The effect of regulations on financial system stability:

An analysis of the impact of the Volcker rule on the

US banking system

by

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Abstract

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This paper seeks to evaluate the impact of the announcement of the Volcker rule on the performance of the stock prices /return on Bank Holding Companies in the US. In order to test the effect of this policy change, daily stock prices and trading assets of 415 Bank Holding Companies in the United States between 2009-2012 were obtained and were classified into three groups according to the value of their trading assets. An event study was carried out on the Cumulative abnormal returns of these companies on three different announcement dates which are considered vital to the implementation of the rule.

It was observed that U.S capital market reacted negatively to the announcement of the rule on those three dates but the effect was more pronounced in the prices of the securities that were exposed to proprietary trading (trading assets) and this was significant around the first announcement date at the 10% significance level. However, the market also reacted negatively on the other two dates, but was not as significant as the first time when the market was anticipating the announcement.

This evidence suggests that the Volcker rule had an adverse effect on the securities values of banks that engage in proprietary trading and could possibly curb their involvement in these speculative trading activities.

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Table of Contents

Chapter 1: Introduction

To what degree can regulatory policies ensure stability of the financial system and address the global financial downturn? This question becomes relevant with the current spate of policies and regulatory reforms geared towards addressing the uncertainties in the financial system. In particular, there was a ripple effect generated by the public announcement and endorsement of Volcker's rule by President Barak Obama on January 21, 2010.

The Volcker rule was proposed and named after the former Federal Reserve (Fed) Chairman Paul Volcker who presided over the Economic Recovery Advisory Board set up by the US president to provide professional recommendations on economic recovery matters and financial sector policies. The rule prohibits any insured depository institution and its affiliates from engaging in "proprietary trading" of debt and equity securities, commodities, derivatives, or other financial instruments. "Proprietary trading" refers to activities of banks which position them to act as a principal in order to profit from near-term price movements from their own trading account or supervised nonbank financial company in any transaction that relate to purchase or sell, or otherwise acquire or dispose of securities.

Technically, the Volcker rule placed limits on some activities rendered by banking entities which were considered to have increased the risk level of the financial system. Such activities include:

➢ Engaging in proprietary trading- Trading activity in which the bank entities acts as a principal in order to profit from near-term price movements.

- Acquiring or retaining equity, partnership or other ownership interest in or sponsoring hedge funds or a private equity funds with the exception of those offered in connection with a bonafide trust, fiduciary and investment advisory functions and subject to minimum limit.

- Sponsoring a hedge fund or a private equity fund.

  These banking entities include foreign banks that maintain branches or agencies in the U.S. or that own U.S. banks or commercial lending companies in the United States. These banks, as well as their parent holding companies, are referred to in U.S. regulations as foreign banking organizations

1.1 Background to the study.

A critical review of events that crystallized into the financial turmoil between 2007 and 2009 revealed that the banking sector contributed to a large percentage of systemic risk experienced by the financial system. The financial crisis then raised the concerns over the effectiveness of the regulatory mechanism which governs these banking activities and the challenges towards the sustenance of the global market economies. It also provided evidence that support the time lag of the existing regulatory framework to financial innovation which makes it difficult to proactively prevent the crisis.

It is obvious that the roles of banking institutions in globalisation cannot be downplayed. Banks provide the financial intermediation which integrates the activities of all other financial elements such as financial markets, financial transactions, financial institutions, and financial instruments amongst others within and across different geographical locations

toward the realization of their goals. They also serve as a central hub of the financial system using their network base and interconnectivity to support the payment and settlement platform of financial instruments all around the globe. If the occurrence of another crisis is to be averted, then the activities of the banking institutions should be well monitored and/or better regulated.

The financial crisis experienced at the wake of 2007/2008 has a common denominator with what was experienced around the period of the Great Depression in the 1930's following the Great Crash of 1929.Both occurred as a result of the involvement of banking institutions in excessive speculative risk trading positions in the capital market. These risky trading positions were geared toward generating excess profits which benefit the management and shareholders of banks at the expense of the tax payers whose interest is in the growth of the real economy. As a result of the crisis, there has been a great deal of interest in monitoring the activities of banks to ensure strong and formidable institutions. This led the US President – Barak Obama to institute an Economic Recovery Advisory Board on February 6 2009 with the mandate to proffer economic recovery matters and financial sector policies. The Board was chaired by the former Federal Reserve chairman, Paul Volcker.

In his submission, Volcker raised concerns on the level of excessive risk undertaken by the banking system in the course of their operations. He underlined the fact that those risky speculative trading activities led to the high levels of systemic risk being experienced in the global financial system. He however, proposed an Act to separate the investment arm of banks which are believed to have posed the vulnerabilities to the system from the commercial arm that oversee the traditional banking activities of loan creation from deposits which

support economic growth. He also considered the endemic issue of moral hazard that is pertinent with the systemically important financial institutions (SIFIs) which was borne out of the privilege enjoyed by having access to government support and deposit insurance. This rule was added to Section 619 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

On July 21, 2010, the Act was publicly announced and endorsed to put in place a new regulatory framework in the financial services industry and was scheduled to be implemented on July 21, 2012. Included in the Dodd-Frank Act is a section (619) that imposes restrictions on proprietary trading activities of banks and their affiliates. The rule however, made some exceptions to trading transactions which involved:

➢ US Government securities

➢ Securities underwriting or market-making, to the extent that either does not exceed near term demands of clients, customers, or counterparties.

➢ Trading activities on behalf of customers.

➢ Securities trading by an insurance business for the general account of the insurance company.

The mechanism of operation of the Volcker rule is similar in principle to the Securities Act of 1933 and Glass-Steagall Act which separated commercial banking activities from investment banking. These acts were adopted aftermath the Great Depression to address the root cause of the crash of the market economies. The cause of the market crash was linked to the "universal

banking" model that was in operation at the time. The model allowed banking institutions to perform various functions in addition to their traditional role of loan creation from customers' deposits. The deregulation in the financial system in the late 1990s led to the end of the Glass-Steagall Act and brought about the re-emergence of the universal banking model. Although the causes of the financial crisis experienced in 2007-09 are believed to be multifaceted in nature they include but are not limited to the response of banking institutions to technological innovation, the lax credit lending process, conflict of interest on the part of the debt rating agencies, greedy nature of investors amongst others. Despite all these reasons, it has been identified that the lack of adequate monitoring and supervisory mechanism on the part of the regulator played a pivotal role in the crash of the system.

