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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

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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.



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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).

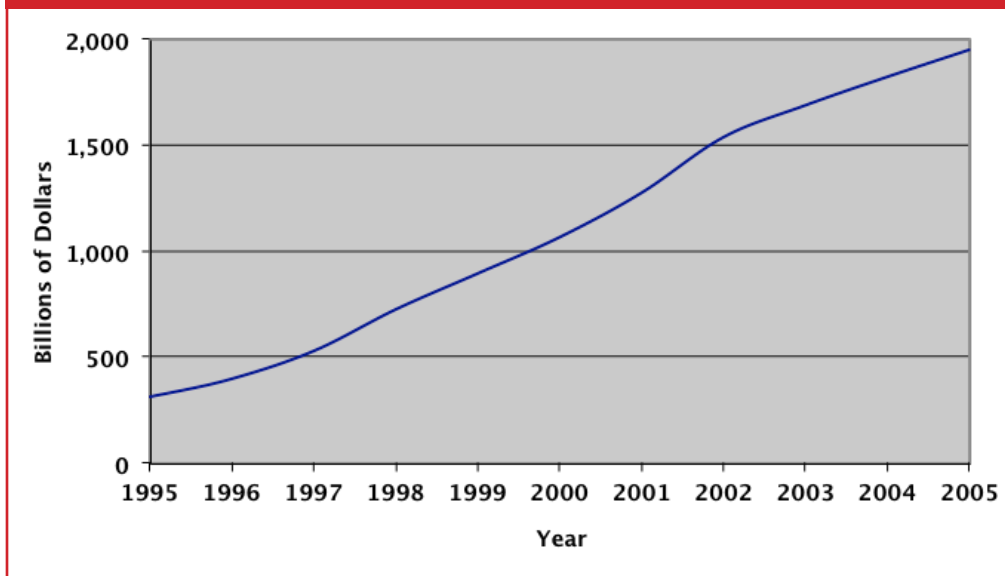
4. The academic research on this subject has reached mixed conclusions, however, with some claiming that there was no conflict of interest in securities underwriting in the pre-Glass-Steagall era (see, for example, Puri (1996), and Kroszner and Rajan (1997)).

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 or 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,

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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.

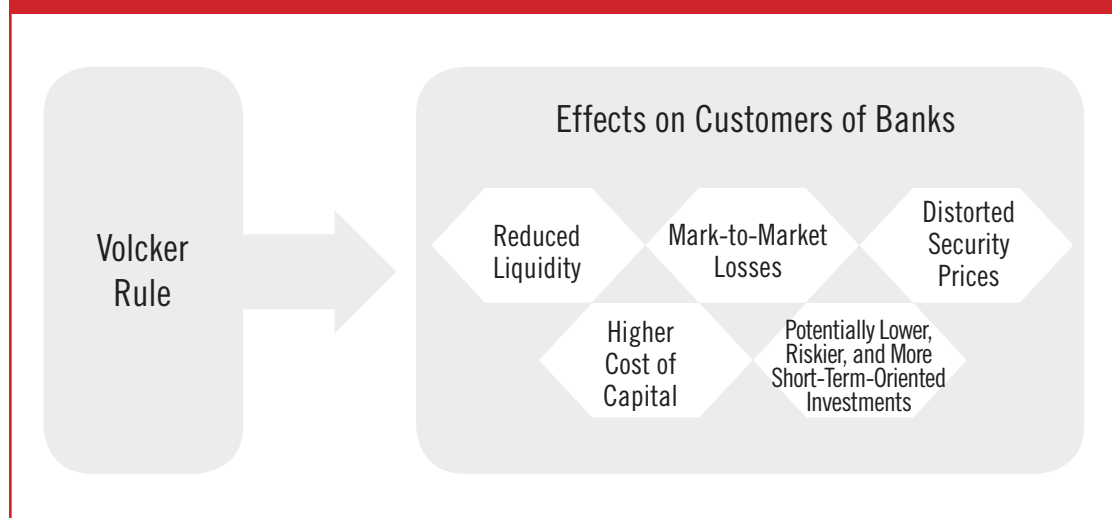
The retrenchment of banks from market making could also have difficult-to-anticipate consequences, which could be as severe as some segments of the market freezing up. An example of such a freezing up is provided by the reaction of credit rating agencies after the passage of the Dodd-Frank Act and the 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.

