact the ability of businesses to obtain the financing needed for short-term operations and long-term growth. Instead the Chamber proposed higher capital standards as an alternative means to achieve the intent of the Volcker Rule—more financial stability but without the regulatory complexity that can harm growth.

Today we have both—the Volcker Rule and higher capital standards. The Volcker Rule has imposed upon financial institutions a complex web of regulatory compliance. Basel III and systemic risk rules have created higher capital standards through opaque processes that make it difficult for the public to truly understand the strength of those firms. This has created incentives whereby firms do not provide the financing they have in the past.

The Volcker Rule has, in combination with other initiatives such as the Basel III Capital Accords, systemic risk rules, the foreign bank operation rules, risk retention rules and new money market fund rules harmed the ability of businesses to affordably raise the financial resources needed to operate on a daily basis and grow. Business financing is now more inefficient. Furthermore, the lack of economic analysis by the regulators in drafting the Volcker Rule is a *prima facie* instance of why evidentiary analysis, subject to public scrutiny and comment, is necessary for the drafting and implementation of regulations that may promote stability **and** growth.

It is important that policy makers review all of these rules individually and on a cumulative basis to determine the impact it has on stability and growth. Moreover, under President Trump's Executive Order on *Core Principles for Regulating the United States Financial System*, laws and guidance to determine if they promote the core principles of fostering growth and enabling U.S. competitiveness, the Volcker Rule should be thoroughly examined. Following such a review action should be taken to address the unintended consequences of the Volcker Rule by repealing it, or undertaking the efforts necessary to amend it. We believe that this hearing is an important first step in starting that process.

Background

Proprietary trading occurs when a financial firm buys and sells stocks, bonds, or other financial instruments, on its own trading account, with the purpose of profiting from market movements. It has been widely acknowledged, including by financial regulators themselves, that proprietary trading was not a cause of the 2008-2009 financial crisis. Nevertheless, some commentators, including former Federal Reserve Chair Paul Volcker were uneasy that banks were engaging in what they felt were not traditional banking activities that they felt might implicate the banks insured deposits. On January 21, 2010, President Barack Obama proposed a ban on proprietary trading and named it after former Federal Reserve Chairman Paul Volcker, its chief architect. The Obama Administration requested other nations to follow suit, which was universally rejected.¹ The Obama Administration supported the Rule's enactment despite the universally recognized fact that it would be exceedingly difficult to demarcate the lines between proprietary trading and other important bank activities like market making and underwriting.

The Volcker Rule was incorporated into the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) at the 11th hour. There was exactly one hearing on the Volcker Rule. During that hearing, in the Senate Banking Committee, serious doubts were voiced on a bipartisan basis as to how this Rule could be implemented. Mr. Volcker, one of the two witnesses at that hearing, was unable to articulate a method for delineating proprietary trading and other trading activities such as market making. Despite the lack of a hearing record establishing the need for the Rule, it was incorporated in the Senate version of the Dodd-Frank Act and became law.

¹ See E.U. Ministers to Resist Obama's Proposal for Banking Overhaul, *Bloomberg News*, Feb. 16, 2010.

Section 619 of the Dodd-Frank Act prohibits financial firms from engaging in proprietary trading and acquiring or retaining any ownership interest or sponsorship of a hedge fund or private equity fund. Additionally, Section 619 included exemptions for market-making and underwriting activities, risk-mitigating hedging and the sale or disposition of financial obligations of the United States.

On October 11, 2011, the Board of Governors of the Federal Reserve (“Federal Reserve”), Federal Deposit Insurance Corporation (“FDIC”), Securities and Exchange Commission (“SEC”), Office of the Comptroller of the Currency (“OCC”) (also collectively as the “regulators”) voted to release a joint Volcker Rule Proposal. This joint rulemaking, encompassing 298 pages and over 1,000 questions, was published in the *Federal Register* on November 7, 2011. The Commodity Futures Trading Commission (“CFTC”) voted to release its version of the Volcker Rule Proposal on January 11, 2012, almost 90 days after the other regulators. The agencies approved and promulgated the Volcker Rule on December 9, 2013. The deadline for covered firms to comply with the Volcker Rule was July 21, 2015.

Since that time we have witnessed a tightening of debt markets whereby traditional buyers of debt and securities have failed to come forth.

Chamber Concerns with the Volcker Rule

The Chamber opposed the Volcker Rule at its inception because of its potential to negatively impact the market-making and underwriting activities needed for businesses to access liquid debt and equity markets. In the alternative the Chamber proposed higher capital standards as a means to promote financial stability if a covered financial institution chose to engage in proprietary trading.

Market makers play an essential role in financial markets, acting as a source of liquidity that keep markets vibrant and make investing feasible. As market makers, banks must hold inventories of the financial instruments in which they make markets. For example, corporations rely upon the “market making” activities of banks in order to secure affordable funding in the bond market. Without these “market making” activities, banks would be unable to underwrite these bonds. Thus, if banks can no longer hold inventory, it will be much more difficult for businesses to raise the amount of capital needed. Typically, banks will hold bonds in inventory that aren’t sold in the marketplace on day one but later in the week. as under the Volcker Rule, however, this temporary inventory build-up is considered proprietary trading and therefore deprives issuers from raising the total amount of capital needed.

It is very difficult to distinguish between market making and proprietary trading without arbitrarily imposing a demarcation. The Volcker Rule significantly constrains their ability by dictating how banks should manage their inventory. This will reduce the depth and liquidity of our capital markets.

Bank trading activities are what create market liquidity and enable the market to provide an efficient clearing price. Without these activities, markets take a giant step backward toward individually negotiated bilateral ‘deals’. Investors would no longer be willing to risk their capital in securities that in exigent circumstances would have to be sold at fire sale prices.

The Chamber submitted 14 letters² to the regulators and other agencies to raise our concerns with the Volcker Rule. Those concerns highlighted process irregularities especially the failure to conduct an economic analysis subject to public review and conduct, and sought post-promulgation action to address adverse consequences with trust preferred securities (“TRUUPS”) and collateralized loan obligations (“CLOs”). In summary the Chamber expressed seven major concerns regarding the Volcker Rule implementation proposed by the regulators:

- 1) The Chamber was concerned how the Volcker Rule proposals were released and believed that comment process has been compromised as a result;³
- 2) The Chamber believed that serious issues and deficiencies exist with the economic and cost benefit analysis used by the regulators;⁴
- 3) In releasing the proposed Volcker Rule, regulators failed to take into consideration the adverse impacts the proposal will have on the ability of companies to raise capital;

² See comment letters of October 11, 2011, November 17, 2011, December 15, 2011, January 17, 2012, February 13, 2012, February 14, 2012, April 16, 2012, November 16, 2012, September 25, 2013, November 7, 2013, November 25, 2013, December 4, 2013, January 14, 2014 and March 4, 2014 from the U.S. Chamber of Commerce to the regulators and FSOC.

³ See October 11, 2011 letter from the CCMC to Treasury Secretary Timothy Geithner requesting that the Financial Stability Oversight Council use its authority to reconcile differences in the various Volcker Rule Proposals issued by the regulators; November 17, 2011 letter from CCMC to the regulators requesting a withdrawal and re-proposal of the Volcker Rule because of the failure of the CFTC to issue its proposed rule in conjunction with the other regulators.

⁴ See December 15, 2011 letter from the CCMC to the regulators citing flaws with the cost benefit and economic analysis of the Volcker Rule Proposal, requesting that the proposal be submitted for enhanced economic analysis under OIRA review, that it be considered an economically significant rulemaking and that the regulators coordinate these efforts under Executive Orders 13563 and 13579. This letter also requested that the cumulative impact of other initiatives, such as Basel III, be taken into account when determining the economic impacts of the Volcker Rule Proposal.

- 4) The Volcker Rule will force commercial companies that own banks to build and maintain compliance programs though they have never engaged in proprietary trading;
- 5) The Volcker Rule creates ambiguity as to permissible market making and underwriting, thereby increasing risk and reducing liquidity for companies;
- 6) The Volcker Rule places the American economy at a competitive disadvantage and may in fact violate existing trade agreements; and
- 7) The Volcker Rule Proposal may endanger infrastructure projects and the businesses that work on them by impacting the ability of State and Municipal governments and agencies to raise capital.

Issues before the Promulgation of the Volcker Rule

a. Failure to Perform an Economic Analysis, Chamber Survey of Members

In proposing the Volcker Rule the regulators did not conduct an economic analysis. The OCC issued an economic analysis over 4 months *after* the Volcker Rule was promulgated, finding that the costs to 46 OCC regulated institutions could be as high as \$4.3 billion dollars. Despite the Chamber's request, as is discussed in greater detail below, the regulators did not study the impacts of the Volcker Rule upon the broader business community nor was it treated as a major rulemaking decision.

An economic analysis of the costs and benefits of a proposed regulation on those affected by it is a critical tool in a regulator's tool box.⁵ Cost-benefit analysis provides discipline to rulemaking so that rules are narrowly tailored to the problem they are designed to address. It also encourages the consideration of less costly alternative approaches.

An agency's failure to undertake economic analysis is more than a missed opportunity. The lack of adherence to express congressional instructions to consider certain costs and benefits is itself a violation of the Administrative Procedure Act, and it increases the possibility that the resulting rule will be found arbitrary and capricious.⁶ For example, in 1996, Congress amended the Securities Exchange Act to require the SEC to consider a proposed rule's economic impact on efficiency,

⁵ See Paul Rose and Christopher J. Walker, *The Importance of Cost-Benefit Analysis in Financial Regulation*, U.S. Chamber of Commerce (2013).

⁶ See 5 U.S.C. § 706(2).

competition, and capital formation, in addition to its preexisting duty to consider the impact on investor protection.⁷ In the years that followed, the SEC failed to take that mandate seriously, often claiming in a perfunctory way that it had “considered” the costs and benefits of a proposed rule and thus satisfied the statute even though it did not publish its analysis. It was not until a series of decisions by the United States Court of Appeals for the District of Columbia that the SEC began to undertake and publish its economic analysis when it proposes a rule.⁸

Despite the clear language of the Riegle Community Development and Regulatory Improvement Act of 1994 (the “Riegle Act”), the banking regulators did not perform an economic analysis of the Volcker Rule. Like the SEC, the Federal Banking Agencies are required to consider the costs and benefits of their proposed rules, albeit with respect to different metrics. Section 302 of the Riegle Act provides:

[i]n determining the effective date and administrative compliance requirements for new regulations that impose additional reporting, disclosure, or other requirements on insured depository institutions, each Federal banking agency shall consider, consistent with the principles of safety and soundness and the public interest: (1) any administrative burdens that such regulations would place on depository institutions, including small depository institutions and customers of depository institutions; and (2) the benefits of such regulations.⁹

In implementing the Volcker Rule, which is designed to minimize the risks of proprietary trading on the federally insured deposits of a financial institutions, the banking regulators failed to undertake a legally mandated a cost-benefit analysis required of a proposed rule that may negatively impact the insured depository institutions that the rule is intended to protect.

⁷ 15 U.S.C. § 77b(b) (“Whenever pursuant to this subchapter the Commission is engaged in rulemaking and is required to consider or determine whether an action is necessary or appropriate in the public interest, the Commission shall also consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation.”); accord 15 U.S.C. § 78c(f) (same); 15 U.S.C. § 80a-2(c) (same); 15 U.S.C. § 80b-2(c) (same).

⁸ See *Bus. Roundtable v. SEC*, 647 F.3d 1144, 1148 (D.C. Cir. 2011) (chastising the SEC “for having failed once again—as it did most recently in *American Equity Investment* . . . and before that in *Chamber of Commerce*—adequately to assess the economic effects of a new rule”); *Am. Equity Inv. Life Ins. Co. v. SEC*, 613 F.3d 166 (D.C. Cir. 2010); *Chamber of Commerce v. SEC*, 412 F.3d 133 (D.C. Cir. 2005).

⁹ 12 U.S.C. § 4802.

On December 15, 2011, the Chamber wrote to the regulators asking that a cost benefit analysis of the Volcker Rule be undertaken for public review and comment. The Chamber letter requested that the Volcker Rule:

- Be considered under the requirements of Executive Orders 13563 and 13579 in order to coordinate different requirements for economic analysis and finalization of rules;
- Be considered an economically significant rulemaking and the public provided with a qualitative and quantitative analysis of the impacts upon the economy as required by the Unfunded Mandates Reform Act of 1995 (“Unfunded Mandates Reform Act”);
- Be subject to an enhanced Office of Information and Regulatory Affairs (“OIRA”) regulatory review process; and
- Be considered in the context of other initiatives, such as Basel III, and other pertinent Dodd-Frank Act rulemakings, when determining the economic impacts

This letter also included a survey of Chamber members demonstrating the impacts of the proposed Volcker Rule upon non-financial businesses (see appendix A). The letter stated in part:

While much of the focus of the Volcker Rule Proposal has been on financial institutions, there are significant costs to non-financial companies that have not been contemplated by the regulators. To illustrate these impacts, included as an appendix to this letter is a survey that uses 2010-2011 historic data, of select U.S. financing companies that provide services for non-financial businesses. It appears that the Volcker Rule will impose at least a five basis point increase in bid-ask spreads. In a confidential survey of five large U.S. borrowers, it estimates that under the Volcker Rule Proposal increase in the bid-ask spreads will be closer to 25-50 basis points increasing lending costs from between \$742 million and \$1.483 billion. In reviewing Volcker Rule impacts upon potential lending strategies for smaller less frequent borrowers, hypothetical scenarios suggest an increase in bid-ask spreads will be closer to 50 and 100

basis points leading to increased lending costs of between \$106 million and \$211 million.

Also, in discussions with our membership it appears that there will be an impact upon switching transactions—the process whereby a financial institution buys back some of an issuer's older bonds as part of the process for a new issuance. For example, a 10 basis point increase caused by the Volcker Rule would increase the costs of switching transactions by \$2.8 million per billion while a 50 basis point increase would drive up costs by nearly \$14 million per billion.

Taken together, by extension, with \$8 trillion of corporate debt outstanding and that approximately \$7 trillion trades in a year, the incremental transaction costs for investors and financing costs for U.S. companies could total into the tens of billions of dollars.

These discussions with our members provide a snap shot of potential costs facing non-financial companies because of just one provision of the Volcker Rule Proposal. Other provisions will also markedly affect liquidity in the financial markets and will increase the costs associated with raising funds for both financial and non-financial firms throughout the economy.

Had the regulators conducted such an analysis and heeded the information the Chamber provided, some of the consequences of the Volcker Rule and other regulations currently interacting with it may have been avoided.

b. Chamber Study: Consequences of the Volcker Rule

In 2012 the Chamber also released a study, ***The Economic Consequences of the Volcker Rule*** (“Thakor study”), authored by Professor Anjan Thakor of the Olin School of Business, Washington University in St. Louis. (Attached as Appendix B). The study had four major findings:

1. The Volcker Rule will have a negative effect on market making and liquidity provisions for many securities.

2. The Volcker Rule will reduce network benefits of market making for financial institutions and businesses.
3. The Volcker Rule is likely to lead to higher costs of capital for businesses and potentially lead to lower capital investments by borrowers creating greater potential focus on short-term investments.
4. The Volcker Rule will make bank risk management less efficient, adversely impact the structure of financial institutions and harm the ability of businesses to raise capital.

The Thakor study found that financial firms were expected to retrench their market making activities away from smaller issuances. Businesses were expected to find a lower level of financial services activity and less liquidity. Market makers in securities operate in networks and any retrenchment will harm the general network benefits that all for the sale of securities. The reduction of those network benefits would be felt even if other non-Volcker regulated entities undertook market making activities. Reductions in liquidity and regulatory uncertainty will lead to higher costs of capital. Therefore, capital expenditures by businesses are of a shorter duration for a quicker payoff. Failure to have longer-term capital investment could lead to jobs losses. By artificially constraining the instruments a financial firm may hold, banks may have to accept more risk or operate with more cash. This will harm the diversification of financial firms and harm the ability of businesses to raise capital.

Unfortunately, many of the findings of the Thakor study are coming to fruition as the Volcker Rule has become fully operational.

Issues Arising Since the Promulgation of the Volcker Rule

In 2016, the Chamber released a survey of more than 300 corporate finance professionals. The report, ***Financing Growth: The Impact of Financial Regulation*** (“Survey”), (attached as Appendix C) found that 79% of treasurers felt that financial services regulation had impacted their business. One-third of treasurers expect the regulatory impact to worsen over the next three years. Treasurers believe that current and pending regulations will make their cash flow and liquidity operations more challenging. One third of these companies are being forced to take unanticipated steps in response to regulatory challenges and businesses are being forced to pass the impact of those costs on to their customers. This survey also

found that businesses had dramatically reduced the number of financial institutions they have used since 2013.

Treasurers stated that the regulations most negatively impacting them were the Volcker Rule, Basel III, SIFI regulations and SEC money market fund reforms.

In previous testimony the Chamber warned that one of the responses to the Volcker Rule would be an increase in the cash reserves that American businesses feel compelled to hold. American businesses have traditionally benefitted from liquid financial markets that enable them to put capital to work rather than holding excessive, dormant reserves. It has given American businesses a competitive advantage over their counterparts in the European Union. Recent regulatory developments have forced American businesses to take more of a European Union approach to finance. While U.S. cash reserves have not hit the ratios held by their European counterparts, U.S. corporate cash reserves rose by \$100 billion since the Volcker Rule has been implemented. Cash at the S&P 500 has risen by over 50%, hitting all-time highs since the Dodd-Frank Act was passed.

Even though corporate bond issuances have increased, bond market liquidity has decreased with fewer dealers and less market making activity. This has led to unexplained stresses in the marketplace. A 2016 CFA Institute found that over a five year period liquidity in high yield investment grade corporate bonds had decreased, there were fewer dealers in the market place, there has been an increase in the time needed to execute a trade, trades are smaller in volume and there was an increase in unfilled orders. The CFA study also found that no liquidity issues existed for government bonds.

A 2016 Federal Reserve study (attached as Appendix D) looked at stress events in the corporate bond market. This study found that bond dealers regulated by the Volcker Rule had changed their behavior by decreasing their market making behavior. Because those dealers make up the preponderance of the marketplace, the Volcker Rule was found to have caused less liquid bond markets during times of stress.

Accordingly, businesses are forced to deal with a longer time horizon in meeting their needs and use a more inefficient marketplace which also creates the incentive to use alternative means of financing including the use of cash reserves. This also has an impact on the overall economy as less cash is deployed for productive purposes.

Many of these issues may have multiple causes, but the Volcker Rule is undoubtedly a contributory and exacerbating factor. In failing to use evidentiary tools

available to them to write the regulation, financial services regulators missed the opportunity to discover these problems before the rule was implemented. That is why the Chamber proposed using the conformance period as a time to “war game” these issues. Unfortunately, this was not done.

These impacts of the Volcker Rule are still working their way through the system and there is time to fix them.

Chamber Recommendations

The confluence of the Volcker Rule and other uncoordinated rule-makings such as those implementing Basel III, the risk retention provisions of the Dodd-Frank Act, systemic risk policies and money market reforms have created stress within the financing mechanisms for businesses. Financial firms now must deal with complex compliance structures that make the deployment of capital either more difficult or more expensive. For smaller companies, certain financial products or services may be unaffordable or altogether unavailable.

While the Chamber still believes that the Volcker Rule should be repealed, we also recognize that there are those who would like to see some form of the Volcker Rule remain in place. Additionally, we must have a better and clearer understanding of these major initiatives and how they interact with each other. Simply put, the Volcker Rule cannot be viewed in a vacuum; it must also be viewed in conjunction with other major rulemakings.

Accordingly, the Chamber recommends the following as a threshold to determine if an outright repeal of the Volcker Rule or a modification of it is the right course of action:

1. Conduct an economic analysis of the Volcker Rule to include the impacts on business financing as well as the consequences for financial institutions. It is important that the regulators understand how the Volcker Rule is affecting the customers of those financial firms. This analysis should also factor in the influences that the Volcker Rule may have on economic growth.
2. Conduct an analysis of major regulatory initiatives undertaken since the financial crisis to determine how they interact with each other and the economic consequences of those actions. This analysis should include, but not be limited, to: the Volcker Rule, risk retention rules, money market fund

regulations, Liquidity Coverage Ratio Rule, Net Stable Funding Ratio Rule, Total Loss Absorbency Coverage Rule, the Foreign Bank Operations Rule and capital rules and other rules promulgated under section 165 of the Dodd-Frank Act.

3. Following these studies, the regulators should report to Congress if the Volcker Rule and others should be repealed outright or amended. Regulators should then proceed with appropriate rulemaking to achieve those goals.
4. Congress and the Administration should take steps to ensure that banking regulators conduct an economic analysis with all rulemakings as required under the Riegle Act and the Administrative Procedures Act.

Conclusion

I appreciate the opportunity to appear before the subcommittee on such an important topic. The Volcker Rule, though well intentioned, has harmed the ability of non-financial businesses to operate and grow. These adverse impacts are exacerbated when combined with other initiatives. Additionally, the manner in which the Volcker Rule was written demonstrates flaws in the rule-writing process. Indeed this is an example of why a data driven, evidentiary based, transparent rule-writing process is needed to achieve the goals outlined by Congress in the least burdensome manner possible.

Our recommendations are common sense solutions to get the facts necessary to determine the path forward—repealing the Volcker Rule or at the very least a holistic and wholesale revision of the Volcker Rule as well as Basel III, the risk retention rules, systemic risk policies, the Foreign Bank Operations Rule and money market fund reforms. Such an exercise can develop policies that will promote both financial stability and economic growth. We look forward to working with all parties and stakeholder in achieving those goals.

I am delighted to discuss these issues further and answer any questions you may have.



CENTER FOR CAPITAL MARKETS
COMPETITIVENESS



THE ECONOMIC CONSEQUENCES OF THE VOLCKER RULE

by

Anjan V. Thakor

John E. Simon Professor of Finance

Olin School of Business

Washington University in St. Louis

Summer 2012



CENTER FOR CAPITAL MARKETS COMPETITIVENESS

Since its inception, the U.S. Chamber's Center for Capital Markets Competitiveness (CCMC) has led a bipartisan effort to modernize and strengthen the outmoded regulatory systems that have governed our capital markets. Ensuring an effective and robust capital formation system is essential to every business from the smallest start-up to the largest enterprise.



TABLE OF CONTENTS

Executive Summary	1
Introduction.....	3
Potential Impact of the Volcker Rule on Market Making and Liquidity Provision	8
Impact of the Volcker Rule on Businesses	13
Impact of the Volcker Rule on Financial Institutions.....	22
The Volcker Rule as One Part of Overall Regulation and Alternatives to the Rule.....	32
Conclusion	34
References	36





EXECUTIVE SUMMARY

This paper provides a fairly extensive analysis of the potential economic consequences of the Volcker Rule, which is a part of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank). This rule puts restrictions on banks' ability to engage in private equity and hedge fund activities and to engage in proprietary trading, some of which may even be related to market making activities. The analysis reveals that these restrictions will adversely affect bank customers as well as banks.

First, the Volcker Rule will have a negative effect on market making and liquidity provision for many securities. The Volcker Rule will induce banks to retrench more from market making in smaller and riskier securities where large and unexpected supply-demand shocks are more likely, thereby reducing market making in the very securities where it is most valuable. The securities issuers and the investors will feel the effects.

There will also be other adverse consequences for bank customers. They will experience a lowered value of financial services provided by banks, less liquidity for the securities that banks issue, and more distorted prices of bank securities that remain distorted for longer than before. Moreover, bank customers are also likely to be forced to record mark-to-market losses on the securities that they hold.

Second, the Volcker Rule will reduce the network benefits of market making for financial institutions and businesses. Market makers in securities operate in networks, and the retrenchment of banks in market making will reduce the value of the network even if unregulated (non-bank) entities move in to fill the vacuum created by the exit of banks. This will eventually hurt bank customers.

Third, the Volcker Rule is likely to lead to higher costs of capital for businesses and potentially lower capital investments by these borrowers, along with a possibly greater focus on riskier or more short-term-oriented investments. Due to reduced liquidity and greater perceived regulatory uncertainty, borrowers will be confronted with higher costs of capital. This is likely to reduce aggregate investment and also make riskier investments more attractive. Moreover, firms will find it more attractive to invest in projects that pay off faster. The reduction in aggregate capital investment may also cause significant job losses.

Fourth, the Volcker Rule will make bank risk management less efficient, and will more broadly adversely impact the structure of financial institutions, harming the ability of businesses to raise capital. By artificially constraining the security holdings that banks can have in their inventories for market making or proprietary trading purposes, the Volcker Rule will make bank risk management less efficient, forcing banks to either accept more risk or operate with more cash. Moreover, it may adversely impact the diversified-financial-services business model of banks, and therefore affect the extent to which banks and capital markets co-evolve in a mutually beneficial manner.

Although the main goal of the Volcker Rule—to reduce overall risk in banking and limit the exposure of taxpayers who insure these institutions—is laudable, it is believed that this goal can be achieved with greater efficiency by making judicious use of capital and liquidity requirements.

INTRODUCTION

In the wake of the 2007–09 financial crisis, there has been a great deal of interest in imposing restrictions on the activities of banks to ensure that they do not engage in risky activities that may increase the fragility of the financial system. On July 21, 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act was enacted to put in place sweeping new regulatory changes in the financial services industry. Included in Dodd-Frank was a section (§619) that imposes restrictions on the proprietary trading activities of banks and their affiliates. This section has come to be known as the “Volcker Rule.” The principal objective of this paper is to examine the economic consequences of the Volcker Rule.

The Volcker Rule

The Volcker Rule *prohibits* any banking entity, including bank affiliates, from—

- 1) Sponsoring, or investing in, a hedge fund, private equity fund, and other types of privately offered funds and pooled investment vehicles.¹

Exceptions: Funds that are organized or offered by banks are exempt from this prohibition, as long as—

- The bank owns no more than 3 percent of the fund;
 - No more than 3 percent of the bank’s Tier-One capital is invested in the fund; and
 - Other requirements are satisfied that pertain to the name of the fund, and affiliated transactions.
- 2) Engaging in *proprietary trading*, which is defined as short-term trading (the purchase and sale of financial instruments) with the intent to profit from the difference between the purchase and sale prices.

Exceptions: Exempt from this prohibition are trading activities—

- In municipal bonds, if they are issued by a state, county or political subdivision (such as a municipality);²
- In connection with “market making”;
- In connection with certain hedging activities intended to reduce risk; and
- Conducted on behalf of customers.

1. These include venture capital (VC) funds, real estate funds, structured finance vehicles, and some special purpose vehicles (SPVs) used in project financing.

2. In its current form, the Volcker Rule would *not* exempt debt issued by an *agency* of a state or political subdivision. According to Thomson Reuters, municipal securities issued by agencies and authorities represented 41.4 percent of the total number of municipal securities issued in 2011 by principal amount. Much of this debt was issued to finance schools, roads, bridges, water systems, and other infrastructure projects (see Polsky (2012)). Thus, the Volcker Rule could affect the liquidity of a large portion of the municipal bond market.

It is worth noting that market making is proprietary trading that is designed to provide “immediacy” to investors. One of the goals of market making is to provide liquidity for investors, so that they can be assured of trading at prevailing market prices rather than being concerned about moving the price adversely as a result of their own trade. A market maker can facilitate this situation by trading out of its own inventory of holdings of that security, rather than relying solely on a concurrent opposite transaction by another investor to execute the trade.

Banking entities are required to be in compliance by the end of the Volcker Rule’s effective date. The rule itself will come into force in July 2012, but the ultimate compliance date is anticipated to be three to four years from the bill’s enactment date of July 21, 2010, with the possibility that the Federal Reserve will issue further extensions.³ Several federal agencies, including the Federal Reserve, other federal banking agencies, the Securities and Exchange Commission (SEC), and the Commodity Futures Trading Commission (CFTC), are currently engaged in writing the specific rules by which they will implement the Volcker Rule. These agencies will determine the details related to the implementation of the market making exemption.

A Historical Perspective on the Origins of the Volcker Rule

In assessing the economic consequences of the Volcker Rule, it is useful to be cognizant of the historical roots of such proscriptions and understand both why they were first adopted and why they were later dismantled. This section provides a brief economic perspective.

In 1933, the Securities Act of 1933 and the Glass-Steagall Act were enacted within the first three months of President Franklin D. Roosevelt’s New Deal. The Glass-Steagall Act provided for the legal and regulatory separation of commercial banking from investment banking (including securities underwriting, market making, and other capital market activities) and insurance. This created a U.S. banking model that was quite distinct from the “universal banking” model in many other countries in the world, most notably those in Europe. One of the principal goals of the Glass-Steagall Act was to ensure that the U.S. banking industry, which had just been provided with federal deposit insurance, would be safe and sound and protected from “non-banking” capital market risks. The idea was that federal deposit insurance created a contingent liability for U.S. taxpayers, mechanisms had to be in place to contain the size of this liability. One such mechanism was the adoption of restrictions on the permissible activities of insured banks, and the exclusion of investment banking and insurance from the permissible set was such a restriction.

In addition to other factors, the Glass-Steagall restrictions were remarkably successful in ensuring the safety and soundness of American commercial banking.⁴ One of the cornerstones of the Glass-Steagall Act was the distinction between a *loan* and a *security*.⁵ Banks were allowed to originate/make loans, but *not* underwrite securities, whereas investment banks were allowed to underwrite securities. For numerous decades after the enactment of the Glass-Steagall Act, this distinction was both conceptually and

3. See Chadbourne & Parke (2010).

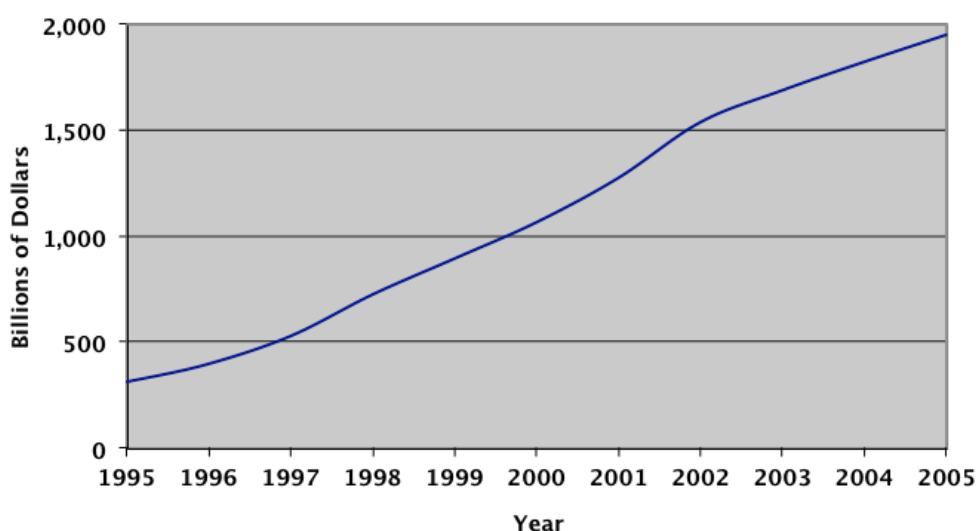
4. The academic research on this subject has reached mixed conclusions, however, with some claiming that there was no conflict of interest in securities underwriting in the pre-Glass-Steagall era (see, for example, Puri (1996), and Kroszner and Rajan (1997)).