1.2 Objectives of Study

This paper seeks to evaluate the impact of the announcement of the Volcker rule on the performance of the stock prices/return of US banking institutions. I will test to ascertain whether regulation has a positive or negative effect on the value of stock prices. To effectively measure this effect, we classify the US banking institutions into three different categories based on the mode of their operations which revolves around pure commercial banking, pure investment banking, and universal banking. This approach was employed to address the limitation posed by the non availability of consistent data on proprietary trading activities conducted by banking institutions. As it stands there is still a thin line between trading activities meant for risk management (hedging) purposes and those intended for proprietary trading. It will take a lot of metrics and data analysis to differentiate between the two and that is beyond the scope of this paper. Furthermore the effect will also be measured on some selected banks which are referred to as systemically important financial institutions

(SIFIs) due to their interconnectivity with the global financial system and wider coverage area within and across the United States geographical boundaries.

The impact of the Volcker rule will be assessed on capital market reaction to the announcement of the information and market players' perception of the importance of the rule aimed at stabilising the fluctuation experienced in the global financial system. This will be achieved by employing the event study methodology to investigate how the US capital market reacts to the impact the rule will have on the banking institutions.

We will examine the effect on 3 different dates which are - January 15, 2009 when the President's advisory committee headed by Paul Volcker released the report that placed limits on proprietary trading by banking institutions- July 21st, 2010 when President Obama signed the Dodd-Frank Wall Street reform and Consumer Protection acts into law, which include section 619 outlining the Volcker rule and on July 21st 2012 , the supposed implementation day of the rule across banking institutions in the United States.

We expect the effect to be pronounced on the announcement of the rule on Jan 15, 2009 which will be in support of the theoretical assertion that:

"If regulation has implications for the value of securities, the effects of regulation are impounded into prices at the time when they are first anticipated" Schwert (1981).

1.3 Chapter organisation /outline

The remainder of the paper is organized as follows. Chapter 2 discusses a literature review, an overview of the rule and the expectation/reaction of market participants on the introduction of the rule. Chapter 3 describes our data. Chapter 4 covers the testing methodology and empirical results. Chapter 5 provides a conclusion.

Chapter 2: Literature Review

A central issue of interest is to understand whether the newly introduced Volcker rule do address the issues for which it was proposed and if so, what is its effects (positive or negative). Also to ensure that it will not pose any negative effects to existing regulatory policies.

Quite a number of studies have been conducted to understand the effect of regulation on the return of securities in the capital market most of which are based on the Securities Acts of 1933 and 1934 Securities Acts proposed by Glass-Stealgal. In the studies conducted independently by Benston (1973) and Stigler (1964), it was concluded that the announcement of the Acts had little or no observable impact on mean returns. However there exist a significant impact in the observed standard deviation. To the best of our knowledge there has been no satisfactory explanation of the latter finding. However, Stigler (1964) and Benston (1973) present the dispersion as the consequence of "other factors" and quality of information.

Allen and Wilhelm (1988) showed that regulation could transfer wealth from one party to another. In their study, it was established with empirical evidence that the Depository Institutions Deregulation and Monetary Control Act of 1980 provided a wealth transfer from non-Federal Reserve System member banks and Savings and Loans (S&Ls) to Federal Reserve Member Banks. Regulation could as well have a disequilibrium effect on the market players in an industry. It could equip a party with a competitive advantage over others within the same industry. This was highlighted in the study conducted by Cornett and Tehranian (1989) with supporting evidence that the banking deregulation passed in 1980 benefited stockholders of large banks and savings and loans, but produced negative abnormal stock

returns for small banks and savings and loans. Das et al (2004) provided some clue as to a fundamental question on whether or not regulatory governance matters for financial system stability. Using empirical evidence they pointed out that regulatory governance has a significant influence on financial system soundness. This was established with variables which reflect the macroeconomic conditions, the structure of the banking system, and the quality of political institutions and public sector governance.

However, recent studies have focused on the effect of regulation on the global financial system and its application towards achieving financial stability, with much emphasis on providing lasting solutions to financial crises and proactively preventing their future occurrence. Chow and Surti (2011) took a holistic view of the regulatory policies proposed to address the issue of the systemically important financial institution. The study showed that though the Volcker rule (US) and the retail ring fencing (UK) policies could be presently undergoing teething and implementation challenges, the concept is valid as it addresses the key policy objectives of mitigating the systemic risk in the financial system as against the narrow utility banking model which was considered as having a radical approach. Both regulations (Volcker rule and ring fencing) have a common denominator which focused on activities classified as being too risky for banking institutions to shed /migrate to the unregulated parts of the financial system and considered that it could lead to accumulation of systemic risk if left unchecked.

King, et al (2012) investigated the impact of the Volcker rule on US Banks Holding Companies (BHCs). In their paper, they measured the perception of the capital market to the announcement of the rule as well as the reaction of the BHC's towards their investment

strategies most of which are exposed to proprietary trading. They employed event studies to observe the cumulative abnormal return (CAR) for 3 groups of BHC's on the announcement of the Volcker rule over the window [-10,+10].It was noted that there was a significant negative impact on the market value of bank holding companies (BHC's), especially for large BHC's with largest exposure to proprietary trading business and a counter effect of trading position in small and large BHC's.

Mateus (2011) in his study analysed the advantages and shortcomings of the banking regulatory reforms proposed by the Vickers Commission on the UK and compared alongside the Volcker rule in the US which are both geared toward addressing the systemic risk in the banking sector as well as mitigating challenges posed by moral hazard. He concluded that both are effective towards their intended purpose, however he made positive suggestions which are aimed at consolidating the reform at both macro and micro-levels.

2.1 Overview of the Volcker rule.

The Volcker Rule attempts to re-enact part of the Glass-Steagall Act which created a legal and regulatory framework to separate commercial banking activities (deposit collection and loan creation) from investment banking activities (securities underwriting, market making, and other capital market activities) and insurance. This was considered necessary to ensure a safe and healthy banking system that is not exposed to the non core banking risk of the capital market. The rule was geared towards maintaining the stability of the financial system and to increase depositors' confidence in the system so as to boost the overall real economy.

