

Lobbying and Innovation in the Financial Sector

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Major Paper presented to the
Department of Economics of the University of Ottawa
in partial fulfilment of the requirements of the M.A. Degree

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Ottawa, Ontario

July 2013

Abstract

The financial collapse of 2008 can most easily be explained by poor regulation of the banking sector. Many scholars attribute this lack of regulation to the banking lobbyists' contributions to influence the politicians for favourable policies. We utilize the theoretical framework established by Perez-Saez and Semenov (Working Paper, 2012), which develops the argument that greater contributions by bank lobbyists will result in greater financial instability and more risk. We empirically test this claim by doing a cross-sectional regression of all 50 States. We use proxies for financial instability acting as the dependent variable, and proxies for lobbying influence as the independent variables. We find support for the claim. Our results consistently show a positive correlation between the amount the bank lobbyists spent, and the variability of the financial stability indicator.

Part I

Introduction

Stability of the banking sector has proven to be a crucial factor in sustained economic growth. After the Great Depression, the Glass-Steagall Act of 1933 was put into place in order to ensure the separation between commercial banking and investment banking. This re-established confidence in the banking system because Wall Street was no longer able to gamble with the money put into commercial banks. In 2001, The Gramm-Leach-Bliley Act officially repealed the Glass-Steagall Act under the argument that the Glass-Steagall Act was an impediment to economic growth. For the better part of a decade, the argument seemed to have credence as an era of unprecedented growth flourished. During this period, many other legislative concessions were made which gave the banks even more autonomy and power. This autonomy and power came with substantial risks and ultimately lead to the financial crisis of 2008. Analysts point at the influence lobbyists had with their contributions in allowing this type of risky behaviour. Our paper will attempt to empirically make this connection by finding evidence that the states which spent the most on financial lobbying also have the banks that where given the most freedom to take on more risk.

In our paper we will develop and test a model linking bank lobby contributions with banking stability. We will approach this problem using multiple methods to be able to see if our result is robust. First, we identify useful proxies for our variable on the risk in the banking industry. We decided on using variations of the standard deviation of return on equity as our first variable. We derived our return on equity with data from Federal Financial Institutions Examination Council. We did three variations on our measure of standard deviation which will ultimately help us infer whether lobbying in the financial sector acts more like a public good -where the entire industry benefits from lobby contributions- or like a private good -where the firm benefits from the lobby contributions. In addition, we used the Housing Price Index volatility as another measure for risk, which we obtained through data from the Federal Housing Finance Agency. We decided on this measure due to the prevalence of mortgages in the subprime loan market which ultimately lead to the financial collapse. As for our independent variables on lobby expenditure, we used lobby contributions as summarized by Follow The Money (2013). We also wanted to look at not the impediments to lobbying through regulation, so we added variables which gave scores to each state based on characteristics of their regulations for lobby disclosure and political financing. These were found on indexes from the Center for Public Integrity (CPI) and the State Integrity Investigation.

We will do our analysis using nationwide cross-sectional and panel data for 2001-2012. All tests are running using Ordinary Least Squares (OLS) regressions on STATA. We ran a multitude of tests and the result was quite robust. In 23 out of 26 tests run using return on equity as the dependent variable, the coefficient on bank lobby expenditure had the expected positive sign, although the results were not as significant as we would like. The most telling result came from the standard deviation within states of the standard deviation of returns by banks, suggesting that lobbying is largely a private good in the banking industry. The results for the HPI regressions had coefficients on the bank variable that were all consistent with economic theory. Also, they were of a magnitude that would have a significant impact on the result. This gave further proof that the states with the most lobbying had a larger increase in their housing prices leading up to the peak of the housing market, and a larger decrease in values in the subsequent crash. This is consistent with our hypothesis that more lobbying would lead to more subprime lending specifically for mortgage backed securities. This would incidentally increase the money supply in the housing market and ensure the formation of a housing bubble.

Weissman and Rosenfield (2009) address the twelve main regulatory failures in the early 2000's which analysts believe lead to the collapse of Lehman Brothers in 2008, and subsequent economic crisis.

- Analysts place blame on the Gramm-Leach-Bliley Act. This is the most common cause which analysts attribute to the rapid expansion of the subprime market.
- They condemn the accounting practices which remained in the banking sector. The banking sector was allowed to hold onto the practice of keeping failing assets off the balance sheet, even though this practice was made illegal in all other sectors after the collapse of Enron.
- Commentators point to the rejection of regulation on financial derivatives by both the executive branch and congress. Both levels of government were given opportunity to limit the use of financial derivatives due to the lack of understanding people had about them and the inherent risk. Both levels of government passed on this opportunity as they were enamored by the economic growth.
- They indict the Securities and Exchange Commission for conceding oversight of banks to the banks themselves. They allowed banks to decide on their own debt-to-net-capital ratio, which let banks use as much leverage as they saw fit. Banks chose levels 3 times higher than was previously permissible, putting them in a position very susceptible to shocks with liquidity at an exceedingly low level.
- Scholars attribute the growing instability in the financial market to an unwillingness by regulators to prevent predatory lending, while the federal government was actively preempting all state laws that tried to protect citizens from such lending. This allowed the market to be driven by the creation of loans that were never going to be honoured, which is clear factor in creating instability.
- They point to the issue of keeping the holder-in-due-course doctrine for mortgages, which gave the mortgage owners no redress for illegal loans.
- Analysts place blame on Fannie Mae and Freddie Mac for altering their evaluation criteria, allowing themselves to join the subprime market. Prior to this Fannie and Freddie had criteria that would disqualify securities which included the majority of subprime loans. This ultimately gave banks somewhere to ditch their failing assets.

- Weissman and Rosenfield (2009) also blame the Security and Exchange Commission for allowing unprecedented mergers. This allowed banks to reach the size that would give them Too-Big-To-Fail status and ensure them government bailouts as is guaranteed under the Federal Deposit Insurance Corporation Improvement Act of 1991.
- Lastly, they condemn the flagrant conflicts of interest created by having the credit rating agencies compete for corporate contracts. By having private firms provide a semi-public function there is incentive for the firms to increase profits by offering more favourable reviews to secure more contracts.

All these regulatory actions and oversights allowed for growth that was fueled by complex financial instruments which few people fully understood. These instruments carried with them substantial risk stemming from the large scale presence of subprime loans within them. Once the market adjusted to the true value of these risky assets the economy was thrown into a devastating recession. Now that the euphoria has calmed and the dust has settled it is easier to look back and examine the reasons that lead to the banks being given such free reign to take on as much risk as they desired. Weissman and Rosenfield (2009) put a strong emphasis on the idea that the lobbyist contribution by banks was a large factor in securing these regulatory actions and oversights. This would explain many of the regulatory actions that could not possibly benefit any party other than the banks. They point to the sheer scale of the lobbyist contributions in the period 1998-2008. The figures spent on lobbyists in this period are staggering: accounting firms \$122 million, commercial banks \$383 million, and security firms spent approximately \$600 million. It is this link between lobbyist expenditure and financial instability which we are trying to find evidence for in this paper.

Literature Review

Our empirical model will be developed using a single lobbying sector (the bankers) that lobby to maximize the allowable risk in the industry. The model will combine works on lobbying by Grossman and Helpman (1994), and Martimort and Semenov (2007), with the literature on innovation by Allen and Gale (2004), Jayaratne and Strahan (1998), and Jimenez et al. (2010).

Lobbying

Grossman and Helpman (1994) develop a theoretical model for protection in the form of trade barriers for industries threatened by imports. The model focusses on industry interest groups that are able to organize themselves into lobbying groups. The model develops a game in which the lobby groups are able to buy influence by offering contributions to the government. The government seeks to maximize its own utility by taking into account the contribution schedule and social welfare. Lobby contribution limits are developed and a case for their effectiveness is examined. This model lends itself perfectly to our analysis of lobbying as government import protection is theoretically equivalent to any form of preferential government legislation.

Gawande and Bandyopadhyay (2000) investigate how the Grossman-Helman model performs when tests are run with real world data. Their empirical results lend broad support to the Grossman-Helman model. This solidifies our decision in our choice model. The model they developed was an ordinary least squares model with the independent variable as the natural log of lobby

contributions. The lobby data they collected was from the Federal Election Commission tapes.

The lobbying game we will develop is similar to the menu auction model of Bernheim and Whinston (1986). They created an auction in which the bidders create bids as a function of the end result. Therefore, each bid is a composite bid. The application that this lends to our study is that it allows the government to know the bids of the lobbyists but also allows the lobbyists to only pay for what they end up with. This gives the government accountability to the lobbyists which is expected. This type of extension to Bernheim and Whinston (1986) was expected as they specifically mention its use in decision maker influence in their paper.

