**(Cover Page Image)**

**DSC5101 Group Assignment 2**

A Relook at “Risk Targeting and Policy Illusions – Evidence from the Announcement of the Volcker Rule”



**November 3, 2019**

Group Members

Utkarsh Chaturvedi ( )

Dasol Kim ( )

Shengnan Sang ( )

Nikhil Thomas ( )

Table of Contents

[**Executive Summary** 2](#_Toc23608016)

[**Model Equations** 2](#_Toc23608017)

[**Data & Exploration** 3](#_Toc23608018)

[**Model Implementation & Analysis** 3](#_Toc23608019)

[**Robustness Tests** 4](#_Toc23608020)

[**Summary & Recommendations** 4](#_Toc23608021)

[**Appendix** 6](#_Toc23608022)

[**Figure(s):** 6](#_Toc23608023)

[**Tables(s):** 6](#_Toc23608024)

[**Reference(s):** 8](#_Toc23608025)

# **Executive Summary**

Enacted into law on July 21, 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act (“Dodd-Frank Act/DFA”), also referred to as the Volcker Rule, prohibits any banking institution from a) engaging in short-term proprietary trading of securities, derivatives, commodity futures and options; b) owning and sponsoring hedge funds or private equity funds. In wake of the 2008 global financial crisis, the Volcker Rule’s primary goal was to enhance banks’ safety and soundness through minimizing exposure to non-banking capital market risks. Exemptions were provided for specific activities including a) underwriting, market making-related, risk-mitigating hedging, trading of government obligations and other activities that improve the U.S. financial stability; b) investing in general corporate purpose companies such as foreign public funds, wholly-owned subsidiaries, joint ventures, acquisition and securitization-related vehicles. Note that an effective implementation of the regulation remained to be seen until 2016 due to the lag in agreement among regulatory agencies as well as the provision of a two to five-year conformance period.

This report will focus on the construction of linear regression model that incorporates an interaction variable, controlling covariates, and fixed time effects. Specifically, results produced from the above model demonstrate several key findings.

1. First, after the announcement of the Volcker Rule, banks decreased their trading assets to a limited extent
2. Second, banks that previously had significant trading asset ratios responded to the regulation the most, while this effect was not pronounced for those with low pre-DFA trading asset ratios
3. Finally, robustness tests suggest that the findings are beneficial to both the banking entities and regulatory bodies