5. See Greenbaum and Thakor (2007).

operationally useful. However, in the 1980s and 1990s, *securitization* emerged as a major force in banking. Securitization is a process whereby a pool of illiquid assets like mortgages or credit card loans (receivables) are pooled together in a portfolio and placed in a trust, and then claims are issued against this portfolio that are sold to capital market investors.⁶ These claims are given ratings by the credit rating agencies, are traded in the capital market and have market-determined yields.

Securitization, which has been hailed as one of the landmark financial innovations of the twentieth century, has grown rapidly because it generates widespread economic benefits. First, it allows banks to diversify more effectively across various sectors of the economy by purchasing claims against loans originated by other banks and selling off some of their own loans. This facilitates the management of credit risk by banks. Second, securitization converts previously illiquid loans into liquid traded securities, thereby reducing banks' liquidity risk. Third, it shifts part of the funding of loans from depositors to capital-market investors who are able to avail themselves of trading opportunities in a liquid market. This reduces the eventual cost of financing these loans from the standpoint of banks, which consequently reduces borrowing costs for bank customers. Fourth, as a result of lower financing costs and improved liquidity, banks are able to profitably provide credit access to credit seekers who were previously excluded from receiving bank credit.⁷ Because of these economic benefits, securitization grew both in volume and scope, and by 2005 the market for asset-backed securities had grown to almost \$2 trillion (Figure 1).⁸

Figure 1: Growth of Asset-Backed Securities



Source: Greenbaum and Thakor (2007).

6. See Chapter 9 in Greenbaum and Thakor (2007).
7. See Song and Thakor (2010) for a detailed analysis of this situation.
8. See Chapter 9 in Greenbaum and Thakor (2007).

One of the consequences of the rise of securitization was that it blurred the boundary between loans and securities. Because securitization is a process of converting loans *into* securities, banks were effectively involved in the process of securities underwriting when they were participating in securitization. Yet, rolling back securitization just to stick to the “letter of the law” of the Glass-Steagall Act seemed economically silly in light of all of the previously discussed economic benefits. Thus, during the 1980s (especially after 1985, when U.S. commercial banking truly embraced securitization) and the 1990s, the economics of the financial services industry gradually but inexorably eroded the *de facto*, although not *de jure*, separation between loan origination and securities underwriting that was at the heart of Glass-Steagall. Banks continued to play a pivotal and ever-increasing role in not only originating the various loans that were securitized but also in making a market in the claims against loan pools that were sold to investors.

To a large extent, this relentless weakening of the separation provisions of Glass-Steagall was a direct consequence of market forces and the underlying shift in the economics of the financial services industry, rather than lobbying efforts or political forces. Eventually, the Glass-Steagall Act was formally dismantled in 1999 with the passage of the Gramm-Leach-Bliley Act, also called the Financial Services Modernization Act. This act repealed Sections 20 and 32 of the Glass-Steagall Act, and authorized bank holding companies and foreign banks that meet eligibility criteria to become financial holding companies, thus allowing them to engage in a broad range of financially related activities.⁹

The Volcker Rule attempts to bring the situation “full circle,” in a manner of speaking. The Dodd-Frank Act does not re-enact the Glass-Steagall Act,¹⁰ but it does revive some of its features through limitations imposed on the ability of commercial banks and affiliated companies to engage in trading “unrelated to customer needs” and investing in and sponsoring hedge funds or private equity funds.

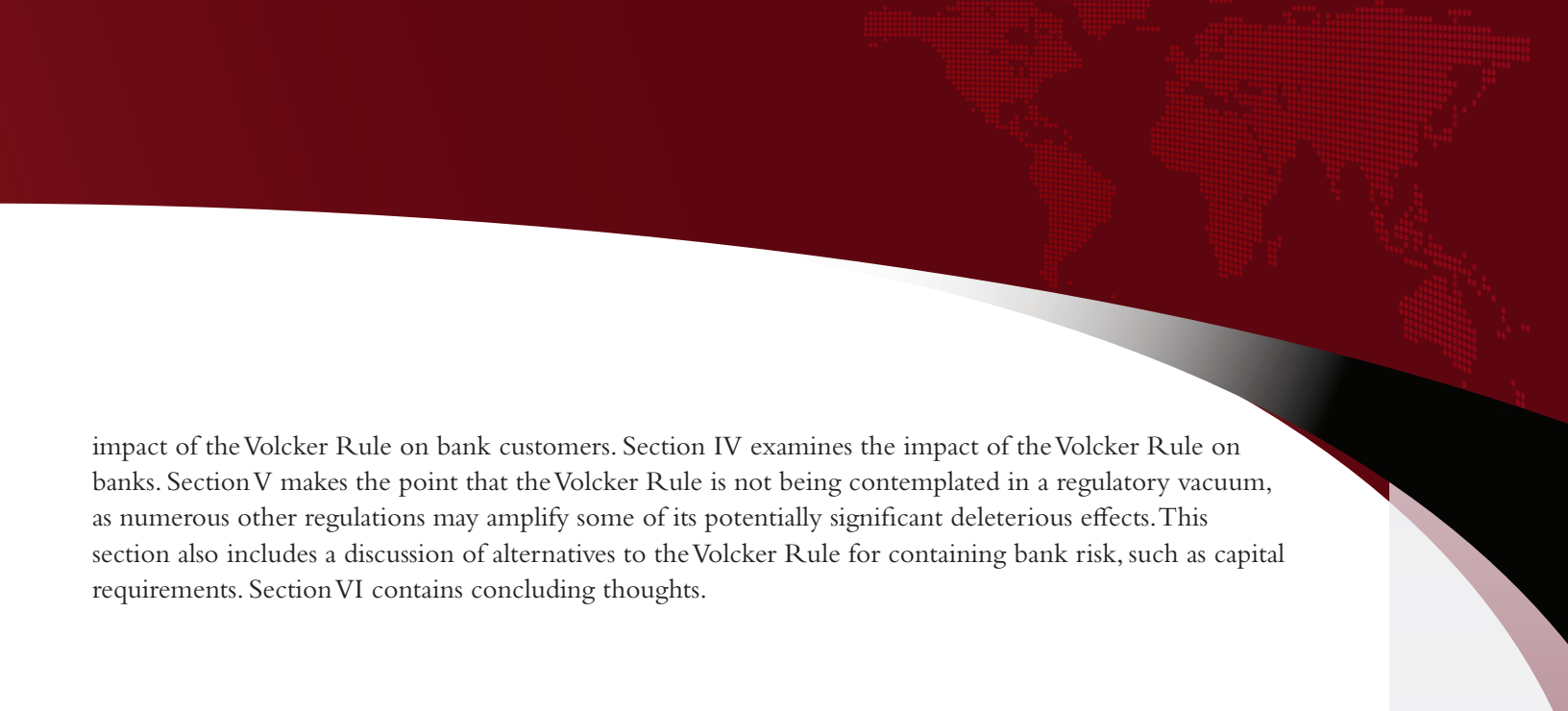
Summary

With this backdrop, this report examines the potential implications of the Volcker Rule for banks and their customers. The main conclusions, as presented in the Executive Summary, are that the Volcker Rule has potentially significant economic consequences. It will adversely affect market making and liquidity provision in the financial market. Borrowers (i.e., bank customers) will have lower market liquidity for their securities, higher financing costs, possibly diminished credit access, lower overall investments, and potentially lower employment. For regulators interested in the safety and soundness of the financial system, it is likely that the activities that banks will be forced to give up will migrate to the unregulated segment of the financial services industry, and possibly lead to a perverse increase in overall risk. For banks, the reduction in market making will impede risk management, obstruct the ability to signal the quality of the loans they have securitized, reduce the value of financial services offered to customers, adversely impact the “business model” of banking, and possibly hamper the economically-beneficial co-evolution of banks and financial markets.

The rest of this report is organized as follows. Section II examines the impact of the Volcker Rule on the economic functions of market making and liquidity provision. Section III examines the potential

9. The merger of Citicorp and Travelers occurred before the Financial Services Modernization Act and was conditionally approved by regulators in anticipation of the Act.

10. See the discussion in Carpenter and Murphy (2010).



impact of the Volcker Rule on bank customers. Section IV examines the impact of the Volcker Rule on banks. Section V makes the point that the Volcker Rule is not being contemplated in a regulatory vacuum, as numerous other regulations may amplify some of its potentially significant deleterious effects. This section also includes a discussion of alternatives to the Volcker Rule for containing bank risk, such as capital requirements. Section VI contains concluding thoughts.

POTENTIAL IMPACT OF THE VOLCKER RULE ON MARKET MAKING AND LIQUIDITY PROVISION

In evaluating the potential impact of the Volcker Rule on market making and liquidity provisions, this section is organized in three parts: the economics of market making and liquidity provision, the network effect in market making, and the likely impact of the Volcker Rule on market making.

The Economics of Market Making and Liquidity Provision

Market makers serve an important economic function in securities markets, and proprietary trading in securities allows banks to be market makers in a variety of securities.¹¹ Market makers handle most of the trading in government bonds, municipal bonds, and corporate bonds, over-the-counter (OTC) derivatives, currencies, commodities of various sorts, mortgage-backed securities, and equities traded in large blocks.¹² Market making is an important part of ensuring that there is a liquid market in the security. An investor who wants to sell a security can call a market maker, who would then purchase the security immediately on its own account and add it to its inventory. Similarly, an investor who wishes to purchase a security can call a market maker, which would then take the security from its own inventory and sell it. This provides two valuable economic functions. One is “immediacy”: as a buyer of a security, I need not wait for a seller to come along right away for the transaction to be expeditiously executed, and as a seller I need not wait for a buyer to appear right away. The market maker serves as an intermediary to make this happen. The other economic function is liquidity, which refers to the ability to purchase or sell a security without moving the price against you (i.e., if you are placing a purchase order, the price does not rise much, and if you are placing a sell order, the price does not fall). It is the market maker’s execution from its own inventory that helps minimize the price impact of individual trades.

This discussion points out an important difference between a *broker* and a *market maker*. A broker simply matches buyers and sellers of securities, whereas a market maker absorbs supply and demand imbalances at any point in time through its own inventory, thereby placing its own capital at risk. Thus,

-
11. The general prohibition on proprietary trading imposed by the Volcker Rule does not apply to purchases or sales of “covered financial positions” by covered banking entities in connection with their underwriting. However, numerous requirements have to be satisfied in order to qualify for this exemption, including the restriction that underwriting activities be “designed not to exceed the reasonably expected near term demands of clients, customers or counterparties.” This restriction limits the inventory holdings of underwriters, which then compromises the ability of underwriters to provide liquidity in a thinly traded market, an issue that will be discussed in greater depth in this report. For now, it is useful to note that infrequent trading is a noteworthy characteristic of this market—more than 90 percent of municipal securities do not trade on a given day and more than 90 percent do not trade in a given month (see Polsky (2012)). This means that much of the municipal trading in its current form may fail to qualify for the proprietary-trading exemption from the Volcker Rule. This may have significant adverse consequences for access and liquidity in this market.
 12. The Volcker Rule exempts currencies, U.S. Treasuries, federal agency bonds, and certain types of state and municipal bonds. See Duffie (2012). However, as discussed earlier, the exemption will *fail* to apply to 41.4 percent of the municipal bond market.
-



a market maker is a “qualitative asset transformer” (QAT).¹³ This QAT function is important because an investor always faces uncertainty about how many other investors are prepared to bid competitively for his trade. The investor is therefore willing to offer a (small) price discount to the market maker in order to have his trade executed expeditiously and without significant (adverse) price impact.

The vast majority of OTC transactions are conducted with market makers. Almost all bond trading is conducted in the OTC market. This includes corporate bonds, municipal and U.S. Treasury bonds, and sovereign bonds issued by foreign governments. Also, the majority of the outstanding national amount of derivatives is traded in the OTC market. Thus, market makers provide immediacy for many securities that are not traded on organized exchanges. Although exchange-traded assets also have the benefit of immediacy, there is the potential for an adverse price impact for large trades, and this price impact grows larger with the size of the trade. A market maker can often handle large block trades with a smaller price impact.

In practice, there is considerable heterogeneity in the demand for immediacy from customers. Duffie (2012) provides some indication of how large a role a market maker can play in a particular stock. As an illustration, he provides information about the actual daily U.S. dollar inventory of the common shares of Apple held by a particular broker-dealer during a contiguous period from 2010 to 2011. These data show that the market maker’s inventory of this security reverts, on average, approximately 20 percent of the way toward normal each day, implying approximately a three-day expected half-life of inventory imbalances. The data also reveal substantial cross-sectional heterogeneity across individual equities handled by the same market maker, with the expected half-life of inventory imbalances being the highest for (least liquid) stocks with the highest-bid-ask spreads and the lowest trading volume.

Large banks tend to be most prominent as market makers for securities where trade frequency is relatively low and trade size relatively large. These are the securities for which issues of immediacy and liquidity are likely to be most pressing, such as lower-rated bonds and credit default swaps. Duffie (2012) reports an individual broker-dealer’s positions in an investment-grade corporate bond, showing that the market making function caused this broker-dealer’s inventory to become *negative*. An indication of the *potential* illiquidity in the corporate bond market is that the expected half-life of inventory imbalances is typically much longer than that for a typical stock. In the illustration provided by Duffie (2012), the expected half-life of inventory imbalances is about two weeks.¹⁴

Like other QAT activities, market making imposes risk on the market maker. This risk stems from the fact that the prices of securities in its inventory may fall, or prices may rise when its inventory is negative. This risk is absorbed by the market maker’s capital, and the higher the amount of capital that the market maker has, the greater its ability to absorb risk and hence the more valuable the market-making function for investors.

13. See Greenbaum and Thakor (2007).

14. Another indication of potential illiquidity in the absence of market makers is low trading frequency. Goldstein, Hotchkiss, and Sirri (2007) examine BBB-rated corporate bonds and find that the fraction of days on which a bond was traded on average was 26.9 percent. Bao, Pan, and Wang (2011) examine more actively-traded bonds and find that, across all market makers, these bonds were traded on average 174 times per month.

Like any other risk bearer in the economy, the market maker needs to be compensated for bearing this risk. The greater the inventory risk faced by the market maker, the higher the expected return (compensation) that the market maker needs. This expected return is not only compensation for bearing risk, but also an implicit reward for the specialization skills that the market maker develops as it learns about changes in market conditions and what early indicators imply about the possible directions of future price moves. Thus, a market maker can profit by anticipating when it makes sense to let its inventory diverge substantially from a “target” or “normal” level in order to provide immediacy to a client who wishes to place a large buy or sell order for a security. For example, the market maker may anticipate that a security’s price is likely to fall in the future, and may thus be willing to satisfy a large purchase order at the current price even though it makes the market maker’s inventory in that security negative.

The market maker’s willingness to absorb supply and demand imbalances in exchange for earning a compensating return produces economic benefits, which have been discussed in the extensive theoretical and empirical research on this subject. Examples are papers by Adrian and Shin (2007); Brunnermeier and Pedersen (2009); and Comerton-Forde, Hendershott, Jones, Moulton, and Seasholes (2010). The basic message of this research is that, in the absence of market makers, the price impacts of trades would be bigger and more persistent. In a nutshell, liquidity would be significantly adversely impacted.

The Network Effect in Market Making

An interesting aspect of market making highlighted by Bech and Garratt (2003) and Duffie (2012) is a “network effect.” A market maker in any security does not operate in a vacuum. Rather, in providing immediacy, a market maker relies on being able to unwind its positions at opportune times by trading with *other* market makers. These market makers may possess knowledge about impending orders from their own customers that may induce them to make trades with a market maker that needs to do so in order to rebalance its inventory. Thus, the existence of a network of market makers *expands* the capacity of any individual market maker to provide immediacy.

This network is crucial in understanding the potential impact of the Volcker Rule. It has been suggested that the loss of market making due to the exit of banks would not be problematic as others will rush in to fill the vacuum. Although such market-making replacements may occur, the network effect indicates that this is unlikely to be without economic consequence.

Who are the major members of this network? Table 1 provides data on the banks that would be affected by the Volcker Rule.

**Table 1:
Primary Dealers That Are the Main Providers of Liquidity Across Asset Classes**

Bank of Nova Scotia	Daiwa Capital Markets Americas	Mizuho Securities (USA)
Barclays Capital	Deutsche Bank Securities	Morgan Stanley & Co.
BMO Capital Markets	Goldman, Sachs & Co.	Nomura Securities International
BNP Paribas Securities	HSBC Securities (USA)	RBC Capital Markets
Cantor Fitzgerald & Co.	J.P. Morgan Securities	RBS Securities
Citigroup Global Capital Markets	Jefferies & Company	SG Americas Securities
Credit Suisse Securities (USA)	Merrill Lynch, Pierce, Fenner & Smith	UBS Securities

Source: Federal Reserve Bank of New York and Oliver Wyman (2011).

Impact of the Volcker Rule on Market Making

Even though market making is meant to be exempted from the Dodd-Frank prohibition of proprietary trading, it appears that the rule writing process of the regulatory agencies will indeed inhibit market making by banks in a way that is likely to be disruptive for market liquidity. Dodd-Frank requires regulators to make a distinction between trading activities that are intended to serve market making purposes and those that are prohibited. How does one go about making this distinction,¹⁵ which is quite difficult to make in practice? Apparently, the intent is to use quantitative metrics to measure the risk taken by the market maker and use this measurement as an indicator of whether the proprietary trading was of the prohibited form. For example, the Agencies drafting the final rule state:

The Agencies expect that these realized-risk and revenue-relative-to-realized-risk measurement would provide information useful in assessing whether trading activities are producing revenues that are consistent, in terms of the degree of risk taking that is being assumed, with typical market making related activities.

Further, it is stated:

...determine whether these activities involve prohibited proprietary trading because the trading activity either is inconsistent with permitted market making-related activities or presents a material exposure to high-risk assets or high-risk trading strategies.

15. In a CNBC interview with on January 9, 2012, Jamie Dimon said, "If you want to be trading, you have to have a lawyer and a psychiatrist sitting next to you determining what was your intent every time you did something."

And then:

Significant, abrupt or inconsistent changes to key risk management measures, such as VaR, that are inconsistent with prior experience, the experience of similarly situated trading units and management's stated expectations for such measures may indicate impermissible proprietary trading.

Regulators are also likely to use a host of metrics to reach their conclusions about whether observed trading activities should be classified as a market making or prohibited proprietary trading. These include revenue-based metrics that measure daily trading revenues and profits compared with historical revenues and profits from total trading activity; revenue-to-risk metrics that measure the amount of revenue the bank generates and its earnings volatility relative to the risks assumed; inventory metrics; and customer flow metrics.

It is unknown at this time whether the final rule will have this approach. If it does, there are likely to be serious consequences for the market making role of banks. Specifically, if these rules are implemented in the manner discussed above, market makers will be able to deal with only moderate supply-demand imbalances, and thus provide immediacy only in limited circumstances. Any market maker who “dares” to step in and absorb relatively large supply-demand imbalances for an expected return commensurate with the risk taken is in danger of exhibiting an increase in market-making risk based on the proposed risk metrics and an increase in profits that could signal that it had engaged in banned proprietary trading. It would therefore expose itself to regulatory sanctions or penalties. This will diminish the willingness of banks to provide market making in precisely those situations in which it produces the greatest economic benefit, namely for smaller, less liquid issues that are most likely to be subjected to large unexpected supply-demand swings and hence large imbalances for market makers.¹⁶ The withdrawal of banks from their current market making in many securities will have consequences for both borrowers and investors. These effects will be discussed in the next section.

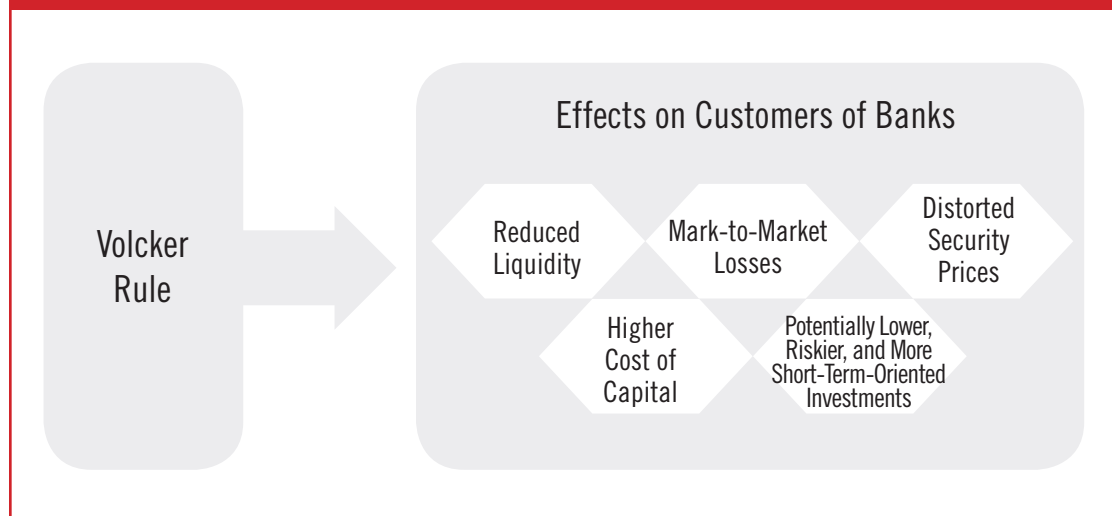
The retrenchment of banks from market making could also have difficult-to-anticipate consequences, which could be as severe as some segments of the market freezing up. An example of such a freezing up is provided by the reaction of credit rating agencies after the passage of the Dodd-Frank Act and the subsequent market consequences. In 2010, the increased legal liability for rating agencies led Standard & Poor's (S&P), Moody's Investor Services, and Fitch Ratings to ask some borrowers—including those who had already obtained ratings—to refrain from using their ratings. Since the SEC required these borrowers to have ratings if they wanted to issue debt securities, the market for issuing asset-backed securities froze up until the SEC agreed to temporarily waive the ratings requirement.

16. This issue is discussed at length by Duffie (2012).

IMPACT OF THE VOLCKER RULE ON BUSINESSES

A rigid implementation of the rule will affect not only banks but also their customers. This section discusses the potential effects summarized in Figure 2.

Figure 2: Impact of the Volcker Rule on Bank Customers



It should be emphasized that the effects depicted above do not represent an exhaustive list. Because of the interconnected nature of the financial market (see Thakor (2011)), it is difficult to predict second- and third-order effects. The effects shown in Figure 2 will be discussed in the following sections.

Reduced Liquidity

Market makers provide liquidity by standing ready to absorb supply and demand shocks. Sometimes these shocks are idiosyncratic; that is, they arise from something specific pertaining only to the security in question. At other times, these shocks may be systemic, pertaining to marketwide events. Duffie (2012) provides an example of such a market-wide event—the deletion of some equities from the S&P 500 stock index. An event like that can force both individual investors and institutions that employ index-tracking strategies to sell their holdings of the deleted securities, often in large blocks. If market makers are available to purchase these securities and add them to their inventories,¹⁷ then the price impact of these trades will be smaller than what it would be in the absence of these market makers. Moreover, without the immediacy provided by market makers, it would take longer for the prices of securities affected by such large trades to return to levels dictated by fundamentals.

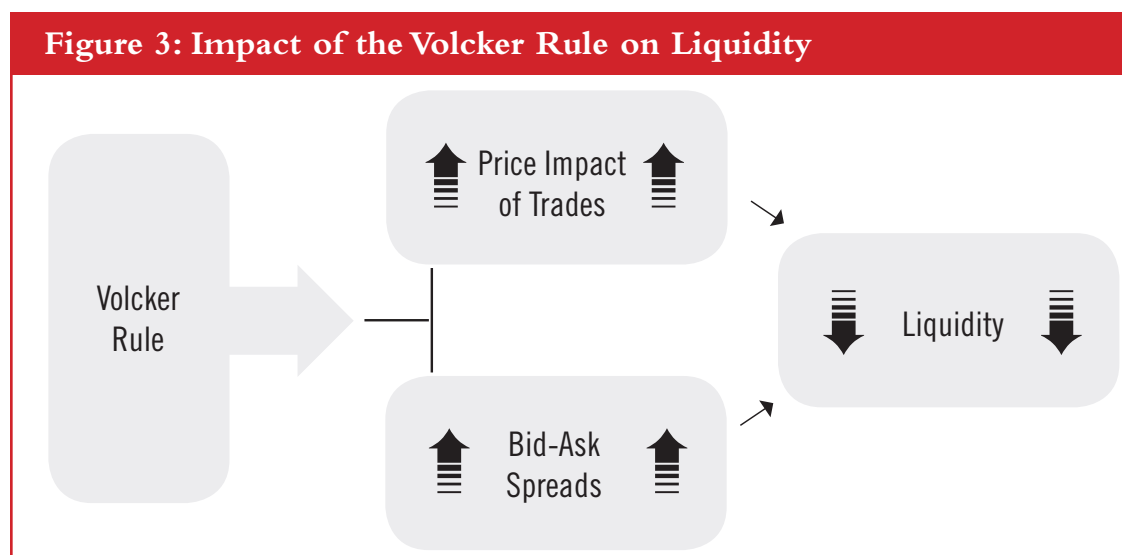
17. In the hope of selling the securities at a higher price later.

This suggests that the Volcker Rule will affect market liquidity in two ways. To understand this, it is useful to note that there are two dimensions of market liquidity: (1) the responsiveness of price to the order flow, and (2) the bid-ask spread. The Volcker Rule can affect both dimensions.

When we think of price responsiveness, what is being considered is the extent to which an order of a particular size moves the price. The more liquid the market in which a given security trades, the smaller the price impact will be for any given trade. As discussed above, the availability of more market makers, including large banks that are willing to commit substantial capital to support their market-making activities, leads to a smaller price impact of trades because market makers are willing to “absorb” trades by adding or subtracting from their inventory. Thus, by reducing the number of available market makers, the Volcker Rule can reduce liquidity in the sense that the trades in any given security trigger bigger price moves.

Now consider the second dimension. The bid-ask spread is the difference between the price at which one can immediately purchase a security from the market maker’s inventory and the price at which one can sell the security to the market maker. The higher the bid-ask spread, the lower the liquidity. Thus, very liquid instruments like money have no bid-ask spreads (unless one is dealing in foreign currencies), whereas relatively illiquid investments like houses have fairly large spreads. As the Volcker Rule will cause at least some retrenchment of banks from market making, the number of market makers in many securities will decline, leading to less competition. Standard economic reasoning would suggest that a consequence of this is likely to be higher bid-ask spreads, and hence lower liquidity across a wide spectrum of asset classes. When bid-ask spreads increase for an asset, trading in that asset goes down. For instance, when the terms of the commission paid to a real estate broker to sell a house is a part of the bid-ask spread on the house, it is considerably more attractive financially to sell the house if the commission is 1 percent than if it is 7 percent.

Thus, both dimensions of liquidity are likely to be adversely affected by the Volcker Rule. This effect will be potentially the greatest in the bond and OTC derivatives markets, where market makers satisfy almost all the demand for immediacy. Figure 3 summarizes the impact of the Volcker Rule on liquidity.





What impact does reduced liquidity have on firms? Amihud and Mendelson (1986) have developed a theoretical model that shows how liquidity affects asset prices. The model uses transactions costs to characterize assets and investment horizons to characterize investors. Investors maximize the expected present value of the cash flows their assets generate, including the costs of transacting. In equilibrium, the expected return on an asset—and hence the cost of capital associated with that asset—goes up as its transactions costs go up because investors need to be compensated for bearing these costs and thus demand a higher return.

Now, one might say that the transactions costs or liquidity costs for most assets traded in U.S. capital markets are not all that large, so why worry about a difficult-to-determine impact of the Volcker Rule on these costs? Note, however, that an investor that is trading in a particular security will need to incur the transactions costs associated with illiquidity (or more appropriately, partial liquidity) over and over again. Thus, these costs add up, and may result in the investor demanding a nontrivial premium. Amihud and Mendelson (2006) write:

While the illiquidity costs of a single transaction are low relative to the asset price (for most publicly traded securities, it is a fraction of a percent), their cumulative effect on value is large because they are incurred repeatedly over the security's life. Thus, the impact of illiquidity costs should equal at least the present value of all costs incurred currently and in the future. A stock, for example, has an infinite life, resulting in an infinite series of transaction costs whose present value can be substantial relative to the stock's value.

This quote suggests that liquidity costs can be significant in the valuation of a security.

Mark-to-Market Losses

Security prices, including bond yields, depend both on cash flow risk—as determined, for example, by the extent to which the issuer's fortunes exhibit co-movement with the broad market—and liquidity. Holding everything else fixed, an investor will demand a lower liquidity premium, and hence be willing to pay a higher price, for a more liquid security than for a less liquid one. To the extent that the presence of banks as market makers enhances liquidity, the retrenchment of banks will diminish liquidity. In response, yields on bonds and expected returns on securities in general will rise to reflect higher liquidity premiums. Consequently, prices will drop, which will lead to immediate losses for investors who need to “mark to market.”

Estimates of the size of these potential losses vary, and admittedly are sensitive to the measurement approach used. The Oliver Wyman (2011) study estimates these losses to be \$90–\$315 billion, and it has been criticized for relying on estimates based on conditions during the depth of the recent financial crisis. The precise magnitude of these estimates is less important than the general principle that regulatory actions that adversely impinge on market liquidity can impose losses on investors. What matters more than the precise magnitude of these losses is the fact that investors now have a heightened awareness of the potential impact of *regulatory uncertainty* on their wealth. With the stroke of a pen, the government can take actions that impose immediate losses on investors. This is *not* a diversifiable risk, so it is reasonable to assume that investors will now increase the risk premium they need to be compensated for this uncertainty. It is indeed a “double whammy” for the issuers of securities—not only does the liquidity premium go up due to the Volcker Rule, but so does the “regulatory uncertainty premium.”

Distorted Security Prices

When liquidity in a market goes down, security prices may remain distorted away from their fundamental values for longer periods. Duffie (2012) provides an example from Newman and Riersen (2003), who study the pattern of yield impacts around the time of a large corporate bond issue. The impact that is studied is for the bonds of firms other than the issuer that are in the same industry as the issuer. Specifically, when a European telecom firm had a large bond issuance from 1999 through 2001, *all* European telecom firms experienced higher bond yields. The behavior of yields through time was also interesting. The yields increased as the issuance date approached, and then recovered to normal levels. What determines the extent of divergence from normal levels as well as the speed of adjustment back to normal is the market *liquidity*. If market makers lower their risk limits or the sizes of supply-demand imbalances they are willing to step in and intermediate, the yield impacts of events like large security issuances will be greater.¹⁸

Empirical evidence on this is provided by Mitchell and Pulvino (2009), who show how significantly corporate bond yields were distorted during the recent financial crisis. Specifically, actual corporate bond yields were much higher than those implied by the prices of the credit default swaps written on these bonds, and this trend occurred across a broad range of investment-grade and high-yield bonds. A widening of the yield spread in this manner is a tell-tale sign of liquidity effects.¹⁹ The reason for this wide spread during the crisis was that capital levels were abnormally low at dealer banks. As a consequence, even corporations issuing investment-grade bonds in late 2008 had to pay interest rates that were 200 basis points higher because of this market friction.²⁰

Such distortions will be exacerbated by the Volcker Rule, not only because of banks retrenching from market making, but also because the incentives of *individual* traders involved in market making will be affected.²¹ Implementation of the Volcker Rule will cause the compensation of these traders to resemble that of brokerage agents. Add this to the reputational risk of violating the regulatory market-making norms that require market making to be relatively low risk to qualify as permissible trading, and market makers are likely to become highly averse to meeting demands for immediacy. Indeed, the proposed metrics to be used in implementing the Volcker Rule will flag sufficiently highly profitable trades as impermissible proprietary trading; since such trades are typically associated with meeting large demands for immediacy, individual traders involved in market making are likely to shun them.