Arguably, the paper that follows most closely to ours is that of Kim (2008). Kim studies the effect that lobbying by S&P 500 companies has on the firms' benefits received from the government. Kim observes that lobbying acts both as a public good, helping out the entire industry, and a private good, helping the firm specifically. Kim also points to the difficulty in embodying the effects of lobbying in ROE based on the fact that some firms are retroactive and will lobby for help after they are in economic hardship while other firms might be more proactive and lobby to prevent a foreseeable hardship. Kim also utilizes the approach of using the log of bank lobby expenditure. Kim did the entire analysis with firms that had information on both lobbying expenditure and balance sheet data such as net income. Kim finds that firms in heavily regulated industries tend to become active lobbyists. Kim points out the relative scarcity of empirical works on returns to lobbying.

Fisman (2001), Jayachandran (2006), Knight (2006), and Chen et al. (2008) all study the relationship between the firms political influence and their direct profits. This is a more common line of inquiry as it is relevant to all sectors of the economy, where looking at the influence on risk is more specific to banking.

Martimort and Semenov (2007) investigate the relationships between interest groups and the decisions to either compete or collude in their attempts for political influence. Martimort and Semenov create a mathematical model to show that it is important for interest groups to have credibility while they share information, otherwise the end result will always be inefficient. We will borrow from the mathematical foundation of this model as well as the theoretical implication that the banking lobby will have the ability to create a strong coalition.

Innovation and Risk

Jayaratne and Strahan (1998) show that bank performance improves with a reduction of regulation and restrictions on bank growth. They attribute this to the "natural' evolution of the industry" where the strongest banks are allowed to grow and the weaker ones are forced out of business by inefficiency. They also found that after deregulation of bank growth, riskiness decreased. The deregulation we are examining is specifically aimed at increasing allowable risk, so this finding does not run counter to our hypothesis. In their study, among other measures, they used the standard deviation of return on equity as a proxy for risk. This is the proxy that we will also use.

Allen and Gale (2004) investigate the relationship between competition and stability in the banking sector. They examine several different models and articulate that in some cases concentration may be preferable to competition and that perfect stability may not be desirable. We borrow extensively from their 3-period model in determining deposit levels in the presence of risk.

From their work we also borrow two principals for our analysis: risk increases with returns, and that risk increases at a faster rate at higher levels of returns.

Jimenez et al. (2010) tests the assertion that reduced competition in the banking sector will reduce risk. They find support for this claim using a Lerner index as their measure of competition. They used standard deviation of ROE as a measure of banking risk, which is a measure we will borrow for our analysis. They utilized bank interest rate data, stock prices volatility, non-performing loan ratio and the solvency ratio as other measures of risk which are more readily available for their Spanish banks.

1 A General Equilibrium lobbying game with a banking sector ¹

Assume an economy with two goods: a numeraire (partially consumed in the first period with the remainder invested for second period consumption) and the good consumed in the second period. There is a continuum of consumers. They are each endowed with ω units of numeraire good in the first period.

Entrepreneurs: There is a continuum of entrepreneurs indexed by their entrepreneurial skills $y \in [0, \bar{y}]$.² An entrepreneur of with index y receives D units of numeraire good in the first period and returns $(1+y)D$ units of consumption good in the second period with probability $p(y)$ and 0 units with probability $1-p(y)$. The probability of success $p(y)$ satisfy the following assumption

Assumption 1: $p'(y) < 0$, $p''(y) \geq 0$; $p(0) = 1$ and $p(\bar{y}) = 0$.

Investing in higher return entrepreneur is riskier than investing in lower return entrepreneur. The riskiness of investments increases more rapidly the higher is the return. This assumption is standard and it was adopted in Allen and Gale (2004). For example linear and quadratic probabilities satisfy these conditions:

$$p(y) = \frac{\bar{y}-y}{\bar{y}}, \quad p(y) = \frac{(y+\bar{y})(\bar{y}-y)}{\bar{y}^2}$$

Banks: We assume that banks are risk neutral financial intermediaries; consumers need banks to transfer their funds to the entrepreneurs (banks are matchmakers here). Following the literature we assume that banks have limited liability. They select the riskiness of their portfolio by choosing the riskiness of entrepreneurs y they are going to lend. The level of riskiness is bounded by \hat{y} - the maximum allowed level of riskiness in the economy. There is no capital, therefore the amount invested in the entrepreneurs is just D . The problem the banks face is the following

$$\pi_B \equiv \max_{y \leq \hat{y}, D} p(y)(y-r_D)D$$

where $p(y)$ is the probability of success of the entrepreneurs selected. The term $y - r_D$ represents the margin of intermediation obtained by the banking sector. We assume that banks are able to organize themselves in a lobbying group.³

The consumers. Consumers can use the endowment in period 1 to consume, or to save and lend it to the banks at an interest rate r_D . If innovation does not succeed, banks do not pay back the loans to the workers (they have limited liability) and the workers consume 0. Thus the workers problem is the following:

¹This is a version of the model in Perez-Saez and Semenov (Working Paper, 2012).

²We assume that there is a continuum of entrepreneurs of each ability y .

³The assumption of exogenous banking organization is reminiscent to the assumption of an organized industry in Grossman and Helpman (1994).

$$\max_{c,D} EU(D, c) = \omega - D + p(y)U(c),$$

such that

$$c = (1 + r_D)D \text{ (period 2 budget constraint if innovation succeeds).}$$

The government. The government maximizes the weighted sum of the consumer surplus and banks contributions C .

$$U_G = \alpha EU(D, c) + C.$$

Note that the government does not take into account the profits of banks. From the point of view of government, bank profits are the deadweight losses.⁴

Timing of the game. There are four stages, $t = 0; 1; 2; 3$.

Stage 0: The banking lobby offers contribution schedules to the government. These contributions are contingent to the maximum degree of innovation (riskiness) in the banking sector \hat{y} . At the end of the stage the government sets the maximum degree of innovation.⁵

Stage 1: Workers can save part of the numeraire and lend it to the banks as deposits at rate r_D .

Stage 2: Banks use deposits to lend to entrepreneurs with characteristic y .

Stage 3: The output of the entrepreneurs with characteristic y is realized with probability $p(y)$.

1.1 Benchmark - no banks

In this section we analyze what is the optimum level of risk y^* and consumption levels m^* ⁶ and c_2^* that maximize the total utility. Lets assume that the social planner can match depositors and entrepreneurs without cost. The social planner's program is

$$\max_{c,D,y} EU(D, c) = \omega - D + p(y)U(c) \tag{1}$$

such that $c \leq (1 + y)D$ and $\omega - D \geq 0$.

Note that because of quasi-linearity of consumers' utility and $U' > 0$ the constraint $c \leq (1 + y)D$ is binding. We assume that the endowment is large enough so that the solution of the social planner is always interior. Thus we solve the following program by the social planner:

$$\max_{D,y} \omega - D + p(y)U((1 + y)D)$$

The first order conditions of the social planner interior solution are

$$\begin{aligned} -1 + p(y)(1 + y)U'(c) &= 0 \text{ and} \\ p'(y)U(c) + p(y)U'(c) &= 0. \end{aligned}$$

From this we obtain:

$$p(y)U'(c) = 1/(1+y) = -p'(y)U(c) \tag{2}$$

The social planner chooses the risk y and the second period consumption c such that in the interior solution we have

$$-\frac{p'(y)}{p(y)} = \frac{U'(c)}{U(c)}.$$

There is efficient trade-off between risk and consumption.

⁴ It is possible to include the profits of banks into the governments objective function as in Grossman and Helpman (1994). The main results will be unaltered.

⁵This lobbying game is similar to the menu auction model of Bernheim and Whinston (1986).

⁶ m refers to current period consumption

1.2 The equilibrium

Assume now that there are costs of matching depositors and entrepreneurs. When these costs are large enough the banking sector plays the role of the matchmaker.⁷

1.2.1 Consumers first order conditions

Consider the consumers' problem when the riskiness y is given exogenously. Their problem becomes:

$$\begin{aligned} & \max_{c,D} [\omega - D + p(y)U(c)] \\ & \text{such that } c \leq (1 + r_D)D \end{aligned}$$

We substitute $c = (1 + r_D)D$ into the consumers' utility function and obtain a maximization problem with only one choice variable for the consumer, D . This leads to the following first-order-condition:

$$1 - (1 + r_D)p(y)U'((1 + r_D)D) = 0$$

From this we obtain the supply function for deposits,

$$D(r_D; y) \equiv \frac{1}{1+r_D}(U')^{-1} \left[\frac{1}{(1+r_D)p(y)} \right] \quad (3)$$

Consumption in the first and second periods are

$$m(r_D, y) = \omega - D(r_D, y) \text{ and} \quad (4)$$

$$c(r_D, y) = (1 + r_D)D(r_D, y), \quad (5)$$

correspondingly.