A very relevant question to ask at this stage is what really brought about the dependence of the banking system on the capital market? The answer cannot but be linked to one of the landmark financial innovations of the twentieth century, securitization.

The advancement in financial innovations in the wake of the 1980s and 1990s birthed the originate and distribute model of banking and with it securitization. This has been a major development in the financial world. Securitization acts as a bridge that links the activities of the banking institutions to that of the capital market. Securitization can be described as a process of blending together different types of debt obligations such as mortgages or credit card loans which appear as illiquid assets on the balance sheet of a banking institution and converting them into liquid traded securities on the capital market. Claims are then issued against these securities which serve as benefit to potential investors. The Claims are then given ratings by the credit rating agencies according to inherent risk.

Securitization provides banking institutions with a very efficient way to mitigate credit risks through diversification across various sectors of the economy by purchasing claims against loans originated by other banks and selling off some of their own loans. It also reduces the cost of financing by shifting part of the loans from depositors to capital market investors and makes available credit to credit seekers who were previously excluded from receiving bank credit. As a result of these economic benefits, securitization grew both in volume and scope, with the banking institution shifting from their traditional model of risk management from originate to hold to originate to distribute.

2.2 Analysis of the Rule:

Impact of Volcker rule on US and Foreign banks

Major financial institutions in the United States have vehemently criticised the proposed rule saying "it is an invasive restriction on one of their most profitable activities " King et al (2012). International banks and head of central banks around the globe have also expressed their view about the extra territorial effects of the rule stating that the measure should strictly be applied to banks operating in the United States who have access to Federal Reserve discount loans and deposit insurance coverage. They argued that the concept underlining the rule is valid since the fall out of proprietary trading by US banks was subsidized by the taxpayers which helped to stabilise the volatility of the system. But the cross effect on other foreign financial entities operating in the US who do not have access to the discount window should be considered as well. The Financial Stability Oversight Council ("FSOC") in January 2011 published a study on the impact of the Volcker Rule on foreign banks, the study conveyed that the Volcker Rule applies to domestic banking operations of foreign institutions in the US but does not affect their dealings which may include proprietary trading outside the shores of the United States. The justification for this was that they are not eligible to discount window loans of federal deposit insurance.

With the execution of the rule, most foreign banks' operations in the US will be impacted and could possibly lead to their exit. As a result the market could see a surge in the presence of shadow banks. Above all it was concluded that the rule would create systemic risk and wreak havoc on the government bond market. Additionally it could affect the globalisation of the world economy since it threatened the sovereign trade relationship with the United States which is considered as the central hub of the global financial system. Any regulation that affects the system will generate ripple effects that will cascade beyond territorial boundaries of the USA.

Analysts and market participants considered the rule as being too complex and difficult to implement, as there is no clear cut division between trading activities meant to hedge risk and those intended for proprietary trading. The rule will most likely increase borrowing costs for foreign governments, reduce liquidity and make the market for foreign government bonds more volatile. It may possibly fall into the category of unintended consequences of a proposed new regulation.

2.3 The impact of Volcker rule on the innovation of financial instruments and Capital markets.

Apparently with financial innovation, products such as Collateralized Debt Obligations (CDOs),Asset Backed Commercial papers (ABS) , Structured investment Vehicles (SIVs) ,Special Purpose Entities (SPEs) ,and CDS (Credit default Swap) have emerged to change the topography of the financial system. Banking institutions have used CDS to diversify portfolios and to transfer credit risk to other entities like the hedge funds which benefit from the stream of cash flows on the loans issued out by the banks. This has improved the risk management of banks and enabled them to shift from their traditional model of loan creation from originate –to- hold to originate –to- distribute; and have resulted in the reduction of the real cost of capital in the economy to both lenders and borrowers of funds.

In the study conducted by Whitehead (2012) on the Volcker rule and evolving market. He argued that Volcker's rule was motivated by the desire to return to a traditional banking model-to create a regulatory divide much like the Glass Steagall Act but did not incorporate

the current spate of technology and sophistication of financial instruments present in the global financial system as new regulations should reflect the new relationships in the market place. He further stated that if proprietary trading is no longer operated by banks, it will be moved to the less regulated institutions (shadow banks) whose activities will increase the overall risk level of the financial system. In a nut shell the Volcker rule might not be able to provide the much needed regulation due to the continuous innovation and complexities of financial instruments as compared with the era of Glass-Steagal.

2.4 The role of the Volcker rule on the sovereign debt market

In January 2012 at the World Economic Forum in DAVOS, Switzerland finance ministers all over the globe sharply disagreed on the implementation on the rule, particularly a clause which stipulates that

"United States banks — and possibly certain foreign banks that do business in America — would be restricted in trading foreign government bonds with an exemption to United States government securities". Timothy Geithner, the Treasury secretary of Federal Reserve.

They were really concerned that this aspect of the rule will stop the US banking system from providing market- making roles for sovereign markets and inadvertently affect the liquidity of the overall sovereign markets and increase borrowing costs for foreign governments. George Osborne Chancellor of the Exchequer of the UK states that

"in practice the regulations would appear to make it more difficult and costlier to provide market-making services in non-U.S. sovereign markets," and that "Any consequent withdrawal of market-making services by banks would reduce liquidity in sovereign markets, which in turn would engender greater volatility and make it more difficult, riskier and costlier for countries such as the U.K. to issue and distribute their debt."

Mizuguchi, Assistant Commissioner for International Affairs at the Japan Financial Services Agency, also raised his concern saying - "we are afraid that US financial institutions may refrain from trading Japanese government bonds". He suggested that the rule might increase the operational and transactional costs of trading in Japanese government bonds and could lead to the exit from Tokyo of Japanese subsidiaries of U.S. banks as well as force Japanese banks to reduce their US operations. Mark Carney, Governor of the Bank of Canada raised his objection to the rule which he envisaged would create its own systemic risk and wreak havoc on the government bond market. He also raised concerns on the extra territorial effect of the law which could threaten the trade Canada-US agreements and the bilateral relationship with the United States.

