

Risk Targeting and Policy Illusions – Volcker Rule and Its Announcement Effects



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(two papers)

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Volcker Rule

- Most important change to banking regulation after the global financial crisis
 - part of Dodd-Frank Act
 - it has been put into law in July 2010
 - full compliance is not likely required before 2017
- Volcker rule explicitly aims at reducing risk-taking
 - limiting banks' proprietary trading and investments in hedge funds, venture capital, and private equity
- We analyze theoretically and empirically whether Volcker Rule has already had effects on US banks' business models, liquidity, and risk-taking

Results

- On average banks reduced the size of their trading books relative to total assets after the passing of the Volcker Rule
- Banks that are affected more by the rule reduce their trading books stronger
 - corresponds with self-declared compliance announcements by banks
- Consistent with our theoretical model, the effect on liquid assets less obvious:
 - affected banks' liquidity ratio (cash and balances at other depository institutions to total assets) rises **less** than the ratio of unaffected banks

Results, cont'd

- Consistent with our theoretical model, risk-taking of the institutions is also less obvious:
 - affected banks' distance to default has **not** decreased more after the enactment of the rule
 - the volatility of trading returns is unchanged across the banks
 - the banking volatility has decreased, so risk-taking has not moved to banking book
 - Volcker Rule has so far **not** led to decrease in risk-taking
- Consistent with our model, remaining trading book is not used for hedging banking earnings
 - the Rule has so far led to a **decrease** in hedging of banking earnings

Related literature

- Schaefer et al. (2013)
 - the rule might increase banks' default probability and reduce their equity value
- King et al. (2013)
 - in the crisis, trading positively related to bank risk and systemic risk and negatively to profitability and stock returns
- Fang et al. (2012)
 - bank-affiliated private equity funds generally underperform and might contribute to credit cycles
- Ang and Richardson (1994), Kroszner and Rajan (1994, 1997), Puri (1994), John et al. (1994), Kang and Liu (2007)
 - study conflicts of interest between commercial banking and investment banking/securities trading
 - results are mixed
- Akhigbe and Whyte (2004), Geyfman and Yeager (2009), Stiroh (2004, 2006), Benston (1994), Saunders and Walter (1994)
 - the effect of additional investment/trading opportunities on banks' risk
 - Freixas et al. (2007), Barth et al. (2000) and Stiroh and Rumble (2006): the risk increase stronger than diversification benefits

Related papers, cont' d

- Empirical evidence of the buffer stock:
 - Liquid asset holdings:
 - Kim et al. (1998)
 - Opler et al. (1999)
 - Capital structure, buffer stock role of equity capital:
 - Harris and Raviv (1990)
 - Booth et al. (2001)
 - Titman and Wessels (1988)

=> companies hold buffer stocks as hedges against liquidity and earnings risks
- Empirical papers on bank behavior:
 - Heid, Porath and Stolz (2004)
 - Furfine (2001)

=> the higher the buffer equity the more banks invest in the risky assets
- Papers on bank owners' asset substitution moral hazard problem:
 - Merton (1977)
 - Furlong and Keeley (1989)
 - Sharpe (1978)

=> risk-based capital requirements lower the moral hazard problem and the probability of default

Related papers, cont' d

- Banks ' optimal portfolio selection:
 - Furlong and Keeley (1989)
 - Cuoco and Liu (2004)
 - Kahane (1977)
 - Kim and Santomero (1988)
 - Keppo, Kofman, and Meng (2010)

=> capital requirements can increase or decrease the portfolio risk
- Value at Risk (VaR):
 - Artzner et al. (1999), Rockafellar, and Uryasev (2002), Embrechts (2000), and Danielsson et al. (2002)
 - Heyde et al. (2006)

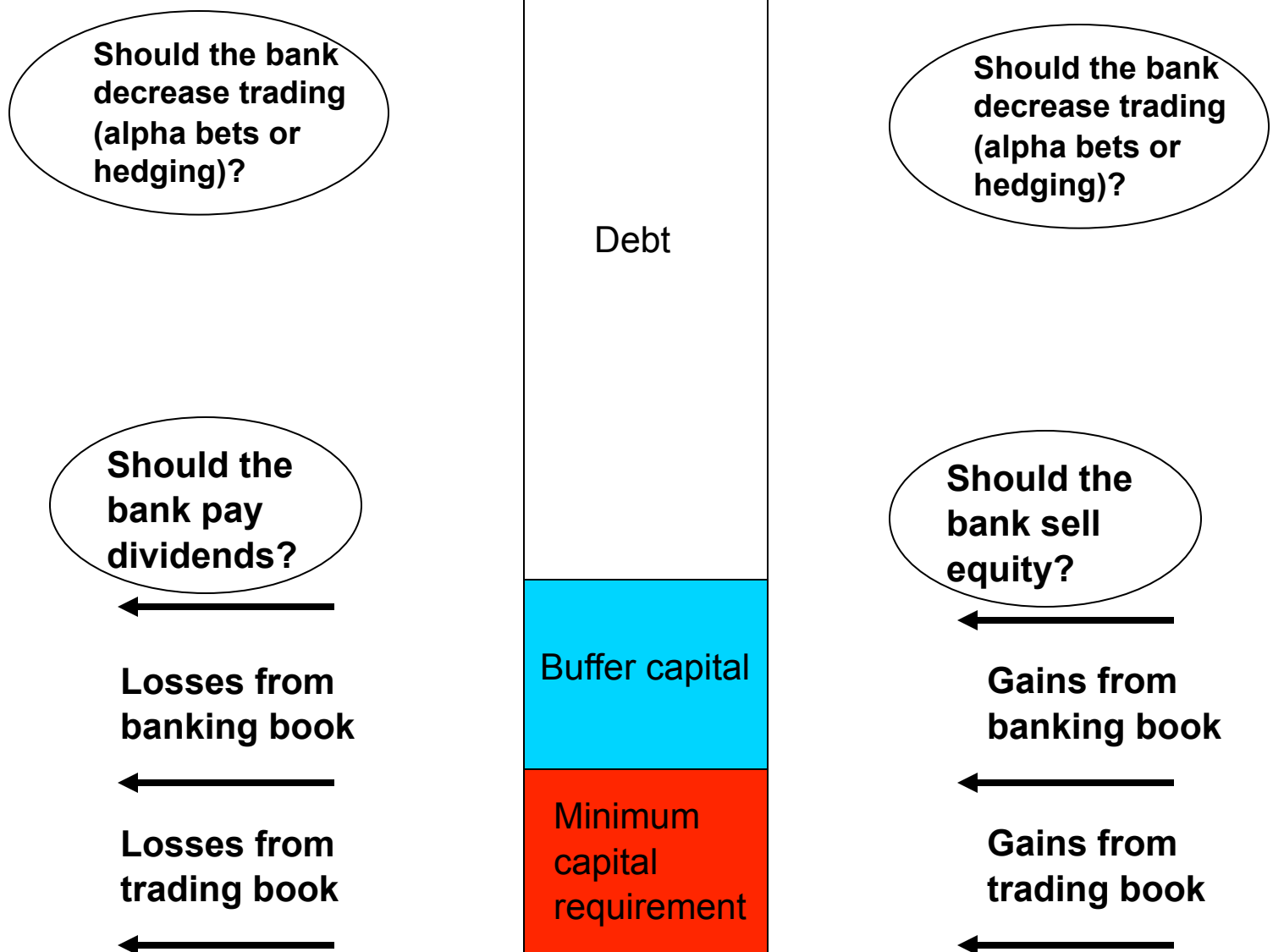
=>VaR has some drawbacks but it is not sensitive to distribution assumption
- By Holmstrom and Tirole (1997) capital induces banks to monitor borrowers
- By Chow and Surti (2011), Whitehead (2011), and Duffie (2012) , the implementation of the Volcker rule would reduce the quality and capacity of market making services that banks provide to U.S. investors
- Theoretical models on optimal firm policies:
 - Milne and Robertson (1996)
 - Asmussen and Taksar (1997)
 - Milne and Whalley (2001)
 - Hojgaard and Taksar (1999, 2001)
 - Peura and Keppo (2004)