Remark 2 a) Note that the supply of deposits positively depends on the probability of success $p(y)$: The dependence shows that depositors are worried about the success of their investment. Usually, in the banking literature, depositors do not care about a bank failure because deposit insurance is usually assumed. In this general equilibrium model, this assumption does not hold anymore.

b) From 3 we obtain that the amount of deposits depends negatively on the riskiness of the project: $\frac{\partial D(r_D, y)}{\partial y} < 0$

c) The supply of D is also affected by the interest rate r_D . Note that the supply in general not always increases with r_D : However, we have

$$\frac{\partial_{r_D} D(r_D, y)}{D(r_D, y)} > -\frac{1}{1+r_D}.$$

In the following example the dependence of the supply of deposits from the rate is more explicit.

Example 3 Lets assume that $U(c) = c^{1-\gamma}$ with $0 < \gamma < 1$. Then we have

$$D(r_D, y) \equiv (p(y)(1 - \gamma))^{1/\gamma}(1 + r_D)^{1/\gamma-1}$$

In this example $\partial_{r_D} D(r_D, y) > 0$, i.e., the supply for deposits always increases with r_D .

⁷For simplicity we may assume that this cost is infinite.

1.2.2 Banks optimum solution

In general the banking sector takes into account the inverse demand $r_D(D, y)$ when optimizing its behavior. The first order conditions are

$$\begin{aligned} y - r_D(D, y) - D \frac{\partial r_D(D, y)}{\partial D} &= 0, \\ p'(y)(y - r_D(D, y)) + p(y) \left[1 - \frac{\partial r_D(D, y)}{\partial y} \right] &= 0, \end{aligned}$$

We have $r_D < y$ and $y - r_D > 0$ is the margin of intermediation obtained by the banks.

The government chooses the upper bound of the level of riskiness \hat{y} . The banks then have to take into account the constraint $y \leq \hat{y}$ when maximizing their profits. Therefore, the parameter \hat{y} can be affected by lobbying. The equilibrium price and risk can be written as $r_D^*(\hat{y})$ and $y^*(\hat{y})$. The equilibrium profit is $\pi_B(\hat{y})$.

1.3 Government program

At stage 0 the government chooses the the upper risk bound \hat{y} in order to maximize the social welfare. We denote $m(\hat{y}) = m(r_D^*(\hat{y}), y^*(\hat{y}))$, $c(\hat{y}) = c(r_D^*(\hat{y}), y^*(\hat{y}))$ the consumption levels in equilibrium as a function of \hat{y} . The government program without lobbying is

$$U_G = \max_{\hat{y}} EU = m(\hat{y}) + p(y^*(\hat{y}))U(c(\hat{y})).$$

1.4 The lobbying game

The lobbying game at stage $t = 0$ is identical to Gawande and Bandyopadhyay (2000).

- The bank lobby submits a contribution schedule $C(\hat{y})$ that is, a schedule of contributions for a given limit in the riskiness \hat{y} .
- Given the schedule submitted by the lobby and the objective function of the government, the government selected the level of riskiness \hat{y} .

Note that banking lobby and government have different objective functions. The banking lobby maximizes the utility of representative bank

$$\pi_B(\hat{y}) - C(\hat{y})$$

The government maximizes the weighted sum of consumer surplus and lobbying contributions

$$U_G(\hat{y}) = \alpha EU(\hat{y}) + C(\hat{y})$$

The banking lobby has to design the contribution schedule which implements its maximum payoff given that the government obtains not less than without lobbying

$$U_G(\hat{y}) \geq \alpha EU(\hat{y}^G),$$

where (\hat{y}^G) is the optimal choice of the government without lobbying. In what follows we focus on truthful contributions given by

$$C(\hat{y}) = \max \{0, \pi_B(\hat{y}) - B\},$$

where B is a non-negative constant. Denote by \hat{y}^L the solution of the lobby's optimization program. Then we have the following:

Proposition 4 $\hat{y}^G < \hat{y}^L < \hat{y}^B$.

Lobbying distorts the socially efficient levels of riskiness and competitiveness of banking sector. The banking sector becomes less competitive and it engages in more risk.

1.5 Caps on contributions

Because of implications of lobbying (proposition 4) the Congress/Parliament may introduce instruments to correct for distortions. Most commonly used instrument is cap on contributions. In this case we have the restrictions in lobbying program:

$$C(\hat{y}) \leq \bar{C},$$

where \bar{C} is a constant. Then the truthful contribution schedule given by

$$C(I) = \min\{\max\{0, \pi_B(\hat{y}) - B\}, \bar{C}\}$$

implements (\hat{y}) and satisfies the cap restriction. Consider the equilibrium cap with lobbying: $\bar{C}^L = \pi_B(\hat{y}^L) - B$. Denote by $\hat{y}^{\bar{C}}$ the solution of the program with caps on lobbying. We have:

Proposition 5 $\hat{y}^{\bar{C}} \leq \hat{y}^L$.

2 Empirical Analysis

2.1 Testable implications

Our model predicts that states with higher lobbying activity (higher cap \bar{C}) have a higher equilibrium level of innovation (higher risk). Therefore, the implication that we will test is that the riskiness of the banking industry increases with the lobbying activity.

2.2 Methodology

2.2.1 Dependent Variables (Proxies for Risk)

We will use two main measures to act as proxies for risk in the financial sector.

Return on Equity The first measure to proxy risk utilizes the bulk data from the Federal Financial Institutions Examination Council (2013). This source provides quarterly balance sheet data for all American banks from 2001 until 2012. The dataset includes data for 10,728 financial institutions with measures for Total Equity Capital and Net Income. We combined these variables to create a Return on Equity (ROE):

$$Return\ on\ Equity = \frac{Net\ Income}{Total\ Equity\ Capital}$$

Return on equity was used by Jayaratne and Strahan (1998) as a measure of bank performance. Being a fraction this measure is susceptible to large outliers when Total Equity Capital was very small or even negative. Negative values for equity made it look as though the bank was having positive returns when, in reality, it was losing money. Extremely small numbers made it so that some measures of ROE were as high as 44 000% which is clearly not useful for analysis. To correct for this problem we simply voided all values below \$1,000,000 (or the bottom 2,160 observations out of 367,415). Realizing that strictly voiding these results would render observations of banks in the worst position useless, we also did a transformation where we censored any value below \$1,000,000 to be equal to \$1,000,000. Risk was proxied through several different forms of the standard deviation of ROE (both voided and censored). Using standard deviation of ROE was an idea taken from Jimenez et al. (2010). For panel data estimation:

- We took the mean annual ROE for each bank. We then took a standard deviation of these means for all banks in each state.⁸
- We took the annual standard deviation of ROE for each bank. We then took the mean of these standard deviations for each state. ⁹
- We took the annual standard deviation of ROE for each bank. We then took the standard deviation of these standard deviations for each state. ¹⁰

To simplify further for cross-sectional analysis we did similar manipulations with greater data grouping:

- We took the mean ROE for each bank over all 12 years. We then took a standard deviation of these means for all banks in each state.
- We took the standard deviation of ROE for each bank over all 12 years. We then took the mean of these standard deviations for each state.
- We took the standard deviation of ROE for each bank over all 12 years. We then took the standard deviation of these standard deviations for each state.

Housing Price Index The second measure to proxy risk utilizes twelve years of Housing Price Index (HPI) data from the Federal Housing Finance Agency (2013). The data were normalized so that the housing price of each state was equal to 1 in the first quarter of 2001. The reason we used HPI data as a proxy for risk is discussed in the discussion of results. Risk will be proxied by the proportional increase in housing prices in states during the lead up to the economic crisis as well as by the proportional decrease in housing prices afterwards. The risk will be measured two ways for both the ascent and descent.

(BOM) Based on maximum values and minimum values after the peak

- Ascent: $Risk = \frac{\max HPI}{HPI_{2001Q1}} = \max HPI \text{ value}$
- Descent: $Risk = \frac{\min HPI \text{ after peak}}{\max HPI}$

(BOT) Based on time periods

- Ascent: $Risk = \frac{HPI_{2007Q2}}{HPI_{2001Q1}}$
- Descent: $Risk = \frac{HPI_{2012Q3}}{HPI_{2007Q2}}$

The reason that the risk was measured based on time as well as based on maximal values is that some states did not face a housing price peak with subsequent collapse. The last quarter of 2012 for Alaska, Iowa, North Dakota, Oklahoma, South Dakota, and Texas had the highest HPI values. By just looking at the maximal values a slow steady climb in HPI until 2012 would be equivalent to a rapid rise in house prices to the same level by 2007. For these states the BOM descent risk will be equal to 1, and the BOT descent risk >1.

⁸A high value here would show that the banks differ substantially within states and that some are more successful overall than others.