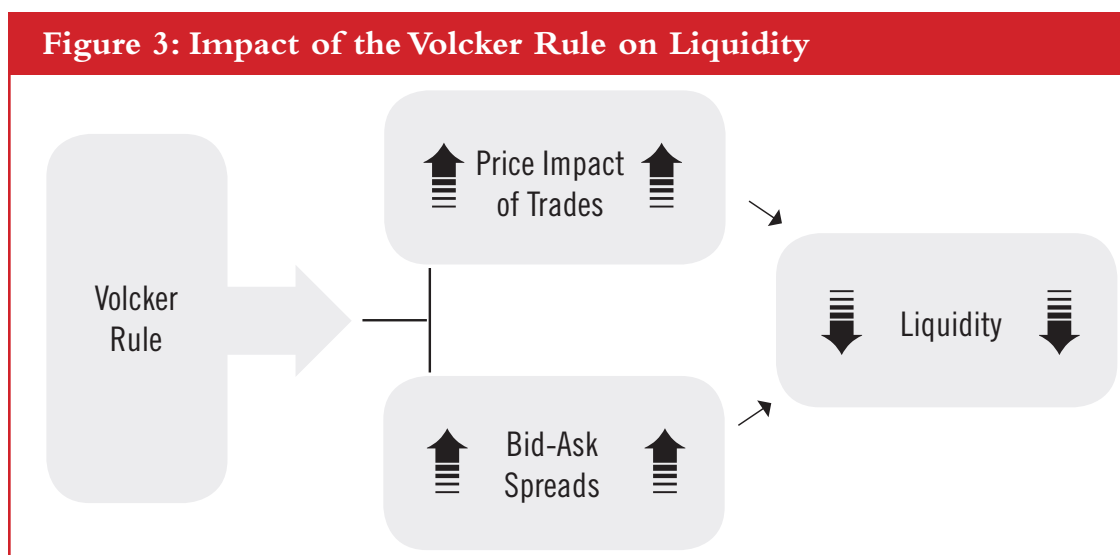
17. In the hope of selling the securities at a higher price later.


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 Rierson (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.