=> these papers rely mostly on stochastic and singular control techniques

Why could the effect of Volcker Rule be dubious so far?

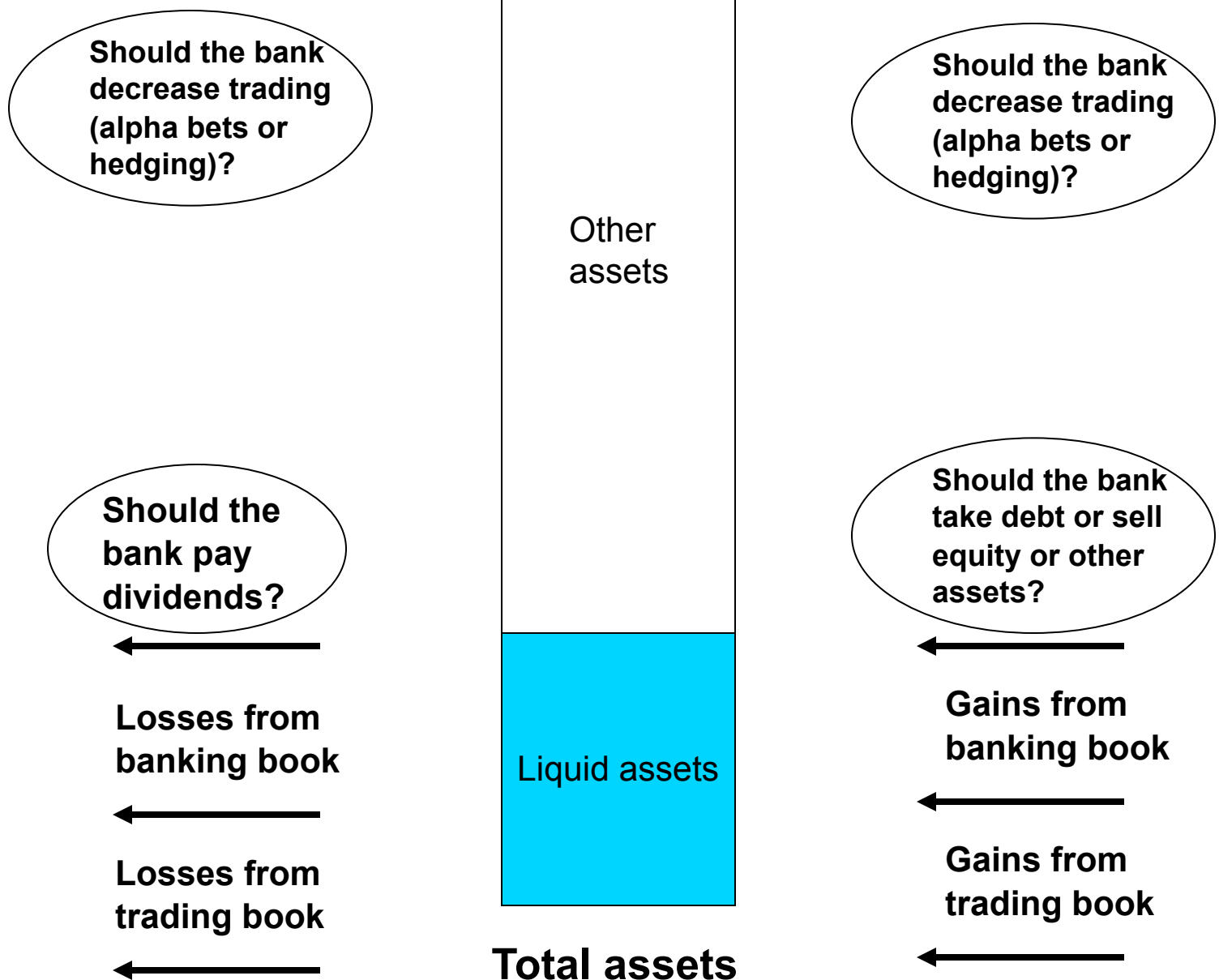
- Volcker Rule is not yet finally implemented
- Risk-taking incentives have not changed and banks can take risk in many ways (e.g. leverage, dividends, banking and trading book risks)
 - our theoretical model shows the endogeneity issues
- Dodd-Frank Act also stipulates a long list of exemptions to the Volcker Rule
 - activities that might be seen as similar to proprietary trading or hedge fund investments
 - difficult to differentiate between prohibited proprietary trading and permitted activities such as trading on behalf of customers, market-making, or hedging
 - difficult to effectively delineate a private equity fund investment from a permitted small business investment fund engagement