Chapter 3: Methodology

3.1 Data Description

For the purposes of this study, a data sample which contains the daily stock prices and trading assets of 415 Bank Holding Companies in the United States between 2009-2012 was generated from the Bloomberg Terminal – a financial application database that provides real time stock prices quotes as well as other timely financial information to a wide network of end users. These data were used to evaluate the reaction of the market to the announcement of regulatory reform. Basically, this paper focused on the Bank Holding companies since the Volcker rule was specifically targeted at monitoring activities as they relate to proprietary trading.

In order to effectively capture the impact of the policy on the Bank Holding Companies, the sample data were divided into three subsamples based on trading assets and the level of their importance to the stability of the financial system. As a result of the non availability of statistical data from the banking institutions since there is no segregation between trading activities meant for proprietary trading and those traded on behalf of the bank clients and those for risk management, a proxy was considered which is the trading asset which entails marketable securities and other short- term investment. This includes liquid investments that are expected to be converted to cash within a reasonable short period of time, usually less than one year. While we considered those banks which the Federal Reserve used for stress tests and comprehensive capital review as systemically important.

Out of the 415 banks in the sample data, Fifty seven (57) have no trading assets were classified as non trading banks, while the rest with trading assets worth of $ 1 billion were classified as trading banks – there were eighty two (82) of such banks. Eighteen banks (18) were also carved out of the banks considered to be involved in trading activities and were classified as systemically important financial institutions (SIFIs). Appendix A provides the lists of these classified bank entities.

3.2 Model Design

This paper is seeks to evaluate the market reaction to the proposal, announcement and implementation of the Volcker rule on the performance of the stock prices/return of the Bank Holding Companies in the United Sates. An event study methodology will be employed in this paper to measure the effect. Cumulative abnormal return will be the proxy to test if there were significant market reactions.

3.2.1 Estimation Window

An estimation window is set before the event date. The estimation window is considered as a period that is prior and after the announcement of the policy when the stock prices are expected to behave normally without the influence of any external constraint. This period is used to evaluate the normal performances of the prices of the securities of these Bank Holding Companies. This paper chooses a 30-day estimation period which is 60 days before the announcement date to 31 days after the announcement date. Expected return of the stock

prices of the banks entities are estimated using the coefficient obtained in the equations below.

Capital Asset Pricing Model (CAPM) was deployed to estimate the performance of the companies relative to the performance of the market index.

$$R_i = \alpha_i + \beta_i R_m + \varepsilon_i \tag{3.1}$$

α_i is a measure of the performance of the securities

β_i is a measure of the performance of the index

R_i is the return of the firms

R_m is the return of the market

ε_i is the error term.

The return on S&P 500 index was used as the proxy for the market return in the CAPM model as the index tracks 500 US stocks as measured by the value of their shares. Most of the securities of the bank holding companies were traded on the index. A linear regression was performed to estimate the value of α_i and β_i.

3.2.2 Event Window

The event window was carefully chosen to span across a nine-day trading period which takes into consideration four days before the announcement date and another four days after the announcement date. This was intended to effectively capture the existence of any abnormal return on the securities which could be attributed to the presence of external constraint prior and the after the announcement of the policy. Abnormal return exist if there is an observable

difference between the actual return of the firm and the estimated return of the firm as showed in Equation 3.2 below.

$$AR_i = R_i - \bar{R}_i \qquad (3.2)$$

AR_i is the abnormal return of the firm

R_i is the actual return in the event window

$\bar{R}_i$ is the expected return using the CAPM model.

Cumulative abnormal is the sum of the abnormal returns in the event period

$$CARi \qquad = \qquad \sum_{j=4}^{4} ARi \qquad (3.3)$$

CAR_i is the cumulative abnormal return of the firm.

3.3 Empirical Test

Cumulative abnormal returns are viewed as the market reaction to the securities of the bank holding companies in the United States. A positive cumulative abnormal return across the firms in the event window confirms that the market believes the policy will create value and increases firms' value, while a negative cumulative abnormal return in the event window suggest a negative perception of the policy by the market . The level of the significance of the cumulative abnormal return plays a very important role in the measurement of the market

reaction. The effect of the Volcker rule was examined on 3 different announcement dates considered critical to its implementation.

After testing the market reaction to the announcement of the Volcker rule on the performance of the stock prices of the Bank holding Companies on the S&P 500 index, a dummy variable was incorporated into the model to measure the difference of the effect in the presence of the proprietary trading in the activities of the Bank Holding companies. It is expected that the Volcker rule will have a pronounced impact on the performance of the stock prices of those banks that are involved in the proprietary trading.

Another dummy variable was also incorporated to into the model to observe the reaction on Systemically Important Financial Institutions (SIFIs) who have large exposure to proprietary trading and whose failures could endanger the stability of the financial system. We expect to see a more significant effect on the performance of the stocks because of the level of exposure to proprietary trading.

Chapter 4: Empirical Results

4.1 Market Reaction

An event study of the stock market reaction to the Volcker rule announcement was conducted using a regression model that has the cumulative abnormal return as the dependent variable with no independent variable. The test was carried out for with each of the three dates that was considered critical to the implementation of the rule. We calculate the cumulative abnormal return for the three sample data of the BHCs: Banks without trading assets, those with trading assets and those with trading assets that are considered to be important to financial system (SIFIs).

Table 4.1(a) - (c) show the results of the market reaction to the publication of the president's advisory committee which proposed the Volcker rule on January 15 2009. In the test conducted, the cumulative abnormal return on all BHCs has a negative value of -1.00668 (significant at less than 1% level as seen from Table 4.1 (a)). This reflects a huge negative market reaction to the stock price of all the Bank holding companies on announcement of the rule. A negative stock price reaction to BHC's which have no trading assets as well as those with trading assets was observed. However, the reaction is not statistically significant at 10% as seen from Table 4.1(b).

Table 4.1(c) showed a mixed market reaction to the announcement within the event window. We observed a contrasting empirical result with the expected theoretical evidence. We would have expected the impact of the announcement to be greater on the SIFIs but it turns out to be

otherwise with the coefficient of the constant term negative (-9.177822) and that of the dummy variable for difference between the SIFIs and non SIFIs (-0.4000382) with both significant at less than 1 % and 10 % respectively. However, the empirical results provide support to the evidence that the Volcker rule has a large and negative impact on Bank Holding Companies with large exposures to proprietary trading. It also supports the theoretical assertion that the effects of regulations are impounded into prices at the time when they are first anticipated.