Higher Cost of Capital

The preceding discussion makes it clear that the Volcker Rule is likely to increase the cost of capital for corporations. The amount of the increase is notoriously difficult to estimate, but the effect on the *cost of capital* will be manifested in an increase in the cost of both debt and equity. Both costs will go up because of a

18. Evidence of market makers operating in the inter-dealer network and redistributing supply and demand shocks is provided by Bech and Garratt (2003).

19. Since a credit default swap is essentially an insurance contract against issuer default on the bond, the implied bond yield reflects credit risk, whereas the actual yield on the bond (as implied by the price at which the bond is trading) reflects both default risk and liquidity risk.

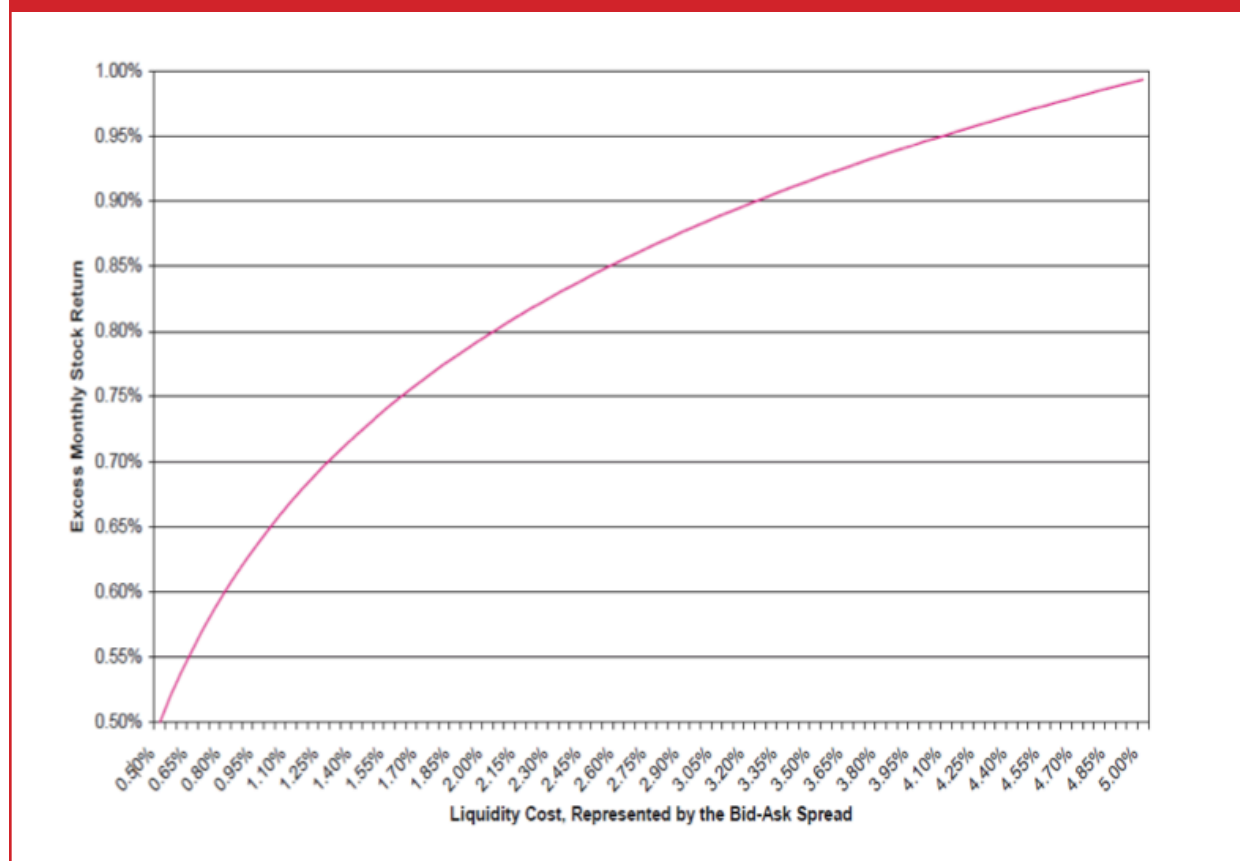
20. See Duffie (2012).

21. See the discussion in Duffie (2012).

higher liquidity premium demanded by investors, as well as a higher premium for regulatory uncertainty. This effect will be larger for smaller and riskier issuers, the very firms for which market liquidity matters the most.

Research has documented that a decrease in liquidity increases the cost of capital, as mentioned earlier. Amihud and Mendelson (2006) use large-sample data to show how illiquidity, as measured by the bid-ask spread on a stock, affects the expected return of the stock and hence the firm's cost of capital (Figure 4). The authors tested the return-illiquidity relationship on NYSE-AMEX stocks from 1960 to 1980. They divided their sample into seven portfolios based on their bid-ask spreads, and within each portfolio they ranked the stocks based on each stock's beta (a measure of the risk of the stock, based on the Capital Asset Pricing Model). Then they estimated the cross-sectional variation of the average return on each portfolio with the bid-ask spread. Figure 4 summarizes their findings.

Figure 4: Liquidity Cost vs. Expected Returns



Source: Amihud and Mendelson (2006).

The main takeaway from their scientific evidence is that average returns (which proxy for expected returns) are higher for stocks with higher bid-ask spreads. They provide a mathematical relationship between the return on a stock and its bid-ask spread, which shows that the stock return increases in proportion to the logarithm of its bid-ask spread.

In finance, the expected return on a stock is synonymous with the equity cost of capital on the stock. Thus, the research discussed above indicates that a potential increase in the bid-ask spread caused by the Volcker Rule will lead to a potential increase in the costs of capital for firms.

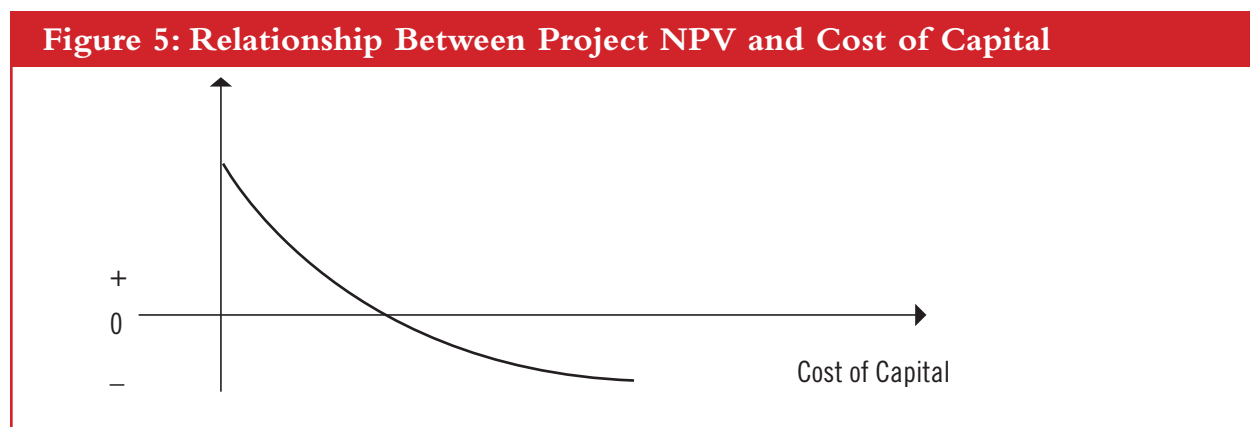
A higher cost of capital for firms has potentially significant consequences for corporate investments and economic growth. It is worth noting that the idea that all that the Volcker Rule will do is to have an impact on bank profits and a small marginal impact on liquidity is deeply flawed. For example, Representative Barney Frank said,²²

The notion that anything that advances liquidity is a good thing, without any regard to stability, is the problem. Much of this liquidity wasn't for customers, but for the banks to make money for themselves.

The flaws in this assertion are that the Volcker Rule will affect only banks and not the liquidity of firms, and that this effect can be ignored.

Impact of Higher Cost of Capital on Investments: Lower Investments, Riskier Investments, and Shorter-Term Investments

Impact on How Much Firms Invest: It has now been well established in academic research, and well illustrated in practice, that when a firm's cost of capital goes up, it invests less. The reason is simple. A firm will invest capital only if doing so has positive net present value (i.e., when the internal rate of return of the investment exceeds the cost of capital).²³ As the cost of capital rises, there are fewer investment projects with internal rates of return high enough to clear the hurdle of exceeding the cost of capital, and the firm invests less. Figure 5 illustrates this relationship between the net present value (NPV) of a project and the cost of capital needed to finance it.



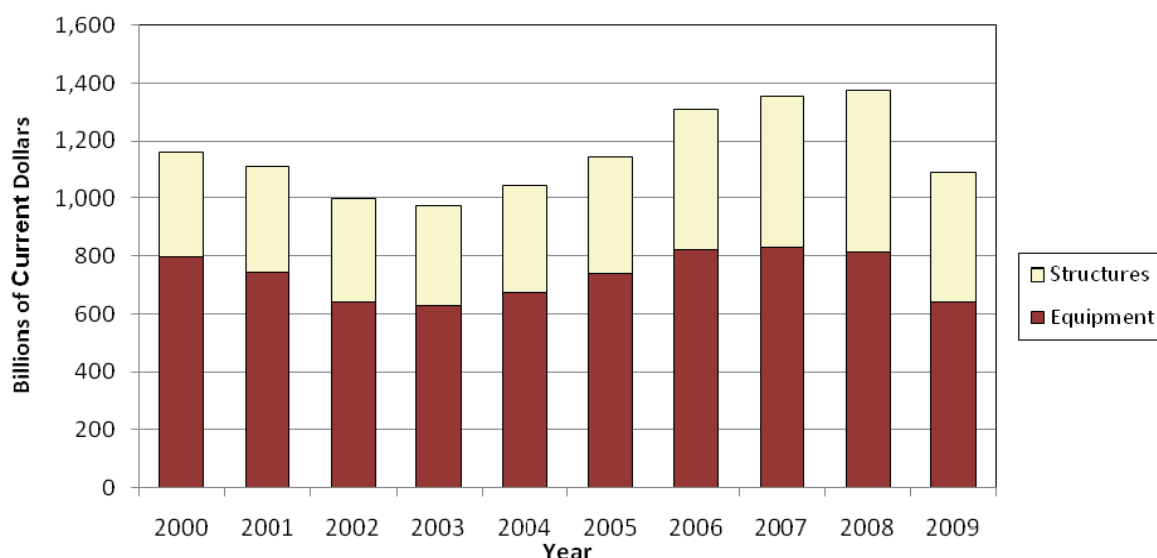
22. See Onaran (2012).

23. This can be found in any corporate finance textbook. See, for example, Brealey, Myers, and Allen (2007).

Figure 5 shows that there is a decreasing and convex relationship between the value of a project to a firm and its cost of capital. A project that is acceptable to the firm at a 10 percent cost of capital may not be acceptable at 15 percent. Thus, as the cost of capital increases, fewer and fewer projects have positive NPV to the firm, and it ends up investing less.

An empirical test of the relationship between investment and the cost of capital was conducted by Gilchrist and Zakrajsek (2007). They find that investment spending is highly sensitive, both economically and statistically, to changes in the firm's cost of capital. They use a large panel data set for their research and estimate that a 1 percent increase in the cost of capital implies a 0.50 to 0.75 percent (1 percent in the long run) reduction in the rate of investment spending.²⁴ To put these estimates in perspective, consider how much U.S. firms invest annually. In 2010, U.S. nonfarm businesses invested \$1,105.7 billion in new and used structures and equipment, up slightly from the 2009 level of \$1,090.10 billion. Figure 6 provides a breakdown by year from 2000 to 2009, and Figure 7 breaks this information down further by industry.

Figure 6: Total Capital Expenditures for All U.S. Nonfarm Business 2000-2009



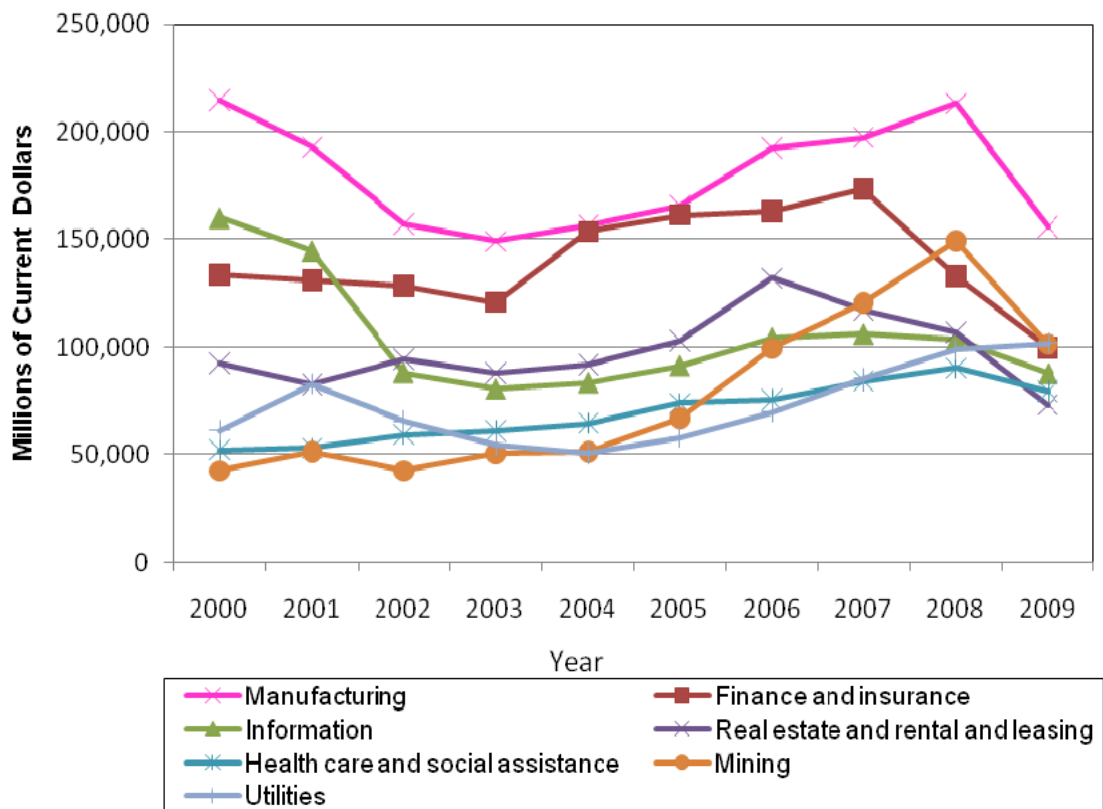
Source: U.S. Census Bureau

A one percent increase in the cost of capital would therefore lead to a \$55 to \$82.5 billion decline in aggregate annual capital spending by U.S. nonfarm firms, and in the long run this could be as much as a \$110 billion annual decline. The most immediate and transparent consequence of this is lower economic growth.

However, there are other effects as well. With lower economic growth comes lower employment. In a recent study, Beard, Ford, and Kim (2010) estimate the relationship between employment and capital

24. The firms in their sample are quite large. The median firm has annual (real) sales of almost \$4 billion and a market capitalization (in real terms) of about \$1.9 billion.

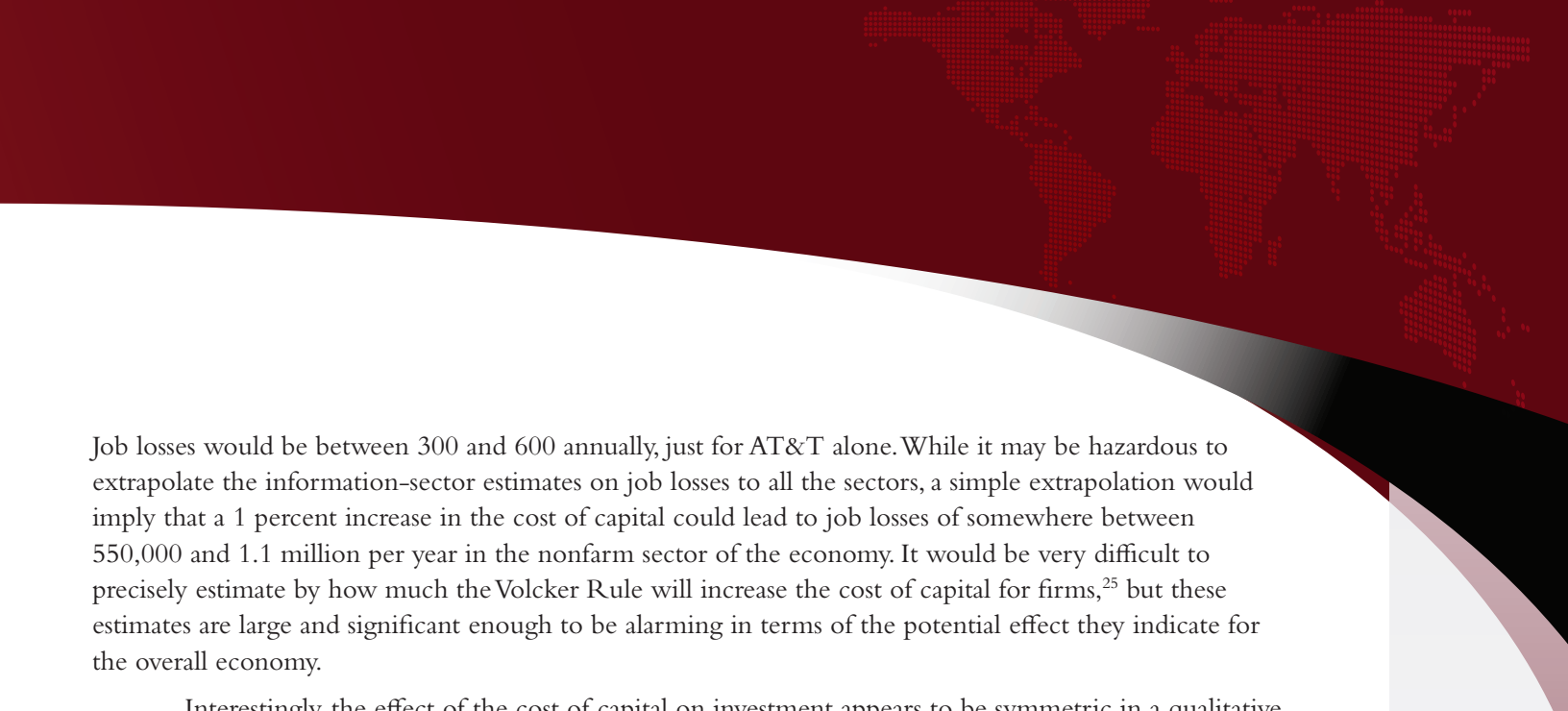
Figure 7: Total Capital Expenditures for Select Major Industry Sectors: 2000–2009



Source: U.S. Census Bureau

expenditures by firms in the information sector. They estimate that a 10 percent negative shock to capital expenditures results in an average loss of about 130,000 information-sector jobs the following five years. Including indirect jobs, these job losses could be as high as 327,600 jobs. Lost earnings are estimated to be \$100 billion over the five-year period. They also estimate the “employment multiplier” to be a loss of 10 information-sector jobs for a reduction of \$1 million in capital expenditures. According to Figure 7, aggregate capital expenditure in the information sector in 2009 was a little over \$150 billion, down from well over \$200 billion in earlier years. A 1% increase in the cost of capital in this sector would imply a reduction in capital spending of \$750 million to \$1.5 billion using the Gilchrist and Zakrajsek (2007) estimates. Based on the Beard, Ford, and Kim (2010) estimates, this would mean a loss of somewhere between 7,500 and 15,000 jobs *annually*.

Consider an example from the information sector. AT&T has a capital expenditure of around \$6 billion. A 1 percent increase in its cost of capital would reduce this expenditure by \$30 to \$60 million.



Job losses would be between 300 and 600 annually, just for AT&T alone. While it may be hazardous to extrapolate the information-sector estimates on job losses to all the sectors, a simple extrapolation would imply that a 1 percent increase in the cost of capital could lead to job losses of somewhere between 550,000 and 1.1 million per year in the nonfarm sector of the economy. It would be very difficult to precisely estimate by how much the Volcker Rule will increase the cost of capital for firms,²⁵ but these estimates are large and significant enough to be alarming in terms of the potential effect they indicate for the overall economy.

Interestingly, the effect of the cost of capital on investment appears to be symmetric in a qualitative sense. Gilchrist, Himmelberg, and Huberman (2005) document that a *reduction* in the cost of capital leads to an increase in investment.

Impact on Risk of Investments: There is also another effect, which is that as the cost of capital rises, the firm needs to find investments with higher expected rates of return, which are typically riskier investments. For example, a firm may have an opportunity to expand its domestic operations and the internal rate of return from doing so is 10 percent. If its cost of capital is below 10 percent, the NPV of this expansion will be positive and the firm will make the investment. But, if the cost of capital rises above 10 percent, the firm will pass up this opportunity and look for something with a higher return, such as an opportunity to build a plant in an emerging market.²⁶ Firms thus may either invest less, resort to riskier investments, or both. As shown in Thakor (2011), reductions in investments, induced by higher financing costs, can have a multitude of spillover effects in an interconnected economy.²⁷ It is difficult to estimate all of the effects generated by this that are pernicious to economic growth.

Impact on the Duration of Projects Invested in: An increase in the cost of capital also makes the firm display a stronger preference for faster-payback projects (i.e., projects on which the firm can recover its investment more quickly). Corporations are often accused of “short-termism,” or making investments that seek to capture short-term profits at the expense of long-term value. But what a higher cost of capital achieves may look behaviorally similar to such a practice even when companies are simply making value-maximizing investments. The reason is that the negative impact of an increase in the cost of capital is *bigger* for more-distant cash flows. Thus, projects with longer payback periods decline more in value than those with shorter payback periods.

25. The details of how the Volcker Rule will be implemented are still uncertain.

26. Emerging market opportunities are likely to have higher expected returns and higher risks.

27. For example, if an automobile manufacturer reduces capital investment (and possibly employment), its “upstream,” auto-parts suppliers may also have to scale back their investments and their “downstream” stakeholders—dealers, for example—may have to do the same.

IMPACT OF THE VOLCKER RULE ON FINANCIAL INSTITUTIONS

The Impact on Risk Management Within Banks

In evaluating the potential impact of the Volcker Rule on banks, this section is organized in four parts: risk management, loan quality signaling in securitization, reduction in the value of financial services provided, impact on the business model of banks, and the effect on the coevolution of banks and markets.

Banks have to manage a variety of risks. The most prominent among these are credit risk, interest rate risk, and liquidity risk. A key aspect of risk management is that it is *not* efficient to manage these risks as if each risk is a tub on its own bottom. Integrated risk management, commonly referred to as enterprise risk management, is essential to effectively cope with these risks.²⁸

As discussed earlier, securitization facilitates bank *credit risk management*. A bank would like to focus its loan origination activities in sectors where it has credit screening expertise because that is where it is most likely to be able to identify and screen out bad credit risks with the greatest precision. However, the downside of this is that it leads to credit concentration risk. This calls for the bank to diversify. Before the advent of securitization, diversification was very costly because it required that the bank sacrifice its origination expertise and make loans in sectors that were less familiar to it than its core expertise sectors. However, securitization offers the bank the best of both worlds. It can originate loans in its sectors of expertise and then reduce credit concentration by securitizing these loans and selling off some of them to other banks and non-bank investors.²⁹ Moreover, it can purchase securitization claims against portfolios of loans in other sectors that were originated by banks that specialize in those sectors. Thus, diversification and credit risk concentration reduction are achieved without having to originate loans in unfamiliar sectors.

Because securitization creates tranches with different maturities, banks can also improve their management of *interest rate risk* by judiciously purchasing asset-backed securities (claims against pools of loans that are securitized). A major source of interest rate risk for banks is that their loans, on average, have a much longer maturity than their deposits. This maturity mismatch means that banks stand to make losses during times of rising interest rates.³⁰ A way to reduce interest rate risk is to shorten the average maturity of the asset side of the balance sheet. A bank can do this by purchasing asset-backed securities that have shorter effective durations³¹ than the average duration of the loans it has originated.³²

28. See Greenbaum and Thakor (2007) for a discussion.

29. However, it may be that even banks that securitize do not sell off enough of the assets they originate to achieve effective risk management. For example, Acharya, Schnabl, and Suarez (2010) state: "...banks increasingly devised securitization methods that allowed them to concentrate risks on their balance sheets which eventually led to the largest banking crisis since the Great Depression."

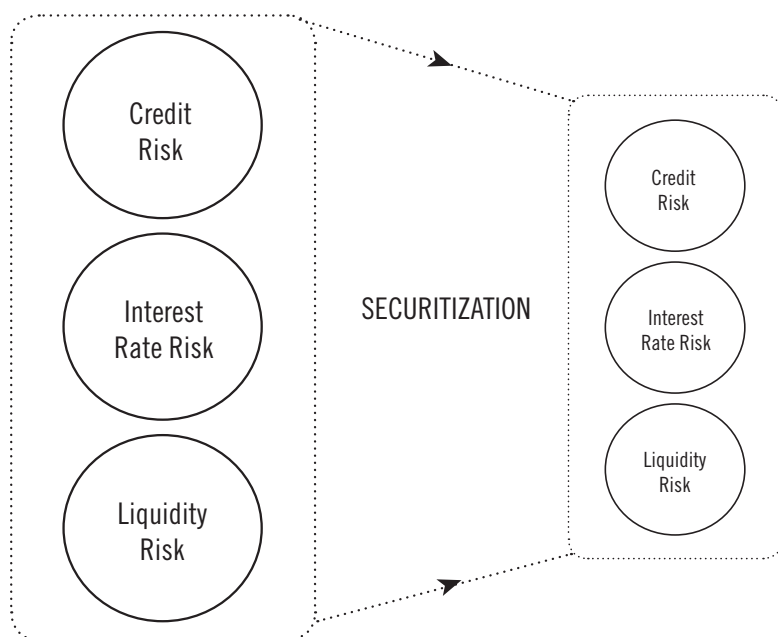
30. This is precisely what happened to savings and loans during the 1980s.

31. Duration is similar to maturity but takes into account the impact of coupon/interest payments on the *effective* maturity. The duration of a zero-coupon bond or a principal-only loan is the same as its maturity. See Greenbaum and Thakor (2007) for an extensive discussion.

32. A portfolio of 30-year fixed rate mortgages typically has an effective average maturity of 9 to 11 years due to prepayments. However, asset-backed securities that are claims against this portfolio can range in duration from 1 year to more than 20 years.

Securitization also enables a bank to more effectively manage *liquidity risk*. A classic problem in banking is that loans are innately illiquid—they cannot be expeditiously sold without incurring a substantial loss in the form of a price discount relative to true value—whereas deposits, especially demand deposits, represent liquid claims. By securitizing its illiquid loans, the bank immediately creates a portfolio of liquid claims that are traded in the capital market. Thus, securitization gives banks the opportunity to manage all three of their major risks, as shown in Figure 8.

Figure 8: Securitization and Bank Risk Management



A rigid implementation of the Volcker Rule can interfere with efficient bank risk management. A bank that is holding an inventory of securitized loans would have to justify to regulators that it is *not* holding this inventory for (prohibited) proprietary trading. As Erel, Nadauld, and Stulz (2011) document, banks with large trading portfolios had holdings of highly-rated asset-backed securities that were *30 times* greater than the holdings of the typical bank. This suggests that there may be complementarities or synergies between market making and intrabank risk management when it comes to holding claims produced by securitization. In other words, having an inventory of securitized claims may facilitate *both* risk management *and* market making. By creating a regulatory environment in which banks are pressured to reduce their holdings of securitized claims, we may inadvertently lower the effectiveness of bank risk management.

How are banks likely to respond to this? It is difficult to say. One possibility, however, is that banks will replace the liquidity provided by securitized claims by the liquidity provided by some other asset, such as cash. Thus, instead of holding an inventory of securitized claims that can facilitate market making, banks may

hold cash instead. There is considerable consternation at present about banks holding excessive amounts of cash and not lending enough. This situation will only appear to be exacerbated if banks are induced to hold even more cash as a part of the change in risk management precipitated by the Volcker Rule.

One might object to the argument that restrictions on proprietary trading may interfere with the ability of banks to prudently manage their own risk exposures. After all, the purpose of the restriction is to *limit* bank risk, and the motivation of the Volcker Rule was presumably that unbridled risk-taking through proprietary trading was partly responsible for the latest financial crisis.³³ The response to this is that there is *no* scientific evidence that proprietary trading had a causal effect on the financial crisis. As Whitehead (2011) points out, this makes it far from apparent why proprietary trading is restricted in the Dodd-Frank Act in the first place. Even Chairman Volcker stated that “proprietary trading in commercial banks was ... not central” to the crisis,³⁴ and Treasury Secretary Geithner mentioned that many of the most significant losses came from traditional extensions of bank credit, rather than proprietary trading.³⁵

Loan Quality Signaling in Securitization

When a bank securitizes a pool of loans, there is a potential credibility problem. The bank has weaker incentives to devote resources to screening loan applicants and investing in the appropriate due diligence if it anticipates that these loans will be securitized than if it knows that the loans will be held on the bank's books. The reason is that the bank bears a greater cost from making a bad loan if the loan stays on the bank's books than if the loan is sold. Of course, investors that purchase the asset-backed securities that are claims against the portfolio of securitized loans rationally anticipate these incentives and adjust the price accordingly.³⁶ This can result in asset-backed claims selling at relatively low prices, which in turn would undo some of the lower-cost-of-financing benefit of securitization.

Considerable research has been conducted on how this problem of asymmetric information and strategic incentives can be resolved. One way to resolve the problem is through “signaling”.³⁷ For example, a dealer selling a used or “pre-owned” car recognizes that potential buyers will have doubts about the quality of the car. A (costly) signal that can resolve these doubts would be a warranty provided by the dealer. The warranty would signal to a potential buyer that the dealer believes the car has high quality since the cost of providing the warranty is higher for a lower quality car. The securitization market also uses signaling.³⁸ By keeping on its books some of the tranches of the loans it securitizes, a bank can signal to the market that it believes that the loans are of high quality. Recent empirical evidence provided by Erel, Nadauld, and Stulz (2011) substantiates this conjecture. The authors document that many banks, to varying degrees, held on to the

33. As Whitehead (2011) indicates, Senator Jeff Merkley, a co-sponsor of the Senate version of the Volcker Rule, placed “the blame” [for the financial crisis] squarely on proprietary trading.

