Impact of the Volcker Rule on Bank Valuations and Risk

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We find that events signaling that the Volcker Rule would impose heavy restrictions on bank proprietary trading had a pronounced negative impact on money center banks, irrespective of whether the London Whale events (reflecting large proprietary trading losses by J.P. Morgan Chase) are included. The money center banks also experienced negative valuation effects in response to the London Whale events.

Other types of banks experienced non-significant valuation effects in response to Volcker Rule events, but all banks experienced a reduction in risk in response to the first event signaling the impending development of the Volcker Rule. We attribute these results to a possible change in the perception of the banking industry, in which investors are more confident that bank risk-taking will be constrained within reasonable limits in the future. Furthermore, we find that the degree of risk reduction following the first event signaling the development of the Volcker Rule is more pronounced for banks that were larger, and that previously exhibited high volatility.

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1. Introduction

The Dodd-Frank Wall Street Reform and Consumer Protection Act was enacted on July 21, 2010 to stabilize the banking system and provide consumers with protection when using financial services. Section 619 of the Dodd-Frank Act bans bank proprietary trading, which represents the bank's use of its own funds to invest in stocks, derivative instruments, and other risky investments.[1]

There are some exceptions, such as the trading of government securities, market making, underwriting, hedging, and transactions executed for customers. Section 619 is referred to as the Volcker Rule with respect to Paul Volcker, a previous chair of the Federal Reserve who believes that proprietary trading needs to be restricted. The specific provisions of this section were to be finalized over time and then fully implemented by July, 2014.

Our objective is to measure the impact of the Volcker Rule on bank valuations and risk, and to explain how the effects vary among banks. While the implementation of the Volcker Rule was widely publicized even before the Dodd-Frank Act was enacted, the provisions that would ultimately be contained within the Rule were uncertain. Therefore, we identify 8 particular event dates in which new information offered signals about the potency of the Volcker Rule provisions. Three of these event dates reflect the highly publicized J.P. Morgan Chase $6.2 billion trading loss[2] announced on May 11, 2012 (widely known as the "London Whale" event). Since J.P. Morgan Chase's loss was not directly attributed to proprietary trading, it prompted regulators to consider imposing more restrictive Volcker Rule provisions that would ensure that such trading is not allowed by banks in the future.

Studies by Park and Peristiani (2007)), Marucci and Quagliarello (2009), Pathan (2009), and Sensama and Jayadev (2009) and the references therein offer insight on how changes in the banking environment can alter bank risk. Yet, theoretical or empirical studies on the impact of previous regulations or the banking environment on banks do not allow conclusions about how the Volcker

[1] Carter and Sinkey (1995), Lyons (1995), Hirtle (1997), and Ang and Richardson (1994) explain how trading activities can affect bank risk. The means by which banks engage in trading activity may be influenced by their perception of government protection [see Bhattacharya, Boot, and Thakor (1998) and Boyd, Chang, and, Smith (1998)].
[2] See http://www.bbc.co.uk/news/business-23692109

Rule provisions affect bank valuations or risk. Therefore, the impact of Volcker Rule provisions on banks deserves to be tested directly. Results from this study should contribute to the existing literature on how shifts in the regulatory environment influence the market's perception of bank valuations and risk.

The Volcker Rule should have more direct effects on the money center banks (MC banks hereafter), but could indirectly affect all banks. We apply a time series model to a portfolio of MC banks, and a separate model to a portfolio of all other publicly-traded banks (non-MC banks hereafter).

We find that events signaling that the Volcker Rule would impose heavy restrictions on bank proprietary trading had a pronounced negative impact on MC banks. The effect on the MC bank portfolio is estimated to be about -1.5% per event day on average over the set of 7 event dates representing new signals about the Volcker Rule. However, the effect of the London Whale event on bank valuations may not be completely due to its signaling of stricter provisions of the Volcker Rule. In particular, attempts by some J.P. Morgan Chase employees to conceal and downplay the amount of the loss[3] could have signaled that other banks were also experiencing trading losses, but were not disclosing them. Therefore, we separate the London Whale events for part of our analysis. We find that MC banks experience negative and significant valuation effects in response to the Whale events, but also experience negative and significant valuation effects in response to the other Volcker Rule events.

In addition, we find that all (MC and non-MC) banks experienced a reduction in risk following the first signal about impending development and enforcement of the Volcker Rule. We attribute these results to a possible change in the perception of the banking industry, in which investors are more confident that bank risk-taking will be constrained within reasonable limits.

We also conduct a cross-sectional analysis to determine whether the impact of the Volcker Rule on bank valuations and risk is conditioned on the bank's characteristics that reflect its degree of risk-taking. We find that the valuation effects of the Volcker Rule are less favorable (or more unfavorable) for banks that are smaller, which could be due to the burden of increased compliance costs on smaller banks that do not possess economies of scale. In addition, banks that generate less non-interest income and are more exposed to risk (greater variability of returns) benefited the most (or were harmed less) by the Volcker Rule.

We also examine how the degree of risk reduction following the first signal about the Volcker Rule varies across banks, and find that larger and riskier banks experienced the greatest reduction in risk. Our results are robust to several model specifications.

2. Background on the Volcker Rule

In response to major losses of banks during the financial crisis, banks were criticized for taking excessive risks with depositor funds. In particular, proprietary trading activities were often cited as a partial reason for the depth of the financial crisis. The Dodd-Frank Act was established in response to criticism about the heavy exposure of banks to risk during the financial crisis. Switzer and Sheahan-Lee (2013) find that U.S. bank valuations declined in response to the Dodd-Frank Act. Conversely, international bank valuations increased in response to the Dodd-Frank Act, which can be attributed to their comparative advantage resulting from provisions that only restricted the U.S. banks.

President Obama initiated a plan for reform of the financial system on January 21, 2010. He endorsed the Volcker Rule, developed by Paul Volcker, the former chair of the Federal Reserve who was a member of Obama's Economic Recovery Advisory Board at the time. The initial draft of the Volcker Rule was introduced by Senators Carl Levin and Jeff Merkely as an amendment to the Dodd-Frank Act on May 10, 2010. The amendment to the Dodd-Frank Act (including the Volcker Rule) was passed by the House of Representatives on June 30, 2010, and by the Senate on July 15, 2010. On July 21, 2010, President Obama signed the Dodd-Frank Act into law. Several regulatory agencies developed the proposal for the Volcker Rule, which was publicized with invitations for comments. On November

[3] See http://www.reuters.com/article/2013/08/14/us-jpm-whale-charges-idUSBRE97D0QU20130814

7, 2011, the Office of the Comptroller of Currency, Department of the Treasury, Board of Governors of the Federal Reserve, SEC, and FDIC published a joint notice of proposed rulemaking to implement the Volcker Rule.

The Volcker Rule proposal adds a new Section 13 to the Bank Holding Company Act to ban proprietary trading (subject to some exemptions), defined as engaging as the principal in transactions (including those involving derivative securities) with the intent to profit. It also prohibits banks from sponsoring or holding an ownership interest in a hedge fund or a private equity fund. While banks can still hold securities that are associated with the process of underwriting or market making, they would be prevented from some permissible trading activities that reflect investment in high-risk assets, or threaten the safety of the bank. [See Fein (2010) and Dombalagian (2013) for more details about the Volcker Rule.].

The Volcker Rule might be perceived as the beginning of a movement to erect barriers between commercial banking and investment banking reflective of the Glass-Steagall Act of 1933. To the extent that regulating banks with restrictions such as the Volcker Rule effectively shifts trading activities from banks to non-banks, it can reduce the risk of the banking system and reduce moral hazard. The Rule was intended to be enforced without consideration of a federal safety net, as bailout remedies might not be necessary if bank regulations prevent larger banks from taking excessive risk. Furthermore, all banks are required to establish a plan for complying with the Volcker Rule, even if they do not believe that they engage in activities that would be prohibited by the Rule.

The Volcker Rule was initially planned for implementation in July, 2012. However, on April 19, 2012 the Federal Reserve clarified that banks must make a good faith effort to comply with the spirit of the Volcker Rule even while the specific guidelines were not finalized, and the full compliance was expected by July 2014.

3. Related Studies on Effects of Bank Regulation

Several related academic studies offer theories and empirically test how bank regulations could affect bank valuations or bank risk, as summarized below.