⁹A high value here would show that on average banks in the state are taking risks, some of which pay off, some of which don't.

¹⁰A high value here would show the degree of variation in the amount of risk some banks take, some being more conservative and some will be more risky

2.2.2 Independent Variables (Proxies for Lobbying and Lobby Caps)

Financial Lobby Expenditure Data for lobby expenditure by the financial industry for each state is available through Follow The Money (2013) back to 2001. We extracted the total annual lobby expenditure for each state for the past 12 years on lobbying related to the following interests: Banks & Lending Institutions, Commercial Banks, Finance & Credit Companies, Miscellaneous Finance, Savings & Loans, Securities & Investment. This resulted in one value for each state for each year. For panel data there was no further manipulation. For cross-sectional data the sum of all 12 years was taken.

We also extracted the total annual lobby expenditure over all sectors for the same periods. We created a ratio of banking lobby expenditure against all lobby expenditure in each state. This allowed us to see if absolute or relative bank lobby contributions in states had more impact on risk.

Lobbyist Regulation and Accountability In addition we used indexes from the Center for Public Integrity (CPI) and the State Integrity Investigation. These are to proxy for lobbying caps as higher scores indicate deterrents to lobbying through transparency and reporting regulation.

“The Center for Public Integrity created a ranking system that assigns a score to each state (with lobbying legislation) based on a survey containing a series of questions regarding state lobby disclosure. The questions addressed eight key areas of disclosure for state lobbyists and the organizations that put them to work:

- Definition of Lobbyist
- Individual Registration
- Individual Spending Disclosure
- Employer Spending Disclosure
- Electronic Filing
- Public Access (to a registry of lobbyists)
- Enforcement and
- Revolving Door Provisions (with a particular focus on ‘cooling off periods’)” (Chari and Murphy, 2008)

The CPI scores range from a low of 34 for Wyoming and a high of 87 for Washington with a maximum value of 100 (Chari and Murphy, 2008).

The State Integrity Investigation (2013) had a more in depth breakdown with scores relating to each question. We chose the questions relating to lobbying disclosure and political financing. Each of the questions below were rated on a scale of 0-100.

Lobbying Disclosure

1. Is there a clear definition of a lobbyist in the state?
2. Are lobbyists required to register with the state?
3. Are lobbyists required to disclose spending?
4. Are lobbyists’ employers or principals required to disclose spending?
5. Can citizens access the information reported from lobbyists to the state government?
6. Is there effective monitoring of lobbying disclosure requirements?

Political Financing

1. Are there regulations governing the financing of political parties?
2. Are there regulations governing the financing of individual political candidates?
3. Are the regulations governing the political financing of parties effective?

4. Are the regulations governing the political financing of individual candidates effective?
5. Can citizens access records related to the financing of political parties?
6. Can citizens access records related to the financing of individual candidates' campaigns?

Having this many variables exposed regressions to symptoms of severe multicollinearity, which made themselves readily evident which will be discussed in results. In order to rectify this situation all the political financing and all the lobbying disclosure scores were added together to make only 2 aggregated variables. All of these indices are a single time evaluation and are therefor best suited for cross-sectional analysis.

2.2.3 Tests

We will test whether the lobbying expenditure and proxies for lobbying caps have an effect on the proxies we used for banking sector risk. In order to test this we will run ordinary least squares (OLS) regression estimations with each of the risk proxies acting as the dependent variable in turn while the lobbying variables are the independent variables. For the ROE estimations the tests will be run both as cross-sectional and panel regressions. For the HPI estimations we will strictly use cross sectional analysis. We started out with τ_4 and τ_5 each split up into 6 different coefficients based on the questions above and denoted by x in the 16-variable model.

16-variable model

$$risk\ proxy = \tau_1 bank + \tau_2 ratio + \tau_3 CPIScore + \tau_{4X} LobbyDisclosureScore + \tau_{5X} PoliticalFinanceScore + constant \quad \forall x = 1, 2, \dots, 6$$

6-variable model

$$risk\ proxy = \tau_1 bank + \tau_2 ratio + \tau_3 CPIScore + \tau_4 LobbyDisclosureScore + \tau_5 PoliticalFinanceScore + constant$$

2-variable model

$$risk\ proxy = \tau_1 bank + constant$$

These OLS regressions were run by STATA.

2.3 Hypotheses

We expect that the states with the most lobbying expenditure (absolutely and relatively) and the least regulation will have the highest variance in return on equity and housing price index. For ROE estimations and ascending HPI estimations we expect that the coefficients τ_1 and τ_2 would be positive, while the coefficients τ_3 , τ_4 and τ_5 would be negative if run in isolation. For descending HPI estimations we expect the opposite: τ_1 and τ_2 would be negative, while the coefficients τ_3 , τ_4 and τ_5 would be positive.

2.4 Discussion of Results

A more thorough examination of the regression results is located in the Appendix of Results (Tables 1-2). This discussion will be limited to the more noteworthy findings.

2.4.1 Return on Equity

16-variable model

The 16-variable regressions readily showed signs of severe multicollinearity when run as both panel and cross-sectional tests. The main symptom of multicollinearity is a strong overall model (large r^2 and high F-stat) with many insignificant coefficients. Another symptom is that often coefficients will have unexpected signs or magnitudes. To test formally for multicollinearity we ran a correlation of all explanatory variables against each other. The threshold value we used to determine that multicollinearity was an issue was any value above .50. We also ran a condition index with the criteria that above 30 was to be considered severe multicollinearity.

With these criteria we found multicollinearity was an issue. Correlation results showed that the problem was much more pronounced in the Political Financing variables than it was in the Lobby Disclosure variables. The condition index for the panel regressions of 68.54 >> 30 so we have further evidence of multicollinearity. The condition index for the cross-sectional regressions of 73.45 >> 30 so we once again conclude that multicollinearity is an issue.

6-variable model

We started out by testing for multicollinearity in the more condensed model by using the same tests with the same criteria. For panel data the condition index dropped to 19.98 < 30 and the correlations did not exceed .51, so we were satisfied that the problem with multicollinearity was solved. For cross-sectional data the condition index dropped to 21.31 < 30 and the correlations did not exceed .50, so again, we settled on the idea that the multicollinearity was solved.

We added a Jarque Bera test for normality of errors and found that our errors were not normally distributed. This is a problem that will not bias our coefficients but will lead to fewer of them being statistically significant as the null hypotheses of F and t-tests become harder to reject.

Of all the 6-variable regressions, only one of them had results worth discussing. The interesting result came from the panel data regression when the dependent variable was the standard deviation within states of the standard deviation of bank's censored return on equity (Table 1.1). This test had an r^2 value of .2345 and a strong F-statistic. The only statistically significant coefficient was the one on bank lobby expenditure. The coefficient was $3.45 * 10^{-8}$ which when multiplied by the average and maximum values of contributions lead to values of .0540 and .6383, respectively (both large enough to have a significant impact on the constant of .02483). The mathematical interpretation of a standard deviation of another standard deviation is complicated, so all that needs to be noted is that in this case the bigger the positive coefficient, the more support it lends to our theory. A theoretical explanation of the standard deviation of another standard deviation is to follow. This strong test statistic with only one significant coefficient lead us to run the regression with a single independent variable: bank lobby expenditure.

2-variable model

Once again, the only regression result worth discussing came from the panel data regression with the dependent variable as the standard deviation in each state of the standard deviation of each bank of their censored return on equity (Table 1.1). Despite dropping 4 explanatory variables the r^2 value only dropped to .1892 and the F-statistic was much stronger. The coefficient was similar, with a value of $3.77 * 10^{-8}$ (still capable of having a meaningful impact on the constant term of .1204). This result has the same implications as above.

Discussion of ROE results

The better fitting results of Censored ROE when compared to Void ROE is consistent with the original notion that dropping the most extreme negative data points was too rash a decision. Censoring them instead of dropping is more reasonable because we are particularly interested in the banks in these extremely vulnerable positions.

What was striking was the difference in the suitability of ROE depending on how the standard deviation was calculated. The model that had the most success was the model that measures the variance in the standard deviation of firms return on equity in each state. A positive coefficient (τ_1) suggests that the states that have higher lobbying expenditure in the banking sector also have more variance in the standard deviation of their return on equity. This means that states with higher lobbying expenditure have a wider continuum of banks that take little risk (and have consistent returns) to banks that take extreme risks (and have highly variable returns).