34. See Dixon and Wutkowski (2010).

35. See Hearing before the Congressional Oversight Panel (2009).

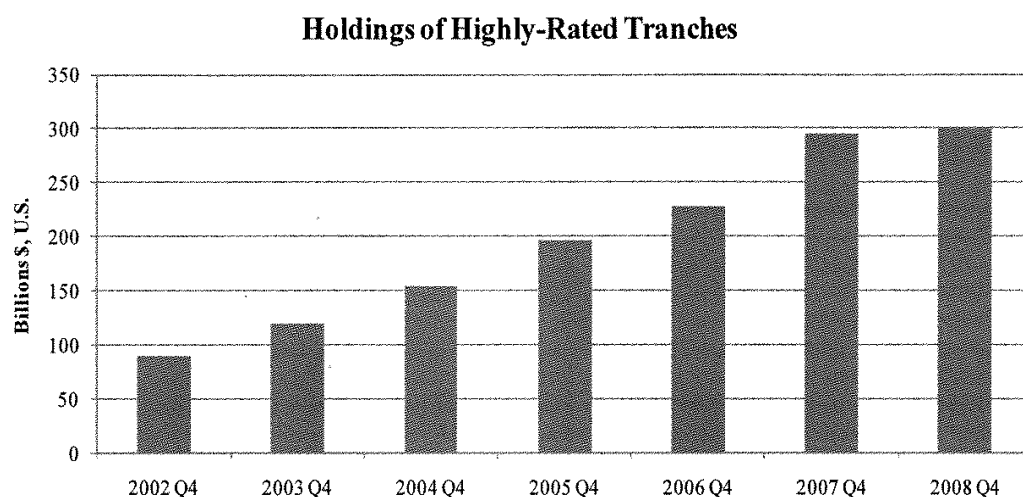
36. In a Nobel-Prize-winning contribution, Akerlof (1970) showed that markets in which asymmetric information creates incentives for this kind of strategic behavior, there may be a complete breakdown of the market.

37. In another Nobel-Prize winning contribution, Spence (1974) showed that in the labor market, individuals who possess more information about their own innate abilities than employers do can signal this information through the level of education they acquire.

38. Greenbaum and Thakor (1987) was the first paper to provide a rigorous theoretical model to show this.

asset-backed securities that were associated with the loans they had originated. During the subprime crisis, many of these securities became “toxic” and imposed losses on these banks. Most of these securities were highly rated, and included AAA, AA, and A tranches of asset-backed securities and collateralized debt obligations. The losses that banks incurred arose from declines in the values of these securities during the crisis and the fact that banks had to recognize market-to-market losses associated with these declines. For example, Citibank experienced asset value write-downs of \$18 billion the fourth quarter of 2007 alone. The figure below shows how the holdings of highly rated securitization tranches varied through time during the period from the fourth quarter of 2002 to the fourth quarter of 2008. As Figure 9 shows, these holdings amounted to about \$300 billion.

Figure 9: Dollar Amounts of Holdings of Highly-Rated Tranches

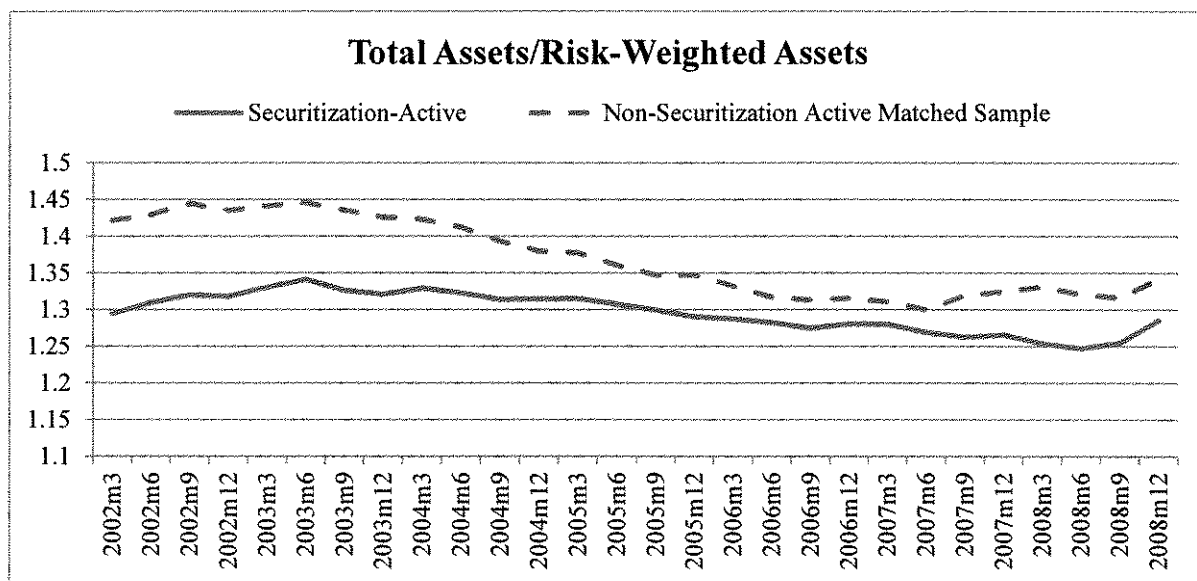


Source: Erel, Nadaud, and Stulz (2011).

Figure 9 plots the aggregate, nominal U.S. dollar amount of holdings of highly-rated tranches through time. The sample runs from 2002 to 2008 and includes all U.S. publicly-traded bank holding companies. The plot is created using the “highly rated residual” measure of highly-rated holdings, defined as the sum of nongovernment or nonagency mortgage-backed securities; asset-backed securities rated in the highest three investment grade (AAA, AA, or A) categories; and nongovernment, nonagency mortgage-backed securities in trading securities. The measure includes held-to-maturity and available-for-sale securities with 20 percent or 50 percent risk weight minus securities in 20 percent or 50 percent risk-weight category that are issued or guaranteed by the government or government-sponsored agencies. All values are at amortized costs, except for mortgage-backed securities from trading assets that are recorded at fair values.

Erel, Nadaud, and Stulz examine a number of different explanations for why banks chose to hold on to the most highly rated securitization tranches related to the loans that they originated. They find the strongest empirical support for the signaling hypothesis. In particular, they find that, for most banks, the holdings of highly rated tranches as a percentage of assets were less than 1 percent, but that banks with large trading positions had holdings that were, on average, 30 times larger than the holdings of the typical bank, as mentioned earlier. Their evidence makes it clear that banks with large trading assets allocate more of their holdings to highly rated tranches, as shown in Figure 10.

Figure 10: Time Series Plot of Total Assets to Risk-Weighted Assets



Source: Erel, Nadauld, and Stulz (2011).

This figure plots the ratio of total assets to risk-weighted assets using a sample of U.S. publicly-traded bank holding companies. The sample includes all securitization-active bank holding companies and a size-based matched sample of nonsecuritization active bank holding companies. Banks are deemed “securitization-active” if the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is greater than zero in any quarter between the years 2003 and 2006.

Based on their evidence, the authors conclude as follows:

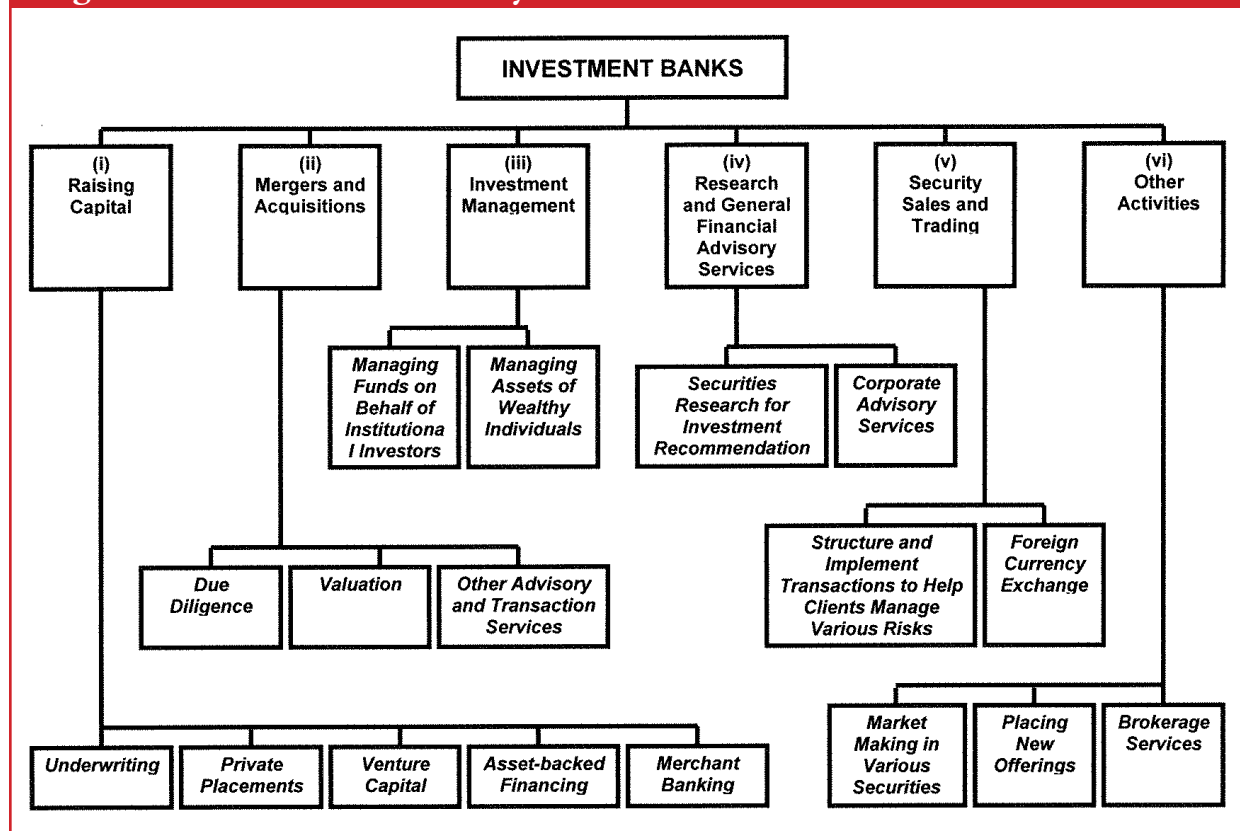
We find, however, that banks active in securitization held more highly-rated tranches. Such a result can be consistent with regulatory arbitrage as well as with securitizing banks holding highly-rated tranches to convince investors of the quality of these securities. Our evidence supports the latter hypothesis.

The implication of this research is that banks may consider it important to hold in their portfolios asset-backed securities related to the loans they originate and securitize in order to signal the quality of the loans being securitized. Without this ability to signal, a bank may have to accept a relatively large “lemons discount” in price when it sells securitized claims. This can reduce the benefit of securitization, particularly the cost-of-funding advantage commonly associated with raising funds through securitization rather than deposits. The consequence may not only be diminished securitization by banks, but also a higher cost of financing for those who borrow from banks.

Reduction in the Value of Financial Services Provided by Banks

Banks provide a variety of services to their customers, some of which may be adversely affected by the Volcker Rule. Market making is one such service, and it was discussed earlier. There are, however, other services as well that fall under the general umbrella of “advisory services”. Examples are advice on what securities to issue in the secondary and the timing of security issuances, advice on whether to do an initial public offering and at what price, trading advice, risk management advice and so on. Figure 11 shows the wide variety of services that investment banks, for example, provide.

Figure 11: Services Provided by Investment Banks



Source: Greenbaum and Thakor (2007).

A bank’s knowledge of financial markets enables it to provide services that add value to its customers. This knowledge is gained in a variety of ways, one of which is market making. In particular, the fact that market making involves a network, as explained earlier, means that the larger the number of trades that the bank is involved in as a market maker, the more it learns about market conditions and the more valuable a member of the network it becomes. This knowledge then not only enhances its effectiveness as a

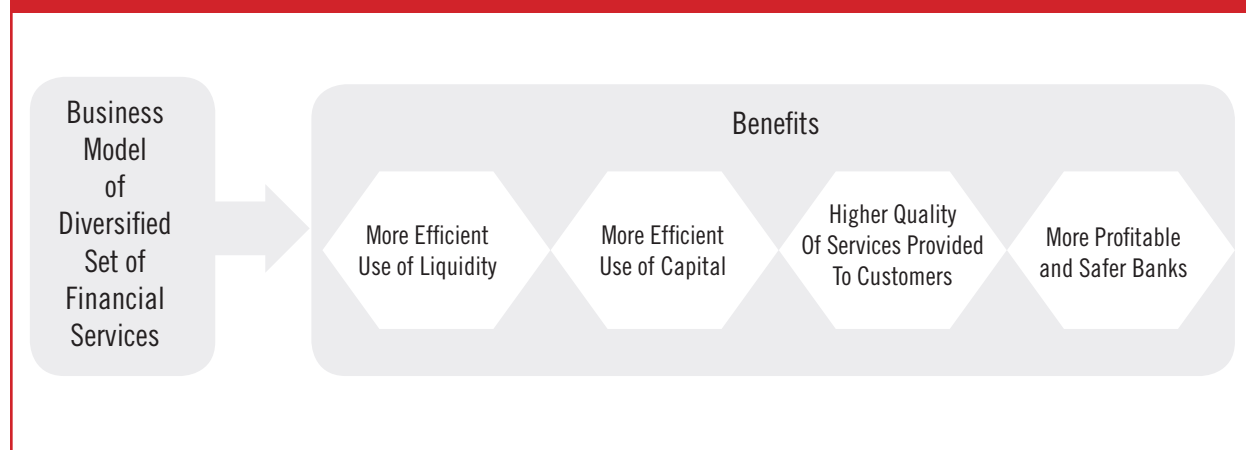
market maker, but also increases the value it provides across a wide range of services, such as those shown in Figure 11. This knowledge has been referred to as the “cross-sectional reusability of information.”³⁹

Restrictions on proprietary trading that limit the role that banks play as market makers also diminish the amount of information that banks can gather about market conditions and lowers the value of the services that they provide to their customers. Some have argued that claims about the potential harm done by the reduced role of banks as market makers are overblown, because if banks engage in less market making then others (non-banks) will step in and fill the vacuum. The argument that non-banks *may* fill the space vacated by banks may be valid, but what is *not* valid is the assertion that this would be without adverse economic consequences. This discussion reveals that one of the consequences will be a lower value of services provided to the customers of banks. In the end, it is the bank *customers* who may be adversely affected.

Impact on the Structure of Financial Institutions

As discussed earlier, banks have evolved a business model over the past few decades that involves providing a diversified set of financial services that include commercial and investment banking, including securities underwriting and market making. Many of these activities are shown in Figure 11. This evolution of the banking business model occurred *not* because of changes in regulation but because of the inexorable march of market forces. The dynamics of the financial services industry made it economically beneficial for banks to expand their business model to provide a diversified set of financial services. As shown in Figure 12, this evolving business model provided numerous economic advantages.

Figure 12: The Benefits of a Business Model Based on Providing Diversified Financial Services



Let us examine each benefit in turn.

39. See Greenbaum and Thakor (2007).



More Efficient Use of Liquidity: Keeping more liquid assets, like cash, on the balance sheet is one way for banks to manage liquidity risk. However, keeping liquidity like this is costly for banks because liquid assets like cash are “lazy” assets that earn little by way of return. Banks therefore face a tradeoff: keep assets tied up in low-return liquid assets in order to reduce liquidity risk, or invest in higher-yielding assets and accept more liquidity risk. This induces banks to be *efficient* with their use of liquidity, keeping as little of it as necessary to meet their risk management objectives.

When banks engage in a broader set of activities, it makes their liquidity risk management more efficient. The reason is that each activity is subject to random needs for liquidity, but the random liquidity “shocks” for the different activities are *not* perfectly correlated with each other. That is, when more liquidity is needed for the bank’s market-making activity, less liquidity may be needed for its commercial banking activity. Such imperfectly correlated liquidity shocks allow the bank to avail of internal “operational” diversification and keep less liquidity to achieve the same level of *enterprise* liquidity risk than if it lacked such diversification because, keeping the size of its balance sheet fixed, its business model was such that it engaged in fewer activities.⁴⁰

This means that a Volcker Rule that causes banks to retrench from market making will reduce the efficiency of the bank’s liquidity risk management. Banks are likely to respond by keeping more liquidity on the balance sheet (i.e., more “lazy” assets). This, in turn, will increase the bank’s cost of providing various services, and the higher cost will likely be passed on to the bank’s customers.

More Efficient Use of Capital: Like liquidity, capital also presents banks with a tradeoff. On the one hand, keeping more capital increases the overall safety of the bank. On the other hand, capital is costly for the bank.⁴¹ Thus, banks will attempt to optimize their use of capital. Using logic similar to that for liquidity, we can see that banks will be able to use capital more efficiently when they engage in more activities. When one activity finds itself in turbulent waters and needs more capital to buffer the shocks to the business, another activity may need less capital because it is doing well. This way, the bank can achieve a desired level of safety with less capital than if it had a less diversified business mix.

One economic reason for this that is worth mentioning is that although the bank’s shareholders do not care about whether the bank is operationally diversified (because shareholders can diversify their own holding across firms at negligible cost), the bank’s employees, customers, and other stakeholders do care about diversification. The bank’s financial distress or failure can affect employees (who may have to be laid off) and customers (who may experience disruptions in the provision of services to them). The bank will take these considerations into account in determining how much capital to hold on its balance sheet.

Because a bank with a greater scope of business activities can deploy its capital more efficiently to manage its business risk than a bank with a narrower scope, such a bank will also be less averse to meeting higher regulatory capital requirements. The “political economy” of regulatory capital requirements reflects an ongoing tension between the desire of regulators charged with microprudential regulation to impose higher minimum capital requirements and the desire of banks to operate with lower capital requirements.

40. This point has been developed theoretically and buttressed with empirical evidence by Kashyap, Rajan, and Stein (2002).

41. One reason may be that banks have access to core deposits that have economic rents associated with them. Equity capital does not.

To the extent that allowing banks to operate with the diversified financial services model leads to a more efficient use of capital, it may prove to be easier for regulators to obtain the cooperation of banks in endorsing higher capital requirements.⁴²

Higher Quality of Services Provided to Customers: A bank with a more diversified set of financial services as its business model will end up gathering more information about market conditions than a bank that does not provide as diversified a set of services. This was discussed earlier as a benefit of cross-sectional information reusability, which increases the value of the services the bank provides to its customers. The Volcker Rule can impede this.

Perhaps just as important, such a business model also affects the bank's overall *strategy*. Growth opportunities in one sector can generate potential opportunities in another sector largely because of complementarities or scope economies in operating in both sectors. For example, growth in relationship lending to small or mid-sized private firms can permit the bank to learn more about the needs of these firms and eventually figure out the optimal timing for taking these firms public by underwriting their initial public offerings.⁴³ This can facilitate growth in the bank's securities underwriting business, and a bank that observes a growth in relationship lending in its commercial banking division may choose to formulate a growth strategy of expansion in underwriting, perhaps through an acquisition. To put it in a nutshell, a bank's business model affects its value-maximizing growth strategy, and regulatory initiatives like the Volcker Rule that affect the business model will also influence the bank's growth strategy.

More Profitable and Safer Banks: As discussed earlier, a business model of providing more diversified financial services can generate more profits for banks and make them safer. However, there is another dimension to this from the standpoint of the bank's business model. When the bank's activities are artificially curtailed by regulatory proscriptions, the bank is not only forced to retrench from a potentially profitable activity, but also may be compelled to alter its business model. The reason is that retrenching from one activity causes a decline in valuable customer-specific and market information the bank gathers. Because of cross-sectional information reusability, this diminishes the value of *other* activities. In some instances, some of these activities may no longer be as profitable as they were before. This may cause the bank to call its entire business model into question.

Effect on the Coevolution of Banks and Markets and the Ability of Businesses to Raise Capital

Traditionally, the view in academic research has been that commercial banks compete with the capital market for business. A bank loan and commercial paper are often close substitutes for high-credit-quality borrowers. Mutual funds are close substitutes for bank deposits, and grew in prominence when Regulation Q ceilings on deposit interests became binding during the high-interest-rate period of the 1980s.

In a recent paper, Song and Thakor (2010) show, however, that besides competing, banks and

42. This is important in part because there are numerous ways in which banks can circumvent higher capital requirements and also because banks can always choose to give up certain activities if capital requirements are viewed as being too onerous, thereby driving these activities to unregulated sectors of the financial services industry.

43. See Boot and Thakor (2000) for a theoretical analysis of this and related relationship banking issues.



markets also complement each other and *coevolve*. When financial markets are better developed, banks are able to finance themselves with equity capital at lower cost, which enables them to expand their scope of lending by extending credit to riskier borrowers. This facilitates the development of banking. Similarly, when banks become more effective in screening borrowers, they are able to ensure that only borrowers above a certain quality threshold are able to go public and have their security issuances underwritten. This benefits the capital market. The Song and Thakor (2010) analysis suggests that when banks have access to a broader range of activities—private equity, hedge funds, market making, and the like—than were permitted before Glass-Steagall was dismantled, the coevolution of banks and markets is facilitated. That is, the impact of positive developments in the capital market on the development of banks and the impact of positive developments in banking on the development of the capital market are both elevated. This suggests the disturbing possibility that denying banks the opportunity to invest in hedge funds, private equity, and the like will artificially constrain the coevolution of both banks and markets.

THE VOLCKER RULE AS ONE PART OF OVERALL REGULATION AND ALTERNATIVES TO THE RULE

This section discusses two issues: the fact that the Volcker Rule is but one piece of an emerging complex mosaic of regulation and its potential effect must be evaluated with that in mind, and that the goals of the Volcker Rule could be met by other means that may be economically more sensible.

Volcker Rule and Other Regulations

The Volcker Rule is not being proposed in a vacuum; it is only one of many other regulations that are about to hit financial and nonfinancial firms in the near future. Thus, we need to worry not only about the impact of the Volcker Rule in isolation, but *in conjunction* with other regulations, some of which may exacerbate its effects. In particular, we need to think about how the effects of the Volcker Rule might *interact* with the effects of other regulations, with potential amplification consequences for the various effects. Some of these other regulations are derivatives regulation, money-market funds regulation, and Basel III capital requirements for banks.⁴⁴ These regulations are briefly discussed here.

Derivatives: Regulation of derivatives is the responsibility of the CFTC and the SEC. Title VII of the Dodd-Frank Act provides a framework for regulation of the OTC swaps market. The CFTC and the SEC are required to define key terms relating to jurisdiction (such as swap, security-based swap, and security-based swap dealers, and major participants in swap transactions) as well as adopt joint regulations for things like recordkeeping requirements and capital and margin requirements.⁴⁵

Money Market Funds: The U.S. money market mutual fund industry is a \$2.65 trillion business. The industry now faces an overview by the Financial Stability Oversight Council, and one of the goals of the proposed new regulations is to prevent runs on money market mutual funds. These funds are among several financial intermediaries that are collectively referred to as the “shadow banking system.” In response to large withdrawals from these funds during the financial crisis, the SEC enacted several regulations in 2010, such as forcing funds to shorten the average maturity of their holdings, keep 30 percent of their assets in securities convertible into cash within seven days, and disclose holdings monthly. Further regulations are expected (including a proposal that funds abandon their stable share price policy) in response to options for additional regulation proposed by the President’s Working Group on Financial Markets.

Basel III Capital Regulation: Basel III is a global regulatory standard on bank capital adequacy, stress testing and market liquidity risk agreed upon by the members of the Basel Committee on Banking Supervision. It will require banks to hold 4.5 percent of common equity (up from 2 percent in Basel II), 6 percent Tier-One capital (up from 4 percent in Basel II) of risk-weighted assets, a mandatory capital conservation buffer of 2.5 percent, and a discretionary countercyclical buffer that would permit national regulators to require up to an additional 2.5 percent of capital during periods of high credit growth. Further, there is a minimum 3 percent leverage ratio, a liquidity coverage ratio that requires a bank to hold sufficient high-quality liquid assets to cover its net stable funding ratio. This will require banks to hold an amount of stable funding that exceeds the amount of stable funding necessary over a one-year period of stress.

44. This is by no means an exhaustive list.

45. See U.S. Securities and Exchange Commission (2011).



The combination of these regulations will result in substantially greater restrictions on banks and other institutions, and will affect the costs of capital for the customers of these financial institutions. With a highly interconnected economic system, it would be dangerous to view any of these regulations in isolation in terms of its potential impact.

What Are the Intended Benefits of the Volcker Rule and How Can We Capture Them Without the Rule?

The main objective of the Volcker Rule is to reduce systemic risk and banking fragility, so that we do not have another debilitating financial crisis. This is a laudable goal, and one that few would dispute. The question is whether there are better ways to meet this objective.

It is useful to begin this discussion by reiterating that the demise of the Glass-Steagall Act was brought about by *market forces* and the changing economics of financial services. The same forces dictate the efficiency of providing a diversified set of financial services today, at least in the case of large banks whose core competencies are aligned with such a strategy. To “turn back the clock” and return to the functional separation mandated by Glass-Steagall, while appealing to a populist theme for holding banks “accountable,” is simply not sound economics. Nonetheless, the issue of how to contain the risk of banks is germane and needs to be tackled.

One appropriate way to achieve this goal is through sound capital regulation. Acharya, Mehran, Schuermann, and Thakor (2012) discuss an approach for a two-tiered capital requirement on banks. This approach calls for both higher capital requirements and capital requirements of a different form. Specifically, banks would be subjected to a Tier-One capital requirement as they are now, although stress tests and other calibration exercises may be needed to determine the level appropriate for efficient microprudential regulation. In addition, there would be a “special capital account” that banks would need to build up through earnings retentions. The level of capital this account may be made *countercyclical*, so that banks have to keep more capital when they (and the economy) are doing well, and less capital during downturns. Whenever the regular Tier-One capital account takes a hit, capital is transferred out of the special capital account into the regular account to bring the bank back in compliance. Dividends are then restricted to allow the bank to gradually build the special capital account back up to its original (pre-transfer) level.

The special capital account can also do “double duty” by satisfying a liquidity requirement. This can be achieved by requiring that some portion or all of the special capital account is invested in very liquid securities like Treasuries. This proposal has features that are similar to some of the features in the Basel III capital regulation discussed earlier.

Placing more capital in banking, especially in a countercyclical manner, combined with other mechanisms like regulatory monitoring, can go a long way in increasing the safety and soundness of the financial system. That is a fundamentally better economic approach than trying to “put the genie back in the bottle” by reviving a part of the Glass-Steagall Act. Note, however, that there is a strong word of caution necessary here. Although it makes sense to emphasize the role of additional capital in microprudential bank regulation, this emphasis assumes that there are *not* other regulations like the Volcker Rule that are also adopted. Adding the Volcker Rule on top of higher capital requirements may be economically damaging.

CONCLUSION

This paper has examined the potential economic ramifications of the Volcker Rule. The effects on market making and liquidity provision in general, the effects on the customers of banks, and the possible effects on banks have been discussed.

We have witnessed time and again the dismantling of regulatory restrictions because of the evolution of market forces that made these restrictions economically obsolete even before they were officially removed. One example is Regulation Q ceilings on interest rates on bank deposits. The high-inflation period of the 1980s that drove up market interest rates and led to the emergence of money-market mutual funds eventually led to the demise of Regulation Q. Another example is interstate branching restrictions. The economies of banking indicated serious inefficiencies associated with these restrictions and eventually caused them to be removed in 1994. In none of these cases did we try to turn the clock back and revive a modified version of these outdated restrictions. So it is with Glass-Steagall and the Volcker Rule.

The Volcker Rule and *Market Making and Liquidity Provision:*

Diminished Market Making Services: One effect of the Volcker Rule is likely to be diminished market making services provided by banks, and consequently lower liquidity in markets where banks are market makers. The reduction in market making by banks will also cause banks to retrench more from market making in smaller and riskier securities where large and unexpected supply-demand shocks are more likely. This will reduce market making in precisely those securities where it is most valuable.

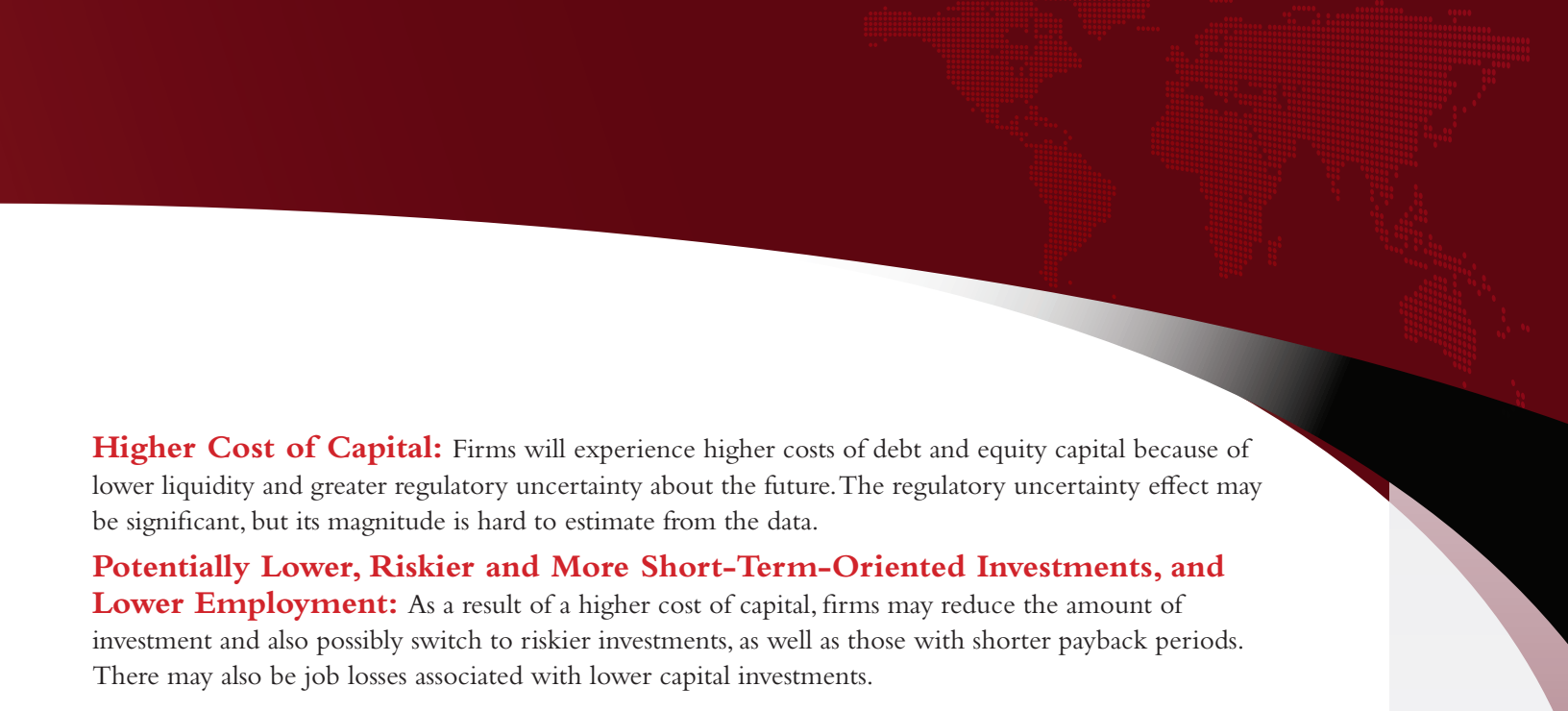
Diminished Network Benefits in Market Making: Market makers operate in a network, and this network permits market makers to benefit from the inventory balances of other market makers as well as their knowledge of market conditions. A reduction in the network following the retrenchment of banks induced by the Volcker Rule is likely to diminish the value of the network, and hence the value of market making services to the bank's customers.

The Volcker Rule and *Businesses:*

Reduced Liquidity: Due to retrenchment from market making by banks, issuers of securities are likely to be confronted with a less liquid market, and the lower liquidity will be manifested in both a higher price impact of trades and a higher bid-ask spread. This has both cost-of-capital and market-access consequences for firms that go to the capital market to issue securities and raise capital.

Mark-to-Market Losses: An immediate impact of the Volcker Rule will be the anticipation of lower future liquidity that will cause expected returns on securities to rise, as both the liquidity premium and the regulatory uncertainty premium go up. Consequently, prices of securities are likely to fall, causing investors to book mark-to-market losses.