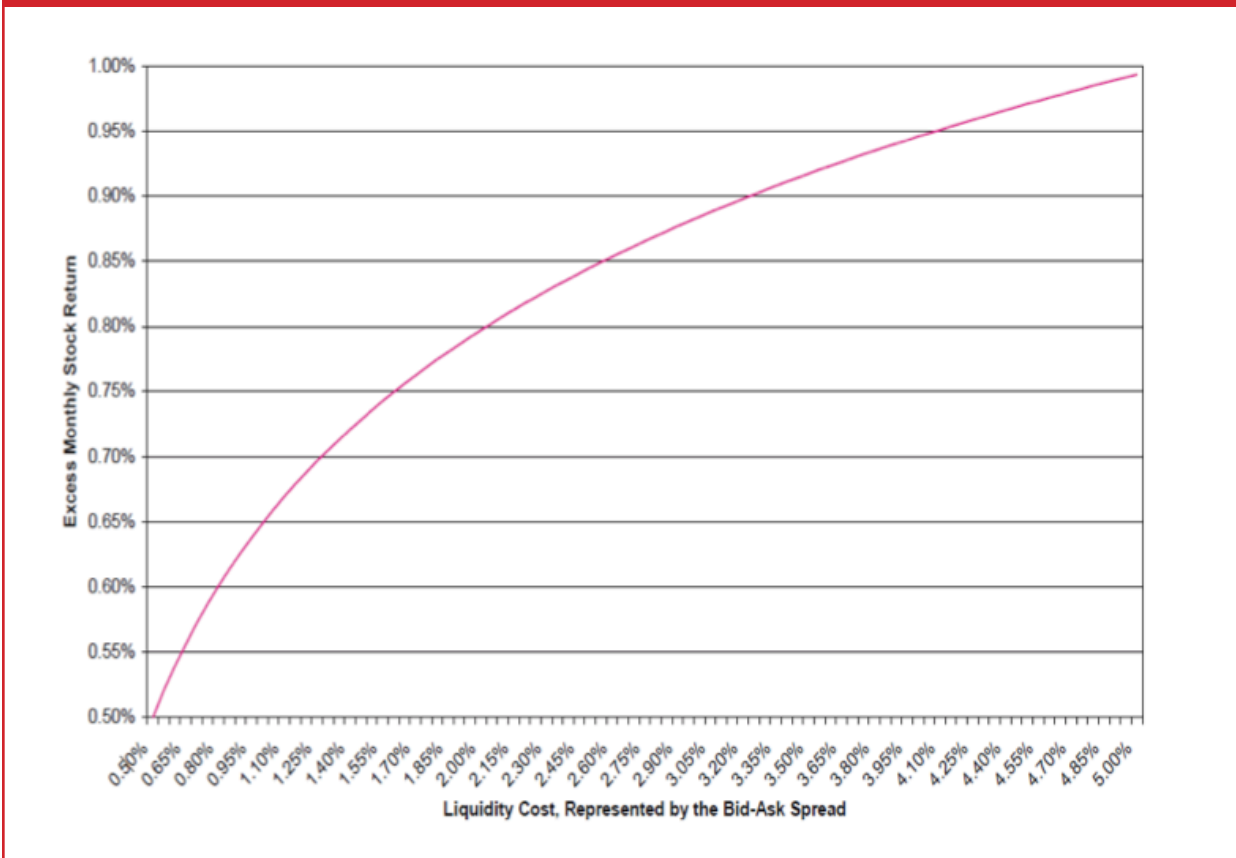
20. See Duffie (2012).

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.

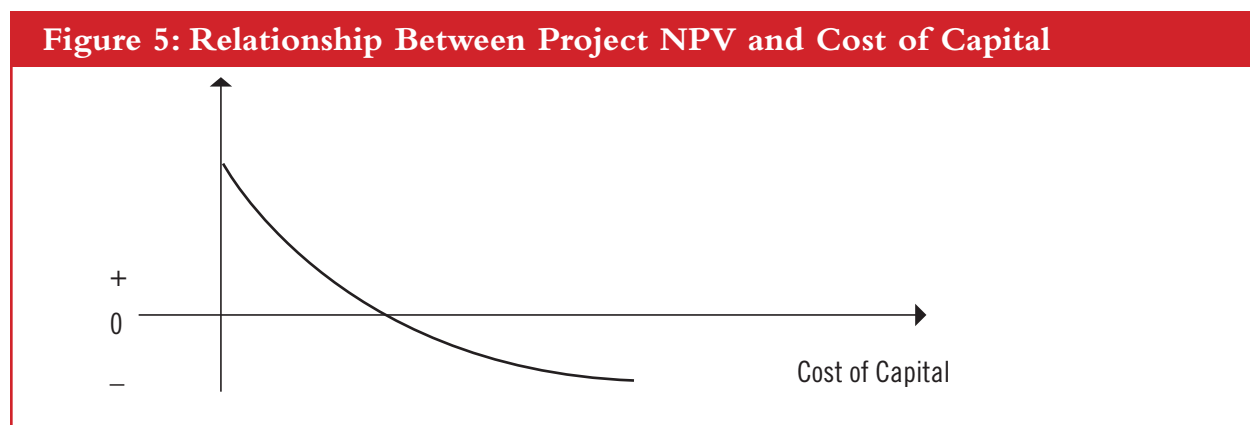
A higher cost of capital for firms has potentially significant consequences for corporate investments and economic growth. It is worth noting that the idea that all that the Volcker Rule will do is to have an impact on bank profits and a small marginal impact on liquidity is deeply flawed. For example,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