Test results of cumulative abnormal return on   January 15, 2009

Table 4.1 (a)

Cumulative abnormal return	Coef.	s.d.	t	p
_cons	-1.00668*	0.1013468	-9.93	0.000

* Significant at less than 1 % level

Table 4.1 (b)

Cumulative abnormal return	Coef.	s.d.	t	p
Trading	-0.588964	0.6538517	-0.90	0.370
_cons	-1.4322578	0.645729	-0.67	0.505

Table 4.1 (c)

Cumulative abnormal return	Coef.	s.d.	t	p
SIFIs	-0.4000382	0.2411486	-1.66	0.101
_cons	-9.177822	0.1136785	-8.07	0.000

Table 4.2 (a) – (c) shows the results of the market reaction on July 21, 2010 when President Obama signs the Dodd-Frank Act into law which include section 619 referred to as the Volcker rule. The test for the cumulative abnormal returns showed a negative market reaction of -0.0614898 to the announcement on all the BHCs and it's statistically significant at less than 10%. The coefficient of the dummy variable which depict the difference between BHCs with trading and trading assets reacted positively to the announcement with statistically significance of about 10%.While difference between the SIFIs is negative and non statistically significant. This tells us that the market has already reacted to the information when the rule was first proposed and announced and it no longer has much effect when it was eventually signed into law.

Test results of cumulative abnormal return on   July 21, 2010.

Table 4.2 (a)

Cumulative abnormal return	Coef.	s.d.	t	p
_cons	-0.0614898*	0.0215604	-2.85	0.005

* Significant at less than 1 % level

Table 4.2 (b)

Cumulative abnormal return	Coef.	s.d.	T	P
Trading	0.0972827	0.0566075	1.72	0.089
_cons	-0.14206674	0.0515185	-2.76	0.007

Table 4.2 (c)

Cumulative abnormal return	Coef.	s.d.	T	p
SIFIs	-0.0126224	0.561729	-0.22	0.823
_cons	-0.0591948*	0.0239522	-2.47	-0.015

* Significant at less than 1 % level

Table 4.3 (a) - (c) show the results of the market reaction on July 23,2012, although the supposed implementation date of the Volcker rule supposed to be July 21,2012.But this happened to fall on a weekend, so market reaction was then tested on the next trading day. The test for the cumulative abnormal returns showed a negative market reaction of 0.0177698 to the announcement on all the BHC's, but it is not statistically significant. The coefficient of the dummy variable which depicts the difference between BHCs with trading and trading assets is negative e and statistically significant. While difference between SIFIs is negative and non statistically significant.

Test results of cumulative abnormal return on   July 21,2012 .

Table 4.3 (a)

Cumulative abnormal return	Coef.	s.d.	t	p
_cons	-0.0177698	0.0274739	-0.65	0.519

Table 4.3 (b)

Cumulative abnormal return	Coef.	s.d.	t	p
Trading	-0.309111*	0.694912	-4.45	0.000
_cons	-0.2435406*	0.0638926	3.81	0.000

* Significant at less than 1 % level

Table 4.3 (c)

Cumulative abnormal return	Coef.	s.d.	t	p
SIFIs	-0.0232896	0.071002	-0.33	0.744
_cons	-0.013448	0.0305858	-0.44	0.661

The full results of the empirical analysis are provided in Appendix B.

Chapter 5: Conclusions

The evidence obtained from the empirical analysis suggests that the market reacted negatively to the announcement of the Volcker rule on each of the three days events. However the level of significance of the reactions differs across the three groups of the Bank Holding Companies which are classified as; Non Trading, Trading and the Systemically Important Financial Institutions.

The impact of the Volcker rule was more pronounced on the security prices of BHC's with trading assets and the SIFI's which are considered to be involved in proprietary trading, than those without trading assets. Market reaction was more visible when it was firstly announced on the January 15, 2019 than any of the other two dates and this supports the theoretical expectation that if a policy will have an effect on the value of stocks, it will have larger impact on its prices when it was first anticipated.

We noticed some discrepancies in the data analysis when compared with theoretical assertion by the way the market reacted to the securities prices of the non trading BHCs on announcements of the policy. We had expected a positive market reaction, but it turned out otherwise. We concluded that it could be due to non availability of actual proprietary trading data from the bank since there is no segregation.

In a nut shell we have observed that the market reacted negatively to the announcement of the Volcker rule and this will inadvertently affect the returns and the value of the bank holding companies that engage in proprietary trading.

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Appendix A:

Subsample A : Systemically Important Financial Institutions

S/N	Ticker	Short Name	Mrkt Sec & Other ST Invts LF	Market Cap
1	C US Equity	CITIGROUP INC	1,043,889,979,392.00	88,036,081,664.00
2	JPM US Equity	JPMORGAN CHASE	824,585,027,584.00	141,465,600,000.00
3	GS US Equity	GOLDMAN SACHS GP	778,741,022,720.00	52,486,160,384.00
4	MS US Equity	MORGAN STANLEY	600,573,018,112.00	29,988,200,448.00
5	BAC US Equity	BANK OF AMERICA	518,062,997,504.00	86,215,598,080.00
6	MET US Equity	METLIFE INC	403,193,004,032.00	36,541,419,520.00
7	WFC US Equity	WELLS FARGO & CO	342,580,002,816.00	180,386,643,968.00
8	STT US Equity	STATE ST CORP	106,983,997,440.00	19,988,275,200.00
9	BK US Equity	BANK NY MELLON	91,448,999,936.00	26,496,514,048.00

10	PNC US Equity	PNC FINANCIAL SE	67,391,000,576.00	33,093,140,480.00
11	COF US Equity	CAPITAL ONE FINA	56,705,998,848.00	32,852,926,464.00
12	USB US Equity	US BANCORP	47,570,001,920.00	63,378,792,448.00
13	STI US Equity	SUNTRUST BANKS	33,859,000,320.00	13,594,029,056.00
14	RF US Equity	REGIONS FINANCIA	28,529,000,448.00	10,006,471,680.00
15	BBT US Equity	BB&T CORP	28,336,001,024.00	22,148,386,816.00
16	FITB US Equity	FIFTH THIRD BANC	17,614,999,552.00	13,930,724,352.00
17	KEY US Equity	KEYCORP	14,540,000,256.00	7,943,959,552.00
18	AXP US Equity	AMERICAN EXPRESS	6,326,000,128.00	65,570,242,560.00