This result lends support to the idea that lobbying is more of a private good, where firms gain the advantage they pay for, than a public good where the whole industry benefits. This runs counter to Kim's observation that "lobbying also has a positive effect on the firm's equity returns relative to the market and, to a lesser degree, relative to its industry" (2008) but is consistent with his observation that "firms in the same industry may have different propensities to lobby depending on how keen their key executives are towards lobbying" (2008). Kim also points to the difficulty in embodying the effects of lobbying in ROE based on the fact that some firms are retroactive and will lobby for help after they are in economic hardship (which helps us view the variance on return on equity) while other firms might be more proactive and lobby to prevent a foreseeable hardship (which prevents large fluctuations in return on equity making our measure useless) (2008). The main point is that firms do a cost-benefit analysis of lobbying and will only do it if they see that "lobbying can yield firm-specific returns"(Kim, 2008), so it would make sense that lobbying is not entirely a public good in the industry. If there was a strong result for the state average of standard deviation of ROE for banks, that would lend support to the notion that lobbying is a public good at the state level, but this was not supported.

Another interesting result is that, although the coefficient on bank lobby contribution was not always significant, 23 times out of the 26 regressions the coefficient was positive. A positive coefficient is consistent with our theory that there is more risk in the states with higher lobbying expenditure. This was the only result that was the robust, suggesting that the only thing that matters when it comes to lobbying for influence is the actual dollars spent, and not the hoops that lobbyists have to jump through to spend them.

Overall, our results suggested a link between lobbyist expenditure and banking stability giving support to our hypothesis. We wanted to find further evidence of this link with results that were more consistently significant. This led us to explore potential improvements to our methodology. We found that Jimenez et al. (2010) had problems with finding statistically significant results when regressing standard deviation of return on assets as a dependent variable with competition as the independent variables. Kim (2008) also had problems finding statistically significant results when using equity returns as an independent variable while using lobbying contributions as the independent variables. Kim (2008) attributes the failed results to attenuation bias caused by inaccurate lobby reporting. He further attributes the lack of results to the fact that lobbying might be endogenous to the model; in our case that would mean that if the average bank in a state is taking more risks they're going to lobby more, such that "it could be that a firm engages in lobbying

because it anticipates a hardship in the near future” (Kim, 2008). We would like to add another potential problem with the use of measures such as return on equity and return on assets: the balance sheet data for the financial sector are not overly reliable due to “accounting rules adopted by the financial industry that allowed banks [...] to take money-losing assets off their balance sheets. [...] the scale of banks’ off-balance sheet assets is enormous - 15.9 times the amount on the balance sheets in 2007” (Weissman and Rosenfield, 2009). “Furthermore, large banks tend to be more complex, harder to monitor, and more interdependent” (Vives, 2010). These complications could easily lead to considerable bias within our methodology.

To overcome these problems we decided to consider a new proxy for risk that is less easily influenced by balance sheet manipulations and that does not have the risk curbed by government assistance and bailouts. We decided on looking at the variation of housing price index.

2.4.2 Housing Price Index

Why HPI? The reason we believed housing price index was a reasonable proxy for risk is that the major type of risk that banks were engaged in was in the market of “mortgage-backed securities” during the housing bubble (Weissman and Rosenfield, 2009). Mortgage-backed securities were the main engine for risk for many reasons. One strong reason is that Fannie Mae and Freddie Mac were established with the purpose “to purchase mortgages from private bankers and other lenders so that they have additional funds to continue originating new mortgages” (Weissman and Rosenfield, 2009). This gave the banks somewhere to sell their bad loans to when default was becoming more likely as Fannie and Freddie were “major players in the ‘secondary market’” (Weissman and Rosenfield, 2009). The fact that Fannie and Freddie were specifically in the mortgage business meant that the increase in money supply from predatory lending was mainly in the housing sector. Basic macroeconomic theory tells us that an increase in money supply inevitably leads to inflation, which fueled on the housing bubble (Weissman and Rosenfield, 2009).

Another reason mortgage-backed securities were the main source of risk comes from the limited liability held by banks that bought them, due to the holder-in-due-course doctrine for these securities (Weissman and Rosenfield, 2009). This, paired with the Federal Deposit Insurance Corporation Improvement Act (1991) that passed into law the ideal of Too-Big-To-Fail, made mortgage backed securities the best vehicle to take substantial risks for banks (Weissman and Rosenfield, 2009; Vives, 2010). “Since the banks weren’t going to hold the mortgages in their own portfolios, they had little incentive to review the borrowers’ qualifications carefully” (Weissman and Rosenfield, 2009). Finally, because the banks were given the ability to monitor their own capital requirements they took on far more risk than necessary, as was seen when “the banks’ internal risk models performed horribly in the housing bubble and subsequent meltdown” (Weissman and Rosenfield, 2009).

The HPI measure of risk stays unobstructed by influence because struggling home-owners received eviction notices instead of bailouts.

Lastly, a nice benefit to a cross-sectional analysis of HPI as an indicator is that “Federal banks originated fewer abusive loans” (Weissman and Rosenfield, 2009). This makes a pure cross-sectional analysis more possible.

Results of HPI analysis All the STATA regression results follow in the Appendix of Results (Tables 3-4). In every regression both the constant and the coefficient on the bank variable were

statistically significant and consistent with our theory. Furthermore, the coefficient for bank was significant based on its impact. The coefficient multiplied by the average bank lobby expenditure showed that this variable effected the baseline case (of no lobbying) by 1.5-3.0%. When the coefficient was multiplied by the maximum value of bank lobby expenditure, the variable effected the baseline case (of no lobbying) by 24.0-46.9%.

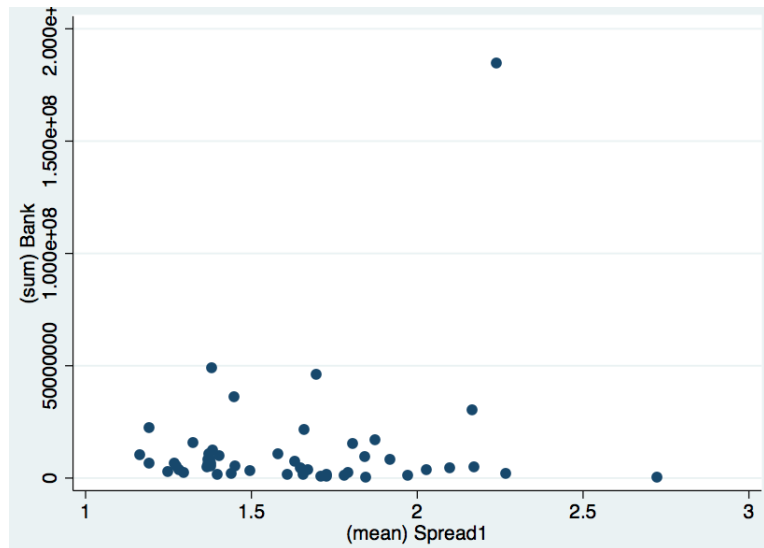
The model with the strongest results was the 6-variable ascending model based on maximum and minimum values (Table 4.2). It had an $r^2=.2074$ and very strong F-statistic. The constant of 1.77 means that in the baseline case (of no lobbying) the home prices in a state will have increased by 77% from the first quarter of 2001 until the height of that states housing market. The bank coefficient means that the state that spent the most on lobbying increases that expected value to 2.60, or a 160% increase in housing value. The only other significant coefficient is that associated with the Lobby Disclosure variable. It has a negative sign, which is also consistent with our theory, and the coefficient is significantly large enough to have a meaningful impact on the constant. The states with strict regulation on lobbyists will have a higher score on this variable and will therefore see less variability in their housing prices. The maximum score on the Lobby Disclosure variable would bring the baseline constant of 1.77 down to 1.18, or a mere 18% increase in housing value. Of course these effects do not act in isolation, and there are other statistically insignificant variables that are offsetting these effects, but these results lend some support to our theory.

The 6-variable descending model based on maximum and minimum value also had strong results with an $r^2=.1565$ (Table 4.4). The constant was .77, which means that the baseline case for a state that did not lobby was a home value at their trough of 77% the value of their peak housing price. The state that spent the most brought that value down to .41, or 41% of the value of houses at the peak. It is worth noting that the only other coefficient that is nearly significant is on the Ratio variable, and it has a positive coefficient which would offset some of these effects.