Capital optimization problem



Liabilities and equity capital

Liquid asset optimization problem



Objective of the bank

- The value of the bank equals the expected discounted present value of dividends:

$$\bar{V}_{\bar{\pi}}(\bar{X}(0), D(0)) = E \left[\int_0^{\bar{\tau}_{\bar{\pi}}} e^{-(r+\delta)t} d\bar{L}_{\bar{\pi}}(t) - \sum_i e^{-(r+\delta)(t_i^{\bar{\pi}} + \Delta)} [\bar{s}_i^{\bar{\pi}} + K D(t_i^{\bar{\pi}} + \Delta)] I_{\{t_i^{\bar{\pi}} + \Delta \leq t\}} \right]$$

discounted dividends
↓

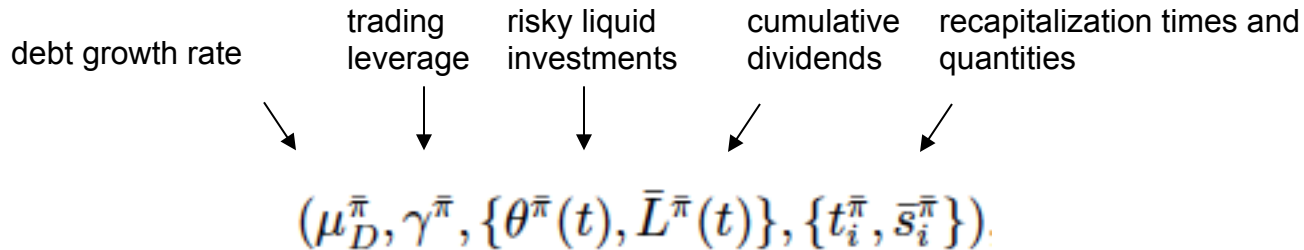
discounted
recapitalization costs
↓

where E is expectation and δ is the discount rate, \bar{X} is either liquid assets or equity and its dynamics depend on

- leverage
- liquid and illiquid asset investments
- recapitalizations
- dividends

Control policy

- A control policy π is a collection



- Admissible controls satisfy
 - μ_D and $\gamma \in [0, 3\%]$ (Volcker rule) are constant
 - $\theta(t) \in [0, 100\% \text{ of trading book}]$
 - $L(t)$ is nondecreasing
 - t_i is a stopping time, $s_i \geq 0$

Bank value

- The value function of the problem is the value of an optimally managed bank:

$$\bar{V}(\bar{x}, d) = \sup_{\bar{\pi} \in \Pi} \bar{V}_{\bar{\pi}}(\bar{x}, d)$$

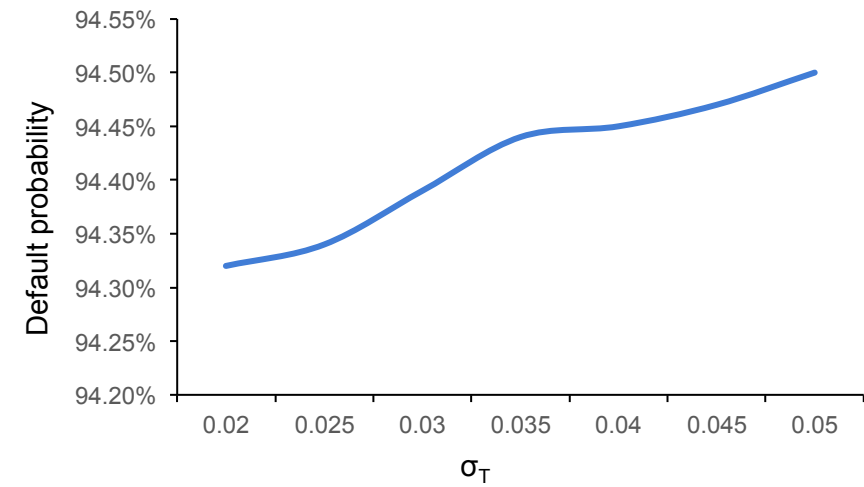
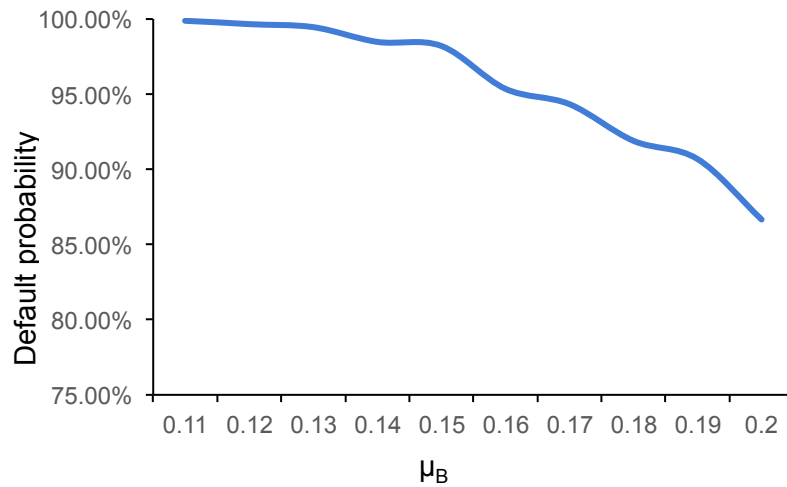
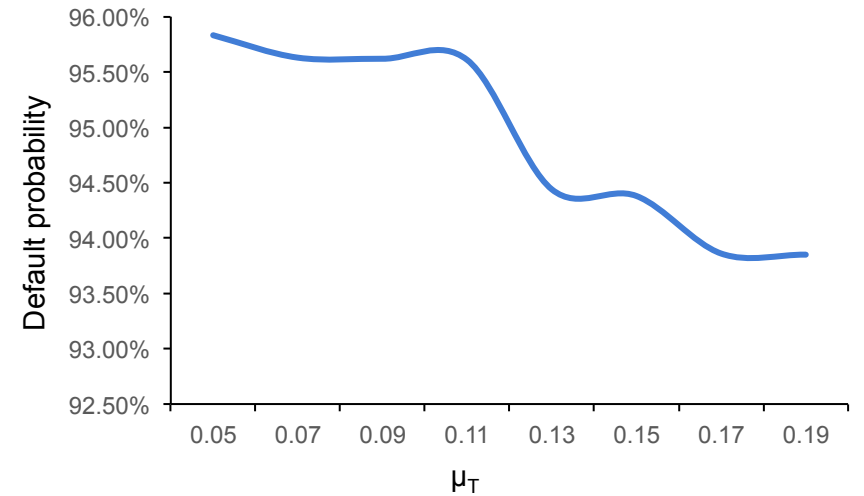
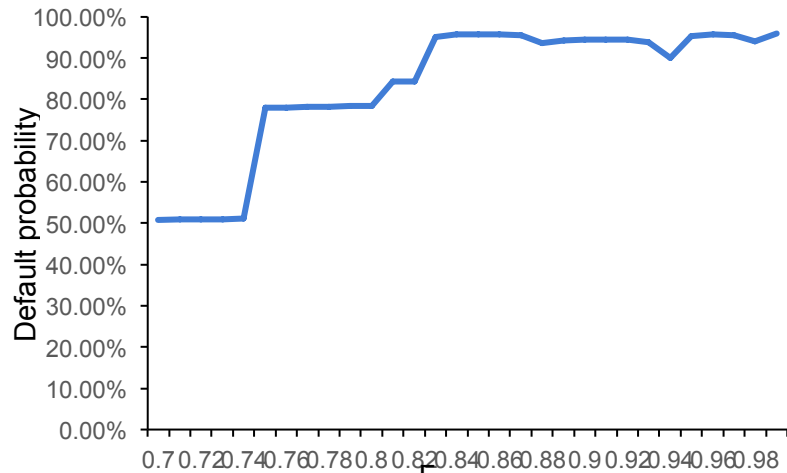
- Possible conflict: Banks objective is to maximize the value, regulators e.g. minimize the default probability or maximize liquidity