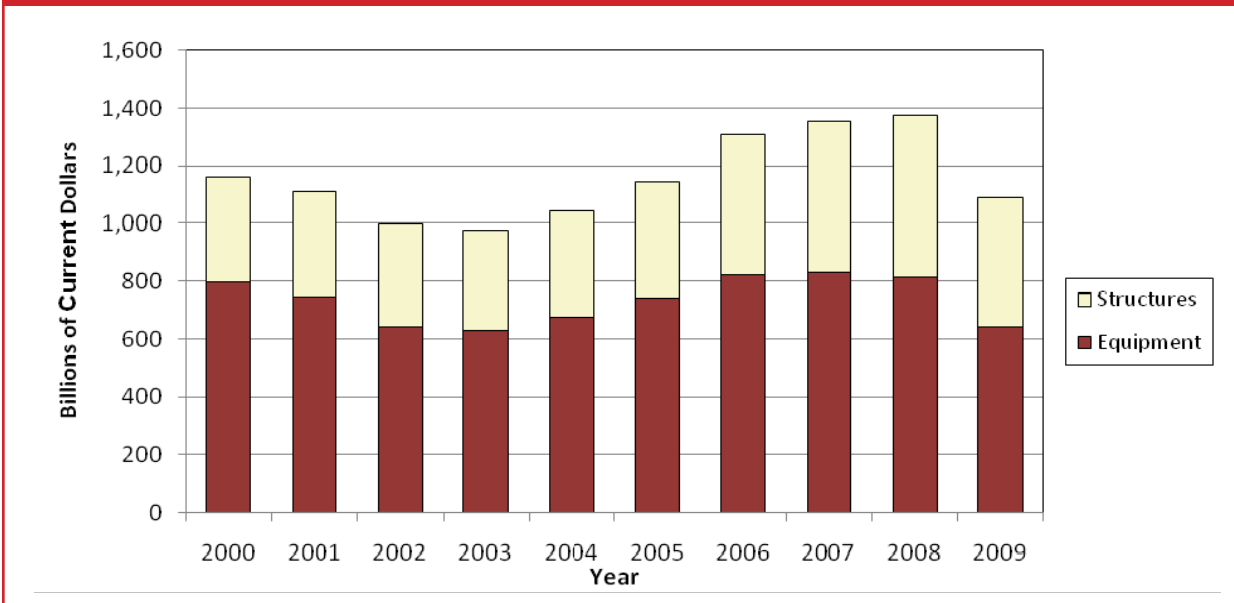
22. See Onaran (2012).