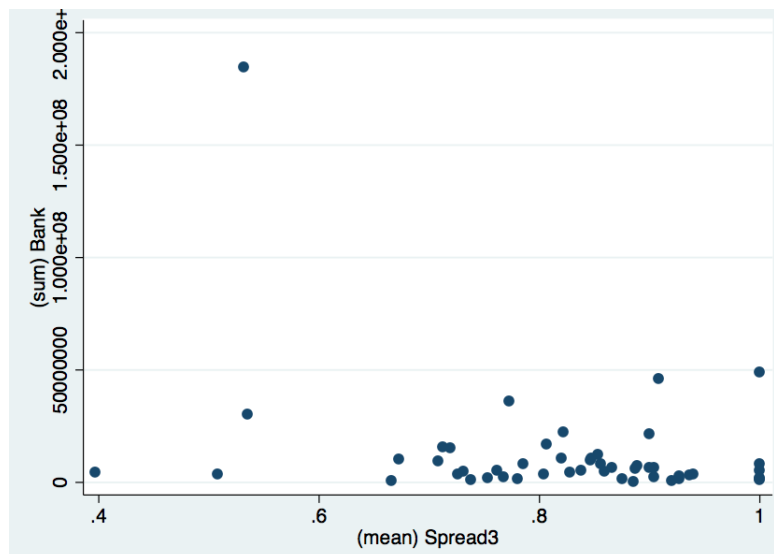
When looking for potential data problems we note that our independent variables haven't changed since the ROE estimations so the same multicollinearity problem persists in the 16-variable model. The Jarque Bera test shows that the errors are still not normally distributed, which may explain why the F-test failed to give results in some tests. We ran White's test to check for heteroskedasticity because of the non-normality of the errors. In all the following regressions we failed to reject the null hypothesis that the errors were homoskedastic. We did not need to worry about treating heteroskedasticity because the test statistic did not surpass the critical chi-squared value. Nonetheless, to be safe, all regressions are run with the `vce(robust)` option. The problems we faced still indicate that the estimates are the best linear unbiased estimators; however, the non-normality makes disproving the null hypotheses of t-tests more difficult.

The fact that the ascending and descending models both show a significant relationship between bank lobbying expenditure and the variability of housing prices gives our theory considerable support. We created a scatter plot to visually see the impact of bank lobby expenditure on the maximum increase and decrease in HPI. Visually it became apparent that our results were largely biased by a single outlier. The graphs for the ascending (Graph 1) and descending (Graph 2) models follow.

Graph 1 Bank Lobby Expenditure vs. Maximum Increase in House Price Index

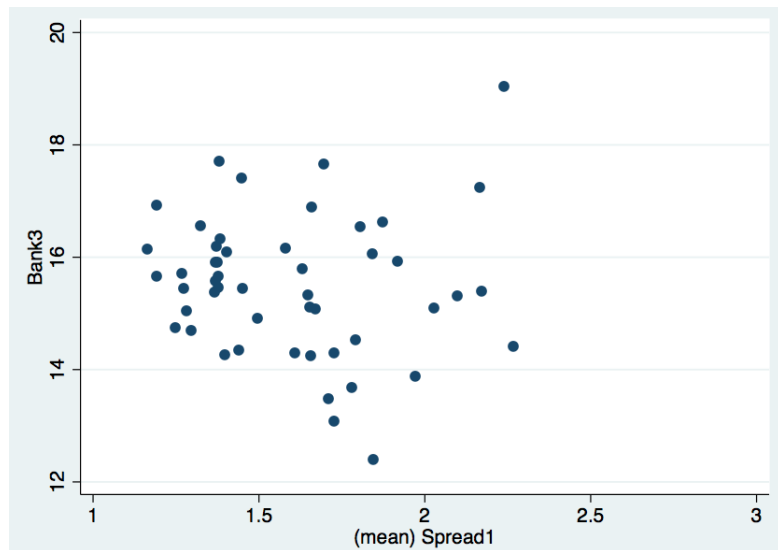


Graph 2 Bank Lobby Expenditure vs. Maximum Decrease in House Price Index



This suggests that our results were not as strong as we initially believed; however, the consistent results supporting our hypothesis still indicate that future research in this field is warranted. One way to minimize the effect of this single outlier is to use the log of bank lobby expenditure as the main explanatory variable as recommended by Kim (2010). By graphing $\log(\text{Bank})$ against the change in HPI we see little discernible pattern (Graph 3), and when we recalculated the regressions for all ROE and HPI variations using $\log(\text{Bank})$ the results were not promising.

Graph 3 Log of Bank Lobby Expenditure vs. Maximum Increase in House Price Index



Overall, we have found modest for our hypothesis that bank lobbying expenditure will have a negative correlation with the stability of the banking sector. We believe that this area of research has great potential and that further consideration into this topic is warranted.

2.4.3 Possible Solutions

Other risk proxies

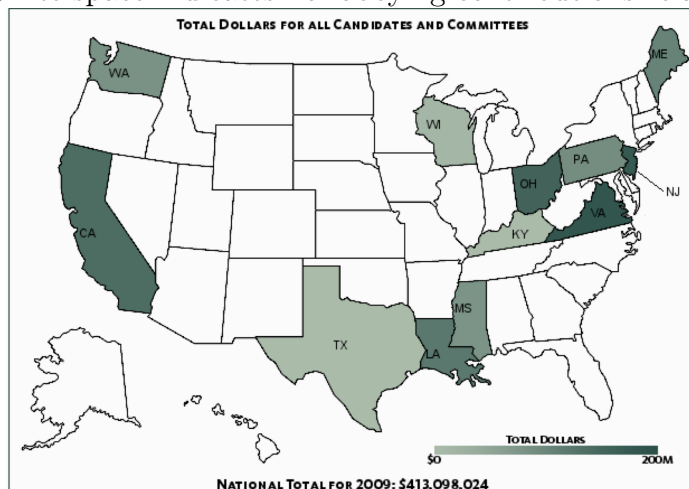
Jimenez et al. proposed many other measures of risk that could be useful in further research. They utilized bank interest rate data, stock prices volatility, non-performing loan ratio and the solvency ratio as measures of risk (Jimenez et al., 2010). The problem we had with utilizing stock price or interest rate data was being able to find that data, and do find it on such a large scale. We set out to examine all the banks in the Nation, and that seems to have lead to poorer quality data and an over-reliance on summarized data. The non-performing loan ratio and solvency ratio would be calculable using the same balance sheets that we used and could be an interesting way to re-explore this topic. With utilizing these data sheets again however, the potential problem with the reliability of the balance sheet information remains.

Lobby Data

The problem with this data set lies in the large gaps that are evident when you look at the map of contributions as recently as 2009 (Figure 1).

Figure 1 Lobbying contributions in Financial Sector for the Year 2009

*White space indicates no lobbying contributions relating to any of these topics



These large gaps in data can easily lead to misspecification error and inaccurate results in regression analysis. A better solution would be to narrow the analysis down to firms where the lobby expenditure data, and balance sheet information are known. Kim (2008) used lobbying expenditure specific for firms of S&P 500 Index's constituent firms.

Another way to fill in these gaps is to distinguish between campaign contributions and lobbying. The data from Follow the Money that we have been using seems to be cataloguing just the campaign contributions. By including actual lobbying expenditure we could fill the gaps because “lobbying expenditures are, on average, 6.67 times larger than total campaign contributions” (as was found in the sample by Kim, 2008). Lastly, leaving out lobbying data could be crucial if Kim's finding is correct that “only lobbying is positively and significantly related to CEO compensation” (2008) when compared to campaign contributions.

A potential better source of lobby data would be to examine the archives of the Center for Responsive Politics (Weissman and Rosenfield, 2009) (Kim, 2008).

Conclusion

Overall, our regression results suggested a modest link between lobbying expenditure and financial stability. In order to prove our theory much more research has to be done. There is strong research potential in the potential solutions listed in the previous section. The main weaknesses in our analysis stem from an incomplete dataset of lobby expenditure data as well as a sample size of financial data that was too large and relied too heavily on summarizing.

An extension to this work is being done examining the effect of lobbying on the competition in the banking sector. It would be interesting to combine the analysis and see if the effects are complementary in understanding lobbyist influence. Jimenez et al. (2010) mentions two models by which bank competition and risk taking interact. The first model he mentions, is the franchise value paradigm (which his model lent support to). This paradigm says “banks limit their risk-taking in order to protect quasi-monopoly rents” when they have market power, implying a negative correlation (Jimenez et al., 2010). Vives (2010) seems to agree with this paradigm stating that “market power enhances the banks' charter value, making it more conservative”. Another option would be the Boyd and De Nicolo model where an “increase in bank market power both in the

loan and deposit markets translates into higher loan rates charged to borrowers. In a moral hazard environment [...], entrepreneurs facing higher interest rates on their loans could choose to increase the risk of their investment projects.” (Jimenez et al., 2010). This case would favor the argument for a positive correlation between the two.

2.5 Appendix of Results

2.5.1 Return on Equity

The results for the Return on Equity regressions will follow in the tables below. Each line of the table represents a different regression which was conducted. The first column states whether the dependent variable was the censored return on equity or the void return on equity. The second column asserts whether the 16, 6, or 2 variable model is being analyzed. The r^2 of the overall test follows. The next column is the probability that the model has no predictive power, based on the statistics of an F-test.