3.1. Federal Deposit Insurance Corporation Improvement Act

The Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 stipulated that deposit insurance premiums were to be based on the risk of the banks, as a means of reducing the moral hazard problem. Akhigbe and Whyte (2001) find that banks experienced positive returns and risk reduction following the passage of this act.

3.2. Riegle-Neal Interstate Banking Efficiency Act of 1994

Black, Fields, and Schweitzer (1990) determine that the liberalization of interstate banking laws for state-chartered banks resulted in positive returns for regional banks and negative returns for MC banks. The Riegle-Neal Interstate Banking Efficiency Act of 1994 allowed federally-chartered banks to engage in interstate banking. Hughes, Lang, Mester and Moon (1996) find that banks experienced greater economies of scale and lower liquidity risk as a result of this act. Nippani and Green (2002) document that bank performance improved in the post Riegle-Neal period. Akhigbe and Whyte (2003) find a significant decline in systematic and total risk following the passage of Riegle-Neal Act. Yet, Dick (2006) determines that the risk of banks' credit portfolio increased while the loan spreads declined after the enactment of Riegle-Neal Act, which is attributed to the increased competition.

3.3. Gramm Leach Bliley Act of 1999

The Gramm Leach Bliley Act of 1999 allowed affiliations between banks and other financial firms, including securities firms, and insurance companies. This act helped to pave the way for banks to engage in proprietary trading. Czyrnik and Klein (2004) and Mamun, Hassan, and Maroney (2005) find that the value of banks (especially larger ones) increased significantly following the passage of Gramm Leach Bliley Act of 1999. However, Akhigbe and Whyte (2004) and Geyfman and Yeager (2009) determine that banks experienced an increase in risk following the enactment of Gramm Leach Bliley

Act. Furthermore, Cebula (2010) documents that bank exposure to risk and uncertainty increased following the Gramm Leach Bliley Act, thereby increasing bank failures.

3.4. Sarbanes-Oxley Act of 2002

The Sarbanes-Oxley Act of 2002 was not specifically applicable to banks, but was relevant to banks because it improved financial reporting processes and transparency. Akhigbe and Martin (2006) find that banks benefited from the passage of Sarbanes-Oxley Act (SOX) of 2002. While the act improved the transparency of the banking industry (the most opaque banks benefited the most), it also imposed significant compliance costs in the banking industry.

3.5. Volcker Rule

Studies by Downing (2012), Chow and Surti (2011), Duffie (2012), Thakor (2012), and Chung and Keppo (2012) specifically address the Volcker Rule. Downing (2012) suggests that banks can effectively use derivatives to hedge their risk, which could have implications for the Volcker Rule. Chow and Surti (2011) and Duffie (2012) offer opinions on how the Volcker Rule may limit financial services provided to U.S. investors. According to Thakor (2012), the Volcker Rule could reduce the risk management capabilities of banks, and may also reduce the services they offer

However, our perspective is focused on how the Volcker Rule affects the valuation and risk of banks, and therefore is distinctly different from these studies. Chung and Keppo (2012) acknowledge that the effects of the Volcker Rule could have favorable or unfavorable effects on bank default likelihood and profits, because the bank activities that are reduced or eliminated by the Volcker Rule are risky. They apply a Monte Carlo simulation based on specific assumptions, and conclude that the Volcker Rule will decrease the profitability of banks.

4. Hypotheses

The Volcker Rule was viewed as one of the most controversial components of the Dodd-Frank Act,[4] and received much media attention because of its potential to reform (whether favorably or unfavorably) the banking system. We develop competing hypotheses for how the Volcker Act could affect bank valuations.

4.1. Unfavorable Impact of Volcker Rule

To the extent that the Volcker Rule restricts trading activities, it may prevent some banks from fully capitalizing on their information advantages and expertise. Consequently, banks may focus on more traditional bank activities that generate less revenue. Second, the reduction in some trading activities could cause a decline in revenue from other fee-based services (such as brokerage activities) that were connected to trading activities. Third, banks will incur higher expenses associated with compliance to conform with the Volcker Rule. Fourth, the Volcker Rule has been criticized for the causing a brain drain in the banking industry. Several top traders have left commercial banks to join or form hedge funds where they can utilize their talent more freely.[5]

For the reasons expressed here, the Volcker Rule could cause an expected reduction in future bank earnings, which should cause an immediate decline in bank valuations. Research by Chung and Keppo (2012) derive estimates that indicate a decline in bank profitability due to the Volcker Rule. In addition, some analysts have generated specific estimates of a decline in bank profitability. Standard & Poor's suggests that the decline in profits will be more pronounced if the Volcker Rule is more restrictive.[6] To the extent that the market agrees with these assessments, the share price response of banks should decline in response to any signals that the Volcker Rule will be more restrictive. This impact could be especially acute if the MC banks are still implicitly protected because they are too big

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[4] See http://newsandinsight.thomsonreuters.com/Securities/Insight/2012/04_-_April/The_Dodd-Frank_Act__Size_matters/

[5] See http://www.bloomberg.com/news/2010-07-14/deutsche-bank-loses-option-trader-saiers-to-hedge-fund-alphabet-management.html or http://www.thestreet.com/story/10980944/1/volcker-rule-whos-who.html

[6] See http://www.bloomberg.com/news/2012-10-22/volcker-rule-may-cut-10-billion-in-bank-profit-s-p-says

to fail, as they might no longer be able to fully capitalize on this downside protection if their risky taking activities are limited.

4.2. Favorable Impact of Volcker Rule

A counter hypothesis also deserves consideration. Proprietary trading allows banks to engage in massive speculative positions, which increases their exposure to adverse market conditions. Since the Volcker Rule restricts trading activities, it causes commercial banks to shift funds toward safer projects, and should result in lower exposure to risk.[7] Standard & Poor's states that bank exposure to credit risk may decline due to the Volcker Rule.[8] To the extent that the Volcker Rule reduces risk, it could reduce the bank's cost of accessing debt, and may increase the ability of banks to access funds in the money markets, including the commercial paper market.

Moreover, the Volcker Rule may reduce the bank cost of equity, and may reduce the amount of equity that banks need to support their operations. Under these conditions, banks may attract a new clientele of shareholders who prefer the lower risk profile, and this could increase the liquidity of bank stocks. Banks that restrict trading activities might also improve their image among customers and citizens who have protested in various forms (including the "occupy Wall Street" movement) in recent years. These factors that could stabilize the banking system and reduce exposure to risk might cause bank valuations to increase as a result of the Volcker Rule, or may at least attenuate the negative impact caused by potential reduction in bank profitability.

4.3. Impact of Volcker Rule on MC Banks Versus non-MC Banks

The Volcker Rule is specifically intended to limit the proprietary trading of the largest U.S. banks. Bank of America, Citibank, J.P. Morgan Chase, and Wells Fargo were explicitly mentioned in the proceedings of the Volcker Rule. These banks not only were actively engaged in proprietary trading, but were at the center of the financial crisis and the controversial bank bailout, which motivated the Volcker Rule. The operations of MC banks should be affected more than those of other banks as a result of the Volcker Rule, because the restrictions prevent these banks from acting as they would have without the Rule. Therefore, the effects of the Volcker Rule (whether favorable or unfavorable) should be most pronounced for the MC banks.

While the Volcker Rule clearly can influence the valuations and risk of the MC banks, it can also affect other publicly-traded banks. First, some of these banks engage in proprietary trading, and therefore their operations could be directly affected. Second, a decline in trading activity by banks could cause a decline in non-interest income, as the banks experience a decline in brokerage fees and trading income. Third, even if the proprietary trading by banks is mostly replaced by hedge funds (see Whitehead, 2011), any banks that provide financing to hedge funds could be indirectly exposed to trading losses incurred by hedge funds. Fourth, all banks are required to establish a plan for complying with the rule, even if they do not believe that they engage in activities that would be prohibited by the rule.