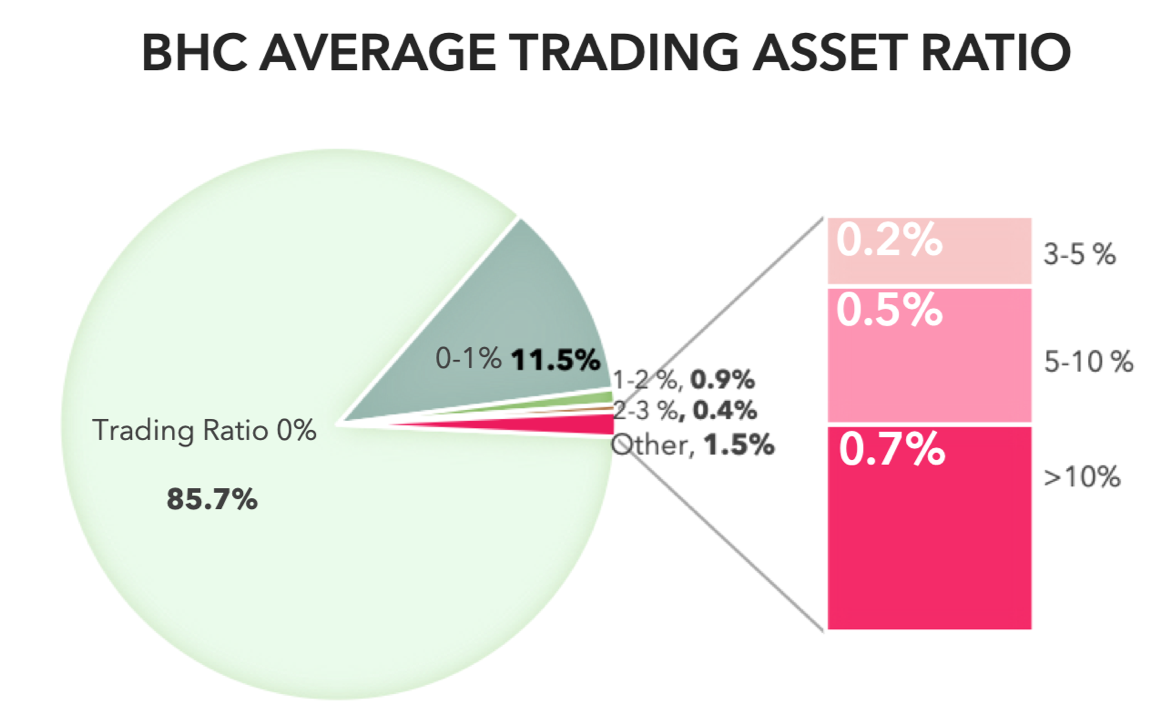
# **Model Equations**

To truly understand the effect that Volcker rule has had on the trading ratios of BHCs, we have used a simple regression model with the following equation –

* ***TradingAssetRatio***is the BHC’s trading asset ratio in each quarter from 2004 to 2015, which is modelled in this analysis
* A variable has been engineeredasbinary variable, to indicate the pre-post time of DFA coming into effect.
* Variable is has been calculated as the
* Interaction variable was created between these 2 variables. **Control Variables** and **Fixed Effects** were added to make the model robust.
* For the list of control variables used, refer table xxxxx in the Appendix

# **Data & Exploration**

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx



Note that 41,442 missing observations have been omitted for simplicity.

# **Model Implementation & Analysis**

**Assumption 1:** Bank holding companies with traditionally relatively large trading books pre-DFA will have the most impact and display substantial reaction to the Volcker Rule.

**Hypothesis 1:** *The affected banks started to reduce their trading asset ratio after the announcement of the Volcker Rule (Jussi Keppo, Josef Korte, 2018).*

#### Baseline models

--------------------------------------------------------

#### Measuring magnitude & impact of DFA against pre-DFA trading ratios

* Add test(s) for confirming that time effects are necessary (in appendix or here)

**Testing for non-linear trends:**

We added squared effects to our *affect* variable to check if any non-linear trends are present or can be captured. While the effects of this iteration(s) corroborate our results above, we find no evidence that a non-linear trend of reduction in trading ratio exists.

#### Impact on banks

Having established that Volcker rule have had an effect on the trading ratios of banks, we look into which banks have been affected the most. Observing the coefficient value of interaction variable *(Affect\*pre\_DFA\_flag)*, we observe it to be significant & negative.

The coefficient is particularly interesting in the way it’s interacting with *affect*. An interpretation of this interaction coefficient could be that as ‘*affect’* value increases (i.e. for banks having higher pre-DFA trading ratio), the magnitude of drop in trading ratios is higher. E.g. for banks with 0.1% average pre-DFA trading ratio, the magnitude of effect of DFA would be *(-0.1%\*16.1%),* but for banks with 10% pre-DFA trading ratio, the magnitude is *(-10%\*16.1%).*

The interaction variable with fixed effects tries to improve upon this even further. Since BHC’s have been controlled along with period, the *affect* variable is now acting as a counter-factual for treatment group during the post-DFA period. So, the interaction effect is now measuring the %drop in trading ratio observed, after being controlled for each bank.

Hence, we conclude that, if the pre-trading ratio of banks are higher *(‘affect’),* the effect of DFA is more pronounced.

**Classification for impact on banks:**

**---------------- Yet to be done**

# **Robustness Tests**

1. Test 1

To ensure that our results are in-fact inline we build robust models that considered control Variables and Fixed Affects into all of our models – However we did run further robustness checks

* Run a DiD model that considered only those BHCs that had Pre-DFA Trading ratios >=3% as the Treatment group – the coefficients of this model were still negative and significant
* Used Propensity matching for the treatment and Control group in the above model based on Q1 control variables so DiD is calculated using similar BHCs in control and treatment groups – which resulted in a coefficient that was still negative and similar to above

The above 2 results tested for the true affectedness of the Volcker rule based on Trading Asset Ratios however this can be disagreed by considering that banks may have all anyway considered a change in business models after the financial crisis, this was argued with the below tests:

* Consider Pre 2007 ratios before the financial crisis – this showed similar results when compared to our model results
* Removed all BHCs with 0 trading asset ratios - our results still held true

With the above tests we feel that we have a strong robust result – that Volcker rule did negatively affect Trading Asset Ratios

1. Test 2
2. Test 3
3. Test 4

# **Summary & Recommendations**

Fig 1

Overall, the results indicate that the Volcker Rule effectively steered a decrease in banks’ trading asset ratios, of which banking entities with predominant trading activities prior to the announcement demonstrated stronger reactions to the regulation. Note that the majority of bank holding companies had close to zero or insignificant trading asset ratios preceding the Dodd-Frank Act. This further warrant robustness testing in order to evaluate the strength of statistical model in the treatment and control groups.