Helpful tips for reading the results:

- Stat Sig = The number of coefficients that are statistically significant at the 95% level of confidence over the number of coefficients estimated. The statistically significant coefficients are listed in brackets and refer to the equations from the methodology section.
- CwT= “Consistent with Theory”. This tells how many of the coefficients that were statistically significant have the proper sign to be consistent with theory. It is shown as a fraction over the total number of statistically significant coefficients. In brackets are the coefficients that are statistically significant and consistent with our theory.
- Multicollinearity = The symptoms of multicollinearity were severe enough in the 16-variable model that listing off the coefficients that were statistically significant and consistent with theory was unnecessary and misleading.
- $(\tau_1) < 0$ = The coefficient on the banking lobby expenditure variable was negative and therefore against theory. This was noted in every case, not just when the coefficient was statistically significant.
- In the column “Prob>F” a blank answer means that STATA did not provide an F-statistic. This only happened in the void regressions, which suggests that there were too many gaps in the data to appropriately estimate the accuracy of the overall test.
- Lastly, the consistent and statistically significant coefficients are listed

Table 1.1 Panel Data (Standard Deviation within State of Standard Deviation within Banks) The 1 series of tables looks at Panel Data regression results with the proxy for risk being variations of the standard deviation of return on equity. For full coding information refer to Table 5.2. When evaluating the results of the panel data regressions we focussed on the $r^2_{between}$ value because we were interested in differences between states and the majority of the independent variables used were constant over time.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	16	.5084	.0241	Stat Sig: 2/15 (τ_{51}, τ_{54}) CwT: 1/2 (τ_{54}) Multicollinearity.
Void ROE	16	.4524	.0751	Stat Sig: 3/15 ($\tau_{51}, \tau_{52}, \tau_{54}$) CwT: 2/3 (τ_{51}, τ_{54}) Multicollinearity.
Censored ROE	6	.2345	.0365	Stat Sig: 1/5 (τ_1) CwT: 1/1 (τ_1) (τ_1) = $3.54 * 10^{-8}$ constant: .02483
Void ROE	6	.0997	.4577	Stat Sig: 0/5
Censored ROE	2	.1892	.0016	Stat Sig: 1/1 CwT: 1/1 Regression results posted below.
Void ROE	2	.0413	.1569	Stat Sig: 0/1

Table 1.1.1 Panel Data (Standard Deviation within State of Standard Deviation within Banks) STATA results for regression of CROE with Bank as only independent variable.

```

Between regression (regression on group means)   Number of obs   =   400
Group variable: StateCode                       Number of groups =   50

R-sq:  within = 0.0480                          Obs per group: min =    6
        between = 0.1892                          avg =    8.0
        overall = 0.0001                          max =   12

                                                F(1,48)         =   11.20
sd(u_i + avg(e_i.))= .2180816                    Prob > F         =   0.0016

```

CROE	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Bank	3.77e-08	1.13e-08	3.35	0.002	1.50e-08	6.03e-08
_cons	.1204097	.0348902	3.45	0.001	.0502583	.1905611

Table 1.2 Panel Data (standard deviation of average ROE in banks) Once again, bank is always positive even if not significant. Same multicollinearity problem so just left regressions with all 16 variables out.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	6	.1298	.2891	Stat Sig: 0/5
Void ROE	6	.1270	.3023	Stat Sig: 0/5
Censored ROE	2	.0759	.0528	Stat Sig: 0/1
Void ROE	2	.0271	.2537	Stat Sig: 0/1

Table 1.3 Panel Data (state average of standard deviation of banks ROE) Once again, bank is always positive even if not significant. Same multicollinearity problem so just left regressions with all 16 variables out.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	6	.0941	.4940	Stat Sig: 0/5
Void ROE	6	.0980	.4684	Stat Sig: 0/5
Censored ROE	2	.0540	.1045	Stat Sig: 0/1
Void ROE	2	.0105	.4796	Stat Sig: 0/1

Table 2.1 Cross Section (Statewide Standard Deviation of Standard Deviation of ROE for banks) The 2 series of tables looks at cross-sectional regression results with the proxy for risk being variations of the standard deviation of return on equity. For full coding information refer to Table 5.1.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	16	.4227	.7520	Stat Sig: 1/15 (τ_{54}) CwT: 1/1 (τ_{54}) Multicollinearity.
Void ROE	16	.4367	.	Stat Sig: 4/15 ($\tau_2, \tau_{51}, \tau_{52}, \tau_{54}$) CwT: 3/4 ($\tau_2, \tau_{51}, \tau_{54}$) Multicollinearity.
Censored ROE	6	.1983	.3969	Stat Sig: 0/5 (τ_1)<0
Void ROE	6	.1495	.0831	Stat Sig: 1/5 (τ_5) CwT: 1/1 (τ_5) (τ_5)=-.000365 constant=.0756
Censored ROE	2	.0067	.2188	Stat Sig: 0/1
Void ROE	2	.0222	.2522	Stat Sig: 0/1

Table 2.2 Cross Section (Statewide Standard Deviation of Mean ROE for banks) Due to multicollinearity the 16-variable model is once again dropped.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	6	.2323	.4722	Stat Sig: 0/5 (τ_1)<0
Void ROE	6	.1598	.	Stat Sig: 1/5 (τ_3) CwT: 0/1
Censored ROE	2	.0008	.5956	Stat Sig: 0/1
Void ROE	2	.0161	.	Stat Sig: 0/1

Table 2.3 Cross Section (Statewide Average of Standard Deviation of ROE for banks) The results were not strong enough to follow through with the 2-variable model.

Dependent Variable	Variables in Model	$r^2_{between}$	Prob>F	Notes
Censored ROE	6	.2163	.6946	Stat Sig: 0/5 (τ_1)<0
Void ROE	6	.1065	.	Stat Sig: 0/5

2.5.2 Housing Price Index

In the following regression results the coefficients LobDiscA and PoliFinA refer to τ_4 and τ_5 respectively.

Based on Time Points

The 3 series of tables looks at the STATA results when risk is based on the values achieved at certain time points. The max point is the peak of the housing market (2nd quarter of 2008) and the end point is the 3rd quarter of 2012. For full coding information refer to Table 5.3.

Table 3.1 Ascent Risk for 2-variable model

Linear regression		Number of obs = 51				
		F(1, 49) = 3.91				
		Prob > F = 0.0537				
		R-squared = 0.0310				
		Root MSE = .30786				
Spread1	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Bank	2.03e-09	1.03e-09	1.98	0.054	-3.37e-11	4.09e-09
_cons	1.565706	.0473032	33.10	0.000	1.470647	1.660765

Table 3.2 Ascent Risk for 6-variable model

Linear regression		Number of obs = 49				
		F(5, 43) = 5.62				
		Prob > F = 0.0005				
		R-squared = 0.1531				
		Root MSE = .28136				
Spread1	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Bank	3.61e-09	8.33e-10	4.33	0.000	1.93e-09	5.29e-09
Ratio	-6.121997	3.996218	-1.53	0.133	-14.18114	1.937144
CPIScore	.0015814	.0039551	0.40	0.691	-.0063947	.0095576
PoliFinA	.0007389	.0006472	1.14	0.260	-.0005664	.0020442
LobDiscA	-.000818	.0005	-1.64	0.109	-.0018263	.0001904
_cons	1.635668	.2691901	6.08	0.000	1.092794	2.178541

Based on Time Points

Table 3.3 Descent Risk for 2-variable model

Linear regression	Number of obs =	51
	F(1, 49) =	18.63
	Prob > F =	0.0001
	R-squared =	0.0953
	Root MSE =	.12684

Spread3	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
Bank	-1.52e-09	3.51e-10	-4.32	0.000	-2.22e-09	-8.11e-10
_cons	.9067138	.0192116	47.20	0.000	.8681066	.9453209

Table 3.4 Descent Risk for 6-variable model

Linear regression	Number of obs =	49
	F(4, 43) =	.
	Prob > F =	.
	R-squared =	0.1332
	Root MSE =	.12853

Spread3	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
Bank	-1.68e-09	3.15e-10	-5.34	0.000	-2.32e-09	-1.05e-09
Ratio	2.236548	1.63814	1.37	0.179	-1.067077	5.540173
CPIScore	-.0018413	.0015116	-1.22	0.230	-.0048896	.0012071
PoliFinA	-.0000124	.000197	-0.06	0.950	-.0004097	.0003849
LobDiscA	.0000554	.0002195	0.25	0.802	-.0003874	.0004981
_cons	.9349951	.1464721	6.38	0.000	.6396059	1.230384

Based on Maximum and Minimum Values

The 4 series of tables looks at the STATA results when risk is based on the maximum values the housing market reached in each state and the minimum values after that point. For full coding information refer to Table 5.4.