Subsample B: BHCs with no trading assets

S/N	Ticker	Short Name	Mrkt Sec & Other ST Invts LF	Market Cap
1	TRCY US	TRI CITY BNKSHS		

	Equity		-	143,814,384.00
2	GRNB US Equity	GREEN BANKSHARES	-	236,359,680.00
3	IBCA US Equity	INTERVEST BNCS-A		2,474,960.00
4	FCBN USEquity	FIRST CITIZEN		462,940,736.00
5	MBVA US Equity	MILLENNIUM BANKS		6,427,771.50
6	HBSI US Equity	HIGHLANDS BANKSH		18,783,066.00
7	NXTYQ US Equity	NEXITY FINANCIAL		9,319.67
8	CAPB US Equity	CAPITALSOUTH BAN		54,072.23
9	CNBW US Equity	CNB CORP		
10	ALRS US Equity	ALERUS FINANCIAL		123,079,544.00
11	HABC US Equity	HABERSHAM BANCRP		33,823.12
12	KTHN US Equity	KATAHDIN BANKSHS		42,100,552.00
13	WDFN US	WOODLANDS FINL		25,149,600.00

14	FMWC US Equity	FIRST MANITOWOC		100,650,000.00
15	OXBC US Equity	OXFORD BANK CORP		3,570,167.50
16	PABK US Equity	PAB BANKSHARES		1,379.50
17	DBCP US Equity	DELMAR BANCORP		8,381,007.00
18	WBHC US Equity	WILSON BANK HLDG		
19	CPKF US Equity	CHESAPEAKE FINL		47,110,752.00
20	FCMP US Equity	FIRST COMMUNITY		34,405,672.00
21	HPTB US Equity	HIGH POINT BANK		34,214,064.00
22	FGFH US Equity	FORESIGHT FINL		44,550,240.00
23	HLAN US Equity	HEARTLAND BNCCRP		43,789,004.00
24	MBCR US Equity	MERCANTILE BNCRP		1,443,474.50
25	BAOB US	BARABOO		18,175,582.00

	Equity	BANCORP		
26	SBNC US Equity	SOUTHERN BCSH/NC		
27	TWCF US Equity	TOWN & COUNTRY F		25,273,972.00
28	MNBT US Equity	MOUNTAIN NATIONA		921,063.81
29	BCBF US Equity	BEACH COMMUNITY		
30	NAFHZ US Equity	NORTH AMERICAN F		
31	HYCY US Equity	HENRY COUNTY		
32	SOME US Equity	SOMERSET TR HLDG		
33	ENBP US Equity	ENB FINANCIAL		75,659,280.00
34	WBNK US Equity	WACCAMAW BANKSHS		52,263.57
35	SCSG US Equity	SOUTHCREST FINAN		17,691,876.00
36	TYFG US Equity	TRI-COUNTY FINAN		
37	SNLC US	SECURITY NATL		

	Equity	IO		
38	CZNL US Equity	CITIZENS NATL-KY		40,935,672.00
39	TRVR US Equity	TWO RIVERS FINAN		35,525,400.00
40	MFGI US Equity	MERCHANTS FINAN		
41	OCBI US Equity	ORANGE COUNTY BA		78,220,168.00
42	CFOK US Equity	COMMUNI FIRST/SC		16,609,177.00
43	FSOF US Equity	FIRST SOUTHERN B		
44	FBIP US Equity	FNB BANCORP/PA		
45	SAEB US Equity	SAEHAN BANCORP		90,135,192.00
46	HONT US Equity	HONAT BANCORP		85,524,080.00
47	DBIN US Equity	DACOTAH BANKS		
48	DEAR US Equity	DEARBORN BANCORP		230,571.19
49	PNBC US	PRINCETON NATL		

S/N	Ticker	Short Name		Mrkt Sec & Other ST Invts LF
	Equity			1,174,608.75
50	BVBC US Equity	BLUE VALLEY BAN		11,535,744.00
51	RCBC US Equity	RIVER CITY BANK		72,096,408.00
52	IALB US Equity	INDEPENDENT ALLI		
53	CCBD US Equity	COMMUNI CENTRAL		19,821.37
54	FBTT US Equity	FIRST BANKERS TR		50,299,136.00
55	GABA US Equity	GEORGIA BANC		1,733,344.63
56	PFCF US Equity	PACIFIC CITY FIN		
57	KISB US Equity	KISH BANCORP		

Subsample C: BHCs with Trading Assets (Assets greater than 1 Billion Dollars)

S/N	Ticker	Short Name	Mrkt Sec & Other ST Invts LF	Market Cap
1	C US Equity	CITIGROUP INC	1,043,889,979,392.00	88,036,081,664.00
2	JPM US	JPMORGAN CHASE		

			Equity	824,585,027,584.00	141,465,600,000.00
3	GS US Equity	GOLDMAN SACHS GP		778,741,022,720.00	52,486,160,384.00
4	MS US Equity	MORGAN STANLEY		600,573,018,112.00	29,988,200,448.00
5	BAC US Equity	BANK OF AMERICA		518,062,997,504.00	86,215,598,080.00
6	MET US Equity	METLIFE INC		403,193,004,032.00	36,541,419,520.00
7	WFC US Equity	WELLS FARGO & CO		342,580,002,816.00	180,386,643,968.00
8	STT US Equity	STATE ST CORP		106,983,997,440.00	19,988,275,200.00
9	BK US Equity	BANK NY MELLON		91,448,999,936.00	26,496,514,048.00
10	PNC US Equity	PNC FINANCIAL SE		67,391,000,576.00	33,093,140,480.00
11	COF US Equity	CAPITAL ONE FINA		56,705,998,848.00	32,852,926,464.00
12	USB US Equity	US BANCORP		47,570,001,920.00	63,378,792,448.00
13	STI US Equity	SUNTRUST BANKS		33,859,000,320.00	13,594,029,056.00
14	RF US	REGIONS			