Distorted Security Prices: The retrenchment of banks from market making due to the Volcker Rule is likely to cause security price distortions because of supply shocks that are larger in magnitude and persist longer. This means that security prices can stray from the fundamentals.



Higher Cost of Capital: Firms will experience higher costs of debt and equity capital because of lower liquidity and greater regulatory uncertainty about the future. The regulatory uncertainty effect may be significant, but its magnitude is hard to estimate from the data.

Potentially Lower, Riskier and More Short-Term-Oriented Investments, and Lower Employment: As a result of a higher cost of capital, firms may reduce the amount of investment and also possibly switch to riskier investments, as well as those with shorter payback periods. There may also be job losses associated with lower capital investments.

The Volcker Rule and *Financial Institutions*:

Impact on Risk Management in Financial Institutions:

A rigid implementation of the Volcker Rule may interfere with efficient risk management in banks.

Loan Quality Signaling in Securitization: Banks that securitize the loans they originate can signal the quality of the loans they securitize by how much of the securitized tranches they hold on their balance sheets. If the Volcker Rule impedes their ability to do this, it will interfere with the signaling that banks can engage in, potentially causing a decline in the prices at which the securitization tranches can be sold.

Reduction in the Value of Financial Services Sold by Banks: A diminished role for banks as market makers will reduce the amount of information about market conditions that banks gather, and hence diminish the value of advisory and other services that banks provide to their customers.

Impact on the Structure of Financial Institutions: Currently, banks have a business model of providing diversified financial services, and this model is driven by scope economies and complementarities across different financial services. Restrictions on proprietary trading of the form contained in the Volcker Rule may alter this business model and make it less efficient.

Effect on the Coevolution of Banks and Markets: Banks and capital markets coevolve. Advances in one propel advances in the other. A rigid implementation of the Volcker Rule may impede this coevolution.

The main goal of the Volcker Rule is to limit (systemic) risk in banking. This is a good goal, but instead of using the Volcker Rule, it can be achieved more efficiently by asking banks to set aside the appropriate amount of (equity) capital and on-balance-sheet liquidity to cope with the risks they face.

REFERENCES

- Adrian, T., and H. S. Shin, “Liquidity and Leverage,” working paper, Federal Reserve Bank of New York Staff Report 328, June 2007.
- Akerlof, G., “The Market for ‘Lemons’: Qualitative Uncertainty and the Market Mechanism,” *Quarterly Journal of Economics* 84, no. 3 (August 1970), pp. 488–500.
- Acharya, V., H. Mehran, T. Schuermann, and A. V. Thakor, “Robust Capital Regulation,” working paper, Federal Reserve Bank of New York, 2012.
- Archarya, V., P. Schnabl and G. Suarez, “Securitization Without Risk Transfer,” 2010, *Journal of Financial Economics*.
- Amihud, Y., and H. Mendelson, “Asset Pricing and the Bid-Ask Spread,” *Journal of Financial Economics* 17 (1986), pp. 223–249.
- , “Stock and Bond Liquidity and its Effect on Prices,” *Financial Markets Portfolio Management* 20 (2006), pp. 19–32.
- Beard, R. T., G. S. Ford, and H. Kim, “Jobs, Jobs, Jobs: Communications Policy and Employment Effects in the Information Sector,” Phoenix Center Policy Bulletin No. 25, October 2010.
- Bech, M., and R. Garratt, “The Intraday Liquidity Management Game,” *Journal of Economic Theory* 109 (2003), pp. 198–219.
- Boot, A., and A. V. Thakor, “Can Relationship Banking Survive Competition?” *Journal of Finance* 55, no. 2 (April 2000), pp. 679–714.
- Brealey, R., S. Myers, and F. Allen, *Principles of Corporate Finance* (9th ed.), McGraw-Hill, 2007.
- Brunnermeier, M., and L. H. Pedersen, “Market Liquidity and Funding Liquidity,” *Review of Financial Studies* 22 (2009), pp. 2201–38.
- Carpenter, D. H., and M. M. Murphy, “The ‘Volcker Rule’: Proposals to Limit ‘Speculative’ Proprietary Trading by Banks,” *Congressional Research Service Report for Congress* 7–5700, June 22, 2010.
- Chadbourne & Parke, LLP, “Client Alert,” July 29, 2010.
- Comerton-Forde, C., T. Hendershott, C. Jones, P. C. Moulton, and M. S. Seasholes, “Time Variation in Liquidity: The Role of Market Maker Inventories and Revenues,” *Journal of Finance* 65 (2010), pp. 295–331.
- Dixon, K., and K. Wutkowski, “Volcker: Proprietary Trading Not Central to Crisis,” Reuters, March 30, 2010.
- Duffie, D., “Market Making Under the Proposed Volcker Rule,” Working Paper Series No. 106, *Rock Center for Corporate Governance*, January 16, 2012.
- Erel, I., T. Nadauld, and R. M. Stulz, “Why Did U.S. Banks Invest in Highly-Rated Securitization Tranches?” Working Paper 2011-16, Charles A. Dice Center for Research in Financial Economics, Ohio State University, July 2011.
- Gilchrist, S., C. P. Himmelberg, and G. Huberman, “Do Stock Price Bubbles Influence Corporate

Investment?” *Journal of Monetary Economics* 52 (2005), pp. 805–827.

Gilchrist, S., and E. Zakrajsek, “Investment and the Cost of Capital: New Evidence from the Corporate Bond Market,” NBER Working Paper 131714, June 2007.

Greenbaum, S., and A.V.Thakor, “Bank Funding Modes: Securitization Versus Deposits,” *Journal of Banking and Finance* 11, no. 3 (September 1987), pp. 379–401.

Greenbaum, S. I., and A.V.Thakor, *Contemporary Financial Intermediation*, Elsevier, 2007.

Kashyap, A., R. Rajan, and J. Stein, “Banks as Providers of Liquidity: An Explanation for the Co-Existence of Lending and Deposit Taking,” *Journal of Finance* 57, no. 1 (February 2002), pp. 33–73.

Kroszner, R., and R. Rajan, “Organization Structure and Credibility: Evidence from Commercial Bank Securities Activities Before the Glass-Steagall Act,” *Journal of Monetary Economics* 39, no. 3 (August 1997), pp. 475–516.

Mitchell, M., and T. Pulvino, “Arbitrage Crashes and the Speed of Capital,” working paper, *AQR Capital Management*, 2009.

Newman, Y. S., and M. A. Rierson, “Illiquidity Spillovers: Theory and Evidence from European Telecom Bond Issuance,” working paper, Graduate School of Business, Stanford University, 2003.

Oliver Wyman, “The Volcker Rule Restrictions on Proprietary Trading: Implications for the U.S. Corporate Bond Market,” monograph, December 2011.

Onaran, Y., “Attack on Volcker Rule Seen Exaggerating Cost of Disruption to Bond Market,” <http://www.bloomberg.com/news>, January 18, 2012.

Polsky, A., “Restrictions on Proprietary Trading and Certain Interests in, and Relationships with, Hedge Funds and Private Equity Funds,” letter to the OTC, Board of Governors of the Federal Reserve System, FDIC and SEC, *Municipal Securities Rulemaking Board*, January 31, 2012.

Puri, M., “Commercial Banks in Investment Banking: Conflict of Interest or Certification Role?” *Journal of Financial Economics* 40, no. 3 (1996), pp. 373–401.

Song, F., and A.V.Thakor, “Financial System Architecture and the Co-Evolution of Banks and Markets,” *The Economic Journal* 102, no. 547 (September 2010), pp. 1021–12.

Spence, M. A., “Competitive and Optimal Responses to Signals: Analysis of Efficiency and Distribution,” *Journal of Economic Theory* 7, no. 3 (March 1974), pp. 296–332.

Thakor, A.V., “Sources of Capital and Economic Growth: Interconnected and Diverse Markets Driving U.S. Competitiveness,” monograph, *Center for Capital Markets Competitiveness*, U.S. Chamber of Commerce, Spring 2011.

U.S. Securities and Exchange Commission, December 30, 2011, <http://www.sec.gov/spotlight/dodd-frank/derivatives.shtml>.

Whitehead, C. K. “The Volcker Rule and Evolving Financial Markets,” *Harvard Business Law Review*, 2011, pp. 40–72.



CENTER FOR CAPITAL MARKETS COMPETITIVENESS

U.S. Chamber of Commerce
Center for Capital Markets Competitiveness
1615 H Street, NW, Washington, DC 20062
Phone: 202-463-3162
www.centerforcapitalmarkets.com

**Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.**

The Volcker Rule and Market-Making in Times of Stress

Jack Bao, Maureen O’Hara, and Alex Zhou

2016-102

Please cite this paper as:

Bao, Jack, Maureen O’Hara, and Alex Zhou (2016). “The Volcker Rule and Market-Making in Times of Stress,” Finance and Economics Discussion Series 2016-102. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.102>.

NOTE: Staff working papers in the Finance and Economics Discussion Series (FEDS) are preliminary materials circulated to stimulate discussion and critical comment. The analysis and conclusions set forth are those of the authors and do not indicate concurrence by other members of the research staff or the Board of Governors. References in publications to the Finance and Economics Discussion Series (other than acknowledgement) should be cleared with the author(s) to protect the tentative character of these papers.

The Volcker Rule and Market-Making in Times of Stress¹

Jack Bao
Federal Reserve Board

Maureen O'Hara
Johnson Graduate School of Management
Cornell University

Xing (Alex) Zhou
Federal Reserve Board

September 2016

Abstract

Focusing on downgrades as stress events that drive the selling of corporate bonds, we document that the illiquidity of stressed bonds has increased after the Volcker Rule. Dealers regulated by the Rule have decreased their market-making activities while non-Volcker-affected dealers have stepped in to provide some additional liquidity. Furthermore, even Volcker-affected dealers that are not constrained by Basel III and CCAR regulations change their behavior, inconsistent with the effects being driven by these other regulations. Since Volcker-affected dealers have been the main liquidity providers, the net effect is that bonds are less liquid during times of stress due to the Volcker Rule.

JEL classification: G14, G21, G23, G24, G28

Keywords: Volcker Rule, Corporate Bond Illiquidity, Regulation, Capital Commitment, Dealer Inventory, Market-Making, Financial Crisis

¹ We thank Manuel Adelino, Sergey Chernenko, Dan Covitz, Alie Diagne, Darrell Duffie, Josh Gallin, Adam Kolasinski, Jongsub Lee, Nellie Liang, Kleopatra Nikolaou, and seminar participants at the Federal Reserve Board for helpful comments and discussions. The views expressed herein are those of the authors and not necessarily of the Federal Reserve Board of Governors or its staff. All errors are our own.

1. Introduction

Among the many regulatory changes following the financial crisis, few are more controversial than the Volcker Rule. Enacted as part of the Dodd-Frank Act, the Volcker Rule was intended to limit bank risk-taking by restricting or prohibiting certain speculative activities. Critics (for example, Duffie [2012]) contended that an unintended consequence of the Rule could be diminished bond market liquidity, resulting from a reduction in banks' market making activities. Advocates of the Rule disagreed, arguing that non-Volcker affected dealers could compensate for any market making reductions, leaving liquidity essentially unchanged. Recent empirical studies of post-crisis market behavior (e.g., Trebbi and Xiao (2015), Bessembinder, Jacobsen, Maxwell, and Venkataraman (2016), and Dick-Nielsen and Rossi (2016)), however, find conflicting evidence of the effect of regulations on bond market liquidity. In this paper, we focus specifically on the implementation of the Volcker Rule and its impact on bond market liquidity, particularly in times of market stress.

We argue that fully understanding the impact of the Volcker Rule on market liquidity requires understanding how liquidity behaves in the face of severe conditions, or exactly when liquidity is needed most. As shown by recent research, liquidity deterioration was particularly pronounced during the height of the Financial Crisis.² Practitioners and policymakers alike have noted that illiquidity in times of market stress may be the more relevant metric for gauging market stability and performance.³ The main motivation and first major contribution of our paper is to study whether illiquidity is relatively worse in periods of stress after the Volcker Rule was

² See Bao, Pan, and Wang (2011), Dick-Nielsen, Feldhutter, and Lando (2012), and Friewald, Jankowitsch, and Subrahmanyam (2012).

³ See recent comments by Deutsche Banc Research (2016) and testimony by Powell (2016) that even if liquidity is high in normal conditions, it may become more troublesome in periods of stress.

implemented. Motivated by Ellul, Jotikasthira, and Lundblad (2011) who find evidence of forced selling of downgraded bonds induced by regulatory constraints imposed on insurance companies, we use downgrades of corporate bonds to junk as stress events where liquidity is demanded by clients. Focusing on regulation-induced sales has the added advantage of plausibly preventing investors from optimally timing their trades, thereby providing a more reliable estimate of the liquidity conditions that investors face.

Our focus is on a difference-in-differences test comparing the illiquidity of downgraded corporate bonds to a baseline control group both before-and-after the Volcker Rule was implemented. In particular, the first difference is the difference in price impact between a set of bonds recently downgraded to speculative-grade from investment-grade and a set of BB bonds used to control for the general level of illiquidity.⁴ The second difference is between the post-Volcker difference and the pre-Volcker difference. Our results show that bond liquidity deterioration around rating downgrades has worsened following the implementation of the Volcker Rule. We find such adverse effects whether we benchmark to the pre-crisis period or to the period just before the Volcker Rule was enacted, and we find that the relative deterioration in liquidity around these stress events is as high during the post-Volcker period as during the Financial Crisis. Given how badly liquidity deteriorated during the financial crisis, this finding suggests that the Volcker Rule may have serious consequences for corporate bond market functioning in stress times.

The second motivation and contribution of our study is to understand how the Volcker Rule induced changes in dealer behavior, and particularly to identify any differential effects on Volcker-affected vs. non-Volcker-affected dealers. Because the Volcker Rule applied only to banks with

⁴ Results are similar if we instead use bid-ask spreads.

access to government backstops (such as deposit insurance or Federal Reserve borrowing), other dealers without such access can continue to trade and could, in principle, step in to provide additional liquidity in cases where the lines between permissible market-making and prohibited proprietary trading are blurred.

Using a unique data set with dealer identities, we present evidence that non-Volcker-affected dealers have been providing more liquidity during post-Volcker stress times. In the post-Volcker period, the relative share of dealer-customer trades taken by non-Volcker dealers has increased. Dealers affected by the Volcker Rule see a statistically significant increase in agency trades, or trades in which the dealer has pre-arranged an offsetting trade so as not to have inventory risk. For non-Volcker dealers, we see no such effects on agency trades in the post-Volcker period. We also find that Volcker-affected dealers significantly reduce their capital commitment, while non-Volcker dealers commit more capital in market-making. Combined with our results on the increased illiquidity during the post-Volcker period, these results suggest that while non-Volcker dealers have stepped in (as proponents of the Volcker Rule suggested would happen), opponents of the Volcker Rule were correct in arguing that the change would not be immediate.⁵ At least during stress times, this new participation is not yet enough to offset the decreased liquidity in bond market trading.

Finally, a third goal of our research is to disentangle the effects of the Volcker Rule from those of other important regulations on dealer bond market behavior. We do so by focusing particularly on the implementation period as compared to the period just before implementation and also by splitting dealers by their exposure to Basel III. Though most banks' capital ratios are significantly above Basel III minimums, increased Basel III capital requirements along with

⁵ See the Federal Register (2014) publication on the Volcker Rule for details of comment letters. Liquidity deterioration was particularly severe during the height of the Financial Crisis.

Comprehensive Capital Analysis and Review (CCAR) requirements may potentially mean that some banks will reduce their market-making activities because of CCAR constraints. These constraints arise from the fact that dealers are required to meet minimum capital requirements in stress scenarios. Thus, to ensure that our results are not driven by banks constrained by the start of Basel III implementation (along with existing CCAR requirements), we split Volcker-affected dealers into those that are CCAR-constrained and those that are not. We find that capital commitment has decreased significantly for dealers that have neither failed CCAR tests nor been given a conditional pass. Thus, our results are unlikely to be driven by banks adjusting their business to remedy failed CCAR tests.

Our paper is most closely related to three recent studies on regulation and liquidity, all of which focus on the general regulatory environment following the global financial crisis. Studying general trends in corporate bond market liquidity, Trebbi and Xiao (2015) argue that liquidity has not deteriorated following post-crisis regulations. Bessembinder, et al. (2016) provide a similar finding, but also add an examination of dealer behavior. They find that while there is little evidence of increases in transactions costs, there is evidence that dealers behave differently as new regulations have been implemented. Dick-Nielsen and Rossi (2016) study liquidity provision around index exclusion events, finding that liquidity has deteriorated post-crisis. All three papers provide evidence of how liquidity and market-making has changed in post-crisis years following the passage of reform rules, but in contrast to these studies, our focus is on isolating the specific effects arising from implementation of the Volcker Rule. Our main results relate to comparing the post-Volcker implementation period to the period just before Volcker implementation, whereas both Bessembinder et al. (2016) and Dick-Nielsen and Rossi (2016) focus on the years prior to

Volcker Rule implementation.⁶ Trebbi and Xiao's (2015) sample extends to the end of 2014, but they also do not focus on the Volcker Rule implementation period. Furthermore, our use of the regulatory version of TRACE, with dealer identities, allows us not only to split dealers by those that are directly affected by the Volcker Rule and those that are not, but also to identify which dealers were potentially affected by other regulations such as Basel III and CCAR.

The evidence in our study suggests that there are significant costs to the proprietary trading ban in the Volcker Rule, but it is important to note that we do not do any welfare analysis to assess whether the Volcker Rule is overall net positive or net negative for financial markets and the economy.⁷ One obvious potential benefit of the Volcker Rule is the ban of risky trades by institutions that could eventually seek government support if their risky trades led to significant losses. Such analysis requires modeling the trade-off between the social cost to the loss of liquidity in corporate bond markets and the societal benefit of safer banks and is beyond the scope of our study.

The rest of the paper is organized as follows. In Section 2, we discuss the Volcker Rule and its potential impact on market-making in the corporate bond market. In Section 3, we describe our data sources and variable construction. In Section 4, we examine changes in liquidity around times of stress. In Section 5, we examine how the behavior of Volcker-affected and non-Volcker-affected dealers changes with the implementation of the Volcker Rule. We also discuss Basel III and CCAR regulations. Section 6 concludes.

⁶ In fact, both papers discuss their results as being related to an anticipation of new regulations. Our results, in contrast, look at the implementation of the Volcker Rule.

⁷ There are, of course, costs to not having regulation. For example, Chernobai, Ozdagli, and Wang (2016) show that operational risk events increased during the gradual deregulation of bank holding companies from 1996 to 1999. We are, however, unaware of any studies quantitatively measuring the costs of allowing banks to participate in proprietary trading.

2. Potential Impact of the Volcker Rule on the Corporate Bond Market

As part of the Dodd-Frank Act, passed July 21, 2010, section 13 (the “Volcker Rule”) was added to the Bank Holding Company Act of 1956. Section 13 generally prohibits banking entities from engaging in proprietary trading or having ownership or relationships with hedge funds and private equity funds. Implementation of section 13, however, was not immediate and followed a laborious process. On January 18, 2011, the Financial Stability Oversight Council (2011) released a study of its recommendations for implementing section 13. The Treasury, Board of Governors, FDIC, and SEC worked with the CFTC in formulating a proposal before releasing a version for comments in the Federal Register (2011) in November 2011. In December 2013, final regulations were issued, and final regulations with details of market participants’ comments were released in the Federal Register (2014) on January 31, 2014. On April 1, 2014, the Volcker Rule became effective with banks of at least \$50 billion in trading assets required to report some quantitative metrics starting July 2014. By July 21, 2015, large banks were required to be fully compliant with the Volcker Rule. During the conformance period, banks were required to make good faith efforts to conform to the new rules.⁸ Hence, we expect to already see some effects of the Volcker Rule starting in April 2014.

Other research (e.g., Bessembinder et al. (2016) and Dick-Nielsen and Rossi (2016) has argued that anticipation of new regulation implementation could lead to earlier changes in dealer behavior. Though we expect the impact to be the greatest once the implementation period requires dealers to begin reporting metrics on market-making activity, our tests do not preclude the possibility of some changes in dealer behavior prior to rule implementation. In particular, our tests

⁸ See Federal Reserve Board (2016).

are designed to gauge the additional impact of Volcker Rule implementation, mainly benchmarking to the period just before implementation.

The intent of the Volcker Rule is to prohibit banking entities with access to the discount window at the Federal Reserve or to FDIC insurance from engaging in risky proprietary trading. It is important to keep in mind that not all financial firms are covered. For example, an Oliver Wyman and SIFMA (2011) study lists Cantor Fitzgerald & Co., Daiwa Capital Markets, Jefferies & Co., and Nomura as explicitly not covered. It is also the case that not all trading activities are precluded. Recognizing that some activities are necessary for the market to function normally, the Volcker Rule includes an explicit set of permitted activities. The most relevant one for this paper, and arguably the most controversial, is a provision that permits market-making. Essentially, affected dealers can trade securities in a way to facilitate client-driven transactions, but cannot transact in a way intended to make profits based on the price appreciation of securities.

A major difficulty in implementing the market-making exception is distinguishing allowed market-making from prohibited proprietary trading. The Financial Stability Oversight Council (2011) proposed a number of principles to distinguish between the two. Among these are that market-making should have rapid inventory turnover with the vast majority of profits from bid-ask spreads rather than profits from inventory appreciation. Proprietary trading is likely to have more modest turnover with significant profits from inventory appreciation. The FSOC also proposed a number of metrics including measures of inventory aging, customer-initiated trade ratios, and revenue from customer-initiated flows. The final law requires establishment of an internal compliance program and the reporting of seven sets of metrics: (1) Risk and Position Limits and Usage, (2) Risk Factor Sensitivities, (3) Value-at-Risk and Stress VaR, (4)

Comprehensive Profit and Loss, (5) Inventory Turnover, (6) Inventory Aging, and (7) Customer Facing Trade Ratio.

Critics of the Volcker Rule noted many gray areas in the rule and further argued that ambiguity in how the rule would be enforced was likely to be detrimental to market liquidity. Furthermore, though the intent of market-making and proprietary trading may be different, observationally, they are difficult to distinguish. In fact, some argued that proprietary trading could be deemed “risky market-making.” Duffie (2012) writes, “... an attempt to separate ‘legitimate and acceptable’ market-making from ‘speculative and risky’ market-making is not productive, in my opinion.” Duffie and other commenters suggested that the Volcker Rule could be particularly problematic in illiquid markets such as corporate bond markets. Duffie notes that whereas the average half-life of order imbalance in equities is three days, for investment grade corporate bonds it is roughly two weeks. Thus, metrics based on measures such as inventory aging and inventory turnover could be particularly problematic for market-making in corporate bonds. Furthermore, dealers who fear violating the Volcker Rule could be unable to properly manage inventory. One of the guidelines for the Volcker Rule is meeting “near-term customer demand.” But absent perfect predictions about future customer demand, market makers may be hesitant to acquire bonds in advance of a predicted spike in customer demand.

The final rule also presents complications for fulfilling customer demand because of the required internal compliance metrics. The Federal Register (2014) notes that trades exceeding internal limits “should not be permitted simply because it responds to customer demand.” Instead, a banking entity is required to have escalation procedures that include “demonstrable analysis and approval.” Such regulations mean that market makers will find it particularly difficult to respond to large sells in the market.

One initial proposal that was dropped in the final rule was a requirement for detailed revenue attribution. This included identifying revenue attributable to the bid-ask spread as opposed to price appreciation. While the final rule no longer has such a requirement, it does have a profit and loss attribution requirement that focuses on revenue generation patterns. Abnormal patterns could raise a red flag and lead to further review. Given the illiquid nature and infrequent trading patterns in corporate bonds, this could potentially cause issues for market makers, particularly when a significant subset of its bonds has a severe order imbalance.

In summary, Volcker Rule requirements have the potential to impact the behavior of dealers covered by the rule and lead to less liquid markets. Ambiguity as to what is legal market-making and what is prohibited proprietary trading may exacerbate the problem by pushing dealers toward more conservative trading strategies. New rules favoring customer-facing trades may discourage dealers from using the interdealer market, while inventory-based metrics may lead dealers to reduce their inventory exposure. Perhaps most pertinent to our study, the requirement that dealers set internal limits may result in dealers being unable to respond to increased customer demands during times of stress. With all of these theoretical reasons why the Volcker Rule may damage corporate bond liquidity, particularly in times of stress, we turn to assessing whether the empirical evidence is consistent with these concerns.

3. Data and Sample Description

To examine how the Volcker Rule has affected corporate bond liquidity in stress periods, we focus on bond trading around times when a bond was downgraded from investment-grade to speculative-grade. Insurance companies, the dominant investors in the corporate bond market, face regulatory restrictions when investing in the corporate bond markets. The National Association of Insurance Commissioners (NAIC) classifies corporate bonds into six risk categories (NAIC1 to

NAIC6) based on their credit ratings, and requires insurance companies to maintain a higher level of capital when investing in bonds in a higher risk category.⁹ In addition, insurance companies are usually required to invest no more than 20% of their assets in bonds below NAIC2, i.e., speculative-grade bonds. Ellul, Jotikasthira, and Lundblad (2011) find that rating downgrades to speculative-grade can trigger fire sales in the bond market since greater capital requirements and other regulatory constraints prompt widespread divestment by insurance companies. Such regulation-induced fire sales generate high demand for liquidity, and can cause substantial price pressure in the absence of adequate liquidity provision.

We obtain the rating history file from Mergent's Fixed Income Securities Database (FISD) for the period from January 2006 to March 2016. This data file provides the announcement date of rating actions by the three largest rating agencies: Standard & Poor's (S&P), Moody's, and Fitch. We focus on fixed coupon corporate bonds with semi-annual coupon payments, \$1000 par amount, and fixed maturity. These bonds are issued in U.S. Dollars by U.S. firms in the following three broad FISD industry groups: Industrial, Finance, and Utility. We exclude from our sample the following bonds: convertible or putable bonds, private placements, asset-backed issues, and issues which are part of a unit deal. Since rating agencies differ with respect to the timing of rating actions, we follow Ellul, Jotikasthira, and Lundblad (2011) and define the rating change event as the date of downgrade from investment-grade to speculative-grade announced by the first acting rating agency.

We then extract data from FINRA's TRACE database on corporate bond transactions during the one month following each rating downgrade. These data provide detailed information

⁹ Bonds rated AAA, AA, A are in NAIC risk category 1 (NAIC1). NAIC2-NAIC5 correspond to BBB, BB, B and CCC rated bonds respectively. Bonds rated CC or lower belong to NAIC 6. The capital charge for NAIC1 to NAIC6 is 0.4%, 1.3%, 4.6%, 10%, 23% and 30%, respectively.

on all secondary market transactions in the downgraded bond, including bond CUSIP, trade execution date and time, trade price and quantity, a buy or sell indicator, an indicator for agency or principal trade, and an indicator for inter-dealer trade. In addition, the data also contain information on dealers for each trade and, in the case of inter-dealer trades, both sides of the trade. Our version of TRACE is the regulatory version of TRACE, which has dealer identities. The standard version of TRACE, while including flags for dealer-customer and interdealer trades, does not identify the dealer(s) involved in a trade. Knowing dealer identities allows us to separately analyze liquidity provision by Volcker-affected and non-Volcker-affected dealers. Lastly, for each of the rating downgrades in our sample, we obtain characteristics information, including total par amount outstanding, issuance date and maturity date, from Mergent FISD.

To examine bond liquidity during stress times, we estimate the average price impact during the one-month post-downgrade period in the spirit of Amihud (2002):

$$PriceImpact_i = \frac{1}{(N_i-1)} \sum_{t=2}^{N_i} \frac{(P_{i,t} - P_{i,t-1})}{Q_{i,t}},$$

where $P_{i,t}$ and $Q_{i,t}$ represent the price (per \$1000 of par value) and par amount (in thousands) of the t -th trade in bond i , and N_i represents the total number of trades during the one month following the downgrade of bond i .¹⁰ In calculating the price impact measure, we exclude the following transactions: when-issued, cancelled, subsequently corrected, reversed trades, and exclude inter-dealer trades. Following Bessembinder, Kahle, Maxwell, and Xu (2009) and Ronen and Zhou (2013), we remove trades with \$100,000 or less in par amount to avoid the substantial noise that these small trades introduce into prices.

¹⁰ Because we have transaction-level data with trade direction, we modify our calculation of the Amihud (2002) measure to use transaction-level data (as in Dick-Nielsen, Feldhutter, and Lando (2012)) and also use signed trades rather than using absolute changes in prices. As in Amihud (2002), which is based on the theoretical model of Kyle (1985), we aim to capture liquidity by using the response of price to order flow.

Table 1 presents our final sample of rating downgrades after matching FISD's rating history file with FINRA's TRACE data. A total of 687 bonds by 218 firms were downgraded from investment grade to speculative-grade during the period from January 2006 to March 2016. Moody's acted first in 375 bonds, followed by S&P, which downgraded 247 bonds, and then Fitch who acted first for the remaining 89 bonds. Out of the 687 bonds, 356 were downgraded by one notch, and 157 were downgraded by two notches. The remaining 174 bonds were downgraded by three or more notches.

We divide our sample period into five sub-periods: Pre-crisis Period (January 1, 2006 – June 30, 2007), Crisis Period (July 1, 2007 – April 30, 2009), Post-crisis Period (May 1, 2009 – July 20, 2010), Post-Dodd Frank Period (July 21, 2010 – March 31, 2014), and Post-Volcker Period (April 1, 2014 – March 31, 2016). We focus on comparing bond liquidity during the Post-Volcker Period with that during the other four sub-periods prior to the effective date of the Volcker Rule.¹¹ The designations of the four pre-Volcker sub-periods are generally consistent with existing studies (e.g., Dick-Nielsen, Feldhutter, and Lando (2012), and Bessembinder et. al. (2016)).¹²

As pointed out by Trebbi and Xiao (2015), using exact dates of regulatory policies to study the impact of regulation on market liquidity is potentially complicated by anticipatory or delayed responses by market participants. For example, bank dealers might have become more conservative in market-making in anticipation of the rule prohibiting proprietary trading. In addition, regulators gave market participants over one year to fully comply with the Volcker Rule. Thus, using the effective date of the Volcker rule allows us to capture only partial effects of the Volcker Rule on bond liquidity and biases against finding results. The complete effects (including

¹¹ Since our focus is on examining bond liquidity during the one-month following each downgrade, we exclude those downgrade events that happened during the last month in each of the five sub-periods.

¹² The regulatory period that other papers study largely coincides with the period we classify as the Post-Dodd Frank Period.

both implementation and anticipation-related actions) could be larger than our empirical methodology captures.

Table 1 shows how the distribution of sample of rating downgrades across the five sub-periods. A total of 182 bonds were downgraded during the post-Volcker Period. The number of downgraded bonds increases from 114 for the Pre-Crisis Period to 210 for the Crisis Period, and then declines to 68 and 113 for the Post-Crisis Period and Post-Dodd Frank Period, respectively.