MC banks hold more than 50 percent of all bank assets, so that any regulatory change that influences the valuation and/or risk of MC banks can have a major impact on the banking system.[9] Ben Bernanke, the recent chair of Fed, implied in the past that the failure of MC banks could have had an impact on the entire banking system and financial system.[10]

Since MC banks are closely connected with other banks, any conditions that affect MC banks can spread to other banks. Schweitzer, Szewcyk, and Varma (2001) show that debt rating downgrades of MC banks adversely affect share prices of other banks. The exposure of MC banks to market risk, credit risk, counterparty risk, and liquidity risk is transferable to other banks because of the relationships between MC banks and other banks. In particular, MC banks are connected with other banks due to syndicates, loan participations, securitizations across bank networks, interbank loans,

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[7] See http://www.huffingtonpost.com/2012/02/08/david-viniar-goldman-sachs_n_1263241.html

[8] See http://www.bloomberg.com/news/2012-10-22/volcker-rule-may-cut-10-billion-in-bank-profit-s-p-says.html

[9] See http://www.europac.net/commentaries/road_bank_nationalization

[10] For example, see http://www.stlouisfed.org/newsroom/speeches/2008_10_02.cfm

and deposit and broker relationships.

To the extent that the Volcker Rule limits risk-taking activities of the MC banks, it may also change the risk perception of banks in general.[11] Many financial articles acknowledge that the proposed Volcker Rule might cause a fundamental shift in regulatory philosophy about moving banks toward their traditional role defined by the Glass-Steagall Act.[12] Some financial articles hint that the Volcker Rule might be a first step toward the return to Glass-Steagall rules.[13]

4.4. Impact of the London Whale Event on Bank Valuations

On May 11, 2012, J.P. Morgan Chase (the largest U.S. commercial bank at the time) announced (before markets opened) that its London subsidiary experienced a large loss. The reason for the loss appeared to be unique to the bank, as the financial media offered details about bad bets made by a trader at J.P. Morgan Chase, who was allowed to take unusually large investment positions. Since the investment positions by the J.P. Morgan Chase trader are not systematic across the banking industry, other banks were not directly affected by J.P. Morgan Chase's loss.

Yet, this event also caused speculation that the Volcker Rule provisions would be strengthened to ensure that banks do not incur such losses similar types of transactions in the future. J.P. Morgan Chase was one of the most outspoken critics of the Volcker Rule.[14] Its publicized loss prompted the financial media to question whether the Volcker Rule could have prevented this activity, and therefore could have prevented J.P. Morgan Chase's loss had it been implemented before then. The loss gave regulators new ammunition to justify more restrictive provisions within the Volcker Rule.[15] Thus, investors may have anticipated a more potent Volcker Rule as a result of the London Whale event. [16]

Although the London Whale could signal more restrictive provisions within the Volcker Rule, it could have other implications about the banking industry. Some Chase employees allegedly attempted to minimize the effect of this loss.[17] The loss was first reported to be $2 billion and it was later revised several times until the final amount was reported to be $6.2 billion. The perception that the bank attempted to conceal the amount of the loss could signal that other banks may be engaged in similar behavior. Since the effect of the London Whale may not be completely due to its signal about the restrictive provisions of the Volcker rule, we assess the effects of the London Whale event separately from the other Volcker Rule events for a portion of our analysis.

4.5. Cross-Sectional Analysis of Volcker Rule Effects on Banks

The sensitivity of bank valuations or risk to the Volcker Rule could be conditioned on the following bank characteristics.

Reliance on Non-interest Income. The Volcker Rule intends to limit the proprietary trading by banks. Thus, banks that engage in proprietary trading could experience a decline in non-interest income if their trading operations are restricted by the Volcker Rule. Second, banks that rely heavily on non-interest income might also be adversely affected if their brokerage fees or other fees are reduced as a result of a reduction in their own trading, or trading by their connected bank clients. Third, if the Volcker Rule is interpreted as an initial stage of impending reversion toward the Glass-Steagall regulations, banks that rely on non-interest income could be more restricted from offering non-traditional services in the future.

Bank Size. Banks will incur compliance costs as a result of the Volcker Rule, and the Dodd-Frank Act in general. Larger banks should be more able to absorb the costs because of their economies of

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[11] See http://money.msn.com/family-money/why-the-volcker-rule-matters-to-you-bankrate

[12] See http://www.heritage.org/research/reports/2012/04/volcker-rule-may-make-the-financial-and-banking-system-riskier

[13] See http://www.dailyfinance.com/2011/10/12/volcker-rule-made-simple-banks-cant-gamble-with-our-money/

[14] See http://dealbook.nytimes.com/2012/05/11/before-big-loss-jpmorgan-was-one-of-volcker-rules-fiercest-foes/?_r=0

[15] See http://www.huffingtonpost.com/2012/06/06/volcker-rule-jpmorgan-loss_n_1574490.html

[16] See http://www.brookings.edu/research/papers/2012/05/14-jpm-loss-elliott

[17] See http://www.reuters.com/article/2013/08/14/us-jpm-whale-charges-idUSBRE97D0QU20130814

scale. Furthermore, managers of larger banks should have more risk-taking opportunities than smaller banks because of their wide scope of operations. To the extent that the Volcker Rule allows for a more stable banking industry, the valuation effects and potential risk reduction should be more favorable for the banks whose managers are restricted by the Volcker Rule to a greater degree.

Loan Loss Provisions. A higher level of loan loss provisions may indicate the degree to which a bank pursues risky lending activities. Since banks with more loan loss provisions may be more exposed to systematic loan problems, these banks may benefit to a greater degree if they are restricted from excessive risk-taking, or if the banking industry in general is perceived to be safer due to the Volcker Rule. Thus, banks that have a higher degree of loan loss provisions may experience more favorable valuation effects or a more pronounced reduction in risk due to the Volcker Rule.

Bank Stock Price Volatility. Since banks that exhibit more pronounced stock price volatility may be perceived to be more exposed to bank industry problems, these banks may benefit to a greater degree if they are restricted from excessive risk-taking, or if the banking industry in general is perceived to be safer due to the Volcker Rule. Thus, banks with more volatile stock prices may experience more favorable valuation effects or a more pronounced reduction in risk as a result of the Volcker Rule.

Capital Ratio. Many studies such as those by Milne and Robertson (1996), Hojgaard and Taksar (1999), Furfine (2001), Peura and Keppo (2003), Diamond and Rajan (2000), Heid (2007), and Berger and Bouwman (2009) suggest that bank capital can serve as a cushion against risk-taking behavior or adverse environmental conditions. Since banks with less capital may be more exposed to bank industry problems, these banks may benefit to a greater degree if they are restricted from excessive risk-taking, or if the banking industry in general is perceived to be safer due to the Volcker Rule. Thus, banks that maintain less capital may experience more favorable valuation effects or a more pronounced reduction in risk as a result of the Volcker Rule.

5. Identification of Event Dates

We identify key news events that could have signaled new information about the degree of restrictions to be contained in the Volcker Rule, which could affect bank valuations and risk. While we control for key dates that signal the development of the Dodd-Frank Act in general, we focus on specific events in which there was material information about the potential potency of the Volcker Rule that could be easily distinguished from other signals about the Dodd-Frank Act. The key events are summarized below.

5.1. Event Dates for Volcker Rule

Thursday, January 21, 2010 President Obama initiated a plan for reform of the financial system on January 21, 2010, and endorsed the Volcker Rule.

Monday, May 10, 2010 the initial draft of the Volcker Rule was introduced by Senators Carl Levin and Jeff Merkely as an amendment to the Dodd-Frank Act.

November 7, 2011 Regulators announced a draft proposal (reviewed by the Federal Reserve, the Office of Comptroller of the Currency, the SEC, and the FDIC) of the Volcker Rule, which was open to comments.[18]

Friday, April 13, 2012 The Wall Street Journal suggests that J.P. Morgan Chase will incur large losses due to its proprietary trading. This event could trigger tougher restrictions imposed by the Volcker Rule.[19]

Wednesday, May 2, 2012 before markets open, a Reuters article quotes a senior banker of Bank of America, who states that while banks lobbied against restrictions that would be caused by the

[18] See Nov. 7 2011 proposal and Feb. 14 2012 CFTC proposal http://www.perkinscoie.com/news/pubs_detail.aspx?op=updates&publication=3587 and http://www.occ.gov/news-issuances/news-releases/2011/nr-ia-2011-155a.pdf

[19] See http://blogs.wsj.com/deals/2012/04/13/j-p-morgan-a-london-whale-hes-more-of-a-shrubbery/

Volcker Rule, it is clear that regulators expect banks to reduce their risk-taking activities.[20] A N.Y. Times article states that much progress was made on development of the Volcker Rule, and the implementation is on track.[21]

Friday, May 11, 2012 J.P. Morgan Chase announces before markets open that its London subsidiary experienced a trading loss estimated to be about $2 billion due to proprietary trading, which is the activity that the Volcker Rule is intended to restrict. ABC News states that regulators are reviewing the situation.[22]

Monday, May 14, 2012 on the weekend prior to this date, a large number of financial news articles speculated that the proprietary trading loss by J.P. Morgan Chase could or should encourage regulators to tighten their proposed provisions of the Volcker Rule. For example, Sheila Bair (the previous chairperson of the FDIC) voiced her concerns on Friday after markets closed that loosely defined exceptions to the Volcker Rule could prevent the Rule from being effective.[23] Many articles questioned whether the existing draft of the Volcker Rule would be sufficient to prevent the types of proprietary trading that caused J.P. Morgan Chase's large losses in the future. One likely inference was that the provisions of the Volcker Rule may need to be more restrictive to effectively prevent excessive proprietary trading.