These findings are meaningful for both the financial institutions and its regulatory authorities. Authorities such as the Basel Committee on Banking Supervision and the International Association of Insurance Supervisors concurred and delineated a list of global systematically important banks “G-SIBs”. Historically, such banks maintain considerable equity trading portfolios, and in accordance to the model implications, responded the most after the announcement of the Volcker Rule. Hence, separate regulatory compliance requirements should be imposed on the peer groups. Concurrently, smaller financial institutions will be categorized into another peer group based on factors including total amount of assets, cross-jurisdictional network and reach, interconnectedness, infrastructure, and complexity and diversification of transaction activities. Specifically, risk-based “CAMELS” monitoring system is an ideal barometer for assessing bank entities’ overall well-being. The scoring test is comprised of “Capital Adequacy”, “Asset Quality”, “Management”, “Earnings”, “Liquidity”, and “Sensitivity to Market Risk”.

# **Appendix**

## **Figure(s):**

## **Tables(s):**

**List of control variables:**

**Propensity Matching:**

Summary of balance for all data:

Means Treated Means Control SD Control Mean Diff eQQ Med eQQ Mean eQQ Max

distance 0.5447 0.0105 0.0360 0.5343 0.6226 0.5126 0.9314

dep\_lnassets 17.7727 13.1233 1.2477 4.6495 5.2155 4.5758 6.7666

dep\_leverage 0.0825 0.0937 0.0345 -0.0113 0.0075 0.0232 0.2536

dep\_liquidity 0.0477 0.0397 0.0283 0.0081 0.0030 0.0245 0.3021

dep\_depositratio 0.3462 0.6672 0.1051 -0.3211 0.3220 0.3040 0.4670

dep\_creditrisk\_total3 0.0208 0.0177 0.0168 0.0031 0.0035 0.0128 0.1617

dep\_loans\_REratio 0.5095 0.6992 0.1489 -0.1896 0.1977 0.1764 0.2710

dep\_cir 0.4704 0.5058 0.1513 -0.0354 0.0320 0.1727 2.4278

dep\_cpp\_bankquarter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

dep\_roa1 0.0031 0.0029 0.0030 0.0002 0.0003 0.0051 0.0556

Summary of balance for matched data:

Means Treated Means Control SD Control Mean Diff eQQ Med eQQ Mean eQQ Max

distance 0.5447 0.2769 0.1857 0.2678 0.5708 0.4535 0.8599

dep\_lnassets 17.7727 16.9081 1.9861 0.8646 3.2135 2.7773 3.9687

dep\_leverage 0.0825 0.0890 0.0194 -0.0065 0.0032 0.0082 0.0832

dep\_liquidity 0.0477 0.0606 0.0549 -0.0129 0.0065 0.0126 0.0657

dep\_depositratio 0.3462 0.4337 0.1666 -0.0875 0.2216 0.2071 0.3033

dep\_creditrisk\_total3 0.0208 0.0121 0.0094 0.0087 0.0061 0.0075 0.0149

dep\_loans\_REratio 0.5095 0.4923 0.1673 0.0172 0.0829 0.0873 0.1699

dep\_cir 0.4704 0.5493 0.1771 -0.0789 0.0180 0.0316 0.2426

dep\_cpp\_bankquarter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

dep\_roa1 0.0031 0.0027 0.0025 0.0004 0.0004 0.0008 0.0063

Percent Balance Improvement:

Mean Diff. eQQ Med eQQ Mean eQQ Max

distance 49.8793 8.3248 11.5374 7.6856

dep\_lnassets 81.4041 38.3854 39.3052 41.3492

dep\_leverage 41.9111 57.4377 64.6527 67.1846

dep\_liquidity -59.5066 -116.8199 48.6839 78.2683

dep\_depositratio 72.7386 31.1845 31.8803 35.0403

dep\_creditrisk\_total3 -179.5325 -74.5364 41.3991 90.8106

dep\_loans\_REratio 90.9082 58.0502 50.5397 37.3072

dep\_cir -122.8331 43.6474 81.7202 90.0068

dep\_cpp\_bankquarter 0.0000 0.0000 0.0000 0.0000

dep\_roa1 -182.5071 -24.7034 84.0083 88.7502

Sample sizes:

Control Treated

All 783 18

Matched 22 18

Unmatched 761 0

Discarded 0 0

**Non-linearity test #1(using FE):**

Call:

plm(formula = bhc\_avgtradingratio ~ after\_DFA\_1 + dep\_lnassets +

dep\_leverage + dep\_liquidity + dep\_depositratio + dep\_creditrisk\_total3 +

dep\_loans\_REratio + dep\_cir + dep\_cpp\_bankquarter + dep\_roa1 +

Affect + Affect\_squared + Affect \* after\_DFA\_1 + Affect\_squared \*

after\_DFA\_1, data = Data\_org, effect = "twoways", model = "within",

index = c("rssd9001", "rssd9999"))

Unbalanced Panel: n = 2428, T = 1-38, N = 40026

Residuals:

Min. 1st Qu. Median 3rd Qu. Max.

-1.0883e-01 -4.5857e-04 -2.2389e-05 4.0625e-04 1.9008e-01

Coefficients:

Estimate Std. Error t-value Pr(>|t|)

dep\_lnassets -1.6122e-04 1.6619e-04 -0.9701 0.332005

dep\_leverage 5.7391e-03 1.8154e-03 3.1613 0.001572 \*\*

dep\_liquidity -1.1384e-03 1.0037e-03 -1.1342 0.256720

dep\_depositratio 8.9877e-04 5.4264e-04 1.6563 0.097670 .

dep\_creditrisk\_total3 1.1062e-03 1.3350e-03 0.8286 0.407333

dep\_loans\_REratio -1.0818e-02 6.7016e-04 -16.1420 < 2.2e-16 \*\*\*

dep\_cir 3.7363e-04 1.2797e-04 2.9197 0.003505 \*\*

dep\_cpp\_bankquarter 1.0902e-05 1.4993e-04 0.0727 0.942035

dep\_roa1 7.6922e-03 8.0199e-03 0.9591 0.337495

after\_DFA\_1:Affect -3.0338e-01 8.8088e-03 -34.4404 < 2.2e-16 \*\*\*

after\_DFA\_1:Affect\_squared 4.3512e-01 3.4721e-02 12.5317 < 2.2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 1.251

Residual Sum of Squares: 1.1431

R-Squared: 0.086212

Adj. R-Squared: 0.025982

F-statistic: 322.061 on 11 and 37550 DF, p-value: < 2.22e-16

**Non-linearity test #1(without FE):**

Call:

lm(formula = bhc\_avgtradingratio ~ after\_DFA\_1 + dep\_lnassets +

dep\_leverage + dep\_liquidity + dep\_depositratio + dep\_creditrisk\_total3 +

dep\_loans\_REratio + dep\_cir + dep\_cpp\_bankquarter + dep\_roa1 +

Affect + Affect\_squared + Affect \* after\_DFA\_1 + Affect\_squared \*

after\_DFA\_1, data = Data\_org)

Residuals:

Min 1Q Median 3Q Max

-0.107147 -0.000262 0.000003 0.000217 0.194160

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -3.837e-03 5.434e-04 -7.061 1.68e-12 \*\*\*

after\_DFA\_1 1.257e-05 7.685e-05 0.164 0.8701

dep\_lnassets 3.089e-04 2.770e-05 11.152 < 2e-16 \*\*\*

dep\_leverage 1.608e-03 9.312e-04 1.727 0.0842 .

dep\_liquidity 1.417e-04 7.190e-04 0.197 0.8438

dep\_depositratio 1.000e-04 2.973e-04 0.336 0.7366

dep\_creditrisk\_total3 2.465e-03 1.002e-03 2.460 0.0139 \*

dep\_loans\_REratio -9.974e-04 2.131e-04 -4.681 2.87e-06 \*\*\*

dep\_cir 2.663e-04 1.274e-04 2.091 0.0366 \*

dep\_cpp\_bankquarter -2.360e-04 1.264e-04 -1.866 0.0620 .

dep\_roa1 -2.834e-03 7.723e-03 -0.367 0.7137

Affect 9.749e-01 6.031e-03 161.654 < 2e-16 \*\*\*

Affect\_squared 6.078e-02 2.387e-02 2.546 0.0109 \*

after\_DFA\_1:Affect -2.541e-01 8.105e-03 -31.348 < 2e-16 \*\*\*

after\_DFA\_1:Affect\_squared 2.759e-01 2.894e-02 9.533 < 2e-16 \*\*\*

## **Reference(s):**