4. Liquidity around Stress Events

Studying the effect of Volcker Rule on corporate bond liquidity during stress times is challenging since liquidity of the bond market might have changed over time for reasons unrelated to the post-crisis regulations. To account for the potential influence of such time trends, we use a difference-in-differences methodology by first comparing the price impact in the BB bonds newly downgraded from BBB with that in the existing BB bonds, and then examine how their differences have change from the Pre-Volcker periods to the Post-Volcker Period. Specifically, for each downgrade event, we calculate the average *PriceImpact* in bonds which were rated BB by the acting rating agency during the same one-month period, labeled as *PriceImpactControl_i*. *PriceImpactDiff_i* is the first difference and is defined as the difference in *PriceImpact* between the downgraded bond *i* and other BB bonds during the same one-month period

$$PriceImpactDiff_i = PriceImpact_i - PriceImpactControl_i.$$

We then compare *PriceImpactDiff* over different periods.

4.1. Univariate Analysis of Price Impact Measures

Table 2 shows that the average *PriceImpactDiff_i* is 0.016 during the Post-Volcker Period. This is substantially higher than the mere 0.003 during the Pre-Crisis period. It is also higher than the 0.007 and 0.011 for the Post-Dodd Frank Period and the Post-Crisis Period, and

only slightly smaller than the 0.018 for the Crisis Period. To benchmark these numbers, consider two trades at \$1000 and \$1016 (per \$1000 in face value), respectively. Suppose that the second trade is for \$1,000,000 in face value. This gives a price impact measure of $(1016 - 1000)/1000 = 0.016$.

The changes in $PriceImpactDiff_i$ across sub-periods mainly reflect changes in $PriceImpact_i$ of the downgraded bonds, rather than those of the BB bonds in the control sample. For our sample of downgraded bonds, $PriceImpact_i$ was 0.007 during the Pre-Crisis Period. It jumped to 0.03 during the Crisis-Period, but has since declined to 0.021 in the Post-Crisis Period, and further to 0.015 in the Post-Dodd Frank Period. However, following the implementation of the Volcker Rule, the trend of declining price impact reversed: $PriceImpact_i$ increased to 0.024, higher than any of the Pre-Volcker sub-periods except for the Crisis Period. This finding is intriguing given that $PriceImpactControl_i$ did not change from the Post-Dodd Frank Period to the Post-Volcker Period. In fact, the changes in $PriceImpactControl_i$ over time for the control sample of BB bonds not in stress are consistent with that documented in Bessembinder et al. (2016). In sum, bond liquidity around stress events have deteriorated since the Volcker Rule took effect.

4.2. Regression Analyses

To check the statistical significance of the changes in $PriceImpactDiff_i$ from the pre-Volcker sub-periods to Post-Volcker Period, and also to control for the influences of other factors on bond liquidity during stress times, we conduct regression analyses in this section to further study the Volcker Rule effect on corporate bond liquidity.

We create four dummy variables for the four sub-periods after the Pre-Crisis Period: Crisis, Post-Crisis, Post-Dodd Frank, and Post-Volcker. Crisis takes the value of one if a rating

downgrade occurred during the Crisis Period, and it takes the value of zero otherwise. The other three sub-period dummies are created in a similar way. We then regress $PriceImpactDiff_i$ on the four sub-period dummies, and a host of control variables.

First, although all our sample bonds were downgraded from investment grade to speculative-grade, they differ from each other in terms of both pre-downgrade rating and the number of notches downgraded. Since such differences can affect bond trading following the downgrade announcement, and hence the $PriceImpactDiff_i$ measure, we include as control variables *Previous Rating* and $\Delta Rating$, which refer to the rating of the bond prior to the downgrade and the number of notches by which it was downgraded, respectively. Second, we control for bond characteristics, including (the log of) number of years since issuance (*Log Age*), number of years until maturity (*Log Time to Maturity*), and total par amount outstanding (*Log Amount Outstanding*). Lastly, we include into the regressions several variables that capture general market conditions during the same one-month period following each downgrade. These variable include aggregate market index returns, such as the return to the S&P 500 Index (*SP500 Index Return*), the return to the Barclays Capital U.S. Investment-Grade Corporate Bond Index (*IV Bond Index Return*) and the Barclays Capital U.S. High-Yield Corporate Bond Index (*HY Bond Index Return*). We also include changes in market volatilities, such as the change in CBOE stock market volatility index (ΔVIX), the change in the volatility of the Barclays Capital U.S. Investment-Grade Corporate Bond Index ($\Delta IV Bond Volatility$) and the Barclays Capital U.S. High-Yield Corporate Bond Index ($\Delta HY Bond Volatility$), and the change in 3 month LIBOR rate ($\Delta 3M LIBOR$). Changes in market volatilities and interest rates are calculated by comparing the one-month following a downgrade

to the one-month prior to the downgrade.¹³ Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

Column I of Table 4 presents the result from this regression analysis. We find that bond characteristics affect the *PriceImpactDiff_i* measure, with older bonds and bonds with longer time-to-maturity experiencing lower liquidity following their downgrade, while larger issues enjoy higher liquidity. *Previous Rating* and *Rating Change* do not have a significant impact on the *PriceImpactDiff_i*, and neither do the macro-economic variables.

More importantly, the coefficient for all four sub-period dummies are positive and significant at the 5% level, suggesting that bond liquidity around stress events has significantly deteriorated since the beginning of financial crisis. Consistent with the summary information presented in Table 2, the magnitude of the coefficient for sub-period dummies first declines monotonically from Crisis to Post-Dodd Frank, but then increases from Post-Dodd Frank to Post-Volcker. Tests on the differences in the coefficients on sub-period dummies show that the coefficient for Post-Volcker is significantly higher than that for Post-Dodd Frank, and it is not statistically significantly different from that for Crisis and Post-Crisis. These results suggests that bond liquidity around stress events has worsened following the implementation of the Volcker Rule, and it has deteriorated to a level similar to that during the financial crisis.

To confirm that the increase in *PriceImpactDiff_i* for Post-Volcker is mainly driven by higher price impact for the downgrade bonds, rather than lower price impact for BB bonds, we run the regression by using either *PriceImpact_i* or *PriceImpactControl_i* as the dependent variables. These results are presented in Columns II and III, respectively. For the sample of downgraded bonds, Post-Volcker has a significantly higher coefficient than Post-Dodd Frank. The coefficient

¹³ For ease of reference, we also provide a definition of all of these independent variables in Table 3.

for Post-Volcker is not statistically different from Crisis and Post-Crisis. These results mirror those from using *PriceImpactDiff_i* as the dependent variable. Meanwhile, for the sample of BB bonds not experiencing any rating changes, there is no significant difference in the coefficients for Post-Volcker and Post-Dodd Frank, both statistically and economically. Taken together, these results are consistent with Volcker Rule degrading liquidity in the bond market around times of stress.

4.3. Robustness Checks

We conduct three tests to examine the robustness of our results on post-Volcker bond liquidity changes. First, we investigate the sensitivity of our results to an alternative measure of liquidity, *Realized Spread*. Second, we study whether using the compliance date instead of the effective date of the Volcker Rule affects our results. And finally, we use a matched sample approach to conduct the difference-in-differences test.

4.3.1 Alternative Liquidity Measure

Measuring liquidity in financial markets is challenging. The fact that most bonds do not trade often makes it even hard to measure liquidity in the bond market as almost all the existing bond liquidity measures rely on transaction data.¹⁴ The reliability of these liquidity measures varies with the amount of trades used in estimation. In this section, we estimate a measure of *Realized Spread* which has relatively low requirements on trade frequency. Specifically, for each downgraded bond, we first calculate the daily *Realized Spread* by taking the difference between volume weighted average customer buy prices (Ask) and volume weighted average customer sell prices (Bid) during the one-month following the downgrade. To avoid the noise embedded in small trades, we exclude trades with \$100,000 or less in par amount. We then average the daily spread across days within the one-month period to get an event level estimate: *RealizedSpread_i*.

¹⁴ One notable exception is Mahanti et al. (2008) who propose a latent liquidity measure for corporate bond by using the holding-weighted average turnover rate of bond portfolio of each fund that holds the bond.

For each downgrade event, we also calculate the average *RealizedSpread* in bonds which were rated BB by the acting rating agency during the same one-month period. We then subtract the average BB bond *RealizedSpread* from that of the downgraded bond to get a *SpreadDiff_i* measure.

We regress *SpreadDiff_i* on the four sub-period dummies and all the control variables and the results are presented in Column I of Table 5. The coefficients for sub-period dummies declines from 0.166 for Crisis to 0.066 for Post-Crisis, and further to 0.051 for Post-Dodd Frank. However, the downward trend of *RealizedSpread* reverses following the implementation of the Volcker Rule. The coefficient of Post-Volcker is 0.09, which is higher than that for the Post-Dodd Frank at the 10% level. Therefore, liquidity as captured by *RealizedSpread* also seems to have deteriorated post-Volcker.

4.3.2 Alternative Definition of Post-Volcker Period

The final Volcker Rule became effective April 1, 2014, but the compliance date for banks to fully conform their proprietary trading activities to the Volcker Rule was July 21, 2015. To examine how any lagged reaction of market participants to regulation during the gap between the effective date and compliance date affects our results, we use the compliance date of the Volcker Rule to redefine Post-Volcker period. Specifically, Post-Dodd Frank period now is from July 21, 2010 to July 20, 2015 and Post-Volcker period is from July 21, 2015 to March 31, 2016. The other sub-periods are defined as earlier.

Column II of Table 5 again provides evidence of deteriorating liquidity following Volcker Rule. The coefficient of Post-Volcker is 0.026, more than double that of Post-Dodd Frank (0.011) and the different is statistically significant at the 10% level. Also similar to the results from using the Final Rule Effective date to define Post-Volcker, the coefficient of Post-Volcker is not significantly different from that of Crisis and Post-Crisis.

4.3.3 Alternative Approach for the Difference-in-Differences Test

In examining how liquidity in downgraded bonds has changed over time, we compare each downgraded BB bond with a sample of BB bonds not experiencing any recent rating changes. Although both downgraded bonds and bonds in the control group have the same rating, they can differ in other key attributes, which could affect their liquidity. To account for this possibility, we use a matched sample approach by comparing each downgraded BB bond with a sub-sample of the BB bonds that are similar to the downgraded BB bond in terms of time-to-maturity, total par amount outstanding, and age.

Specifically, we first segment BB bonds in the control group into three time to maturity categories: short-term (maturing within one year), medium-term (with time to maturity greater than one year by no more than seven years), and long-term (maturing over seven years). Within each maturity category, we further segment bonds into three size categories: small issue, medium issue, and large issue, using \$0.5 Billion and \$1.5 Billion in total par amount outstanding as the cutoffs. Finally, we divide bonds within each size category into new issues and seasoned issues, depending on whether its time since issuance is greater than one year. Therefore, we form a total of eighteen bond groups in the control sample based on time to maturity, amount outstanding, and age. We then calculate *PriceImpactDiff* for each downgraded bond by taking the difference between the *PriceImpact* of the downgraded bond and the average *PriceImpact* of BB bonds from the matching group during the same one-month period.

Column III of Table 5 shows that using the matched sample approach has little impact on our results. We continue to observe that following Volcker Rule, the marginal deterioration in bond liquidity during stress times is as severe as during the financial crisis period.

5. Dealer Behavior Around Stress Events

In this section, we study how the behavior of dealers has changed around Volcker Rule implementation and, importantly, compare the behavior of Volcker-affected dealers and non-Volcker-affected dealers. In Subsection 5.1, we discuss how we identify whether a dealer is Volcker-affected and in Subsections 5.2 and 5.3, we document the change in behavior across the two groups over time. Finally, we discuss other regulations in Subsection 5.4.

5.1 Identifying Volcker-Affected Dealers

A key issue is identifying which broker-dealers are subject to the Volcker Rule. This is a non-trivial task as full lists of Volcker-affected institutions are not published. In a study of the Volcker Rule, Oliver Wyman and SIFMA (2011) provide a list of 21 liquidity providers and whether they categorize as affected by the Volcker Rule.¹⁵ Of these 21 banks, they identify four (Cantor Fitzgerald & Co., Daiwa Capital Markets, Jefferies & Co., and Nomura) that are not affected by the Volcker Rule. Among those affected are major bank holding companies such as Goldman Sachs and Morgan Stanley. However, this list is far from complete as TRACE data identifies hundreds of dealers transacting in the bond market.

To determine whether other broker-dealers are covered by the Volcker Rule, we follow the principle that the Volcker Rule was designed to prevent institutions with access to government backstops from participating in proprietary trading. The two most prominent backstops mentioned in the Federal Register (2014) discussion of the Volcker Rule are FDIC insurance and access to the Fed's discount window. We start with the broker-dealers on the Oliver Wyman and SIFMA (2011) list and add to it the top 300 broker-dealers in terms of trading volume; together, these broker-dealers account for 97% of total bond market trade volume. We then search both the FDIC's database of FDIC-insured banking institutions and the National Information Center's

¹⁵ We reproduce this list in Table 6.

institution database to see which of the 300 broker-dealers were subject to the Volcker Rule. The former is relatively straightforward. If a broker-dealer, or more likely an affiliate (i.e., a commercial bank with the same parent holding company) is listed as having FDIC insurance, we code it as Volcker-affected. The latter is more complicated as the NIC database contains “banks and other institutions for which the Federal Reserve has a supervisory, regulatory, or research interest...” Thus, not all institutions in the database are necessarily Volcker-affected. We look for institutions coded as National Banks, State Member Banks, Bank Holding Companies, and Financial Holding Companies and treat these as Volcker-affected. Among the main types of institutions in the NIC database that we do not treat as Volcker-affected are Securities Broker/Dealers and Domestic Entity Other. As a third source, we search the Federal Reserve Board’s Resolution Plans website (<https://www.federalreserve.gov/bankinfo/reg/resolution-plans.htm>) to identify large bank holding companies under Fed supervision that must submit a living will.¹⁶ Combining results from our manual search with the list in Oliver Wyman and SIFMA (2011) results in approximately 45% of the top dealers being determined to be Volcker-affected.

5.2 Dealer Trading Activities

We start by documenting basic dealer trading patterns around downgrade-to-speculative (“stress”) events in Table 7. In the month following a downgrade, the average turnover of downgraded bonds is close to 40% in the Post-Volcker period, higher than any of the other four periods in our sample. It is also much higher than the 9% monthly turnover of BB bonds during the Post-Volcker period, consistent with significant selling by insurance companies in the period just after downgrades to speculative-grade. However, the proportion of total trading volume that

¹⁶ Living wills are mandated by Dodd-Frank to prevent taxpayer bailouts in the future. Thus, the fact that regulators require a living will suggests that these are institutions with government backstops.

is dealer-customer (as opposed to interdealer), 62%, is roughly in line with the other periods of our sample.

Of perhaps more interest, we compare Volcker-affected and non-Volcker-affected dealers in the other panels of Table 7. Our focus is on the proportion of dealer-customer trading handled by Volcker vs. non-Volcker dealers and also the dealers' use of agency trading. The underlying evidence in Ellul, Jotikasthira, and Lundblad (2011) is that around stress events, some institutional investors (e.g., insurance companies) sell bonds due to regulatory constraints. Dealers then intermediate these trades, and potentially hold inventory in bonds when selling demand exceeds buying demand. Both the proportion of customer-dealer trades and the percentage of agency trades address how dealers react to customer demands.

Volcker-affected dealers tend to be larger than non-Volcker dealers and handled 93% of dealer-customer volume around stress events in the pre-crisis period. Over our sample period, we see a gradual decline in the share of dealer-customer volume handled by Volcker-affected dealers. By the Post-Volcker period, non-Volcker dealers were handling almost one quarter of the dealer-customer volume. Though the increasing volume handled by non-Volcker dealers is consistent with Volcker-affected dealers scaling back their market-making due to the Volcker Rule, we cannot rule out the explanation that there has been a gradual time series change in the dealer business that has led the smaller, non-Volcker dealers to take a greater share of dealer-customer volume.

Next, we turn to how agency trading has changed over time for Volcker and non-Volcker dealers. Agency trading occurs when a dealer has lined-up a counterparty to immediately offset a trade with a customer. For example, if an insurance company decides to sell a downgraded bond, a dealer in an agency trade would line-up another customer (or dealer) to purchase the bond. In

such a case, dealers do not commit capital or take on any inventory risk. A principal trade, in contrast, involves dealers taking on one side of a trade without pre-existing knowledge that they will be able to unwind the trade quickly. We follow Harris (2015) and Bessembinder et al. (2016) and define a trade as an agency trade if it is offset by another trade in the opposite direction within one minute.

Our empirical results indicate that Volcker-affected dealers have increased the proportion of their total volume that is done on an agency basis. Pre-crisis, only 12% of the volume traded by Volcker-affected dealers was in agency trades. This number jumped to a little over 15% with the onset of the Financial Crisis and stayed fairly flat until jumping again to almost 23% with enforcement of the Volcker Rule. The sudden jump in the proportion of volume done as agency trades is suggestive of a causal effect of the Volcker Rule on Volcker-affected dealers' willingness to hold bonds on their balance sheet without pre-arranging an offsetting trade. Non-Volcker dealers, in contrast, have seen a decline in the proportion of trades that they do on an agency basis. During the Pre-Crisis Period, almost half of the trades done by non-Volcker dealers around stress events were done as agency trades. By the Post-Volcker Period, this percentage had dropped to 29%.

To more formally study the changes in agency trades across time for Volcker and non-Volcker-affected dealers, we run a regression of proportion of trades that are agency trades on period dummies and controls. Our base regression is,

$$\begin{aligned}
 & \textit{Proportion of agency volume}_i \\
 &= \beta_0 + \beta_1 \textit{Crisis} + \beta_2 \textit{Post - Crisis} + \beta_3 \textit{Post - Dodd Frank} \\
 &+ \beta_4 \textit{Post - Volcker} + \gamma X + \epsilon,
 \end{aligned}$$

where the unit of observation is a stress event, the dependent variable is the proportion of volume done by either Volcker or non-Volcker dealers done on an agency basis, and the omitted period dummy is the Pre-Crisis Period. X represents a vector of control variables that are the same as defined in Table 3 and used in Table 4. Our variable of interest is β_4 , which directly measures the difference in the proportion of volume done on an agency basis between the Post-Volcker Period and the Pre-Crisis Period. Also of interest is the difference between β_4 and the coefficients on the other sub-period dummies.

The regression results are presented in Table 8. In the first column, the dependent variable is the proportion of agency trading done by Volcker Rule affected dealers after stress events. The coefficient on the Post-Volcker dummy is 0.133, indicating a 13 percentage point increase in volume done on an agency basis relative to the pre-crisis period. This change is slightly larger than the 11 percentage point increase without controls in Table 7. Importantly, we also see that the coefficient on the Post-Volcker dummy is also significantly larger than for the other periods in our sample. The Post-Dodd Frank period has a statistically significant coefficient of 0.046, indicating a 4.6 percentage point increase in agency trades compared to the Pre-Crisis Period, but also much smaller than the Post-Volcker Period. The nine percentage point increase in agency trading from the Post-Dodd Frank Period to the Post-Volcker Period is both statistically and economically significant.

In the second column of Table 8, we re-run our agency trade regression, but instead consider the proportion of trades done on an agency basis by non-Volcker-affected dealers. While the coefficients on all of the sub-period dummies are negative and the amount of agency trading done by non-Volcker dealers is smaller (in magnitude) during the Post-Volcker Period as compared to any other period, we do not find any statistical significance. In particular, unlike

Volcker-affected dealers, we do not find a sharp jump in the proportion of agency trading for non-Volcker dealers upon implementation of the Volcker Rule. If anything, we find the opposite, at least in terms of point estimates. Our results are consistent with the Volcker Rule inducing Volcker-affected dealers to shift from principal to agency trading as a way to avoid inventory imbalance.

5.3 Dealer Capital Commitment

A more direct measure of dealers' willingness to hold inventory imbalances is the time-weighted capital commitment. In the one month following a stress event, we calculate for each dealer the absolute deviation from starting inventory. The intuition is that if a dealer starts with a particular desired inventory level, the first purchase moves the dealer above this desired inventory level, but a following sell will again move the dealer back towards the desired inventory level. The actual desired inventory level is unobservable, so our implicit assumption is that the starting level of inventory is optimal. To calculate how far a dealer is from the starting inventory level, we simply take the accumulated buys and subtract the accumulated sells from the starting point. To calculate the time-weighted capital commitment, we then average the absolute distance from the starting inventory, weighting by the amount of time the inventory level is held.

While our measure is similar to the dealer capital commitment measure in Bessembinder et al. (2016), it is important to note that we measure capital commitment over the course of a month while they construct a daily measure. Their measure implicitly assumes that the starting point at each day is the optimal inventory, whereas our monthly measure allows for inventory to continue to move away from optimal inventory over the course of a few days. In particular, if a dealer has purchased a large volume of a bond in a day and has not sold this volume to another customer or

dealer, the dealer still has significant capital commitment the next day. Once we calculate bond-dealer level capital commitment, we sum across dealers for a given stress event.

In Table 9, we report regressions of time-weighted dealer capital commitment on sub-period dummies and controls separately for Volcker-affected and non-Volcker-affected dealers, similar to our proportion of agency volume regressions. The units for time-weighted dealer capital commitment are the number of bonds, with each bond being \$1000 in face value. In the first column, we find that dealer capital commitment by Volcker-affected dealers has declined in all periods relative to the pre-crisis period. Dealer capital commitment is roughly \$10 million in face value lower on average for a downgraded bond during the Crisis, Post-Crisis, and Post-Dodd Frank periods as compared to the Pre-Crisis period.¹⁷ For the Post-Volcker Period, this decline is \$20 million in face value relative to the Pre-Crisis Period. The lower capital commitment for the Post-Volcker Period is also statistically larger for the Volcker Period than it is for the Crisis, Post-Crisis, and Post-Dodd Frank periods. Thus, while there is a large and sudden drop in capital commitment from the Pre-Crisis to the Crisis Period, there is also a large and sudden drop from the Post-Dodd Frank Period to the Post-Volcker Period, suggesting that there was a significant shift in Volcker-affected dealers around the implementation of the Volcker Rule. Column II of Table 9 considers whether capital commitment has changed for non-Volcker dealers. Our results indicate that capital commitment has actually increased for non-Volcker dealers during the Post-Volcker period, in contrast to Volcker-affected dealers.

5.4 Capital Commitment and Basel III

¹⁷ As a benchmark, the average capital commitment of Volcker-affected dealers in BB-rated bonds during non-stress periods is \$6 million. For non-Volcker dealers, it is \$1.6 million.

A potential concern in trying to isolate a Volcker Rule implementation effect is that, in the post-crisis period, a number of reforms were passed to regulate the finance industry. In particular, the Comprehensive Capital Analysis and Review (CCAR) process began in 2011, requiring bank holding companies (BHCs) to submit capital plans to the Federal Reserve. The capital plan requires that the BHC is able to maintain minimum capital requirements even under stress scenarios, providing a stiff test of a BHC's regulatory capital. The punishment for not passing a CCAR test is that the BHC is not allowed to make capital distributions unless the Federal Reserve indicates in writing that it allows the distribution.¹⁸ Each year, the Federal Reserve publishes a list of BHCs that have either failed their CCAR tests or received only a conditional pass.

In January 2014, the start of Basel III implementation went into effect, adding additional capital requirements above what was required in Basel II. In conjunction with CCAR regulations, this potentially made banks more capital constrained and may have caused BHCs to change their market-making businesses.¹⁹ To test the hypothesis that it was the combination of Basel III and CCAR that is driving our results on dealers, we split dealers into those that were CCAR-constrained and those that were not. We classify any bank that failed a CCAR test or was given a conditional pass in 2014 or 2015 as CCAR-constrained.²⁰ If BHCs change their market-making behavior in response to changing capital requirements, then we would expect CCAR-constrained banks to lower their capital commitment more than BHCs that were able to pass their CCAR tests.

In Table 10, we find that both dealers that passed the CCAR tests and dealers that failed or conditionally passed the CCAR test had lower capital commitment in the Volcker Rule

¹⁸ Historically, the Federal Reserve has continued to allow failed BHCs to continue capital distributions at the same rate as in the past. Effectively, the main constraint is that these BHCs cannot increase their capital distributions.

¹⁹ We thank Darrell Duffie for suggesting the CCAR linkage to us.

²⁰ BHCs receiving a conditional pass are required to remediate deficiencies and resubmit a new capital plan later in the year. Thus, such BHCs would have similar incentives to BHCs that fail CCAR tests.

implementation period as compared to the Post-Dodd Frank Period. However, the decline in capital commitment is higher for the dealers that passed CCAR tests (roughly \$4.5 million) than for dealers that failed or conditionally passed CCAR tests (roughly \$2.6 million), a result at variance with the prediction above.²¹ Hoarding capital to pass the CCAR test is thus not supported as an explanation for decreased dealer capital commitment in bond trading.

6. Conclusion

In this paper, we study the impact of Volcker Rule implementation on corporate bond illiquidity and dealer behavior. Our main finding is that the Volcker Rule has a deleterious effect on corporate bond liquidity and dealers subject to the Rule become less willing to provide liquidity during stress times. While dealers not affected by the Volcker Rule have stepped in to provide liquidity, we find that the net effect is a less liquid corporate bond market. We also rule out that the effects are due to the implementation of Basel III in conjunction with CCAR requirements.

Our study focuses on events where investment-grade bonds are downgraded to speculative-grade to capture plausible events of forced selling. Using these stress events, we find that downgraded bonds exhibit a larger price impact of trading than a control group of BB bonds. More importantly, the relative level of the excess price impact is larger after the Volcker Rule is implemented than the period just before the Volcker Rule is implemented. Indeed, we find the disturbing result that illiquidity in stress periods is now approaching levels seen during the financial crisis.

²¹ It is possible that the BHCs that passed their CCAR tests chose to change their capital commitment in anticipation of Basel III, prior to the actual implementation, whereas the BHCs that failed did not. Nevertheless, this also predicts that if BHCs commit less capital to try to pass CCAR tests, we should still see stronger declines in capital commitment during the Volcker implementation period for those BHCs that failed CCAR tests, relative to those BHCs that passed CCAR tests.

Examining individual dealer behavior allowed us to rule out the possibility that our results are driven simply by time series changes in dealer behavior. We find that following Volcker Rule implementation Volcker-affected dealers are less involved in dealer-customer trades, use a greater proportion of agency trades, and are less willing to commit capital. Non-Volcker dealers pick-up a greater proportion of dealer-customer trades and do not have statistically significant changes in their use of agency trades or willingness to commit capital. Splitting Volcker-affected dealers into those who have failed CCAR tests in 2014 and 2015 and those who have not, we find that capital commitment among downgraded bonds has decreased more for dealers that passed CCAR tests, a result inconsistent with a Basel III explanation for decreased bond market liquidity. Overall, our results show that the Volcker Rule has had a real effect on dealer behavior, with significant effects only on those dealers affected by the Volcker Rule and not all bond dealers.

Table 1: Sample Description

This table provides a description of the corporate bonds downgraded from investment grade to speculative-grade by one of three major credit rating agencies (S&P, Moody's, and Fitch) over the period from January 1, 2006 to March 31, 2016. Data on historical rating changes by the three major rating agencies are obtained from Mergent's Fixed Income Securities Database (FISD). We use the date of announcement by the rating agency who acted first to define the downgrade event. We divide the full sample period into five sub-periods: Pre-crisis Period (January 1, 2006 – June 30, 2007), Crisis Period (July 1, 2007 – April 30, 2009), Post-crisis Period (May 1, 2009 – July 20, 2010), Post-Dodd Frank Period (July 21, 2010 – March 31, 2014), and Post-Volcker Period (April 1, 2014 – March 31, 2016). For the full sample period and each of the sub-periods, we present the number of bonds downgraded and number of firms whose bonds were downgraded. We report the number of bonds in which S&P, Moody's, or Fitch was the first to take action. Note that multiple rating agencies can downgrade a bond on the same day. We also report the number of bonds that were downgrade by one notch, by two notches, and by three or more notches (which are in the “**other**” column) respectively.

	# of Bonds	# of Firms	by S&P	by Moody's	by Fitch	by One Notch	by Two Notches	others
<i>full sample period</i>								
January 1, 2006 – March 31, 2016	687	218	247	375	89	356	157	174
<i>by sub-periods</i>								
Pre-crisis Period (January 1, 2006 – June 30, 2007)	114	45	36	50	37	54	17	43
Crisis Period (July 1, 2007 – April 30, 2009)	210	57	105	100	8	97	80	33
Post-crisis Period (May 1, 2009 – July 20, 2010)	68	16	3	61	4	46	3	19
Post-Dodd Frank Period (July 21, 2010 – March 31, 2014)	113	45	51	41	33	64	28	21
Post-Volcker Period (April 1, 2014 – March 31, 2016)	182	55	52	123	7	95	29	58

Table 2: Univariate Analysis of Corporate Bond Liquidity Following Downgrades

This table analyzes the liquidity of a bond during the one-month following its downgrade from investment-grade to speculative-grade over the period from January 1, 2006 to March 31, 2016. We measure bond liquidity by using a price impact measure, $PriceImpact = (P_t - P_{t-1})/Q_t$, where P_t and Q_t refers to the price (per \$1000 of par value) and par amount (in thousands) of the trade at time t respectively. Retail-sized trades, i.e., those with par amount less than \$100,000 are excluded from calculation in order to avoid the noise they tend to carry as suggested by Bessembinder et al. (2009). We first calculate the $PriceImpact$ measure for each trade, and then average it across the trades within the one-month following each downgrade to get an event level estimate. For each downgrade event, we also calculate the average $PriceImpact$ in bonds which were rated BB by the acting rating agency during the same one-month period, and is labelled as $PriceImpactControl$. $PriceImpactDiff$ is the difference in $PriceImpact$ between the downgraded bond and other BB bonds. We divide the full sample period into five sub-periods: Pre-crisis Period (January 1, 2006 – June 30, 2007), Crisis Period (July 1, 2007 – April 30, 2009), Post-crisis Period (May 1, 2009 – July 20, 2010), Post-Dodd Frank Period (July 21, 2010 – March 31, 2014), and Post-Volcker Period (April 1, 2014 – March 31, 2016). Since our focus is on examining bond liquidity during the one-month following each downgrade, we exclude those downgrade events that happened during the last month in each of the sub-periods. We test whether $PriceImpactDiff$ for each sub-period is statistically different from zero and report the p -value. We also conduct tests on the differences in the $PriceImpact$ liquidity measures between two sub-periods and report the p -value. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	PriceImpact	PriceImpact Control	PriceImpact Diff	p-value	Number of Bonds	Number of Firms
Pre-crisis Period	0.007	0.004	0.003	0.062	114	45
Crisis Period	0.030	0.012	0.018	0.000	210	57
Post-crisis Period	0.021	0.011	0.011	0.129	68	16
Post-Dodd Frank Period	0.015	0.008	0.007	0.000	113	45
Post-Volcker Period	0.024	0.008	0.016	0.007	182	55

Table 3: Independent Variable Definitions

This table provides detailed definitions of independent variables used in the tables below. Dependent variables are defined in the respective tables that they are used in.