5.2. Control Event Dates for Dodd-Frank Act

The Volcker Rule was developed along with many provisions that collectively make up the Dodd-Frank Financial Reform Act. However, because broad announcements about the Dodd-Frank Financial Reform Act in general could have had an impact on the banking industry, we control for these effects in our time series model.

While a complete analysis of the impact of the Dodd-Frank Act is beyond the scope of our study, we apply an additional time series model that separately controls for the three event dates reflecting the development of the Dodd-Frank Act:

Wednesday, June 30, 2010 the amendment to the Dodd-Frank Act (including the Volcker Rule) was passed by the House of Representatives.

Thursday, July 15, 2010 the amendment to the Dodd-Frank Act (including the Volcker Rule) was passed by the Senate.

Wednesday, July 21, 2010 Obama signed the Dodd-Frank Act into law.

Banks of different size categories could be affected in different ways by these events, similar to the events that reflect development of the Volcker Rule. The impetus of the Dodd-Frank Act was to improve the safety of the financial system. However, an indirect effect of the Dodd-Frank Act is to increase compliance costs for banks of all sizes, and those costs in relation to bank size may be especially damaging to smaller banks.[24]

6. Sample

We obtain a sample of U.S. publicly traded banks that have a market value of at least $100 million whose returns are consistently available during the 2009 – 2012 period. While we expect that the effects may be more pronounced for MC banks, we consider all banks that are traded on the NYSE or Nasdaq exchanges so that we can assess whether the impact of the Volcker Rule varies with bank size. Following Akhigbe and Martin (2006), we include in the sample all commercial banks (SIC code 602X) and savings institutions (SIC code 603X).

Our sample selection results in a total of 193 banks. Descriptive statistics for the sample are

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[20] See http://www.reuters.com/article/2012/05/01/banks-regulations-idUSL1E8G1HL120120501

[21] See http://dealbook.nytimes.com/2012/05/02/progress-is-seen-in-advancing-a-final-volcker-rule/ and http://thinkprogress.org/economy/2012/05/03/476115/banks-lobby-volcker-rule/?mobile=nc]

[22] See http://abcnews.go.com/Business/jpmorgan-chase-2b-trading-loss-roils-markets/story?id=16326205

[23] See http://blogs.wsj.com/deals/2012/05/11/bair-fed-should-tighten-volcker-rule-to-avoid-whale-like-mischief/

[24] See http://www.americanbanker.com/bankthink/thanks-to-dodd-frank-community-banks-too-small-too-survive-1054241-1.html

provided in Table 1. The mean asset value of banks as of December 2009 (the year prior to the initial date of the Volcker Rule) is $54.47 billion. However, the variation in bank size is substantial, ranging from $572 million to $2.2 trillion with a standard deviation of 268.8 billion. Bank daily returns have an average standard deviation of 3.05%. The sample banks derive an average of 21.05% of their income from non-interest sources and their loan loss provisions average 1.38% of their total assets. On average, banks hold 15.48% in total, risk-adjusted capital.

The two lower panels of Table 1 show separate summary statistics for MC and non-MC banks. Non-MC banks have a greater variability of returns (3.06%) compared to MC banks (2.85%). However MC banks have greater loan loss provisions (1.9%) compared to non-MC banks (1.37%). MC banks generate a much larger portion of their revenue from non-interest sources (44.09%) compared to non-MC banks (20.56%). Furthermore, MC banks hold less capital (14.49%) compared to non-MC banks (15.5%).

Table 1. Sample Description

Full Sample					
Variable	N	Mean	Std. Dev.	Min	Max
Total Assets	193	54,470	268,827	572	2,223,300
Standard Deviation	193	3.05%	1.30%	1.19%	8.81%
Loan Loss Provisions	193	1.38%	1.39%	0.01%	7.16%
Non-Interest Income	193	21.05%	13.89%	-37.07%	66.10%
Capital Ratio	193	15.48%	4.54%	3.00%	41.45%
MC Banks					
Variable	N	Mean	Std. Dev.	Min	Max
Total Assets	4	1,838,895	424,142	1,243,646	2,223,300
Standard Deviation	4	2.85%	0.62%	2.25%	3.69%
Loan Loss Provisions	4	1.90%	0.29%	1.58%	2.18%
Non-Interest Income	4	44.09%	3.22%	41.61%	48.82%
Capital Ratio	4	14.49%	0.86%	13.26%	15.25%
Non-MC Banks					
Variable	N	Mean	Std. Dev.	Min	Max
Total Assets	189	16,705	41,867	572	281,176
Standard Deviation	189	3.06%	1.31%	1.19%	8.81%
Loan Loss Provisions	189	1.37%	1.40%	0.01%	7.16%
Non-Interest Income	189	20.56%	13.61%	-37.07%	66.10%
Capital Ratio	189	15.50%	4.58%	3.00%	41.45%

Notes: This table shows the descriptive statistics of sample banks. The top panel shows the results for the full sample, the middle panel shows the results for the MC banks, and the bottom panel shows the results for the non-MC banks. Total asset values are reported in millions. Standard deviation measures the standard deviation of returns in the 6-month period prior to the first event (Obama's endorsement) representing the Volcker Rule. The other variables are compiled from the bank's last financial statement prior to the Obama's endorsement of the Volcker Rule. Loan loss provisions and capital ratio are reported as a ratio to total assets, while non-interest income is reported as a ratio to total revenue.

7. Time Series Model

We apply the following model to measure the valuation effects of a particular bank portfolio in response to the news events pertaining to the Volcker Rule:

$$R_{p,t} = a + \beta_1 R_{m,t} + \beta_2 DODD + \beta_3 VOLCKER + \beta_4 VOLCKER\ RISK\text{-}SHIFT + e_t \quad (1)$$

where:

$R_{p,t}$ = bank portfolio return on day t,
β_1 = sensitivity of the bank portfolio return to the market return as estimated by the model,
$R_{m,t}$ = market return on day t,
β_2 = sensitivity of the bank portfolio return to broad signals about the development of the Dodd-Frank Act as estimated by the model,
DODD = a dummy variable that equals 1 on key event dates related to the Dodd-Frank Act and 0 otherwise,
β_3 = sensitivity of the bank portfolio return to implications of the Volcker Rule as estimated by the model,
VOLCKER = a dummy variable that equals 1 on the event dates related to the Volcker Rule and 0 otherwise,
β_4 = the estimated shift in the risk of the bank portfolio following the first signal (Obama's endorsement) about the impending development of the Volcker Rule,
VOLCKER RISK-SHIFT= dummy variable that equals 1 on all dates following the first Volcker Rule event date (January 21, 2010) in which President Obama endorsed the Volcker Rule multiplied by $R_{m,t}$; the interaction term tests for a risk-shift following Obama's endorsement of the Volcker Rule, and
e_t = error term.

7.1. Alternative Model Specifications

We test to determine if our results are robust to different model specifications as explained here:

Proxy for Market. We include the CRSP equally-weighted index as a proxy for the market portfolio in some models, and an alternative CRSP value-weighted index as a proxy for the market portfolio in other models.

Controlling for the Development of the Dodd-Frank Act. We include the *DODD* variable (representing the key dates related to the Dodd-Frank Act that broadly indicate progress in the development of the Dodd-Frank Act) in some models, and exclude the *DODD* variable in other models.