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



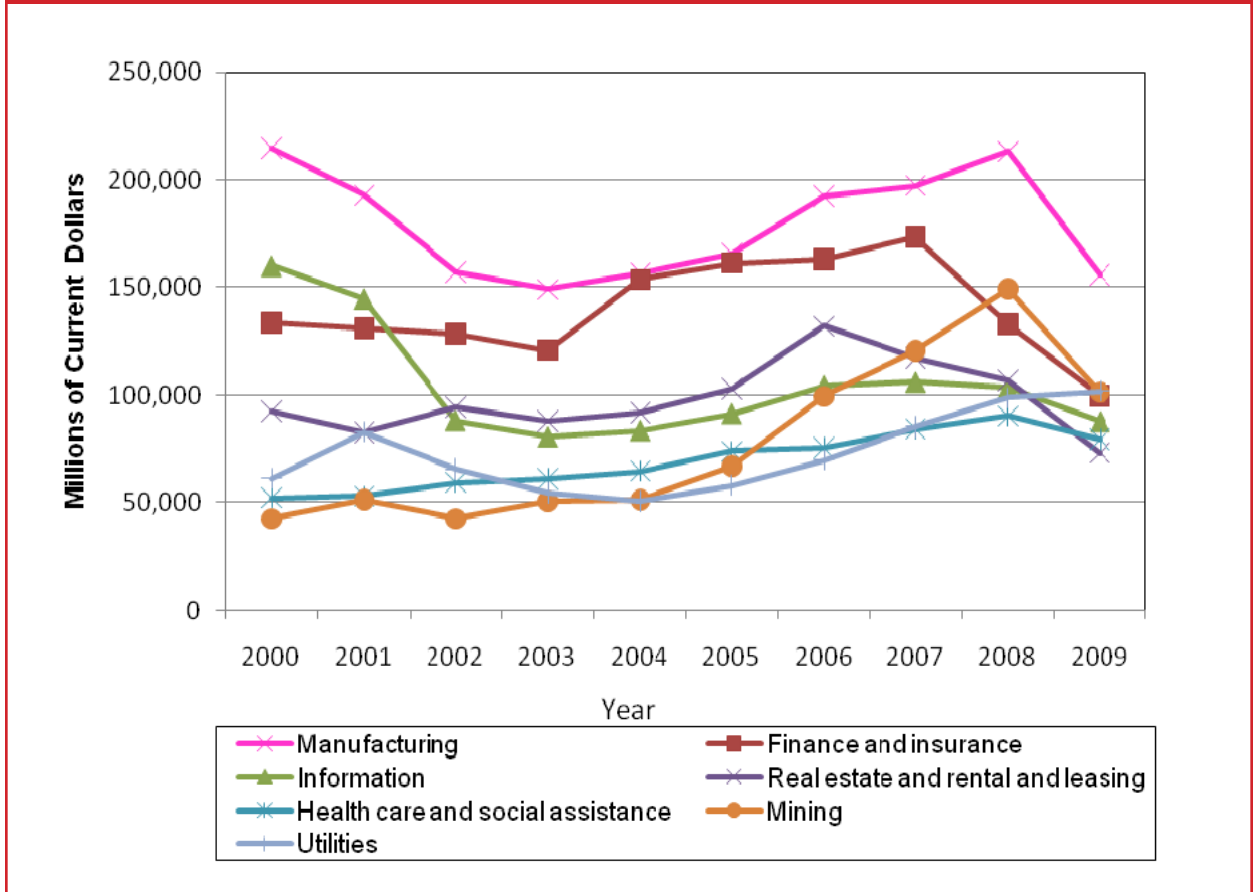
Source: U.S. Census Bureau

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."

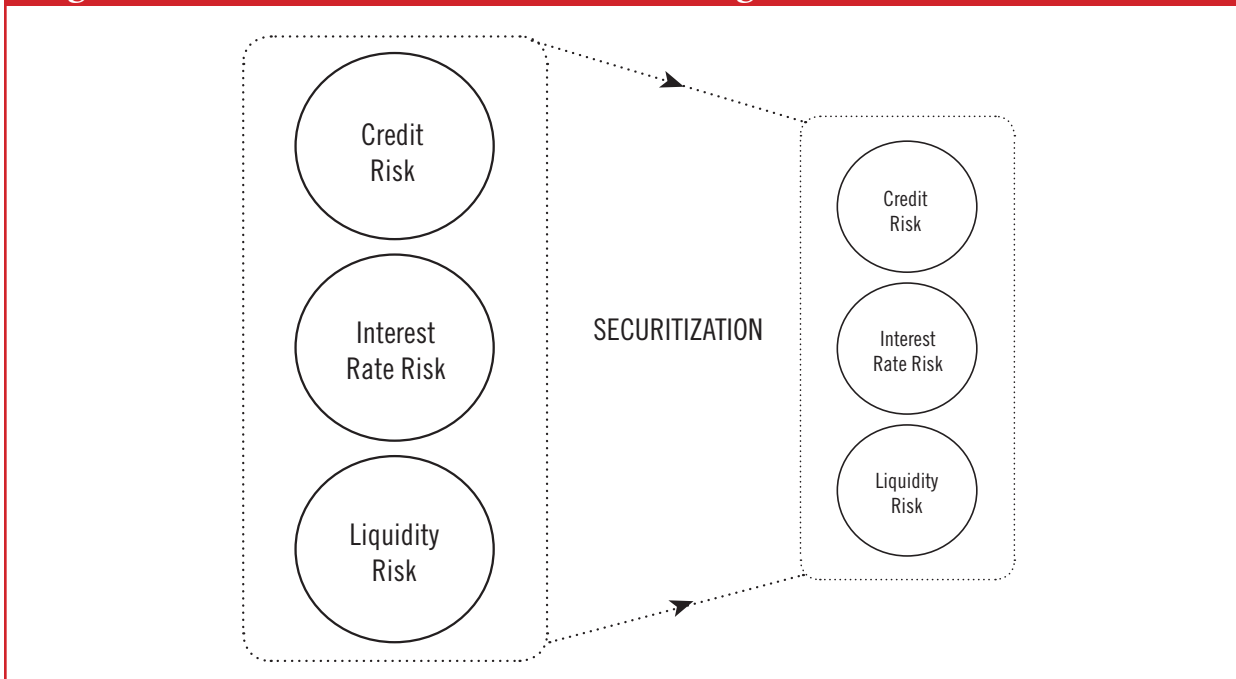
30. This is precisely what happened to savings and loans during the 1980s.