Variable	Definition
Crisis	Dummy variable equal to 1 for July 1, 2007 to April 30, 2009 and 0 otherwise.
Post-crisis	Dummy variable equal to 1 for May 1, 2009 to July 20, 2010 and 0 otherwise.
Post-Dodd Frank	Dummy variable equal to 1 for July 21, 2010 to March 31, 2014 and 0 otherwise.
Post-Volcker	Dummy variable equal to 1 for April 1, 2014 to March 31, 2016 and 0 otherwise.
Previous Rating	The rating of a downgraded bond before the downgrade from investment-grade to speculative-grade. A numeric value is assigned to each notch of credit rating, with 1, 2, 3, 4 ... denoting AAA, AA+, AAA, AA- ... respectively.
Δ Rating	The number of notches that a bond was downgraded.
Age	The log of the number of years since issuance for a bond.
Time-to-Maturity	The log of the number of years to maturity for a bond.
Amount Outstanding	The log of the total amount outstanding in \$thousands.
S&P 500 Index Return	The return of the S&P 500 over the one-month post-downgrade period. It is expressed in decimal form.
IV Bond Index Return	The return to the Barclays Capital U.S. Investment-Grade Corporate Bond Index over the one-month post-downgrade period. It is expressed in decimal form.
HY Bond Index Return	The return to the Barclays Capital U.S. High-Yield Corporate Bond Index over the one-month post-downgrade period. It is expressed in decimal form.
Δ VIX	The change in CBOE stock market volatility index from the one-month pre-downgrade period to the one-month post-downgrade period.
Δ IV Bond Volatility	The change in the standard deviation of the Barclays Capital U.S. Investment-Grade Corporate Bond Index Return from the one-month pre-downgrade period to the one-month post-downgrade period. It is expressed in decimal form.
Δ HY Bond Volatility	The change in the standard deviation of the Barclays Capital U.S. High-Yield Corporate Bond Index Return from the one-month pre-downgrade period to the one-month post-downgrade period. It is expressed in decimal form.
Δ 3M LIBOR Change	The change in the 3 month LIBOR rate (in percentage) from the one-month pre-downgrade period to the one-month post-downgrade period.

Table 4: Corporate Bond Liquidity Following Downgrades

This table analyzes how corporate bond liquidity evolves during the period from January 1, 2006 to March 31, 2016, especially following the effective date of Volcker rule. The dependent variables for Columns I – III are *PriceImpactDiff*, *PriceImpact*, and *PriceImpactControl*, respectively. *PriceImpact* is price impact of trading in a downgraded bond in the month after the downgrade. *PriceImpactControl* is the average price impact for BB-rated corporate bonds in same horizon as *PriceImpact*. *PriceImpactDiff* is the difference between *PriceImpact* and *PriceImpactControl*. The primary independent variables of interest are dummy variables for Crisis, Post-crisis, Post-Dodd Frank, and Post-Volcker. Detailed definitions of all of the independent variables are provided in Table 3. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	I. PriceImpactDiff		II. PriceImpact		III. PriceImpactControl	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	-0.024	0.339	-0.001	0.491	0.022	0.000
Crisis	0.017	0.003	0.022	0.000	0.006	0.000
Post-crisis	0.016	0.024	0.024	0.002	0.007	0.000
Post-Dodd Frank	0.010	0.010	0.013	0.001	0.004	0.000
Post-Volcker	0.021	0.002	0.025	0.000	0.004	0.000
Previous Rating	-0.002	0.361	-0.004	0.252	-0.002	0.000
Δ Rating	0.001	0.348	0.000	0.405	0.000	0.176
Log Age	0.005	0.015	0.005	0.014	0.000	0.213
Log Time to Maturity	0.008	0.010	0.008	0.014	0.000	0.142
Log Amount Outstanding	-0.016	0.000	-0.016	0.000	-0.001	0.018
SP500 Index Return	0.006	0.477	-0.002	0.493	-0.008	0.227
IV Bond Index Return	-0.021	0.460	-0.031	0.443	-0.010	0.347
HY Bond Index Return	-0.152	0.299	-0.182	0.267	-0.030	0.015
Δ VIX	-0.001	0.242	-0.001	0.201	0.000	0.142
Δ IV Bond Volatility	0.313	0.457	1.163	0.345	0.850	0.009
Δ HY Bond Volatility	0.146	0.476	-0.500	0.418	-0.645	0.004
Δ 3M LIBOR	-0.015	0.251	-0.012	0.300	0.003	0.024
Number of Observations	687		687		687	
R ²	0.079		0.079		0.079	
Post-Volcker vs Crisis		0.296		0.384		0.062
Post-Volcker vs Post-crisis		0.315		0.454		0.000
Post-Volcker vs Post-Dodd Frank		0.037		0.040		0.477

Table 5: Robustness Checks on Liquidity Following Downgrades

This table presents results from robustness checks of the analyses on bond liquidity changes following the implementation of the Volcker Rule. In Column I, we use an alternative measure, *Spread*, to capture bond liquidity. For each downgraded bond, we first calculate daily *Spread* by taking the difference between volume weighted average customer buy prices (Ask) and volume weighted average customer sell prices (Bid) during the one-month following the downgrade. We then average the daily spread across days within the month to get an event level estimate. For each downgrade event, we also calculate the average *Spread* in bonds which were rated BB by the acting rating agency during the same one-month period. We then subtract the average BB bond *Spread* from that of the downgraded bond to get a *SpreadDiff* measure. This is the dependent variable for the regression in Column I. In Column II, we used the compliance date for banks to conform their proprietary trading activities and investments in and relationships with non-legacy covered funds under the Volcker Rule, which is July 21, 2015, to define Post-Volcker period. Specifically, Post-Dodd Frank period is from July 21, 2010 to July 20, 2015 and Post-Volcker period is from July 21, 2015 to March 31, 2016. The other sub-periods during our sample are defined as earlier. In Column III, we compare each downgraded bond to the average of other BB rated bonds with similar time to maturity, amount outstanding, and age when calculating the *PriceImpactDiff* measure. We first segment bonds into three time to maturity categories: short-term (maturing within one year), medium-term (with time to maturity greater than one year by no more than seven years), and long-term (maturing over seven years). Within each maturity category, we further segment bonds into three size categories: small issue, medium issue, and large issue, using \$0.5 Billion and \$1.5 Billion in total par amount outstanding as the cutoffs. Finally, we divide bonds within each size category into new issues and seasoned issues, depending on whether its time since issuance is greater than one year. Therefore, we form a total of eighteen bond groups based on time to maturity, amount outstanding, and age. We then calculate *PriceImpactDiff* for each downgraded bond by taking the difference between the *PriceImpact* of the downgraded bond and the average *PriceImpact* of BB bonds from the matching group during the same one-month period. Downgrade events that happened during the last month in each of the newly defined sub-periods are excluded since the one-month following those downgrades overlapped with the next sub-period. The dependent variable in Column II is *PriceImpactDiff* as in Table 4. The primary independent variables of interest are dummy variables for Crisis, Post-crisis, Post-Dodd Frank, and Post-Volcker. Detailed definitions of all of the independent variables are provided in Table 3. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	I. Measuring Liquidity by Spread		II. Use Compliance Date to Define Post-Volcker		III. Use Matched Bonds to Calculate PriceImpactDiff	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	-0.229	0.165	-0.033	0.285	-0.035	0.266
Crisis	0.166	0.002	0.016	0.003	0.013	0.013
Post-crisis	0.066	0.152	0.017	0.020	0.013	0.061
Post-Dodd Frank	0.051	0.156	0.011	0.007	0.008	0.028
Post-Volcker	0.090	0.056	0.026	0.007	0.019	0.004
Previous Rating	0.008	0.349	-0.001	0.418	-0.001	0.450
Δ Rating	-0.022	0.004	0.001	0.353	0.000	0.462
Log Age	-0.009	0.292	0.005	0.013	0.005	0.023
Log Time to Maturity	0.076	0.002	0.008	0.008	0.008	0.006
Log Amount Outstanding	-0.004	0.433	-0.017	0.000	-0.015	0.000
SP500 Index Return	-0.328	0.186	0.016	0.436	0.013	0.443
IV Bond Index Return	-0.440	0.375	-0.071	0.368	-0.006	0.489
HY Bond Index Return	0.932	0.152	-0.176	0.269	-0.158	0.286
Δ VIX	0.007	0.145	-0.001	0.198	-0.001	0.221
Δ IV Bond Volatility	10.592	0.221	-0.009	0.499	-0.096	0.487
Δ HY Bond Volatility	-21.171	0.025	0.336	0.445	0.705	0.382
Δ 3M LIBOR	0.105	0.101	-0.018	0.223	-0.020	0.184
Number of Observations	647		687		687	
R ²	0.058		0.079		0.074	
Post-Volcker vs Crisis		0.050		0.196		0.212
Post-Volcker vs Post-crisis		0.283		0.217		0.255
Post-Volcker vs Post-Dodd Frank		0.075		0.070		0.034

Table 6: Major Liquidity Providers in the Corporate Bond Market and Volcker Rule

This table provides a list of 21 major securities dealers and whether they are subject to the Volcker Rule. Dealers affected by the Volcker Rule are prohibited from participating in proprietary trading, but have a market-making exception. Non-affected dealers are not subject to bans on proprietary trading or market-making.

Source: "The Volcker Rule restrictions on proprietary trading: Implications for the US corporate bond market" presentation by Oliver Wyman and SIFMA.

Dealers Affected by Volcker Rule	Dealers Not Affected by Volcker Rule
Bank of Nova Scotia	Cantor Fitzgerald & Co.
Barclays Capital	Daiwa Capital Markets Americas
BMO Capital Markets	Jefferies & Company
BNP Paribas Securities	Nomura Securities International
Citigroup Global Capital Markets	
Credit Suisse Securities (USA)	
Deutsche Bank Securities	
Goldman, Sachs & Co.	
HSBC Securities (USA)	
J.P. Morgan Securities	
Merrill Lynch, Pierce, Fenner & Smith	
Mizuho Securities USA	
Morgan Stanley & Co.	
RBC Capital Markets	
RBS Securities	
SG Americas Securities	
UBS Securities	

Table 7: Trading Activity by Dealers Affected by Volcker Rule and those not affected by Volcker Rule

This table presents summary information on trading activities by dealers affected by Volcker rule and those not affected by Volcker rule during each of the five sub-periods between January 1, 2006 to March 31, 2016: Pre-crisis Period (January 1, 2006 – June 30, 2007), Crisis Period (July 1, 2007 – April 30, 2009), Post-crisis Period (May 1, 2009 – July 20, 2010), Post-Dodd Frank Period (July 21, 2010 – March 31, 2014), and Post-Volcker Period (April 1, 2014 – March 31, 2016). *All Trade* refers to the aggregate trade volume by all dealers, including both inter-dealer trade and dealer-customer trade, during the one-month following each rating downgrade. To control for the effect of issue size on trade volume, we first divide the aggregate one-month trade volume for each downgrade event by the total par amount outstanding of the downgraded bond, and then average it across bonds within each sub-period. We report the percent of Dealer-Customer trade volume out of the total trade volume for all dealers (*D-C Trade*), as well as for dealers affected by Volcker rule and those not affected by Volcker rule separately. In addition, for the two groups of dealers, we also report their respective share of the total dealer-customer trade volume (*Share of Total D-C Trade*), and the percentage of their dealer-customer trade that is effectively agent trade (*Dealer Agency Trade*). We classify a trade as being effectively agent if it offset by another trade that occurred within one minute with the same trade size by the same dealer but with opposite trade direction. This one-minute algorithm is similar to that used in Harris (2015) and Bessembinder et al. (2016).

	Full Sample		Dealers Affected by Volcker			Dealers Not Affected by Volcker Rule		
	All Trade	D-C Trade (%)	D-C Trade (%)	Share of Total D-C Trade (%)	Dealer Agency Trade (%)	D-C Trade (%)	Share of Total D-C Trade (%)	Dealer Agency Trade (%)
Pre-crisis Period	0.300	65.601	77.428	93.371	12.104	22.119	6.629	46.404
Crisis Period	0.277	70.037	83.295	89.117	15.413	37.803	10.883	45.326
Post-crisis Period	0.219	62.324	75.958	84.569	15.543	29.192	15.431	35.779
Post-Dodd Frank Period	0.306	53.913	67.224	79.728	15.965	33.063	20.272	33.118
Post-Volcker Period	0.383	62.032	75.608	76.297	22.709	48.722	23.703	29.403

Table 8: Volcker Rule and Agency Trades

This table analyzes how dealers' willingness to arrange trades on a principal basis change following Volcker Rule. We first estimate for each dealer the proportion of dealer-customer trade volume completed on effectively agent basis (expressed in decimals) during the one-month following each downgrade. For each downgrade, we divide the active dealers into two groups: those affected by Volcker rule and those that were not. We then average the percent of agency trade across dealers within each dealer group, and use them as the dependent variables in Columns I and II. The primary independent variables of interest are dummy variables for Crisis, Post-crisis, Post-Dodd Frank, and Post-Volcker. Detailed definitions of all of the independent variables are provided in Table 3. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	I. Dealers Affected by Volcker Rule		II. Dealers Not Affected by Volcker Rule	
	Estimate	p-value	Estimate	p-value
Intercept	0.219	0.163	-0.041	0.454
Crisis Period	0.030	0.176	-0.026	0.361
Post-crisis Period	0.037	0.199	-0.062	0.175
Post-Dodd Frank Period	0.046	0.049	-0.048	0.232
Post-Volcker Period	0.133	0.000	-0.077	0.114
Previous Rating	-0.016	0.223	0.035	0.147
Δ Rating	-0.011	0.086	0.017	0.087
Log Age	0.016	0.083	0.026	0.078
Log Time to Maturity	0.006	0.384	-0.008	0.391
Log Amount Outstanding	-0.035	0.006	-0.020	0.209
SP500 Index Return	-0.164	0.280	-0.627	0.110
IV Bond Index Return	-0.520	0.292	1.421	0.226
HY Bond Index Return	0.688	0.117	-0.821	0.232
Δ VIX	-0.002	0.232	-0.008	0.114
Δ IV Bond Volatility	4.730	0.386	-2.517	0.451
Δ HY Bond Volatility	20.346	0.004	3.674	0.409
Δ 3M LIBOR	-0.082	0.105	0.016	0.431
Number of Observations	687		687	
R ²	0.073		0.031	
Post-Volcker vs Crisis		0.003		0.212
Post-Volcker vs Post-crisis		0.019		0.375
Post-Volcker vs Post-Dodd Frank		0.003		0.266

Table 9: Dealer Capital Commitment around Volcker Rule Implementation

This table analyzes how dealers' willingness to commit their own capital to bond trading changes following Volcker rule. During the one-month following a bond's downgrade, we first calculate for each dealer, the absolute value of a dealer's accumulated principal buy volume and accumulated principal sell volume at the time of each of the dealer's trades in the downgraded bond (in thousands of dollars of face value). We then average the absolute difference between accumulated buys and accumulated sells across trades within the one-month for each dealer, weighting each observation by the time for which the capital is committed. Trades that were not offset prior to day end hence received larger weight in the capital commitment calculation. For each downgrade, we divide the active dealers into two groups: those affected by Volcker rule and those that were not. We then aggregate each dealer's capital commitment measure within each dealer group, and use them as the dependent variables in Columns I and II. The primary independent variables of interest are dummy variables for Crisis, Post-crisis, Post-Dodd Frank, and Post-Volcker. Detailed definitions of all of the independent variables are provided in Table 3. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	I. Dealers Affected by Volcker Rule		II. Dealers Not Affected by Volcker Rule	
	Estimate	p-value	Estimate	p-value
Intercept	45675.140	0.030	6371.760	0.003
Crisis Period	-9025.310	0.003	-617.660	0.012
Post-crisis Period	-11231.500	0.000	609.720	0.023
Post-Dodd Frank Period	-12891.800	0.000	1879.880	0.000
Post-Volcker Period	-20127.890	0.000	2131.810	0.000
Previous Rating	-894.800	0.337	-391.460	0.029
Δ Rating	1371.910	0.025	-117.810	0.099
Log Age	-5690.310	0.000	-321.400	0.034
Log Time to Maturity	4250.750	0.002	50.050	0.387
Log Amount Outstanding	16734.870	0.000	966.710	0.000
SP500 Index Return	55463.810	0.004	3324.580	0.072
IV Bond Index Return	38394.350	0.301	-13601.550	0.162
HY Bond Index Return	-149809.210	0.000	-8738.820	0.085
Δ VIX	-589.090	0.033	-42.560	0.110
Δ IV Bond Volatility	-528626.130	0.269	-94993.340	0.214
Δ HY Bond Volatility	633910.390	0.166	33231.020	0.348
Δ 3M LIBOR	2868.600	0.232	-721.820	0.161
Number of Observations	687		687	
R ²	0.472		0.031	
Post-Volcker vs Crisis		0.000		0.000
Post-Volcker vs Post-crisis		0.000		0.068
Post-Volcker vs Post-Dodd Frank		0.000		0.086

Table 10: Capital Commitment by Volcker Affected Dealers: The Effect of CCAR Testing

This table analyzes how CCAR regulations affect capital commitment among Volcker affect dealers. During the one-month following a bond's downgrade, we first calculate for each dealer, the absolute value of a dealer's accumulated principal buy volume and accumulated principal sell volume at the time of each of the dealer's trades in the downgraded bond (in thousands of dollars of face value). We then average the absolute difference between accumulated buys and accumulated sells across trades within the one-month for each dealer, weighting each observation by the time for which the capital is committed. Trades that were not offset prior to day end hence received larger weight in the capital commitment calculation. For each downgrade, we divide the Volcker affected dealers into two groups: those who passed the CCAR testing in both 2014 and 2015, and those either failed or conditionally passed the CCAR test in at least one year. We then aggregate each dealer's capital commitment measure within each dealer group, and use them as the dependent variables in Columns I and II. The primary independent variables of interest are dummy variables for Crisis, Post-crisis, Post-Dodd Frank, and Post-Volcker. Detailed definitions of all of the independent variables are provided in Table 3. Since bonds issued by the same firm are usually downgraded at the same time, we cluster the standard errors at the firm level.

	I. Volcker Affected Dealers who Passed the CCAR Test		II. Volcker Affected Dealers who Failed/Conditionally Passed the CCAR Test	
	Estimate	p-value	Estimate	p-value
Intercept	21561.340	0.065	23872.770	0.027
Crisis Period	-4255.380	0.022	-5114.490	0.001
Post-crisis Period	-7449.130	0.000	-4186.190	0.008
Post-Dodd Frank Period	-6207.900	0.002	-7171.690	0.000
Post-Volcker Period	-10732.840	0.000	-9816.140	0.000
Previous Rating	368.070	0.382	-1240.680	0.138
Δ Rating	808.620	0.035	588.190	0.039
Log Age	-3098.010	0.001	-2670.770	0.000
Log Time to Maturity	2146.430	0.014	2300.440	0.000
Log Amount Outstanding	12345.580	0.000	4428.690	0.000
SP500 Index Return	45166.660	0.000	10757.080	0.153
IV Bond Index Return	11309.940	0.415	33251.730	0.185
HY Bond Index Return	-104937.140	0.000	-46102.670	0.019
Δ VIX	-481.870	0.004	-101.680	0.277
Δ IV Bond Volatility	153290.210	0.393	-636766.770	0.071
Δ HY Bond Volatility	279028.120	0.239	377606.390	0.118
Δ 3M LIBOR	3094.440	0.107	-336.950	0.433
Number of Observations	683		683	
R ²	0.420		0.369	
Post-Volcker vs Crisis		0.002		0.000
Post-Volcker vs Post-crisis		0.020		0.000
Post-Volcker vs Post-Dodd Frank		0.003		0.007

References

- Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets* 5, 31-56.
- Bao, J., J. Pan, and J. Wang (2011). The Illiquidity of Corporate Bonds. *Journal of Finance* 66, 911 – 946.
- Bessembinder, H., S. Jacobsen, W. Maxwell, and K. Venkataraman (2016). Capital Commitment and Illiquidity in Corporate Bonds. Working Paper, Arizona State University and Southern Methodist University.
- Bessembinder, H., K. M. Kahle, W. F. Maxwell, and D. Xu (2009). Measuring Abnormal Bond Performance. *Review of Financial Studies* 22, 4219 – 4258.
- Chernobai, A., A. Ozdagli, and J. Wang (2016). Business Complexity and Risk Management: Evidence from Operational Risk Events in U.S. Bank Holding Companies. Working Paper, Syracuse and Federal Reserve Bank of Boston.
- Deutsche Banc Research (2016). Surviving less liquid markets. March 17, 2016.
- Dick-Nielsen, J., P. Feldhutter, and D. Lando (2012). Corporate bond liquidity before and after the onset of the subprime crisis. *Journal of Financial Economics* 103, 471 – 492.
- Dick-Nielsen J. and M. Rossi (2016). The Cost of Immediacy for Corporate Bonds. Working Paper, Copenhagen Business School and Texas A&M University.
- Duffie, D. (2012). Market-making Under the Proposed Volcker Rule. Working Paper, Stanford University.
- Edwards, A. K., L. E. Harris, and M. S. Piwowar (2007). Corporate Bond Market Transaction Costs and Transparency. *Journal of Finance* 62, 1421 – 1451.
- Ellul, A., C. Jotikasthira, and C. T. Lundblad (2011). Regulatory pressure and fire sales in the corporate bond market. *Journal of Financial Economics* 101, 596 – 620.
- Federal Register (2011). Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Private Equity Funds. Vol. 76, No. 215, November 7, 2011.
- Federal Register (2014). Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships With, Hedge Funds and Private Equity Funds. Vol. 79, No. 21, January 31, 2014.

- Federal Reserve Board (2016). Volcker Rule: Frequently Asked Questions, <http://www.federalreserve.gov/bankinfo/volcker-rule/faq.htm>, March 4, 2016.
- Financial Stability Oversight Council (2011). Study & Recommendations on Prohibitions on Proprietary Trading & Certain Relationships with Hedge Funds & Private Equity Funds, January 2011.
- Friewald, N., R. Jankowitsch, and M. Subrahmanyam (2012). Illiquidity or credit deterioration: A study of liquidity in the U.S. corporate bond market during financial crises. *Journal of Financial Economics* 105, 18 – 36.
- Harris, L. (2015). Transactions Costs, Trade Throughs, and Riskless Principal Trading in Corporate Bond Markets. Working Paper, USC.
- Kyle, A.S. (1985). Continuous Auctions and Insider Trading. *Econometrica* 53, 1315-1335.
- Mahanti, S., A. Nahikkar, M. Subrahmanyam, G. Chacko, and G. Mallik (2008). Latent liquidity: A new measure of liquidity, with an application to corporate bonds. *Journal of Financial Economics* 88, 272 – 298.
- Oliver Wyman and SIFMA (2011). The Volcker Rule restrictions on proprietary trading: Implications for the US corporate bond market, December 2011.
- Powell, J. H. (2016). Trends in Fixed-Income Markets. Testimony before the Subcommittee on Securities, Insurance, and Investment, and Subcommittee on Economic Policy, Committee on Banking, Housing and Urban Affairs, U.S. Senate, Washington, D.C., April 14, 2016.
- Ronen, T., and X. Zhou (2013). Trade and information in the corporate bond market. *Journal of Financial Markets* 16, 61-103.
- Trebbi, F. and K. Xiao (2015). Regulation and Market Liquidity. Working Paper, University of British Columbia.

Annual Term Debt Funding Cost Analysis



CENTER FOR CAPITAL MARKETS
COMPETITIVENESS

Based on the 2010-2011 historical funding of select large U.S. borrowers and assumed funding strategies for three hypothetical small U.S. borrowers, below is an analysis of the funding cost impact due to a widening of bid / ask spreads.

Illustrative Funding Cost Analysis: Annual Term Debt Issuance of Select Large U.S. Borrowers⁽¹⁾

Issuer	Weighted Average Maturity	Weighted Average Coupon ⁽²⁾	Modified Duration	2010-2011 YTD Issuance	2011-2011 YTD Total Cost Impact of +25 bp Increase	2011-2011 YTD Total Cost Impact of +50 bp Increase
Finance Company	7.5 Years	3.180%	6.5 Years	\$30.4bn	+\$498.7mm	+\$997.5mm
Automotive Finance	5.3 Years	2.267%	4.8 Years	\$10.1bn	+\$122.1mm	+\$244.1mm
Captive Finance	5.0 Years	2.055%	4.7 Years	\$5.8bn	+\$68.0mm	+\$135.9mm
Captive Finance	3.5 Years	1.607%	3.4 Years	\$5.2bn	+\$43.3mm	+\$86.5mm
Aircraft Finance	5.8 Years	2.383%	5.3 Years	\$0.8bn	+\$9.9mm	+\$19.8mm
Total	--	--	--	\$52.3bn	+\$742.0mm	+\$1,483.8mm

(1): Funding cost analysis includes USD-denominated debt issued since January 1, 2010

(2): Includes floating-rate note coupons at current spreads over Libor

Sorted by decreasing annual total impact, then total

Illustrative Funding Cost Analysis: Annual Term Debt Issuance of Three Hypothetical Small U.S. Borrowers

	Assumed Weighted Average Maturity	Assumed Weighted Average Coupon	Modified Duration	Assumed Annual Funding Capacity	Annual Total Cost Impact of +50 bp Increase	Annual Total Cost Impact of +100 bp Increase
Company A	5.0 Years	3.750%	4.4 Years	\$250mm	+\$5.6mm	+\$11.1mm
	10.0 Years	4.750%	7.7 Years		+\$9.7mm	+\$19.4mm
Company B	5.0 Years	3.875%	4.4 Years	\$500mm	+\$11.1mm	+\$22.2mm
	10.0 Years	4.875%	7.7 Years		+\$19.2mm	+\$38.5mm
Company C	5.0 Years	4.000%	4.4 Years	\$1,000mm	+\$22.1mm	+\$44.2mm
	10.0 Years	5.000%	7.7 Years		+\$38.3mm	+\$76.5mm
Total	--	--	--	--	+\$106.0mm	+\$211.9mm

Note: Annual total cost impact is calculated based hypothetical annual funding capacities, weighted average maturities of debt issued and weighted average coupons of debt issued

FINANCING GROWTH



THE IMPACT OF FINANCIAL REGULATION

June 16, 2016

#FinancingGrowth



CENTER FOR CAPITAL MARKETS
COMPETITIVENESS

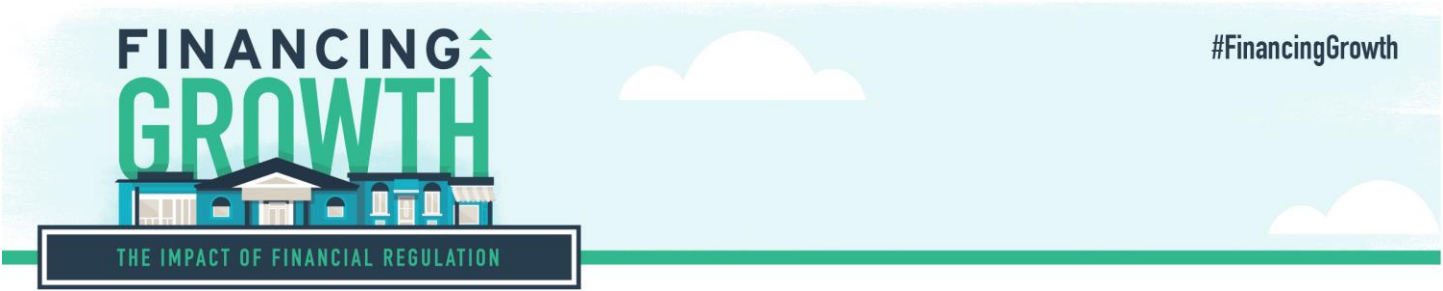


Table Contents

Executive Summary..... 3

 State of Corporate Finance 3

 The Future: What Are Companies Facing 4

Introduction 6

Methodology..... 7

State of Corporate Finance 8

The Future: What Are Companies Facing 11

 Cash Crunch 11

 Impact of Financial Regulations on Main Street Companies 14

Appendix 16

Learn More from Main Street

Whether it was seed capital to open for the first time or a line of credit to build inventory or a short term loan to keep the lights on, businesses rely on community banks, global financial institutions, insurers, and others. These stories illustrate through real companies the benefits of the nexus between Main Street and financial institutions.

Executive Summary

More than three-quarters of American companies of all sizes report that the cumulative effect of the Dodd-Frank Wall Street Reform and Consumer Protection Act and other financial regulatory rules adopted over the past six years is making it harder for them to access the financial services they need. This is true among small, midsized, and even large companies and is felt most acutely in a lack of access to services helping them manage day-to-day liquidity.

This matters because the financial needs of businesses are as diverse as the American economy. Companies work to ensure that they have affordable access to a variety of suppliers for the financial products they need. One of the unintended consequences of the regulatory efforts to reduce risk in the financial system is that many service providers have decided to walk away from providing some products and markets.

Without a robust financial services supply chain, our nation cannot finance adequate economic growth. Regulatory efforts to ensure financial stability must be accompanied by equally vigorous, data-driven analysis to make certain that Main Street companies continue to have access to the financial services they need.

The U.S. Chamber of Commerce surveyed more than 300 corporate finance professionals about their core financial services needs and the indirect regulatory impact of all the newly adopted financial regulations. We asked them about the products they use and the types of financial services they rely on. We also asked them if and how they are seeing the impact from financial regulation on businesses and their customers.

State of Corporate Finance

Main Street Companies Have Different Financing Needs

Companies access and use a variety of different financial products and services on a routine basis, such as¹:

- ◆ Cash management tools
- ◆ Commercial paper
- ◆ Debt financing
- ◆ Derivatives
- ◆ Equity financing
- ◆ Long-term loans

¹ See Appendix for a glossary of key terms used throughout this report.

- ◆ Short-term loans
- ◆ Trade financing

Each of these products and services addresses a specific need faced by Main Street companies. To meet those needs, companies place a high value on the accessibility of products and services to manage their finances.

- ◆ More than half of companies surveyed utilize all eight products and services listed on a routine basis and 85% used 4 or more.
- ◆ 86% said that it is important for financial services providers to offer a wide spectrum of services.
- ◆ 65% want providers to specialize in specific products.

Companies Rely on Financial Institutions of All Sizes

The survey found that businesses use a combination of financial institutions for critical financing activities, and the mix of financial services and products used is closely tied to the availability and diversity of financing sources.

- ◆ 20% of all small and midsize companies said that they use four or more financial institutions to issue commercial paper, raise corporate debt, or access trade financing.
- ◆ Large businesses use four or more financial institutions in a variety of contexts, particularly when obtaining long-term loans, purchasing derivatives, and issuing corporate debt.
- ◆ 68% (up from 50% in 2013) indicated that it is important for their financial services provider to have a global footprint.

The Future: What Are Companies Facing

Knowing that Main Street companies depend on a vibrant and diverse financial services industry, we wanted to understand how

Takeaways

State of Corporate Finance

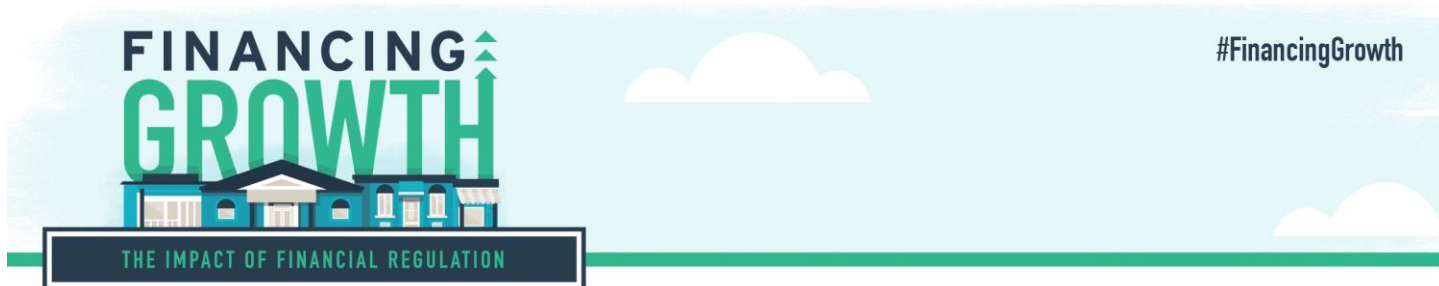
- Businesses are simultaneously relying on multiple financial services providers for a diverse range of critical services.
- Businesses are increasingly looking for a diverse financial services system to meet the growing complexity of their investments and operational financing needs.