Separate Bank Portfolios. Since we are interested in whether the effects of the events vary between MC and non-MC banks, we form two portfolios composed of MC banks with assets of more than $500 billion, and non-MC banks include the remaining banks (banks with less than $500 billion in assets). This cutoff causes our sample of MC banks to represent those that were explicitly mentioned in the proceedings of the Volcker Rule.

Exclusion of J.P. Morgan Chase. We exclude J.P. Morgan Chase from the portfolio when applying some models, since it incurred the direct losses as a result of the London Whale event that we assess in our analysis. Thus, a portion of the effect of the London Whale event on J.P. Morgan Chase is likely attributed to the news that its earnings will be lower (rather than to a signal about the Volcker Rule).

Separation of London Whale Events. We also apply an extra model designed to separate the London Whale events from the other Volcker Rule event dates. The London Whale episode could have indirectly affected the valuations of other banks. The loss associated with the London Whale event was estimated a loss of $2 billion, which was revised several times until the loss amount was ultimately reported be $6.2 billion.[25] Some employees of J.P. Morgan Chase were charged "with wire fraud and conspiracy to falsify books and records related to the trading losses."[26] The event could have caused more suspicion about behavior of other MC banks. To the extent that the London Whale episode affected bank valuations for reasons other than its implications for tougher Volcker Rule provisions, we separate the three London Whale events (April 13, 2012; May 11, 2012; May 14, 2012**)** from the other events pertaining to the Volcker Rule, as shown here:

$$R_{p,t} = a + \beta_1 R_{m,t} + \beta_2 DODD_t + \beta_3 VOLCKER_t + \beta_4 WHALE_t + \beta_5 VOLCKER\ RISK\text{-}SHIFT + e_t \quad (2)$$

where *WHALE* = dummy variable assigned 1 on each of the three event dates pertaining to the London Whale episode as described earlier, and zero otherwise. In this model, the *VOLCKER* variable

[25] See http://www.reuters.com/article/2013/08/14/us-jpm-whale-charges-idUSBRE97D0QU20130814.
[26] See http://www.reuters.com/article/2013/08/14/us-jpm-whale-charges-idUSBRE97D0QU20130814

is revised to exclude the three event dates representing the London Whale episode, since those event dates are separately accounted for by the *WHALE* variable.

Correcting for Heteroskedasticiy. In order to avoid estimation problems caused by heteroskedasticity all models are applied with robust standard errors as in White (1980). In unreported results, we also ran the models with the Newey-West standard errors that are robust to heteroskedasticity and autocorrelation, and the results are qualitatively similar to our reported results.

7.2. Limitations of Measuring Valuation Effects

Our measurement of valuation effects associated with the Volcker Rule is subject to error for reasons expressed in other studies that attempt to measure valuation effects in response to regulations. First, information about an impending regulation occurs in doses over time, and therefore is difficult to capture the entire impact. In addition, there might be other confounding effects that could be occurring at the same time, such that the effects that we measure are not fully attributable to the events associated with the Volcker Rule. We attempt to make sure that there is no other confounding event on the event dates we selected that would possibly affect the banking industry in general. Thus, the use of daily data, accounting for the conditional sensitivity to general stock market movements, and avoiding any obvious publicized events should minimize the potential error.

Another possible reason for measurement error is that investors could have relied on other sources of information disclosed on other dates when assessing the potential impact of the Volcker Rule. While we attempted to identify event days in which new material information was publicized that could have signaled the potential degree of restrictions imposed on proprietary trading, one could argue that other event days might also deserve consideration. Nevertheless, we believe our selection of events should reflect a substantial portion of the set of information that was used by investors to revalue banks due to signals about the Volcker Rule.

8. Cross-Sectional Model

We apply a cross-sectional analysis to explain the variation of the impact that the Volcker Rule had on valuation and the risk-shift of banks. For this purpose, the time series model is applied to each individual bank to derive the estimated Volcker Rule impact on the valuation of that particular bank. Then, the variation of the impact of the Volcker Rule among banks is modeled as follows:

$$VolckerImpact_k = \beta_0 + \beta_1 NII_k + \beta_2 SIZE_k + \beta_3 LLP_k + \beta_4 STDEV_k + \beta_5 CAP_k + u_k \quad (3)$$

First, we use the estimated valuation impact of the Volcker Rule per bank as the dependent variable, as estimated by the coefficient of the *VOLCKER* dummy variable derived from applying the time series model separately to each bank. Then we revise the process by using the risk-shift impact of the Volcker Rule per bank as the dependent variable, as estimated by the coefficient of the *VOLCKER_RISK-SHIFT* variable derived from applying the times series model separately to each bank. The *VOLCKER_RISK-SHIFT* only captures the bank's shift in market risk. We also consider the bank's total risk as measured by the standard deviation of returns. We calculate the bank's shift in total risk as the standard deviation of bank returns post Obama's endorsement of Volcker rule minus

the standard deviation of bank returns prior to Obama's endorsement of Volcker rule.
The independent variables in the cross-sectional model are:
NII_k = non-interest income of the *kth* bank measured as a ratio to total revenue during the year prior to the event of concern,
$SIZE_k$ = the natural logarithm of the total assets of the kth bank prior to the event of concern,
LLP_k = loan loss provisions of the kth bank measured as a ratio to total assets prior to the event of concern,
$STDEV_k$ = the standard deviation of returns of the kth bank in the 6-month period prior to the event of concern,
CAP_k= capital ratio of the kth bank, measured as a ratio to total assets in the year prior to the event of concern.
u_k = error term.

9. Results

9.1. Results of Time Series Analyses

Results from applying the time series model to the portfolios of MC and non-MC banks are disclosed in Table 2. The dependent variable is the daily return for the specified bank portfolio bank. The results of the MC bank portfolio are reported in the top panel, while the results of the non-MC bank portfolio are reported in the bottom panel. The independent variables used in the model are listed in the left margin.

The time series was applied using several different specifications. We report the results for the MC bank portfolio including J.P. Morgan Chase in the portfolio. We also replicated the analysis without J.P. Morgan Chase (since it was directly involved in the London Whale events that partially represent the Volcker dummy variable), and the results (including significance status of all variables) are qualitatively similar. In addition, all the models were also applied with the Newey-West heteroskedasticity and autocorrelation consistent standard errors, and the significance level of all coefficients remains unchanged.

We report the results for 8 different models, whereby the first 4 models (shown in the first 4 columns) rely on the CRSP equally-weighted index as a proxy for the market portfolio, while the next 4 model (shown in columns 5-8) rely on the CRSP value-weighted index as a proxy for the market portfolio. The difference within the first 4 models that rely on the CRSP equal-weighted index is in the variables that are included in the model. The difference within the next 4 models that rely on the CRSP equal-weighted index is also in the variables that are included in the model.

For the portfolio of the MC banks (shown in the top panel), the models have a very strong goodness of fit, with the R-squared statistic ranging from 54.6% to 61.8% among the 8 models.

The coefficient of the market return variable (R_m) is positive and significant at the .01 level in all 8 models. The *DODD* dummy variable is positive in all 4 models in which the *DODD* variable was included, and was significant in two of the models (those in which the equal-weighted index was used as a proxy). Thus, the results offer modest evidence that the MC banks were favorably affected by broad announcements signaling progress toward the implementation of the Dodd-Frank Act.

The coefficient of the *VOLCKER* dummy variable is negative and significant at the .01 level in all 8 models, which offers very strong evidence of negative valuation effects for the MC bank portfolio in response to events that signal the development of the Volcker Rule. The estimated coefficient of the *VOLCKER* dummy variable ranges between -0.015 and -0.0163, which suggests that the portfolio of MC banks declined by about 1.5% to 1.63% per event date on average over the event dates that were identified as signals about the development of the Volcker Rule. Thus, the aggregate impact over all 7 event dates represents an estimated share price response of about -10.5% to -11.41%.

The coefficient of the *VOLCKER RISK-SHIFT* variable is negative and significant at the 0.01 level in all 4 models in which the interaction term was included. This result offers very strong evidence that the risk of MC banks declined following Obama's endorsement of the Volcker Rule.