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).

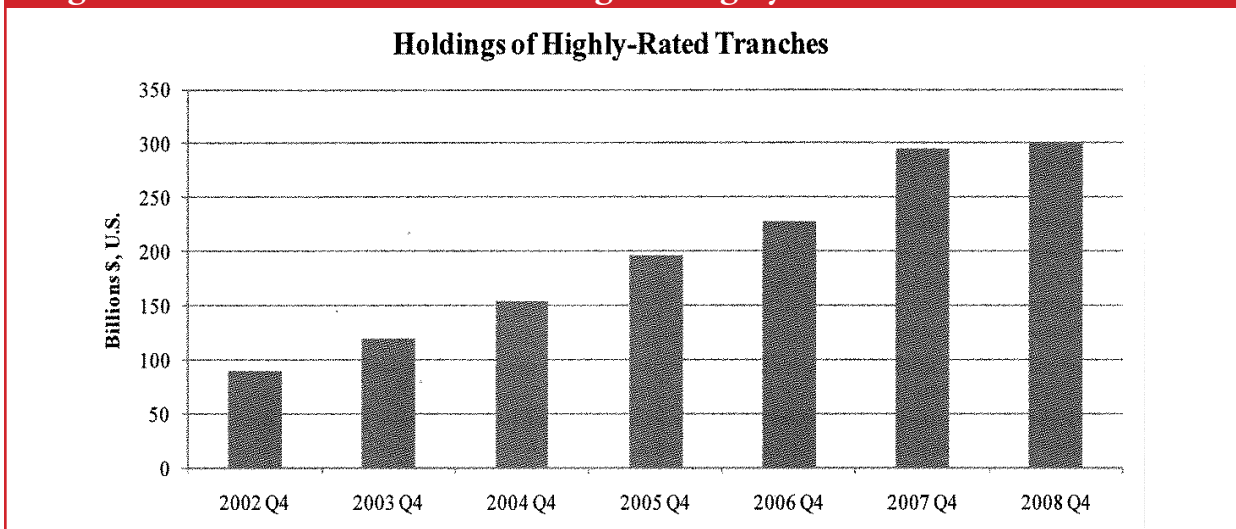
36. In a Nobel-Prize-winning contribution, Akerlof (1970) showed that markets in which asymmetric information creates incentives for this kind of strategic behavior, there may be a complete breakdown of the market.