Cash Crunch: Access to Capital Is the Top Financial Concern for U.S. Businesses

- Managing cash flow and liquidity is the biggest financial concern for companies, and companies believe current and pending regulations will make those operations more challenging.
- One in three companies is taking unanticipated steps in response to regulations and economic changes.
- Companies are concerned about accessing credit, managing day-to-day currency risk, and raising short term capital. All are necessary functions to manage cash flow, liquidity, and fund future expansion and growth.

Regulatory Impact

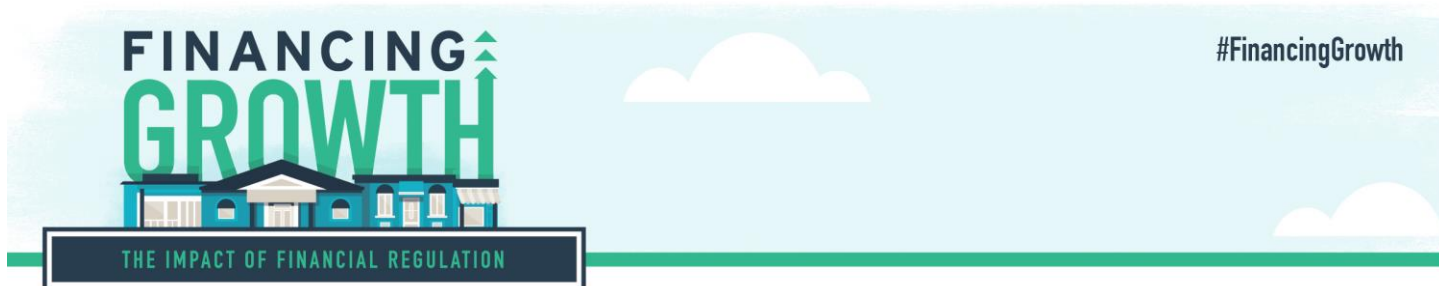
- Nearly four in every five businesses say that financial industry regulation has directly affected their financing activities.
- This is no longer just a corporate issue, as businesses are increasingly being forced to pass the impact of financial regulations on to customers and employees.
- Increased bank capital charges are viewed as the primary source of increased costs.
- One-third of companies expect the regulatory effect to worsen in the next three years.



the implementation of financial services regulation is impacting how companies operate and serve their customers. What we heard was a particularly strong and growing concern for the ability of businesses to access credit and to manage cash flow and liquidity due to existing and pending regulations. Moreover, many businesses are taking unanticipated steps to address increased costs or a lack of access to financial services at the expense of customers or expansion.

- ◆ 43% of the companies surveyed said that maintaining cash flow and liquidity are their chief concern.
- ◆ 50% said that increased bank capital charges have increased their costs and challenges.
- ◆ 79% have seen their business affected by changes in the financial services markets.
- ◆ 29% have increased prices for customers and consumers as a result of changes to the financial services market (double the level seen in 2013).
- ◆ 76% believe that the regulations on the financial services sector will not help their company's outlook over the next two to three years.

As a result, in an era where economic growth has been stagnant, we find that existing and additional regulation of the financial services industry must strike a better balance between its impact on business and economic growth.



Introduction

America is stuck in the worst economic recovery since the Great Depression, with little forward momentum. To mount a turnaround, the country will depend on businesses—large and small—to create jobs and drive new economic growth.

Companies across the country understand and appreciate this responsibility and believe that they could be doing better. But the facts are hard to ignore: Profits are down; there are fewer entrepreneurs starting small businesses; raising capital and accessing credit is more expensive; and capital expenditures are hitting all-time lows. For companies to overcome these hurdles and get the economy back on track, they need a diverse and robust financial system. They need access to reasonably priced capital, cash management solutions, and tools to manage day-to-day business risk.

For example:

- ◆ Agricultural companies need access to competitively priced derivatives to hedge swings in commodity prices.
- ◆ Multinational corporations use derivatives to hedge fluctuations in currencies and interest rates.
- ◆ Company expansions necessary to support growth are financed by short- and long-term debt serviced by banks.
- ◆ Emerging companies rely on investment banks with a global footprint to underwrite public offerings and provide counsel on the timing and type of capital to issue.

Companies that experience cash fluctuations due to inventory production or lag time between production and sales depend on cash management tools to ensure that they have the liquidity to pay suppliers and employees.

We talked directly to corporate treasurers, CFOs, founders, and CEOs.

Collectively, these are the corporate employees who are accountable for making sure that their companies have the resources and funds necessary to manage and safeguard corporate finances—the fuel to sustain and grow any company.

The overall message we heard is that companies have many different financing needs and rely on financial institutions of all sizes. Further, the financial regulatory environment is getting worse and hampering their ability to acquire the financial resources they need.

Sams Carpet Cleaning and Repairs

"Several years ago we were looking to refinance our 17,850-square-foot building in order to save money that we could use to expand our customer base. By working closely with our bank and a Missouri State program, we were able to secure a loan that allowed us to lower our interest rate and generate more cash flow. This freed up additional funds to invest in technology, training, and expansion. For a small business like ours, the cost savings and extra capital came at a great time and allowed us to invest in updating our local business."

Jeff and Susan Sams, Owners

While this report provides insight into how businesses of all sizes use the financial system and how financial services regulation impacts that system, many questions remain. Specifically:

- ◆ Can our financial system succeed in meeting the demands of Main Street companies?
- ◆ Will changes in the regulation of financial institutions continue to limit credit availability or put a strain on market liquidity?

It is already clear, however, that current financial regulations are making it hard for companies to lift the American economy. In fact, 76% of survey respondents believe that the regulations on the financial services sector will not help their companies' outlook over the next three years.

The Chamber is committed to advancing an agenda that promotes well-functioning and strong capital markets so that American businesses have the tools and resources necessary to drive economic growth.

Methodology

The U.S. Chamber's Center for Capital Markets Competitiveness (CCMC), working with Brunswick Insight, surveyed more than 300 corporate treasurers, controllers, CFOs, and CEOs from a wide range of companies with gross revenues from under \$100,000 to more than \$100 million. The online survey, which built upon CCMC's survey work in 2013, was conducted from April 21, 2016, to May 8, 2016. Questions covered topics such as economic outlook, regulatory challenges, cash operations, relationships with financial institutions, and what types of institutions companies use for different financial functions, among other topics.

FACES DaySpa

"My husband and I opened FACES DaySpa more than two decades ago and have watched it grow into a successful business. A couple years ago we wanted to expand by opening a new FACES Lash Studio. We prefer to own our facilities, rather than renting, so we needed to secure a mortgage from our bank for the property, as well as a loan to upfit the new space. We put together a business plan for FACES Lash Studio and negotiated a purchase price for the real estate. Over the years, FACES has built a close, supportive relationship with our bank which has watched our business grow and is familiar with the success of FACES Day Spa. As a result, we were able to secure both the mortgage and loan on agreeable terms that let us get the Lash Studio off the ground. Now the new business is thriving and has generated enough cash that it allowed us to pay off the upfit loan already. None of this would have been possible if it wasn't for our bank, which continues to be a valuable and reliable partner for our small business."

Patricia Owen, President

State of Corporate Finance

Companies Have Different Financing Needs and Rely on Financial Institutions of All Sizes

From the large multinational manufacturer that uses over-the-counter derivatives to hedge gas prices to the small town florist that uses a short-term loan from the local bank, companies of all sizes rely on the financial services industry to drive growth. Businesses access and use various financial products and services and rely on multiple banks and other financial institutions to mitigate day-to-day business risk, raise capital, issue debt, and manage liquidity.

Since 2013, companies are using more and more varied financial services to provide the tools and services necessary to operate and grow their businesses in an increasingly competitive global market. Unfortunately, the cost and complexity of obtaining these services in the United States has risen due to the regulatory environment.

Key Findings

- ◆ More than half of companies surveyed utilize all eight products and services listed on a routine basis and 85% used 4 or more.
- ◆ 20% of small and midsize companies said that they use four or more financial institutions to issue commercial paper, raise corporate debt, or access trade financing.
- ◆ Large businesses also used four or more financial institutions in a variety of contexts, particularly when obtaining long-term loans, purchasing derivatives, and issuing corporate debt.
- ◆ 86% indicated that it is important for financial services providers to offer a wide spectrum of services.
- ◆ 68% (up from 50% in 2013) indicated that it is important for their financial services provider to have a global footprint.
- ◆ 65% want providers to specialize in specific products.

Great Plains Energy | Kansas City Power & Light Company

“The electric power industry is one of the most capital intensive business sectors in the United States with 2015 capital expenditures totaling over \$100 billion alone. Easy access to the money market and capital markets is essential for Kansas City Power & Light Company and other utility companies to continue to invest in the electric grid to ensure all Americans enjoy safe and reliable power for years to come. We use working capital obtained under or supported by lines of credit provided by financial institutions to conduct daily operations then repay those funds with money raised through debt and equity offerings to permanently finance investments like needed generation facilities and transmission lines. Without the help of Wall Street and banks our business would be impossible. Unfortunately, banking and securities regulation advanced under Dodd-Frank, Basel III, and Money Market Fund reforms have all combined to limit access to capital, restrict legitimate risk management tools, and increase borrowing costs that will serve to limit future capital formation and increase the cost of electricity for everyone.”

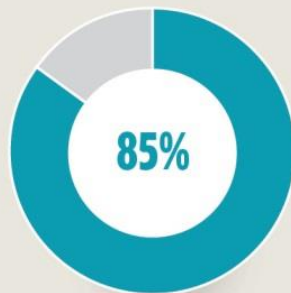
James Gilligan, Assistant Treasurer

Services Used

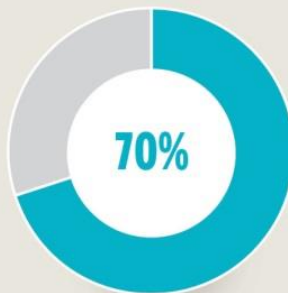
Use of bank services



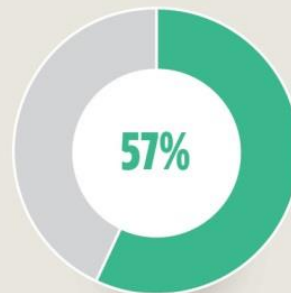
Percentage of respondents that use each service.



Use 4+ services



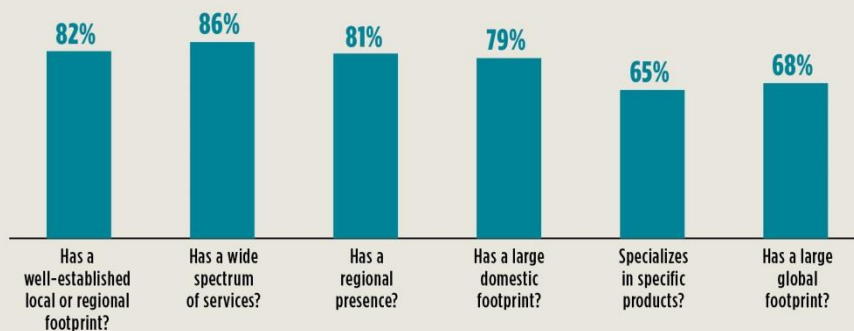
Use 6+ services



Use all services

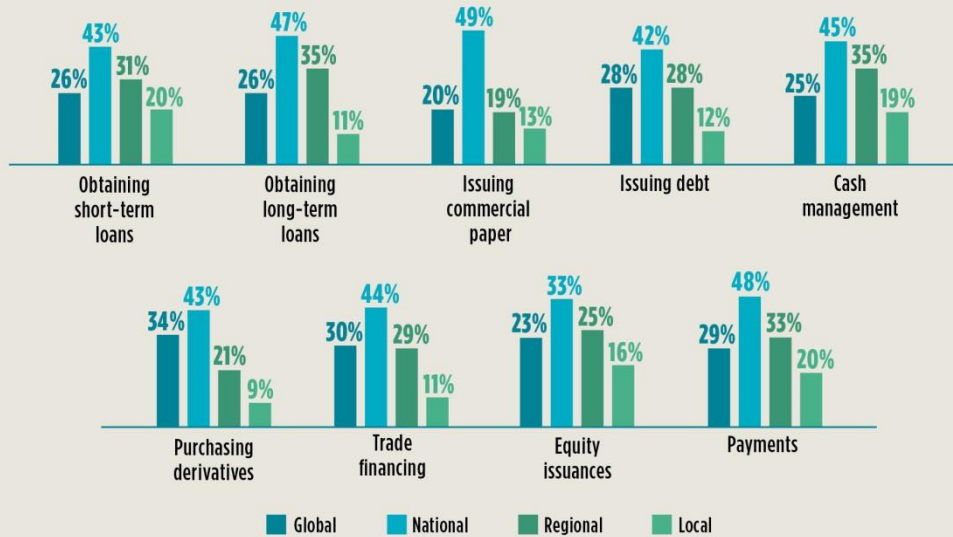
Importance of Bank Attributes

How important is it for your company to have a bank that:



Respondents who indicated attributes as "important"

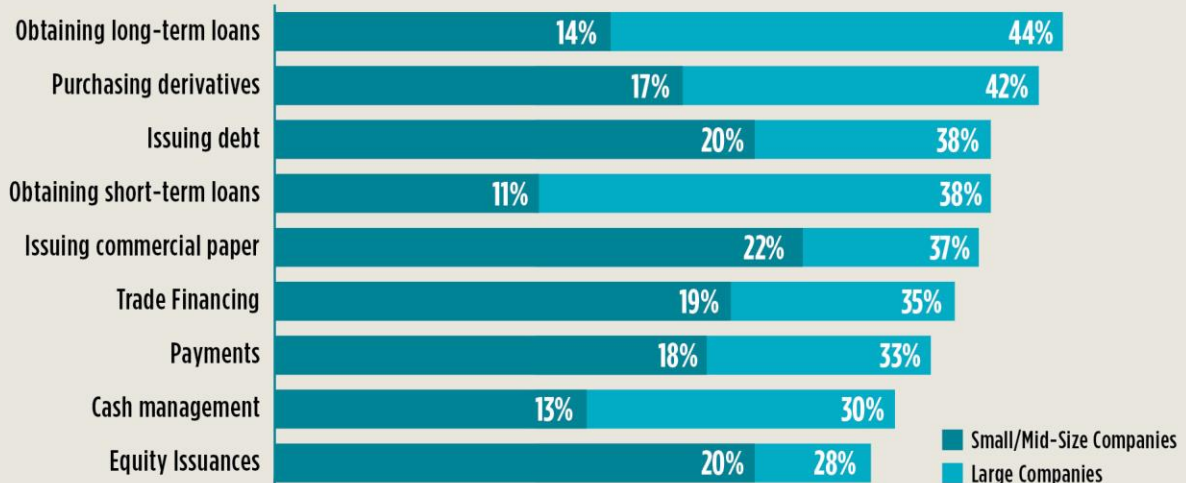
Use of Different Bank Types



Please indicate the type of Financial Institution your company uses mostly for that service.

Number of Institutions Used

Percentage of respondents that use 4 or more financial institutions for each activity



The Future: What Are Companies Facing

Cash Crunch

With a reliance on constrained financial services partners, cash flow and credit access pose the greatest finance challenge to U.S. businesses

Companies often fail or face turmoil because of cash management problems. For example, supplier invoices can come due before revenues or growth in sales needs to be supported by added investment. Managing cash and liquidity are top concerns of Main Street businesses and, in the last five years, regulations and economic changes have forced one in three companies to take new or unexpected steps to manage their cash. This challenge is especially acute for America's smallest businesses.

Key Findings

- ◆ 43% of respondents said that maintaining cash flow and liquidity are their chief concerns.
- ◆ Companies are most concerned about accessing credit, managing day-to-day currency risk, and raising short term capital. All are necessary functions to manage cash flow and liquidity.
- ◆ Regulations and economic changes have forced one in every three companies to take new or unexpected steps to manage their cash.
- ◆ 50% said that increased bank capital charges have increased their costs and challenges.

Quality Support, Inc.

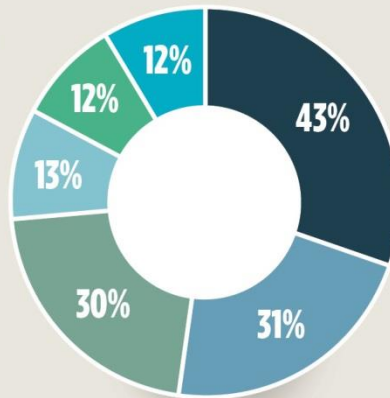
"In 1989, after 21 years in the Marine Corps, I started Quality Support, Inc., with only \$600, a small loan from my Dad...and a dream. I did not even own a suit back then. I worked day and night for a number of years and finally saw progress in the form of more and more contracts. Our big break came when we were offered a very high level contract in the United Kingdom. It was our credit card company that gave us a much needed line of credit that allowed us to take on this important contract in London and make it all work. The contract put my company on the map and on a path to sustainable growth. Without this financing, I'm not sure where we would be today. I cannot thank our credit provider enough for what they did to support our small business in those early days. After 26 years in business, Quality Support continues to operate successfully, in a very competitive and challenging environment."

Wayne Gatewood, Jr., Founder and CEO

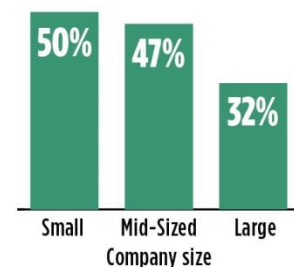
Top Macro Concerns

Over the next 12 months, which of the following issues do you foresee as the **biggest financial concerns** for your business?

- Maintaining cash flow and liquidity
- Managing risks on price fluctuations on exchange rates, interest rates, and commodities
- Dealing with uncertainty over new financial regulations
- Restrictions on diversifying credit from banks and other lenders
- Market liquidity
- Managing risks from international credit markets

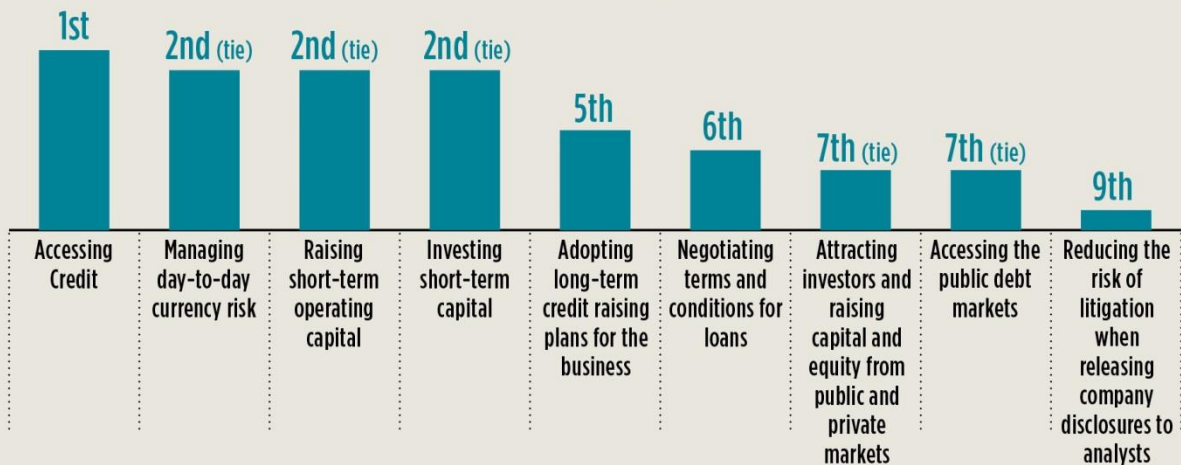


Small businesses, in particular are most concerned about their ability to maintain cash flow and liquidity



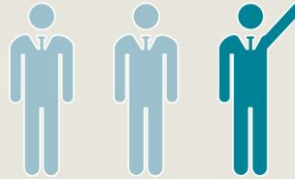
Operational Concerns

Concern (rank)



Changes in Cash Management Practices

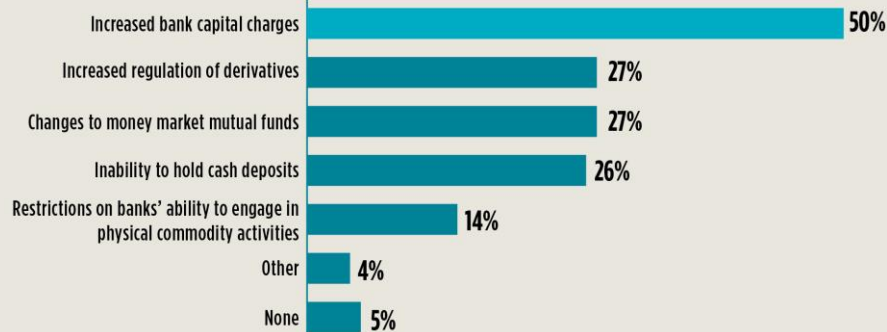
In the past five years, has your company taken any new or unexpected steps to manage cash operations?



Yes - 34%

Sources of Costs

Thinking about the past 2-3 years, which of the following specific regulatory changes have caused increased costs or other challenges for your company?



Most Negative Regulations

In recent years, many new financial rules and regulations have been implemented. Would you say that the following regulations have had a positive or negative impact on your company?

Net Impact of regulations on...



The numbers reflect the net of the percentage of businesses who said each regulation had a positive impact minus the percentage of businesses who said the impact of each regulation was a negative on their business. For example, the negative numbers indicate that more businesses felt the impact was negative for the company.

Impact of Financial Regulations on Main Street Companies

The trickle-down impact of regulatory overreach on customers

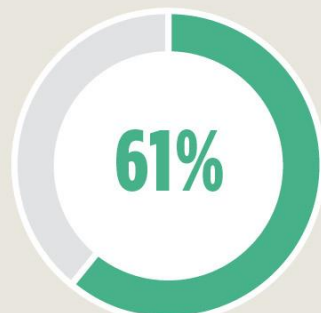
Businesses depend on a healthy, well-regulated financial system to spur economic growth. However, the past decade has been turbulent—from the financial crisis to its legislative response. While many of these reforms have improved the resilience of our financial system, a number of policy responses have gone too far and are negatively influencing Main Street companies and their customers.

Key Findings

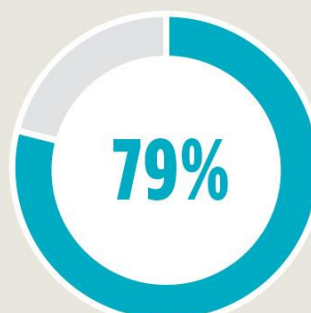
- ◆ 79% of the businesses respondents are affected by changes in the financial services market.
- ◆ 29% have increased prices for customers and consumers as a result of changes to the financial services market (double the level seen in 2013).
- ◆ 39% have absorbed the higher costs.
- ◆ 19% have delayed or cancelled planned investments.
- ◆ 76% believe that the regulations on the financial services sector will not help their companies' outlook over the next two to three years.

Impact of Financial Services Regulation

% of U.S. businesses affected by changes in financial services market

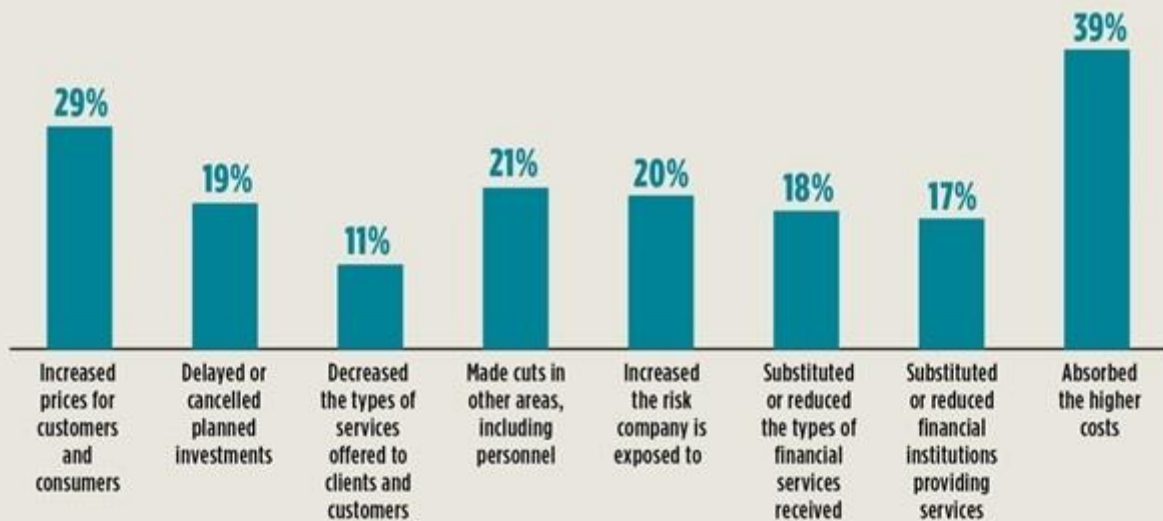


2013



2016

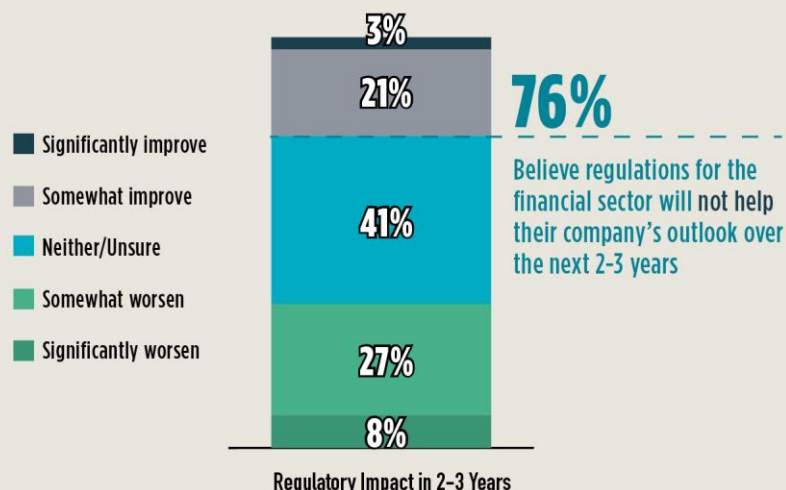
Impact of Financial Services Regulation



Which of the following actions has your company taken as a result of changes to the financial services market?

Looking Forward

Do you expect the regulations [for the financial services sector] to improve or worsen the outlook for your own company over the next 2-3 years?



Appendix

Glossary of Key Terms

Bank regulatory capital: The amount of capital that a bank must hold as required by its financial regulators. This is usually expressed as a ratio of required equity versus the assets held by a bank, adjusted for the assets' potential risk. Bank regulatory capital levels are established by international and domestic standard-setters and regulators, such as the Basel Committee on Banking Supervision and the Federal Reserve, respectively.

Bond: A debt security that represents a fixed-income claim on the cash flows and assets of a company.

Cash flow: The amount of cash and cash-equivalents moving in and out of a business. Businesses need positive cash flow in order to pay short-term obligations, such as everyday expenses, as well as maintain a cash buffer for unanticipated payments.

Cash management tools: These tools assist a company with their short-term financial management needs and include a wide variety of products and services, including money market funds and certificates of deposit.

Commercial bank: A chartered financial institution that provides a variety of services to businesses, including accepting deposits, making loans, and other payment-related services.

Commercial paper: An unsecured short-term debt instrument issued by a company to raise short-term capital and manage near-term liabilities.

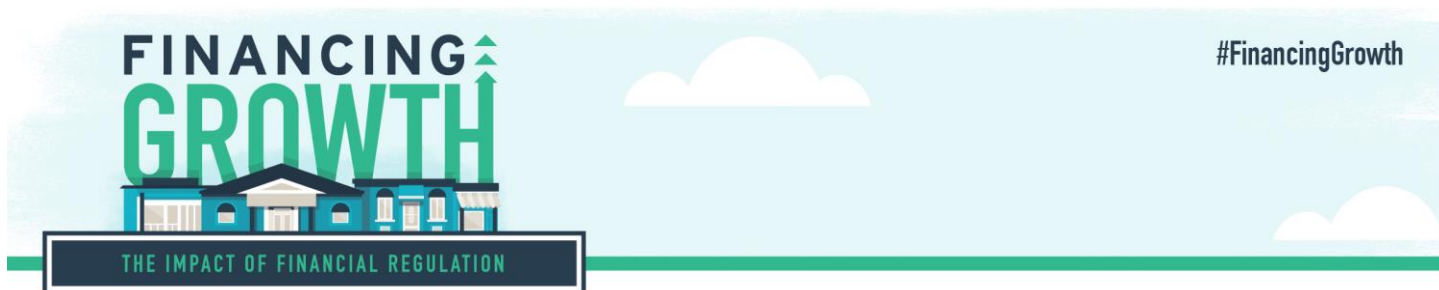
Debt financing: A form of raising capital that includes issuing bonds and other forms of indebtedness through the public and private markets or borrowing money directly from a lender. Debt financing requires paying interest and principal at specified dates.

Derivatives: Financial contracts whose value is driven by the value of another asset or security (known as an "underlying"). Commonly used derivatives include forwards, futures, and swap contracts. For example, swap contracts are used by businesses to manage risk, such as locking in a fixed rate of interest for an overseas payment.

Viking Masek

"Our bank has been a key partner in Viking Masek's success over the last 16 years. When the company decided to transition from a sales organization to an integrated manufacturer in 2006, our bank provided the critical financing needed to purchase our facilities and then remained alongside us three years later when our continued growth required a new addition to our building. In addition to financing subsequent expansions, our bank has worked with us to develop a line of credit that has made our growth possible by allowing us to fund increased inventory and accounts receivable as our demand has grown. The close relationship we have built with our bank has been a key ingredient in the success of our business, which now employs more than 50 people."

Robert "RC" Huhn, Chief Financial Officer



Equity financing: A form of raising capital that allows cash to be contributed to a business in exchange for an ownership interest. Investors participating in equity financing typically have voting rights and share in the percentage of the firm's profits or potential losses.

Investment banks: Financial institutions that provide advisory services and help to raise capital for businesses in the public markets, including through underwriting, asset management, sales and trading, and research.

Liquidity: This refers to the volume of activity in a market, as well as a general measure of the ease of selling securities, such as bonds and stocks, or converting assets to cash. Market makers, like investment banks, help facilitate the flow of trading and ensure efficient, liquid capital markets.

Long-term loans: A loan or other long-term debt obligation that generally lasts more than one year.

Payment systems: These financial tools permit settlement of financial transactions by transferring monetary value – such as by wiring payment.

Risk management tools: These tools, such as derivatives, assist a company in managing their exposure to a variety of different risks, such as changes in interest rates, commodity prices, or foreign currencies.

Short-term loans: A loan or other short-term debt obligation that generally lasts less than one year.

Trade financing: A form of domestic or international financing that allows a firm to extend credit to its customer by selling its goods and services and permitting the customer to pay some date after the receipt of goods and services.

U.S. Chamber of Commerce
Center for Capital Market Competitiveness
1615 H Street, NW
Washington, DC 20062