Sample banks

Table 2: Sample Banks over 2000Q1 - 2010Q1.

Bank Name	$\mu_B, \%$	$\mu_T, \%$	$\mu_D, \%$	$\sigma_B, \%$	$\sigma_T, \%$	$\sigma_D, \%$	ρ_{BT}	ρ_{BD}	ρ_{TD}	$1 - \gamma, \%$
BANK OF HAWAII	19.94	23.35	-0.97	5.08	33.37	7.52	0.1213	-0.4146	0.0096	4.02
JPMORGAN CHASE	17.25	12.60	19.05	4.32	3.04	21.22	0.8700	0.1695	0.0987	381.21
KEYCORP	18.62	16.31	1.05	4.56	7.50	4.44	0.6790	0.0651	-0.0031	27.07
PNC FINANCIAL SERVICES	21.27	28.48	15.26	5.42	12.80	23.46	0.6458	-0.1929	-0.2635	19.93
FIFTH THIRD BANCORP	19.57	57.24	9.99	4.68	28.72	13.89	0.3874	-0.0670	0.1645	5.50
BANK OF AMERICA	18.19	13.67	13.17	4.42	3.70	12.14	0.7769	-0.4191	-0.4261	147.86
BB&T CORPORATION	18.65	15.26	12.54	4.40	9.46	7.31	0.2235	0.2333	-0.1670	5.56
STATE STREET	17.19	36.52	13.71	4.23	10.21	31.73	0.8280	-0.1610	-0.1084	60.53
U.S. BANCORP	20.92	65.12	14.10	4.99	23.82	19.39	0.7056	-0.1253	-0.0672	4.08
WELLS FARGO	21.24	22.00	20.03	5.00	6.03	23.87	0.8244	-0.0142	-0.2187	23.68
SUNTRUST BANKS	16.81	16.60	5.49	4.03	6.45	7.87	0.5161	0.1860	0.2122	27.18
CITIZENS FINANCIAL	14.42	38.17	17.16	3.50	14.83	20.06	0.5763	-0.0104	0.3996	1.55
NORTHERN TRUST	17.23	112.59	8.94	4.23	36.66	12.69	0.6681	0.3488	0.2989	19.49
COMERICA	16.70	93.19	3.97	4.33	32.95	9.09	0.5620	-0.1691	-0.2097	4.75
HARRIS FINANCIAL.	14.34	24.16	5.38	3.70	15.29	16.96	0.3623	0.1166	-0.3011	24.43
UNIONBANCAL	16.15	33.98	9.29	4.05	10.26	6.64	0.8620	-0.0518	-0.1776	9.54
CITIGROUP	22.33	12.34	10.38	5.57	4.22	9.84	0.6685	0.0225	0.3546	263.57

Sample banks, example: default probability



Default probability, cont'd

On average Volcker Rule raises default probability by 14%

Table 3: Default Probability of Sample Banks over 100 years.

Bank Name	Without Volcker Rule, %	With Volcker Rule, %
BANK OF HAWAII	48.57	48.66
JPMORGAN CHASE	100.00	100.00
KEYCORP	7.03	74.83
PNC FINANCIAL SERVICES	62.74	62.44
FIFTH THIRD BANCORP	100.00	100.00
BANK OF AMERICA	100.00	100.00
BB&T CORPORATION	21.29	21.72
STATE STREET	100.00	94.86
U.S. BANCORP	100.00	100.00
WELLS FARGO	87.13	67.60
SUNTRUST BANKS	92.99	100.00
CITIZENS FINANCIAL	62.57	63.41
NORTHERN TRUST	0.71	100.00
COMERICA	30.22	6.30
HARRIS FINANCIAL.	100.00	69.09
UNIONBANCAL	19.59	99.02
CITIGROUP	13.49	72.27

More data...