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

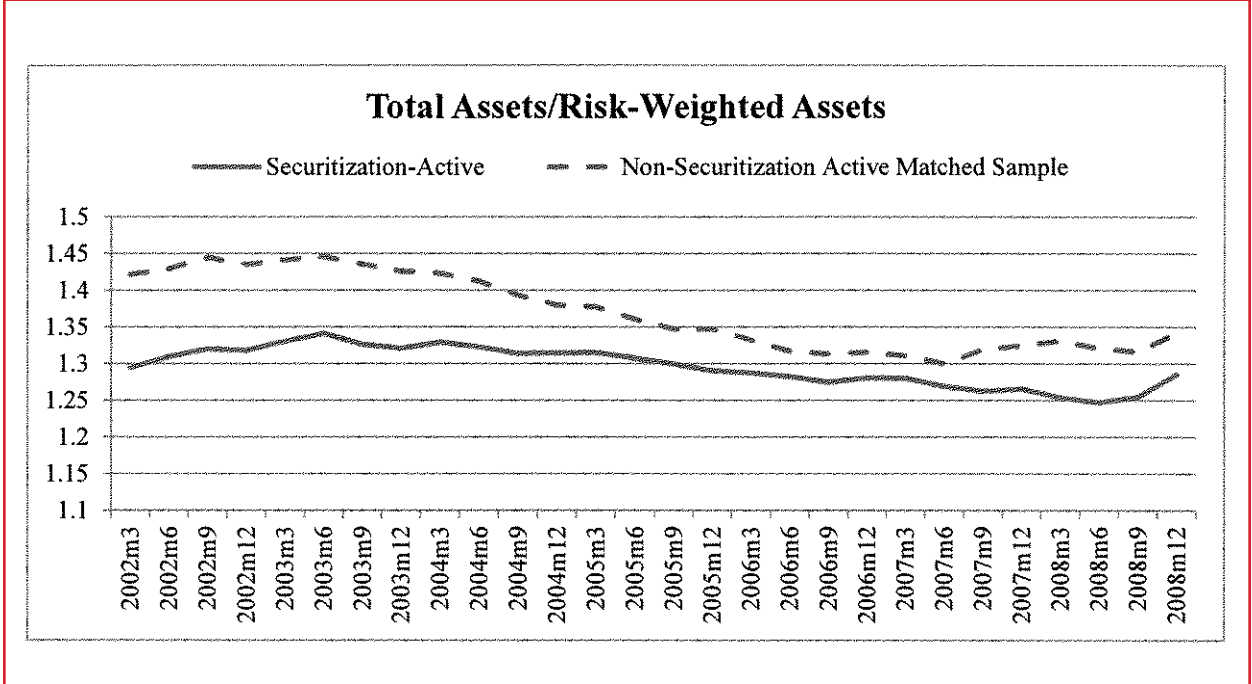


Source: Erel, Nadaud, and Stulz (2011).

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.

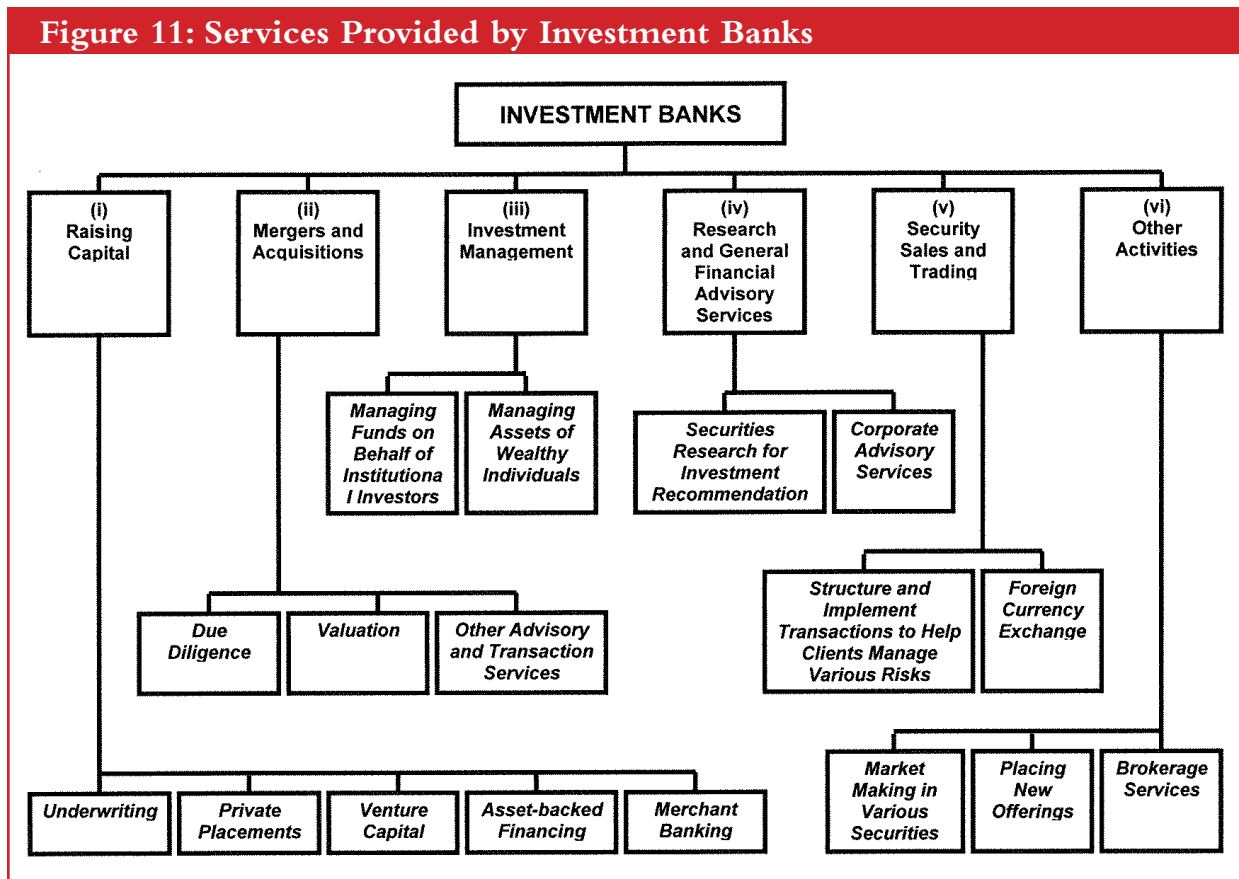
Based on their evidence, the authors conclude as follows:

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.



Source: Greenbaum and Thakor (2007).

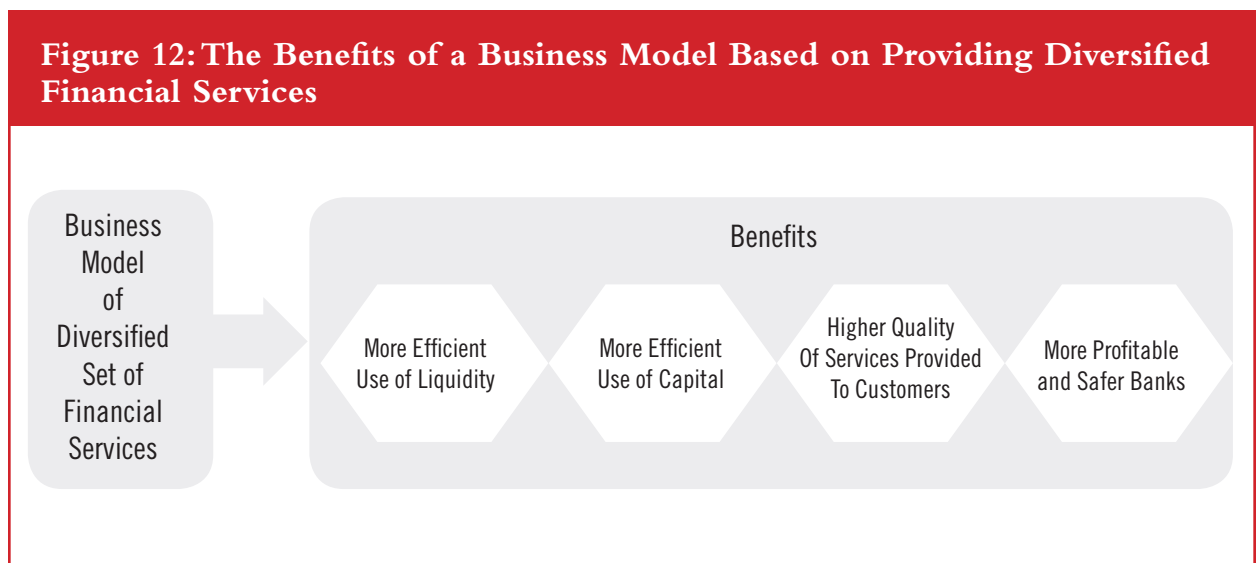
A bank’s knowledge of financial markets enables it to provide services that add value to its customers. This knowledge is gained in a variety of ways, one of which is market making. In particular, the fact that market making involves a network, as explained earlier, means that the larger the number of 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.



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.

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