Table 2. Time Series Model

	MC Banks							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Independent Variables								
Constant	-0.00121	-0.00138*	-0.0012	-0.00137*	-0.000452	-0.000498	-0.000436	-0.000492
Rm	2.065***	2.548***	2.064***	2.548***	2.059***	2.698***	2.058***	2.698***
DODD	0.00436***	0.00188**			0.00519	0.00184		
VOLCKER	-0.0152***	-0.0150***	-0.0152***	-0.0150***	-0.0163***	-0.0161***	-0.0163***	-0.0161***
VOLCKER RISK-SHIFT		-0.901***		-0.901***		-1.115***		-1.115***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.546	0.572	0.546	0.572	0.577	0.618	0.577	0.618
Independent Variables				**Non-MC Banks**				
Constant	-0.00096***	-0.00099***	-0.00099***	-0.0010***	-0.00040	-0.00041	-0.00042	-0.00044
Rm	1.435***	1.520***	1.436***	1.520***	1.380***	1.549***	1.382***	1.549***
DODD	-0.00950***	-0.00993***			-0.00932**	-0.0102**		
VOLCKER	0.00412	0.00417	0.00415	0.0042	0.00334	0.0034	0.00336	0.00343
VOLCKER RISK-SHIFT		-0.159*		-0.157*		-0.294***		-0.292***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.79	0.792	0.789	0.791	0.776	0.785	0.776	0.784

Notes: This table shows the results of the time series model. The top panel shows the results for the portfolio of MC banks, and the bottom panel shows the results for the portfolio of non-MC banks. In models 1-4 the market return is measured by the return of the CRSP equally-weighted index while in models 5-8 the market return is measured by the return of the CRSP value-weighted index. *DODD* is a dummy variable that equals 1 in the event days related to the enactment of the Dodd-Frank Act, and 0 otherwise. *VOLCKER* is a dummy variable that equals 1 in the event days signaling development of the Volcker Rule, and 0 otherwise. *VOLCKER RISK-SHIFT* is the interaction between a dummy variable set equal to 1 for all days since the first signal of the Volcker Rule and the market return. *, **, and *** represent the level of significance at the 10%, 5%, and 1%, respectively.

We surmise that the first signal of impending Volcker Rule restrictions (Obama's endorsement of the Volcker Rule) by itself would have reduced the risk of bank stocks without the subsequent efforts to implement the Rule. The endorsement allows for a starting point to test for the shift in risk, and the momentum toward the development of the Volcker Rule continued after the endorsement.

For the portfolio of non-MC banks (lower panel of Table 2), the models have a very strong goodness of fit, with the R-squared statistic ranging from 77.6% to 79.2% among the 8 models. The coefficient of the market return variable (R_m) is positive and significant in all 8 models. The *DODD* dummy is negative and significant in all four models in which the *DODD* variable was included in the model. These results for the non-MC banks are different from those derived for the MC banks. While all banks could possibly benefit from a more stable banking system, we attribute this difference in results to the increase in compliance costs associated with the Dodd-Frank Act, which is more of a burden for smaller banks that do not fully capitalize on economies of scale.

The coefficient of the *VOLCKER* dummy variable is insignificant for the non-MC banks in all models. However, the coefficient of the *VOLCKER RISK-SHIFT* variable is negative and significant at the .10 level or better in all models, implying a decrease in risk for the non-MC banks since the first signal (Obama's endorsement) of the Volcker Rule.

As a robustness test, we also ran the same model by measuring the risk shift from May 10, 2010 – the date in which the initial draft of the Volcker Rule was introduced by Senators Carl Levin and Jeff Merkely as an amendment to the Dodd-Frank Act. These results have been omitted to conserve space; however, they are qualitatively similar to the results displayed on Table 2. We also measure the impact of the Volcker rule on banks' total risk (results are not shown in tables). Prior to the Obama's endorsement of the Volcker Rule MC banks experienced a 0.067 standard deviation of returns. In the period after the Obama's endorsement of the Volcker Rule, their standard deviation of returns was reduced to 0.024. This difference is significant at the 1% level (t-stat=8.89). Prior to the Obama's endorsement of the Volcker Rule, non-MC banks experienced a 0.045 standard deviation of returns. In the period after the Obama's endorsement of the Volcker Rule their standard deviation of returns was reduced to 0.024. This difference is significant at the 1% level (t-stat=21.32).

9.2. Results of the Time Series Analyses that Isolate the London Whale Event

We also apply a time series analysis in which we separate the three London Whale event days from the other Volcker Rule event days. These results are reported in Table 3 and are qualitatively similar to the results reported in Table 2. The portfolio of MC banks experienced significantly negative valuation effects in response to the Volcker Rule events and London Whale events, while the portfolio of non-MC banks experienced insignificant valuation effects in response to the Volcker Rule events and the London Whale events. The sign and the significance level of the other coefficients are identical to those reported in Table 2.

Additionally, we also apply a time series analysis in which we separate the effect of each individual date. These results are shown on Table 4. These results are qualitatively similar to the prior tables. For the MC banks (shown in the top panel) the dates related to the Dodd-Frank Act generally result in positive and significant returns, while the dates related to the Volcker Rule or the London Whale event generally result in negative and significant returns. For the non-MC banks (shown in the bottom panel) the dates related to the Dodd-Frank Act generally result in negative and significant returns, while the dates related to the Volcker Rule or the London Whale event result in mixed results.

9.3. Results of Cross-Sectional Analyses

Our cross-sectional analysis tests the relationship the between bank share price response to the Volcker events and bank-specific characteristics among non-MC banks, as disclosed in the top panel of Table 5. In order to avoid estimation problems caused by heteroskedasticity all models are applied with robust standard errors as in White (1980). Each of the models is determined by its F-value to be significant, and the goodness of fit as measured by the R-squared statistic ranges from 16.7% to 18.1%.

Table 3. Time Series Model that Separates the London Whale Events

	MC Banks							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Independent Variables								
Constant	-0.00121	-0.00138*	-0.00119	-0.00137*	-0.000452	-0.000497	-0.000436	-0.000491
Rm	2.065***	2.548***	2.064***	2.548***	2.059***	2.698***	2.058***	2.698***
DODD	0.00435***	0.00186**			0.00519	0.00182		
VOLCKER	-0.0140**	-0.0109**	-0.0140**	-0.0109**	-0.0157**	-0.0120***	-0.0157**	-0.0120***
CHASE	-0.0168***	-0.0204***	-0.0168***	-0.0204***	-0.0172***	-0.0215***	-0.0172***	-0.0215***
VOLCKER RISK-SHIFT		-0.904***		-0.904***		-1.118***		-1.118***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.546	0.572	0.546	0.572	0.577	0.618	0.577	0.618
Independent Variables	**Non-MC Banks**							
Constant	-0.000953***	-0.000984***	-0.000983***	-0.00101***	-0.000394	-0.000406	-0.000423	-0.000437
Rm	1.433***	1.520***	1.434***	1.520***	1.379***	1.549***	1.380***	1.549***
DODD	-0.00951***	-0.00996***			-0.00933**	-0.0102**		
VOLCKER	0.00911	0.00967*	0.00913	0.00969*	0.00832	0.00929	0.00834	0.0093
CHASE	-0.00254	-0.00318	-0.0025	-0.00313	-0.00331	-0.00446	-0.00327	-0.00441
VOLCKER RISK-SHIFT		-0.162*		-0.161*		-0.298***		-0.296***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.79	0.793	0.79	0.792	0.777	0.786	0.776	0.785

Notes: This table shows the results of the time series model in which the impact of the London Whale event is measured separately from the impact of the Volcker Rule. The top panel shows the results for the portfolio of MC banks, and the bottom panel shows the results for the portfolio of non-MC banks. In models 1-4 the market return is measured by the return of the CRSP equally-weighted index while in models 5-8 the market return is measured by the return of the CRSP value-weighted index. *DODD* is a dummy variable that equals 1 in the event days related to the enactment of the Dodd-Frank Act, and 0 otherwise. *VOLCKER* is a dummy variable that equals 1 in the event days signaling development of the Volcker Rule (excluding the London Whale event days), and 0 otherwise. WHALE is a dummy variable that equals 1 in the event days in which there was news about the London Whale event, and 0 otherwise. *VOLCKER RISK-SHIFT* is the interaction between a dummy variable set equal to 1 for all days since the first signal of the Volcker Rule and the market return. *, **, and *** represent the level of significance at the 10%, 5%, and 1%, respectively.