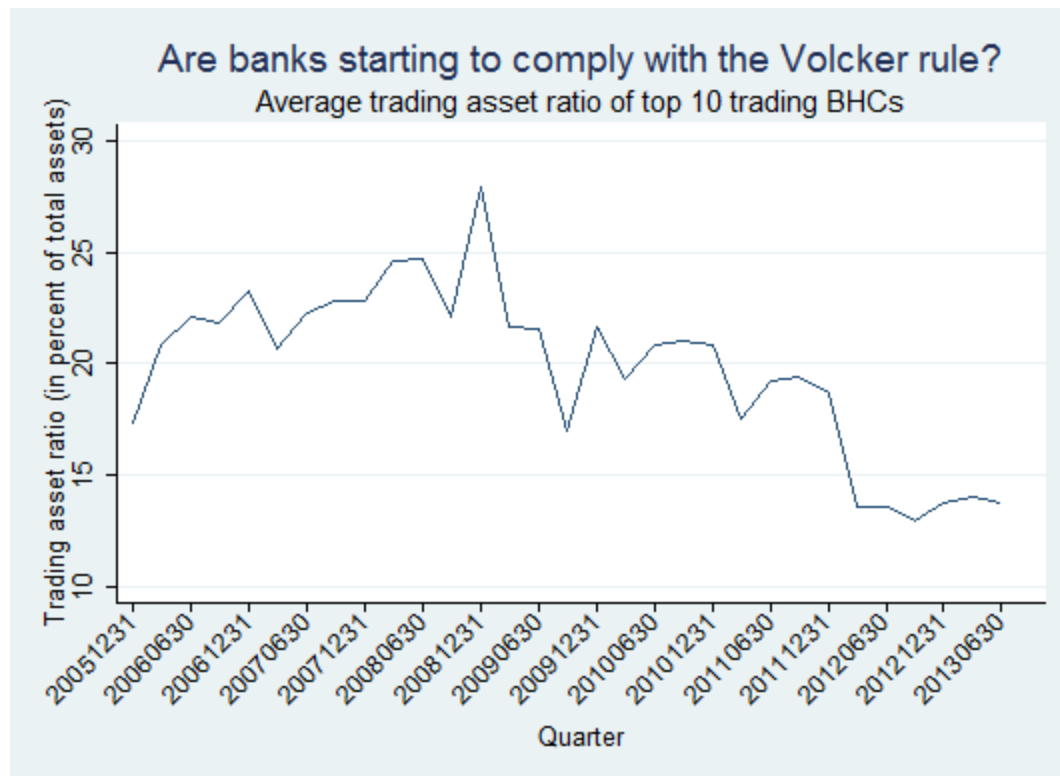
- We analyze empirically whether and how banks are already complying to the rule
 - motivated by several banks' self-declared compliance
- Comprehensive dataset of all Bank Holding Companies in US
 - quarterly data between 2004 and 2013
 - accounting and regulatory data
 - market data

Identification

- Identification relies on the differential affectedness of banks by the rule
- Banks with more activities now banned or limited are affected most
 - institutions with large trading books and large non-bank investments
- We test for several changes in portfolios, risk-taking, and hedging

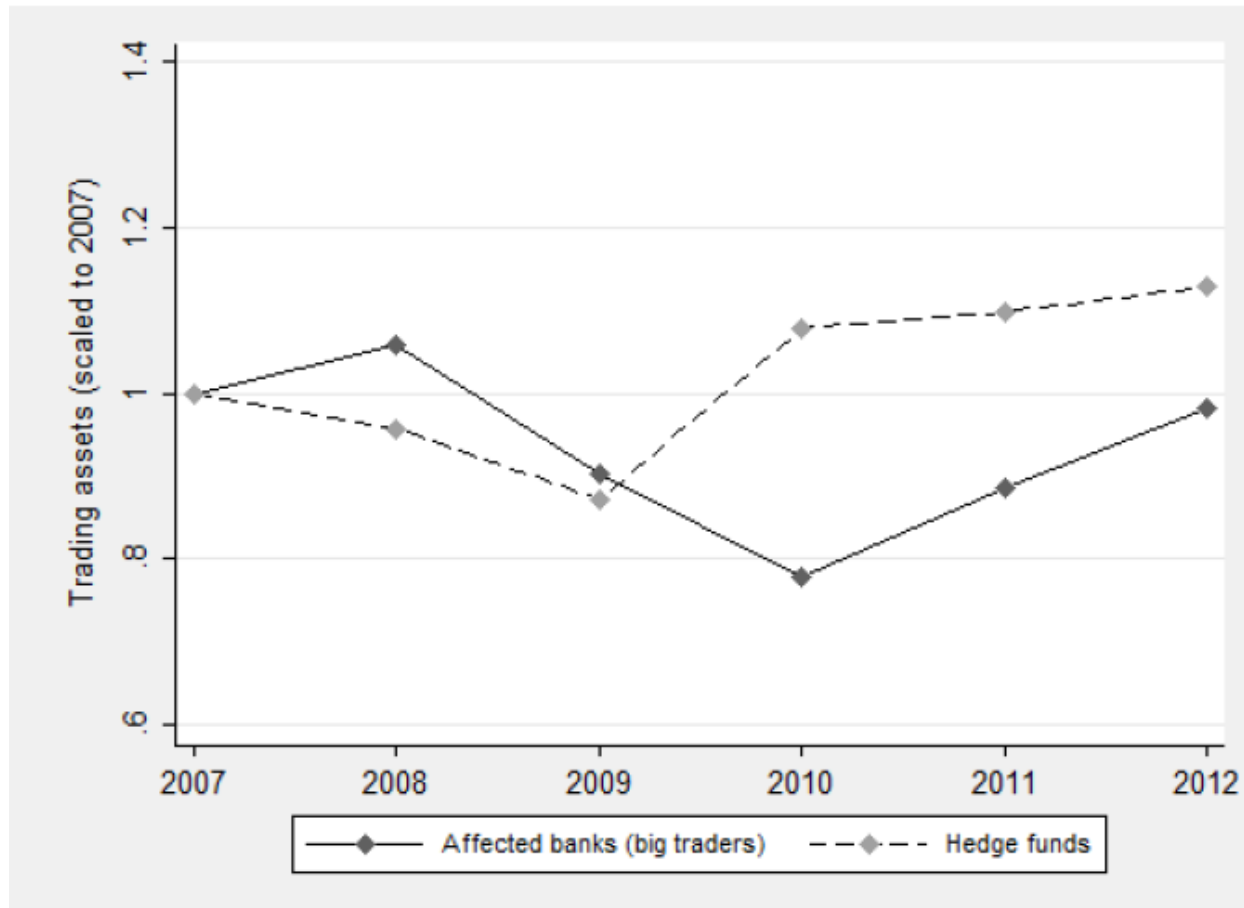
Trading assets

- top 10 trading banks significantly reduced their trading assets after the rule has been put into law in July 2010
 - full compliance is not required before 2015