	Equity	FINANCIA	28,529,000,448.00	10,006,471,680.00
15	BBT US Equity	BB&T CORP	28,336,001,024.00	22,148,386,816.00
16	NTRS US Equity	NORTHERN TRUST	26,843,199,488.00	11,164,798,976.00
17	FITB US Equity	FIFTH THIRD BANC	17,614,999,552.00	13,930,724,352.00
18	KEY US Equity	KEYCORP	14,540,000,256.00	7,943,959,552.00
19	SIVB US Equity	SVB FINANCIAL GR	11,753,263,104.00	2,567,355,904.00
20	BOKF US Equity	BOK FINL CORP	11,129,082,880.00	3,908,067,328.00
21	HBAN US Equity	HUNTINGTON BANC	10,843,985,920.00	5,639,695,872.00
22	FNFG USEquity	FIRST NIAGARA FI	10,038,866,944.00	2,796,431,872.00
23	CMA US Equity	COMERICA INC	9,939,999,744.00	6,002,231,808.00
24	CBSH US Equity	COMMERCE BCSHS	9,229,637,632.00	3,516,592,896.00
25	CFR US Equity	CULLEN/FROST	8,492,329,984.00	3,415,347,456.00
26	DFS US	DISCOVER		

	Equity	FINANCI	8,360,475,136.00	20,013,070,336.00
27	CYN US Equity	CITY NATL CORP	6,928,465,920.00	2,775,472,384.00
28	UMBF US Equity	UMB FINANCIAL	6,397,595,136.00	2,003,742,080.00
29	AXP US Equity	AMERICAN EXPRESS	6,326,000,128.00	65,570,242,560.00

30	MTB US Equity	M&T BANK CORP	6,078,991,872.00	11,053,419,520.00
31	IBOC US Equity	INTL BANCSHARES	5,208,603,136.00	1,241,719,680.00
32	FHN US Equity	FIRST HORIZON NA	5,050,634,240.00	2,254,219,520.00
33	ASBC US Equity	ASSOC BANC-CORP	4,752,400,896.00	2,236,479,488.00
34	FCNCA UEquity	FIRST CITIZENS-A	4,710,622,208.00	1,702,967,424.00
35	SNV US Equity	SYNOVUS FINL	3,735,284,992.00	1,608,546,944.00
36	GBCI US Equity	GLACIER BANCORP	3,492,723,968.00	1,114,226,176.00
37	BOH US Equity	BANK OF HAWAII	3,353,694,976.00	2,092,461,440.00
38	ZION US	ZIONS BANCORP		

			3,327,374,080.00	3,566,950,400.00
39	WBS US Equity	WEBSTER FINL	3,242,808,064.00	1,881,617,280.00
40	FMER US Equity	FIRSTMERIT CORP	3,235,383,040.00	1,742,211,840.00
41	UMPQ US Equity	UMPQUA HOLDINGS	3,046,983,936.00	1,421,026,048.00
42	FULT US Equity	FULTON FINANCIAL	2,935,675,904.00	1,957,800,704.00
43	TRMK US Equity	TRUSTMARK CORP	2,879,027,968.00	1,542,383,488.00
44	SUSQ US Equity	SUSQUEHAN BNCSHS	2,719,185,920.00	1,973,942,016.00
45	BXS US Equity	BANCORPSOUTH INC	2,570,964,992.00	1,393,880,960.00
46	SF US Equity	STIFEL FINANCIAL	2,569,548,032.00	1,775,983,744.00
47	TCBI US Equity	TEXAS CAPITAL BA	2,523,384,064.00	1,835,617,024.00
48	CVBF US Equity	CVB FINANCIAL	2,472,558,080.00	1,252,193,664.00
49	HBHC US Equity	HANCOCK HLDG CO	2,365,050,880.00	2,519,617,792.00
50	STSA US	STERLING		

	Equity	FINL/WA	2,345,914,880.00	1,313,988,224.00
51	CBU US Equity	COMMUNITY BANK S	2,284,171,008.00	1,113,181,056.00
52	ONB US Equity	OLD NATL BANCORP	2,215,546,112.00	1,261,609,600.00
53	BEN US Equity	FRANKLIN RES INC	2,030,941,056.00	25,033,998,336.00
54	EWBC US Equity	EAST WEST BNCRP	2,011,550,976.00	3,116,986,368.00
55	IBKC US Equity	IBERIABANK CORP	1,993,314,944.00	1,389,241,728.00
56	FFIN US Equity	FIRST FIN BANKSH	1,971,585,024.00	1,094,950,016.00
57	FIBK US Equity	FIRST INTER/MT	1,913,982,976.00	640,598,272.00
58	NPBC US Equity	NATL PENN BCSHS	1,786,267,008.00	1,346,478,208.00
59	WTFC US Equity	WINTRUST FINL	1,754,861,952.00	1,370,566,784.00
60	MBFI US Equity	MB FINANCIAL	1,725,761,024.00	1,117,990,912.00
61	UCBI US Equity	UNITED COMMUNITY	1,720,227,968.00	592,119,424.00
62	PVTB US	PRIVATEBANCORP		

			1,708,692,992.00	1,118,866,560.00
63	CPF US Equity	CENTRAL PACIFIC	1,663,355,008.00	584,066,944.00
64	SBSI US Equity	SOUTHSIDE BAN IN	1,624,420,992.00	376,856,288.00
65	CRBC US Equity	CITIZENS REPUBLI	1,494,808,064.00	828,758,592.00
66	NYB US Equity	NY COMM BANCORP	1,470,843,008.00	5,818,315,264.00
67	PCBC US Equity	PAC CAP BANCORP	1,375,700,992.00	1,511,547,648.00
68	PACW US Equity	PACWEST BANCORP	1,351,700,992.00	833,913,664.00
69	HTLF US Equity	HEARTLAND FINL	1,348,215,040.00	431,509,952.00
70	PFS US Equity	PROVIDENT FINANC	1,309,261,952.00	930,383,232.00
71	CATY US Equity	CATHAY GENERAL B	1,271,747,968.00	1,293,473,664.00
72	CNBKA US Equity	CENTURY BANC - A	1,259,160,064.00	174,775,680.00
73	NBTB US Equity	NBT BANCORP INC	1,225,346,944.00	714,523,776.00
74	CIT US	CIT GROUP INC	1,220,600,064.00	7,605,749,760.00