Table 4. Time Series Model that Separates all Dates

				MC Banks				
Independent Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Constant	-0.00121	-0.00138*	-0.0012	-0.00137*	-0.000457	-0.000497	-0.00044	-0.000491
Rm	2.070***	2.548***	2.069***	2.548***	2.066***	2.698***	2.065***	2.698***
Dodd1 (06/30/2010)	0.00504***	0.00286***			0.0113***	0.00702***		
Dodd2 (07/15/2010)	0.00332***	0.00195**			-0.00581***	-0.00557***		
Dodd3 (07/21/2010)	0.00481***	0.000799			0.0102***	0.00405***		
Volcker1 (01/21/2010)	-0.0135***	-0.0193***	-0.0135***	-0.0193***	-0.00695***	-0.0155***	-0.00699***	-0.0155***
Volcker2 (05/10/2010)	-0.0316***	-0.0132***	-0.0316***	-0.0132***	-0.0365***	-0.0147***	-0.0365***	-0.0147***
Volcker3 (11/07/2011)	0.00330***	0.00353***	0.00329***	0.00352***	-0.00732***	-0.00490***	-0.00733***	-0.00490***
Chase1 (04/13/2012)	-0.0166***	-0.0210***	-0.0166***	-0.0210***	-0.0138***	-0.0198***	-0.0139***	-0.0198***
Volcker4 (05/02/2012)	-0.0145***	-0.0146***	-0.0145***	-0.0146***	-0.0121***	-0.0131***	-0.0121***	-0.0131***
Chase2 (05/11/2012)	-0.0290***	-0.0304***	-0.0290***	-0.0304***	-0.0316***	-0.0329***	-0.0316***	-0.0329***
Chase3 (05/14/2012)	-0.00468***	-0.00978***	-0.00470***	-0.00980***	-0.00602***	-0.0119***	-0.00605***	-0.0119***
VOLCKER RISK-SHIFT		-0.903***		-0.903***		-1.116***		-1.117***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.547	0.573	0.547	0.573	0.578	0.619	0.577	0.618
Independent Variables				**Non-MC Banks**				
Constant	-0.00096***	-0.00099***	-0.00099***	-0.0010***	-0.00040	-0.00041	-0.00043	-0.00044
Rm	1.437***	1.520***	1.439***	1.520***	1.384***	1.549***	1.385***	1.549***
Dodd1 (06/30/2010)	-0.00295***	-0.00332***			0.000919**	-0.0002		
Dodd2 (07/15/2010)	-0.00881***	-0.00905***			-0.0152***	-0.0151***		
Dodd3 (07/21/2010)	-0.0167***	-0.0174***			-0.0136***	-0.0152***		
Volcker1 (01/21/2010)	0.0292***	0.0282***	0.0293***	0.0283***	0.0328***	0.0306***	0.0329***	0.0307***
Volcker2 (05/10/2010)	-0.000883	0.0023	-0.000913	0.00222	-0.00206	0.00361**	-0.00208	0.00356**
Volcker3 (11/07/2011)	0.00438***	0.00442***	0.00441***	0.00445***	-0.00278***	-0.00215***	-0.00276***	-0.00213***
Chase1 (04/13/2012)	-0.0117***	-0.0124***	-0.0116***	-0.0124***	-0.0104***	-0.0120***	-0.0104***	-0.0119***
Volcker4 (05/02/2012)	0.00361***	0.00360***	0.00364***	0.00364***	0.00515***	0.00490***	0.00518***	0.00494***
Chase2 (05/11/2012)	-0.00143***	-0.00167***	-0.00140***	-0.00163***	-0.00338***	-0.00372***	-0.00335***	-0.00369***
Chase3 (05/14/2012)	0.00559***	0.00471***	0.00564***	0.00477***	0.00401***	0.00248***	0.00405***	0.00254***
VOLCKER RISK-SHIFT		-0.157*		-0.154*		-0.291***		-0.289***
N	1006	1006	1006	1006	1006	1006	1006	1006
R-sq	0.792	0.794	0.791	0.793	0.779	0.787	0.778	0.786

Notes: This table shows the results of the time series model in which the impact of each event date is measured separately. The top panel shows the results for the portfolio of MC banks, and the bottom panel shows the results for the portfolio of non-MC banks. In models 1-4 the market return is measured by the return of the CRSP equally-weighted index while in models 5-8 the market return is measured by the return of the CRSP value-weighted index. Each date is represented by a dummy variable that equals 1 on that date and 0 otherwise. *, **, and *** represent the level of significance at the 10%, 5%, and 1%, respectively.

Table 5. Cross-Sectional Model: Price Response to the Volcker Rule

				Non-MC Banks				
Independent Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Constant	-0.00967	-0.0103	-0.00961	-0.0102	-0.00964	-0.0101	-0.00959	-0.01
NII	-0.0131**	-0.0131**	-0.0131**	-0.0131**	-0.0132**	-0.0131**	-0.0132**	-0.0131**
SIZE	0.00165**	0.00170**	0.00164**	0.00170**	0.00158**	0.00162**	0.00158**	0.00162**
LLP	0.0482	0.0487	0.0484	0.0488	0.0454	0.046	0.0456	0.0462
STDEV	0.166***	0.171***	0.166***	0.171***	0.159***	0.162***	0.159***	0.163***
CAP	-0.000215	-0.000212	-0.000216	-0.000213	-0.000215	-0.000214	-0.000216	-0.000214
N	189	189	189	189	189	189	189	189
R-sq	0.176	0.181	0.176	0.181	0.167	0.17	0.167	0.171
Independent Variables				**Full Sample**				
Constant	-0.00917	-0.00976	-0.00912	-0.00973	-0.00914	-0.00956	-0.00909	-0.00953
NII	-0.0130**	-0.0130**	-0.0130**	-0.0130**	-0.0130**	-0.0130**	-0.0130**	-0.0130**
SIZE	0.00161**	0.00166**	0.00161**	0.00166**	0.00154**	0.00158**	0.00154**	0.00158**
LLP	0.0496	0.0500	0.0498	0.0503	0.0468	0.0474	0.0470	0.0476
STDEV	0.164***	0.169***	0.164***	0.169***	0.157***	0.160***	0.157***	0.160***
CAP	-0.000224	-0.000222	-0.000225	-0.000223	-0.000224	-0.000223	-0.000225	-0.000224
MC	-0.0258***	-0.0259***	-0.0259***	-0.0260***	-0.0258***	-0.0258***	-0.0258***	-0.0259***
N	193	193	193	193	193	193	193	193
R-sq	0.237	0.239	0.237	0.24	0.231	0.233	0.232	0.234

Notes: This table shows the results of the cross-sectional model in which the dependent variable is the bank's share price response to the Volcker Rule. The top panel shows the results for non-MC banks while the bottom panel shows the results for the full sample (and includes the *MC* dummy which equals 1 if the bank is an MC bank, and 0 otherwise). In each model (1-8), the dependent variable corresponds to its estimate in the time series regression with the same number (1-8). *SIZE* is measured as the natural logarithm of the banks total assets. *STDEV* is the standard deviation of the bank's returns in the 6-month period prior to the first signal of the development of the Volcker Rule. *LLP* is the bank's loan loss provisions as a ratio to total assets. *NII* is the bank's non-interest income as a ratio to total revenue. *CAP* is the bank's total capital ratio. *, **, and *** represent the level of significance at the 10%, 5%, and 1%, respectively.

First, we attempt to explain the variation in the sensitivity of bank stock valuation effects to the *VOLCKER* variable. The dependent variable is the coefficient of the *VOLCKER* variable per bank, which represents that bank's sensitivity to signals pertaining to the development of the Volcker Rule. The variable names are shown in the left margin. The 8 models differ only with respect to the dependent variable. In each model (1 through 8), the dependent variable corresponds to its estimated coefficient of the *VOLCKE*R variable when applying the time series regression model (from Table 2), with the same model number (1 through 8).

The coefficient of *NII* is negative and significant at the .05 level in all 8 models. Banks that rely more on income generated from non-traditional banking activities (such as trading fees and proprietary trading) experienced weaker valuation effects in response to the Volcker Rule events. We attribute this result to the limitations that the Volcker

Rule would impose on proprietary trading and other non-traditional banking activities which could lower the bank's income.