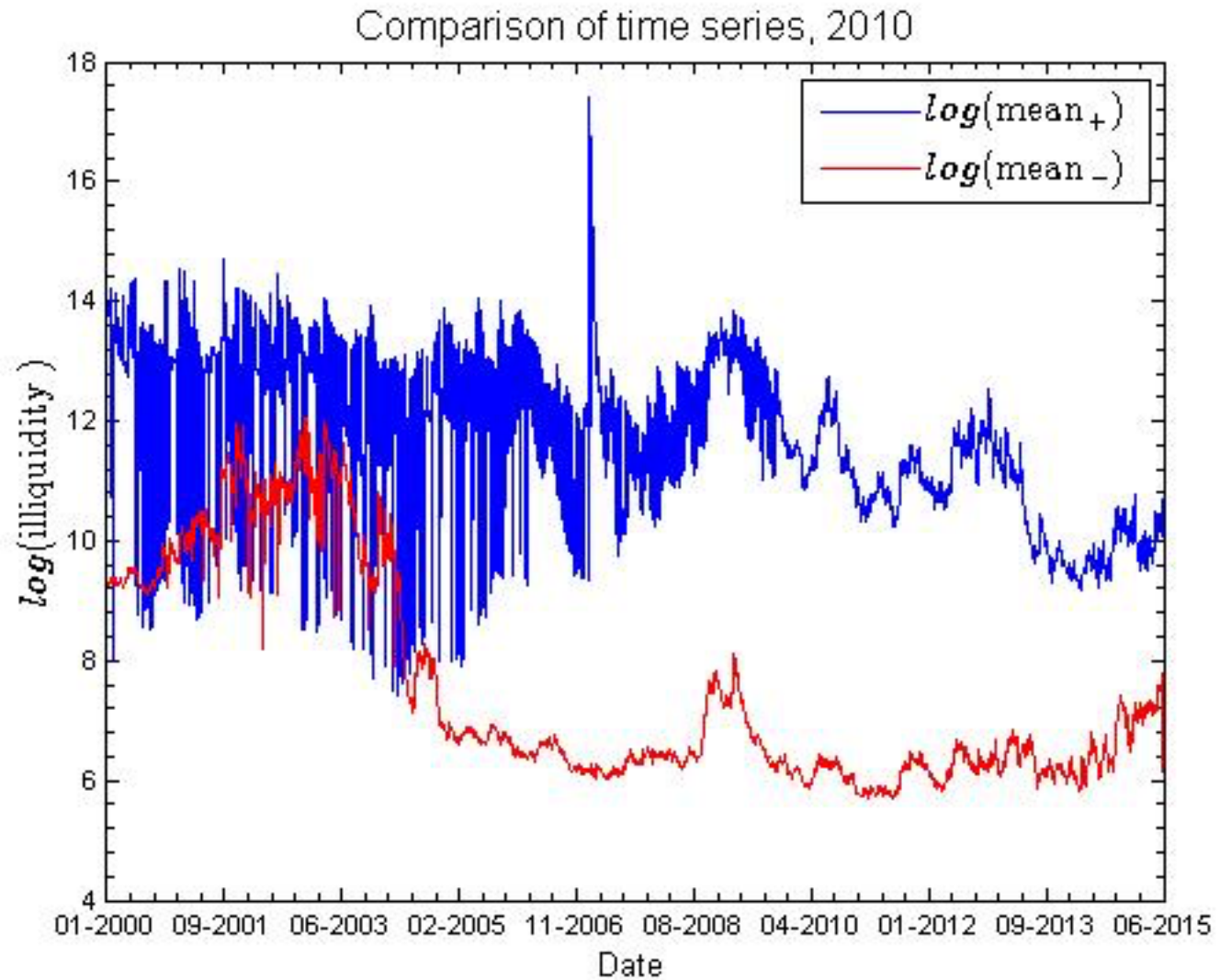
Trading assets, cont'd

- Affected banks reduce more their trading assets



Market illiquidity

By Amihud (2002), we measure the illiquidity of a security at time t as
 $| \text{return at time } t | / \text{volume at time } t$ in 10 million dollars



Summary statistics

Table 1: **Summary statistics**

This table reports variable names, units, means, standard deviations, minimum and maximum values, and the number of observations for the main variables of the dataset. The data sources are: FED Chicago BHC database (BHC), Thomson Reuters Datastream (DS), U.S. Department of the Treasury (TR). The dataset covers the time period from Q3 2004 to Q4 2012.

Variable	Unit	Mean	(Std. Dev.)	Min.	Max.	N
<i>Dependent variables</i>						
Trading asset ratio	Percent	0.33	(2.28)	0	42.97	18881
Non-bank investment ratio	Percent	0.19	(1.53)	0	66.2	60142
Bank z-score		5.19	(1.48)	0.03	13.22	57245
Volatility of trading, σ		0.27	(4.83)	0	164.58	21001
Banking and trading correlation, ρ		-0.03	(0.43)	-0.91	0.95	2462
<i>Explanatory variables and controls</i>						
After DFA	Dummy	0.49	(0.5)	0	1	107908
Avg trading asset ratio pre-DFA	Percent	0.38	(2.47)	0	42.94	19877
Avg trading asset ratio pre-2007	Percent	0.14	(1.32)	0	29.41	39617
Affected BHC	Dummy	0.03	(0.17)	0	1	19877
Avg non-bank investment ratio pre-DFA	Percent	0.14	(1.17)	0	38.55	98003
Total assets	USD mn	5,008	(71,223)	0	2,359,141	61937
Leverage ratio	Percent	10.09	(6.53)	-72.60	100	60054
Return on assets	Percent	0.13	(0.76)	-41.95	81.82	60000
Liquidity ratio	Percent	6.60	(6.68)	0.02	97.12	55707
Deposit ratio	Percent	69.52	(9.91)	0	99.81	98876
Real estate loan ratio	Percent	75.14	(16.24)	0	101.91	19895
Non-performing loan ratio	Percent	4.04	(4.37)	0	75.37	19895
Cost-Income-Ratio	Percent	54.61	(38.22)	-1247.83	1782.28	19170
CPP recipient indicator	Dummy	0.03	(0.17)	0	1	107908

Changes in the trading book

Table 2: Changes in the trading book - Initial compliance with the Volcker Rule?