	Equity			
75	TMP US Equity	TOMPKINS FINANCI	1,201,022,976.00	467,868,896.00
76	FMBI US Equity	FIRST MIDWEST/IL	1,190,244,992.00	894,493,184.00
77	TAYC US Equity	TAYLOR CAPITAL	1,178,616,960.00	488,318,400.00
78	FCF US Equity	FIRST COMMON FIN	1,159,202,048.00	730,979,456.00
79	WAL US Equity	WESTERN ALLIANCE	1,113,026,944.00	765,044,032.00
80	FNB US Equity	FNB CORP	1,088,924,032.00	1,539,654,656.00
81	WSBC US Equity	WESBANCO INC	1,030,428,992.00	539,692,352.00
82	BUSE US Equity	FIRST BUSEY CORP	1,015,844,992.00	414,096,608.00

Appendix B: Stata Output

Regression Analysis of Cumulative Abnormal Return on January 15, 2009

```
.
. *drop london
. *gen london=0
. *replace london=1 if eventcount==2 & set==1
.
. reg cumulative_abnormal_return if diff==0
```

Source	SS	df	MS
Model	0	0	.
Residual	66.5572501	80	.831965626
Total	66.5572501	80	.831965626

Number of obs =   81
F(0,   80) =   0.00
Prob > F   =   .
R-squared   = 0.0000
Adj R-squared = 0.0000
Root MSE   = .91212

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
_cons	-1.00668	.1013468	-9.93	0.000	-1.208366 -.8049929

```
. reg cumulative_abnormal_return trading if diff==0
```

Source	SS	df	MS
Model	.676627492	1	.676627492
Residual	65.8806226	79	.833931931
Total	66.5572501	80	.831965626

Number of obs =   81
F(1,   79) =   0.81
Prob > F   = 0.3705
R-squared   = 0.0102
Adj R-squared = -0.0024
Root MSE   =   .9132

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
trading	-.588964	.6538517	-0.90	0.370	-1.890423 .7124952
_cons	-.4322578	.645729	-0.67	0.505	-1.717549 .8530336

```
. reg cumulative_abnormal_return sifi if diff==0
```

Source	SS	df	MS
Model	2.24042767	1	2.24042767
Residual	64.3168224	79	.814136992
Total	66.5572501	80	.831965626

Number of obs =   81
F(1,   79) =   2.75
Prob > F   = 0.1011
R-squared   = 0.0337
Adj R-squared = 0.0214
Root MSE   =   .9023

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
sifi	-.4000382	.2411486	-1.66	0.101	-.8800324 .0799561
_cons	-.9177822	.1136785	-8.07	0.000	-1.144054 -.6915107

```
.
```

Regression Analysis of Cumulative Abnormal Return on July 21, 2010

```
.
. *drop london
. *gen london=0
. *replace london=1 if eventcount==2 & set==1
.
. reg cumulative_abnormal_return if diff==0
```

Source	SS	df	MS		Number of obs =	99
					F(0, 98) =	0.00
Model	0	0	.		Prob > F =	.
Residual	4.50996903	98	.046020092		R-squared =	0.0000
					Adj R-squared =	0.0000
Total	4.50996903	98	.046020092		Root MSE =	.21452

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
_cons	-.0614898	.0215604	-2.85	0.005	-.1042756	-.0187039

```
. reg cumulative_abnormal_return trading if diff==0
```

Source	SS	df	MS		Number of obs =	99
					F(1, 97) =	2.95
Model	.133259693	1	.133259693		Prob > F =	0.0889
Residual	4.37670934	97	.045120715		R-squared =	0.0295
					Adj R-squared =	0.0195
Total	4.50996903	98	.046020092		Root MSE =	.21242

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
trading	.0972827	.0566075	1.72	0.089	-.0150676	.209633
_cons	-.1420674	.0515185	-2.76	0.007	-.2443174	-.0398173

```
. reg cumulative_abnormal_return sifi if diff==0
```

Source	SS	df	MS		Number of obs =	99
					F(1, 97) =	0.05
Model	.002346425	1	.002346425		Prob > F =	0.8227
Residual	4.50762261	97	.046470336		R-squared =	0.0005
					Adj R-squared =	-0.0098
Total	4.50996903	98	.046020092		Root MSE =	.21557

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
sifi	-.0126224	.0561729	-0.22	0.823	-.12411	.0988652
_cons	-.0591948	.0239522	-2.47	0.015	-.1067333	-.0116563

```
.
end of do-file

.
```

Regression Analysis of Cumulative Abnormal Return around July 15, 2012

```
.
. *drop london
. *gen london=0
. *replace london=1 if eventcount==2 & set==1
.
. reg cumulative_abnormal_return if diff==0
```

Source	SS	df	MS
Model	0	0	.
Residual	7.02884327	96	.073217117
Total	7.02884327	96	.073217117

Number of obs = 97
F(0, 96) = 0.00
Prob > F = .
R-squared = 0.0000
Adj R-squared = 0.0000
Root MSE = .27059

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
_cons	-.0177698	.0274739	-0.65	0.519	-.072305 .0367655

```
. reg cumulative_abnormal_return trading if diff==0
```

Source	SS	df	MS
Model	1.21160845	1	1.21160845
Residual	5.81723482	95	.061234051
Total	7.02884327	96	.073217117

Number of obs = 97
F(1, 95) = 19.79
Prob > F = 0.0000
R-squared = 0.1724
Adj R-squared = 0.1637
Root MSE = .24746

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
trading	-.309111	.0694912	-4.45	0.000	-.4470685 -.1711535
_cons	.2435406	.0638926	3.81	0.000	.1166976 .3703835

```
. reg cumulative_abnormal_return sifi if diff==0
```

Source	SS	df	MS
Model	.007951565	1	.007951565
Residual	7.0208917	95	.073904123
Total	7.02884327	96	.073217117

Number of obs = 97
F(1, 95) = 0.11
Prob > F = 0.7436
R-squared = 0.0011
Adj R-squared = -0.0094
Root MSE = .27185

cumulative~n	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
sifi	-.0232896	.071002	-0.33	0.744	-.1642464 .1176671
_cons	-.013448	.0305859	-0.44	0.661	-.0741686 .0472727

```
.
end of do-file
```