The coefficient of *SIZE* is positive and significant at the .05 level in all 8 models. Smaller banks have less to benefit from any possible regulatory changes that might limit risk-taking activities, and could create more favorable market sentiment due to a more stable environment. Yet, smaller banks still incur compliance costs associated with new regulations. These banks experience less favorable effects than medium-size or large banks in response to the Volcker Rule events. The coefficient of *LLP* is positive as expected, but is insignificant in all models.

The coefficient of *STDEV* is positive and significant at the .01 level in all 8 models. This result supports our hypothesis that riskier banks have a greater potential to benefit from the events signaling the restrictive provisions or impending implementation of the Volcker Rule.

We also replicate the cross-sectional analysis for the entire sample, which includes the MC banks. For this analysis, we include a dummy variable to designate the MC banks. Results are shown in the bottom panel of Table 5. These results are qualitatively similar to the results of the top panel of Table 5. The MC dummy variable that was added to the model in the bottom panel is negative and significant at the .01 level in all 8 models. This result reinforces the earlier results generated by the time series models (shown in Table 2) that suggest the valuation effect of MC banks in response to the Volcker events is worse than that of other banks.

Results from assessing the cross-sectional analysis of the risk-shift in response to the Volcker Rule are disclosed in the top panel of Table 6 for all non-MC banks, and in the bottom panel of Table 6 for the entire sample (which also includes MC banks). The goodness of fit of these models ranges from 39.4% to 59.6% in the top panel, and from 41.4% to 61.8% in the bottom panel. The last column of this table reports the results in which the dependent variable is the change in the bank's total risk. For the sample of non-MC banks (top panel of Table 6), the *SIZE* variable is negative and significant at the 0.01 level in all 5 models, which implies a more pronounced reduction in risk for larger banks. In addition, the coefficient of *STDEV* is negative and significant at the 0.01 level in all 5 models, which implies a more pronounced reduction in risk for banks that were more volatile. The results suggest that the Volcker Rule may allow for more favorable investor sentiment in the banking industry, especially for those banks that previously were perceived to exhibit relatively high risk. The coefficients of the remaining variables are insignificant in all models.

For the entire sample of banks (bottom panel of Table 6), the results are qualitatively similar to the results for the non-MC banks (in the top panel of Table 6). The only notable difference is for the *MC* dummy that was not applicable in the top panel, but is added to the model applied to the entire sample (shown in bottom panel). The coefficient is positive and significant at the 10% level in four out of the five models. This result implies that the degree of risk reduction was smaller for the MC banks versus non-MC banks since the first signal about the impending development of the Volcker Rule.

Table 6. Cross-sectional Model: Risk-shift in Response to the Volcker Rule

			Non-MC Banks		
Independent Variables	**Model 2**	**Model 4**	**Model 6**	**Model 8**	**Total Risk**
Constant	2.039***	2.041***	2.053***	2.055***	0.0358***
NII	-0.0606	-0.0611	-0.0937	-0.0942	-0.00747
SIZE	-0.180***	-0.180***	-0.197***	-0.197***	-0.00383***
LLP	-1.446	-1.434	-2.693	-2.68	0.0886
STDEV	-17.18***	-17.16***	-16.57***	-16.55***	-0.720***
CAP	-0.00712	-0.00718	-0.00715	-0.0072	-0.0000798
N	189	189	189	189	189
R-sq	0.395	0.394	0.417	0.417	0.596
			Full Sample		
Independent Variables	**Model 2**	**Model 4**	**Model 6**	**Model 8**	**Total Risk**
Constant	2.024***	2.026***	2.038***	2.040***	0.0357***
NII	-0.0637	-0.0642	-0.0975	-0.098	-0.0076
SIZE	-0.179***	-0.179***	-0.196***	-0.196***	-0.00382***
LLP	-1.52	-1.507	-2.774	-2.76	0.089
STDEV	-17.02***	-17.01***	-16.41***	-16.39***	-0.723***
CAP	-0.00685	-0.00691	-0.00687	-0.00693	-0.0000792
MC	0.292*	0.289*	0.328*	0.326*	-0.000229
N	193	193	193	193	193
R-sq	0.415	0.414	0.439	0.439	0.618

Notes: This table shows the results of the cross-sectional model in which the dependent variable is the bank's risk-shift in response to the Volcker Rule. The top panel shows the results for non-MC banks while the bottom panel shows the results for the full sample (and includes the *MC* dummy which equals 1 if the bank is an MC bank, and 0 otherwise). In each model (2,4,6,8), the dependent variable corresponds to its estimate in the time series regression with the same number (2,4,6,8). *SIZE* is measured as the natural logarithm of the banks total assets. *STDEV* is the standard deviation of the bank's returns in the 6-month period prior to the first signal of the development of the Volcker Rule. *LLP* is the bank's loan loss provisions as a ratio to total assets. *NII* is the bank's non-interest income as a ratio to total revenue. *CAP* is the bank's total capital ratio. *, **, and *** represent the level of significance at the 10%, 5%, and 1%, respectively.

10. Summary

The Dodd-Frank Act was developed to discourage behavior that was perceived to cause or exacerbate problems during the financial crisis. Section 619 of the Dodd-Frank Act (referred to as the Volcker Rule) was intended to limit proprietary trading by banks. The Volcker Rule was not the impetus for the Dodd-Frank Act, and actually surfaced as an amendment. However, it received much attention as special interest groups argued about its merits. The Volcker Rule provisions were to be finalized over time and then fully implemented by July, 2014.

We attempt to measure how various signals associated with the development of the Volcker Rule influenced bank valuations and risk. Our objective is strictly focused on the sensitivity of bank stock returns to public announcements signaling the development of the Volcker Rule, and is not intended to offer implications about whether the Rule enhances the welfare of bank customers. We find that signals that the Volcker Rule would impose heavy restrictions on bank proprietary trading had a pronounced negative impact on MC (money-center) banks.

For our initial analysis, we consider three London Whale event dates within our set of dates in which relevant information is conveyed about the Volcker Rule content, because regulators were prompted by the London Whale episode to question whether the provisions of the Volcker Rule should be more restrictive. However, the London Whale events could also signal that other banks are experiencing trading losses, but are not disclosing them. Since this type of signal could cause a negative valuation effect on banks irrespective of an impending change in regulation of proprietary trading by banks, we disentangle the three London Whale events dates from the set of Volcker Rule events. This allows us to separately isolate the valuation effects of banks resulting from the London Whale events. We find that the MC banks also experienced negative valuation effects in response to the London Whale events. Furthermore, our revised analysis still shows that MC banks experienced negative valuation effects in response to the Volcker Rule events, even when those events exclude the London Whale episode.

The valuation effects of non-MC banks in response to signals about the Volcker Rule and the London Whale events were not significant. However, we find that all banks (MC and non-MC banks) experienced a reduction in risk following the initial signal regarding the development of the Volcker Rule. We attribute these results to a possible change in the perception of the banking industry, in which investors are more confident that bank risk-taking will be constrained within reasonable limits in the future.

Our analysis controls for the impact of broad announcements about the Dodd-Frank Act on the banking industry. We find that the inception of the Dodd-Frank Act resulted in positive valuation effects for MC banks and negative valuation effects for non-MC banks. While the Dodd-Frank Act was intended to stabilize the banking industry and regain the trust of bank customers, it also caused an increase in compliance costs. Financial news sources questioned whether smaller banks would be able to remain independent given the potential impact of compliance costs.

We also examine how the impact of the Volcker Rule varies across banks by applying a cross-sectional analysis. We find that within the sample of non-MC banks, those banks that generated lower non-interest income benefited the most (or were harmed less) by the Volcker Rule. This result suggests that banks relying more on non-interest income might suffer the greatest reduction in non-interest income due to the Volcker Rule, which could partially offset any benefits of the Volcker Rule in enhancing the safety of the banking system. In addition, the valuation effects experienced by banks in response to Volcker Rule events were more favorable if they were larger, and were previously exposed to higher risk (greater variability of returns and lower capital ratios)..

We also replicated the cross-sectional analysis of the Volcker Rule effects for the entire sample, which includes the MC banks. Results are very similar to the sample of non-MC banks, except that the dummy variable representing MC banks that was added to the model applied the entire sample was negative and significant. This result corroborates the results for the *VOLCKER* variable that were derived from applying the time series analysis.

Furthermore, we find that the degree of risk reduction is more pronounced for non-MC banks that were larger, and that previously exhibited more volatility. These results also hold when conducting a cross-sectional analysis on the entire sample.

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