This table reports multivariate estimates of the enactment effect of the Volcker Rule (part of Dodd-Frank Act) on Bank Holding Companies' trading asset ratio. *After DFA* is 1 for the quarters Q3 2010 - Q4 2012 and 0 for the quarters Q1 2007 - Q2 2009. *Affectedness by Volcker* is the average trading asset ratio in the 10 quarters previous to the discussion and introduction of the Volcker Rule (Q1 2007 - Q2 2009). Control variables comprise the natural logarithm of total bank assets, capital ratio, profitability, liquidity ratio, deposit ratio, NPL ratio, RE loan ratio, cost-income ratio, and an indicator variable that takes the value of 1 if the bank was a recipient of the TARP CPP program in a respective quarter (and 0 otherwise). Quarter and BHC fixed effects are included in the models as indicated. Panel B controls for nonlinear effects by including a squared term of *Affectedness by Volcker* and an interaction between the squared term and *After DFA*. Standard errors are clustered at the BHC level and reported in parentheses, significance levels are indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Baseline tests				
Dependent variable	(1)	(2)	(3)	(4)
	Trading asset ratio			
After DFA	-0.000348 (0.000587)	0.000379 (0.000837)	-0.000193 (0.000202)	
Affectedness by Volcker			0.987*** (0.00573)	
After DFA x affectedness by Volcker			-0.176*** (0.0602)	-0.229*** (0.0634)
Controls	NO	YES	YES	YES
Constant	YES	YES	YES	YES
Quarter FE	NO	NO	NO	YES
BHC FE	NO	NO	NO	YES
Observations	18,881	18,436	17,358	17,358
R-squared	0.000	0.237	0.909	0.936

Trading book, robustness

Table 3: Changes in the trading book - Initial compliance with the Volcker Rule? (Robustness)

This table reports multivariate estimates of the enactment effect of the Volcker Rule (part of Dodd-Frank Act) on Bank Holding Companies' trading asset ratio. *After DFA* is 1 for the quarters Q3 2010 - Q4 2012 and 0 for the quarters Q1 2007 - Q2 2009. *Affected BHC* takes a value of 1 if the average trading asset ratio in the 10 quarters previous to the discussion and introduction of the Volcker Rule (Q1 2007 - Q2 2009) was equal to or larger than 3 percent of total assets and 0 otherwise. *Affectedness by Volcker (pre-2007)* is the average trading asset ratio in the 10 quarters previous to our pre-treatment period (Q3 2004 - Q4 2006). *Affectedness by Volcker (NBI-ratio)* is the average non-bank investment ratio in the 10 quarters previous to the discussion and introduction of the Volcker Rule (Q1 2007 - Q2 2009). Control variables comprise the natural logarithm of total bank assets, capital ratio, profitability, liquidity ratio, deposit ratio, NPL ratio, RE loan ratio, cost-income ratio, and an indicator variable that takes the value of 1 if the bank was a recipient of the TARP CPP program in a respective quarter (and 0 otherwise). Quarter and BHC fixed effects are included in all models. Standard errors are clustered at the BHC level and reported in parentheses, significance levels are indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)
Robustness test	Treatment dummy	Propensity score matching	Pre-2007 affecteness	Excluding non-trading BHCs	Non-bank investment
Dependent variable	Trading asset ratio	Trading asset ratio	Trading asset ratio	Trading asset ratio	Non-bank invest. ratio
After DFA x affected BHC	-0.0286*** (0.00723)	-0.0282*** (0.00630)			
After DFA x affectedness by Volcker (pre-2007)			-0.171*** (0.0497)	-0.218*** (0.0646)	
After DFA x affectedness by Volcker (NBI-ratio)					-0.0687* (0.0397)
Controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES
Observations	17,358	936	17,179	2,533	18,187
R-squared	0.935	0.924	0.907	0.943	0.909

Changes in liquidity ratio

Panel C: Liquidity ratio						
Dependent variable	(1)	(2)	(3)	(4)	(5)	
	Liquidity ratio					
After DFA	0.044*** (0.001)	0.039*** (0.002)	0.044*** (0.001)	0.040*** (0.002)	liquidity ratio = cash and balances at other depository institutions to total assets	
Affectedness by Volcker			0.060 (0.047)	0.008 (0.045)		
After DFA x affectedness by Volcker			-0.078** (0.035)	-0.086*** (0.032)		-0.031 (0.041)
Controls	NO	YES	NO	YES		YES
Constant	YES	YES	YES	YES		YES
Quarter FE	NO	NO	NO	NO	YES	
BHC FE	NO	NO	NO	NO	YES	
Observations	55,707	18,436	55,707	18,436	18,436	
R-squared	0.107	0.214	0.107	0.215	0.691	
p-value for H0: $\beta_3 > 0$			0.014	0.003	0.222	

Liquidity ratio, robustness

Panel C: Liquidity ratio

Robustness test Dependent variable	(1) Treatment dummy	(2) Propensity score matching	(3) Pre-2007 affectedness Liquidity ratio	(4) Excluding non-trading BHCs	(5) Non-bank investment
After DFA x affected BHC	-0.001 (0.009)	0.014 (0.017)			
After DFA x affectedness by Volcker (pre-2007)			-0.039 (0.048)	-0.050 (0.064)	
After DFA x affectedness by Volcker (NBI-ratio)					-0.120*** (0.045)
Controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES
Observations	17,358	856	17,179	2,533	18,187
R-squared	0.680	0.830	0.680	0.801	0.688
p-value for $H_0: \beta_3 > 0$	0.465	0.791	0.207	0.217	0.004

Changes in overall risk

Panel A: Overall BHC risk (z-score)					
Dependent variable	(1)	(2)	(3)	(4)	(5)
	Z-score				
After DFA	0.436*** (0.0248)	0.488*** (0.0784)	0.474*** (0.0584)	0.442*** (0.0828)	
Affectedness by Volcker			-2.218** (1.041)	1.773 (1.225)	
After DFA x affectedness by Volcker			-1.933 (1.188)	-1.676 (1.236)	-3.229 (1.995)
Controls	NO	YES	NO	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	NO	NO	NO	NO	YES
BHC FE	NO	NO	NO	NO	YES
Observations	57,261	17,855	17,288	16,812	16,812
R-squared	0.021	0.069	0.025	0.066	0.748
p-value for H0: $\beta_3 > 0$			0.052	0.088	0.053

z-score = (asset return + capital asset ratio) / asset volatility

Panel B: Volatility of trading returns					
Dependent variable	(1)	(2)	(3)	(4)	(5)
	σ trading returns				
After DFA	-0.0312 (0.209)	-0.115 (0.270)	-0.112 (0.193)	-0.234 (0.241)	
Affectedness by Volcker			-1.850 (1.353)	-5.397* (2.947)	
After DFA x affectedness by Volcker			1.376 (1.470)	1.210 (1.370)	1.883 (2.370)
Controls	NO	YES	NO	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	NO	NO	NO	NO	YES
BHC FE	NO	NO	NO	NO	YES
Observations	21,001	18,156	19,331	17,106	17,106
R-squared	0.000	0.002	0.000	0.004	0.562
p-value for H0: $\beta_3 < 0$			0.175	0.189	0.213

Changes in overall risk, robustness

Panel A: Overall BHC risk (z-score)					
Robustness test Dependent variable	(1) Treatment dummy	(2) Propensity score matching	(3) Pre-2007 affectness Z-score	(4) Excluding non-trading BHCs	(5) Non-bank investment
After DFA x affected BHC	-0.229 (0.269)	-0.170 (0.425)			
After DFA x affectedness by Volcker (pre-2007)			-6.194*** (1.847)	-5.891*** (2.034)	
After DFA x affectedness by Volcker (NBI-ratio)					-1.616 (2.337)
Controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES
Observations	16,812	856	16,736	2,499	17,621
R-squared	0.748	0.864	0.748	0.766	0.762
p-value for H0: $\beta_3 > 0$	0.197	0.344	0.000	0.002	0.241

Panel B: Volatility of trading returns					
Robustness test Dependent variable	(1) Treatment dummy	(2) Propensity score matching	(3) Pre-2007 affectness σ trading returns	(4) Excluding non-trading BHCs	(5) Non-bank investment
After DFA x affected BHC	0.282 (0.314)	0.194** (0.0955)			
After DFA x affectedness by Volcker (pre-2007)			0.847 (2.144)	4.327 (3.739)	
After DFA x affectedness by Volcker (NBI-ratio)					8.852 (7.630)
Controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES
Observations	17,106	842	16,957	2,482	17,935
R-squared	0.562	0.998	0.545	0.97	0.562
p-value for H0: $\beta_3 < 0$	0.184	0.022	0.346	0.124	0.123

Changes in correlation between banking and trading returns

Dependent variable	(1)	(2)	(3) ρ	(4)	(5)
After DFA	-0.0815 (0.0509)	-0.0973* (0.0571)	-0.0932* (0.0550)	-0.109* (0.0593)	
Affectedness by Volcker			-1.369** (0.557)	-1.767** (0.702)	
After DFA x affectedness by Volcker			1.187* (0.715)	1.289* (0.723)	2.209* (1.165)
Controls	NO	YES	NO	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	NO	NO	NO	NO	YES
BHC FE	NO	NO	NO	NO	YES
Observations	2,462	2,445	2,377	2,360	2,360
R-squared	0.009	0.031	0.021	0.047	0.648
p-value for H0: $\beta_3 < 0$			0.049	0.038	0.029

Changes in correlation between banking and trading returns (Robustness)

	(1)	(2)	(3)	(4)	(5)
Robustness test	Treatment dummy	Propensity score matching	Pre-2007 affecteness	Excluding non-trading BHCs	Non-bank investment
Dependent variable			ρ		
After DFA x affected BHC	0.420*** (0.156)	0.598*** (0.173)			
After DFA x affectedness by Volcker (pre-2007)			1.849 (1.513)	2.346** (1.19)	
After DFA x affectedness by Volcker (NBI-ratio)					2.607** (1.221)
Controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES
BHC FE	YES	YES	YES	YES	YES
Observations	2,360	670	2,215	2,020	2,393
R-squared	0.663	0.736	0.632	0.63	0.649
p-value for H0: $\beta_3 < 0$	0.004	0.000	0.111	0.024	0.016

Banking and trading returns

Panel A: Banking						
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Average returns			σ returns		
After DFA	-0.00402*** (0.000149)	-0.00330*** (0.000299)		-0.00155*** (7.35e-05)	-0.00172*** (0.000125)	
Affectedness by Volcker	0.179*** (0.0633)	0.156** (0.0618)		0.0631** (0.0266)	0.0537** (0.0267)	
After DFA x affectedness by Volcker	-0.129** (0.0597)	-0.126** (0.0589)	-0.0805** (0.0316)	-0.0459* (0.0260)	-0.0451* (0.0265)	-0.0261 (0.0167)
Controls	NO	YES	YES	NO	YES	YES
Constant	YES	YES	YES	YES	YES	YES
Quarter FE	NO	NO	YES	NO	NO	YES
BHC FE	NO	NO	YES	NO	NO	YES
Observations	15,542	15,438	15,438	19,172	17,078	17,078
R-squared	0.207	0.264	0.877	0.286	0.338	0.841

Panel A: Trading						
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Average returns			σ returns		
After DFA	0.0945 (0.100)	0.108 (0.120)		-0.112 (0.193)	-0.234 (0.241)	
Affectedness by Volcker	0.0517 (0.496)	-0.391 (1.466)		-1.850 (1.353)	-5.397* (2.947)	
After DFA x affectedness by Volcker	-0.733 (0.691)	-0.578 (0.706)	-1.576 (1.285)	1.376 (1.470)	1.210 (1.370)	1.883 (2.370)
Controls	NO	YES	YES	NO	YES	YES
Constant	YES	YES	YES	YES	YES	YES
Quarter FE	NO	NO	YES	NO	NO	YES
BHC FE	NO	NO	YES	NO	NO	YES
Observations	18,053	17,358	17,358	19,331	17,106	17,106
R-squared	0.000	0.001	0.117	0.000	0.004	0.562

Summary

- We find evidence that banks started to comply with the Volcker Rule in accounting terms by reducing their trading portfolios
 - this is consistent with their announcements
- However, this did not imply less risk-taking or higher liquid asset holdings
 - so far, banks have kept their risk targets by decreasing hedging
 - this is consistent with our model