Table 4.1 Ascent Risk for 2-variable model

Linear regression					Number of obs = 51
					F(1, 49) = 4.21
					Prob > F = 0.0455
					R-squared = 0.0394
					Root MSE = .32962

Spread1	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Bank	2.46e-09	1.20e-09	2.05	0.045	5.18e-11	4.87e-09
_cons	1.593351	.0513396	31.04	0.000	1.49018	1.696522

Table 4.2 Ascent Risk for 6-variable model

Linear regression					Number of obs = 49
					F(5, 43) = 7.35
					Prob > F = 0.0000
					R-squared = 0.2074
					Root MSE = .28152

Spread1	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Bank	4.48e-09	8.46e-10	5.29	0.000	2.77e-09	6.18e-09
Ratio	-7.029021	3.92653	-1.79	0.080	-14.94762	.8895821
CPIscore	.0009531	.0039717	0.24	0.811	-.0070567	.0089628
PoliFinA	.0008134	.0006459	1.26	0.215	-.0004893	.0021161
LobDiscA	-.0010211	.0004878	-2.09	0.042	-.0020048	-.0000374
_cons	1.768872	.2507538	7.05	0.000	1.263179	2.274565

Based on Maximum and Minimum Values

Table 4.3 Descent Risk for 2-variable model

Linear regression

Number of obs = 50
 F(1, 48) = 11.88
 Prob > F = 0.0012
 R-squared = 0.0844
 Root MSE = .12908

Spread3	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
Bank	-1.43e-09	4.16e-10	-3.45	0.001	-2.27e-09	-5.97e-10
_cons	.8383622	.0194201	43.17	0.000	.7993154	.8774089

Table 4.4 Descent Risk for 6-variable model

Linear regression

Number of obs = 49
 F(4, 43) = .
 Prob > F = .
 R-squared = 0.1565
 Root MSE = .13041

Spread3	Robust		t	P> t	[95% Conf. Interval]	
	Coef.	Std. Err.				
Bank	-1.96e-09	3.44e-10	-5.71	0.000	-2.66e-09	-1.27e-09
Ratio	3.236488	1.791806	1.81	0.078	-.3770332	6.850009
CPIScore	-.0020645	.0016176	-1.28	0.209	-.0053267	.0011976
PoliFinA	.0000401	.0002189	0.18	0.855	-.0004013	.0004815
LobDiscA	.0002194	.0001915	1.15	0.258	-.0001669	.0006057
_cons	.7724214	.1416483	5.45	0.000	.4867604	1.058082

Table 5.1 STATA Coding for cross-sectional regressions using bank financial data and VROE/CROE

The Green text denotes comments for clarity.

```

1  //////////Use the Financial Data with Net Income and Total Equity
2  use "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Financial Raw/Financial 2001-2012.dta", clear
3  //////////Generate the Censored and Void Return on Equity measures
4  sort Equity
5  replace Equity = 1000 in 1/2160
6  generate CROE=NetInc/Equity //C is for censored
7  replace Equity = . in 1/2160
8  generate VROE=NetInc/Equity //V is for Void
9  //////////Only use one of the following 3 at a time
10 //1 measures the statewide standard deviation of the standard deviation of returns by the institutions
11 collapse (sd) VROE CROE (mean) NetInc, by (PrimNum FinState)
12 collapse (sd) VROE CROE (mean) NetInc, by (FinState)
13 //2 measures the statewide standard deviation of the mean return of the institutions
14 collapse (mean) VROE CROE (mean) NetInc, by (PrimNum FinState)
15 collapse (sd) VROE CROE (mean) NetInc, by (FinState)
16 //3 measures the statewide mean of the standard deviation of returns by the institutions
17 collapse (sd) VROE CROE (mean) NetInc, by (PrimNum FinState)
18 collapse (mean) VROE CROE (mean) NetInc, by (FinState)
19 //////////combine with lobby data
20 merge 1:m FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/2001-2012 Lobby
Data.dta"
21 drop _merge
22 collapse (sum) Bank Total (mean) CROE VROE ROE NetInc, by (FinState)
23 merge 1:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/Lobby CPI
Scores.dta"
24 drop _merge
25 merge 1:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/SII Detailed
Lobby.dta"
26 drop _merge
27 //////////Same variable creation as in the panel data analysis
28 generate Ratio=Bank/Total
29 generate PoliFinA=PoliFin1+PoliFin2+PoliFin3+PoliFin4+PoliFin5+PoliFin6
30 generate LobDiscA=LobDisc1+LobDisc2+LobDisc3+LobDisc4+LobDisc5+LobDisc6
31 generate Bank2=Bank^2
32 generate Bank3=log(Bank)
33 //////////Regression Analysis
34 //The following are the 2-variable regressions
35 regress CROE Bank, vce(robust)
36 regress VROE Bank, vce(robust)
37 //The following are the 6-variable regressions
38 regress CROE Bank Ratio CPIScore PoliFinA LobDiscA, vce(robust)
39 regress VROE Bank Ratio CPIScore PoliFinA LobDiscA, vce(robust)
40 //The following are the 16-variable regressions
41 regress CROE Bank Ratio CPIScore PoliFin1 PoliFin2 PoliFin3 PoliFin4 PoliFin5 PoliFin6 LobDisc1 LobDisc2 LobDisc3
LobDisc4 LobDisc5 LobDisc6, vce(robust)
42 regress VROE Bank Ratio CPIScore PoliFin1 PoliFin2 PoliFin3 PoliFin4 PoliFin5 PoliFin6 LobDisc1 LobDisc2 LobDisc3
LobDisc4 LobDisc5 LobDisc6. vce(robust)

```

Table 5.2 STATA Coding for panel regressions using bank financial data and VROE/CROE

```

1 use "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Financial Raw/Financial 2001-2012.dta", clear
2 //Generate the Censored and Void Return on Equity measures
3 sort Equity
4 replace Equity = 1000 in 1/2160
5 generate CROE=NetInc/Equity //C is for censored
6 replace Equity = . in 1/2160
7 generate VROE=NetInc/Equity //V is for Void
8 generate Year=year(Date)
9 //Only use one of the following 3 at a time
10 //1 measures the statewide standard deviation of the standard deviation of returns by the institutions
11 collapse (sd) VROE CROE (mean) NetInc, by (PrimNum FinState Year)
12 collapse (sd) VROE CROE (mean) NetInc, by (FinState Year)
13 //2 measures the statewide standard deviation of the mean return of the institutions
14 collapse (mean) VROE CROE (mean) NetInc, by (PrimNum FinState Year)
15 collapse (sd) VROE CROE (mean) NetInc, by (FinState Year)
16 //3 measures the statewide mean of the standard deviation of returns by the institutions
17 collapse (sd) VROE CROE (mean) NetInc, by (PrimNum FinState Year)
18 collapse (mean) VROE CROE (mean) NetInc, by (FinState Year)
19 //Now we merge together with our Lobby data sets
20 merge m:m FinState Year using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/2001-2012 Lobby
Data.dta"
21 drop _merge
22 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/Lobby CPI Scores.dta"
23 drop _merge
24 encode FinState, generate(StateCode)
25 xtset StateCode Year
26 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/SII Detailed Lobby.dta"
27 drop _merge
28 //Final variable creation
29 //Combine Political Finance and Lobby Disclosure into one variable each for the 6-variable model
30 generate PoliFinA=PoliFin1+PoliFin2+PoliFin3+PoliFin4+PoliFin5+PoliFin6
31 generate LobDiscA=LobDisc1+LobDisc2+LobDisc3+LobDisc4+LobDisc5+LobDisc6
32 generate Bank2=Bank^2 // tested as an alternate variable for bank expenditure in all following tests
33 generate Bank3=log(Bank) // tested as an alternate variable for bank expenditure in all following tests
34 //Panel Regressions
35 //The following are the two variable models
36 xtreg CROE Bank, be
37 xtreg VROE Bank, be
38 //The following are the 6 variable models
39 xtreg VROE Bank Ratio CPIScore PoliFinA LobDiscA, be
40 xtreg CROE Bank Ratio CPIScore PoliFinA LobDiscA, be
41 //The following are the 16 variable models. The number refers to the question number in the Political Finance and Lobby
Disclosure questionnaire outlined in methodology.
42 xtreg VROE Bank Ratio CPIScore PoliFin1 PoliFin2 PoliFin3 PoliFin4 PoliFin5 PoliFin6 LobDisc1 LobDisc2 LobDisc3 LobDisc4
LobDisc5 LobDisc6, be
43 xtreg CROE Bank Ratio CPIScore PoliFin1 PoliFin2 PoliFin3 PoliFin4 PoliFin5 PoliFin6 LobDisc1 LobDisc2 LobDisc3 LobDisc4
LobDisc5 LobDisc6, be

```

Table 5.3 STATA Coding for Regressions using Housing Price Index based off of the date of the peak housing prices and the most recent value

```

1  //////////Use Housing Price Index Data
2  use "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Financial Raw/HPI.dta", clear
3  drop if Year<2001
4  //////////Establishing time-based points
5  bysort FinState: gen Start=HPI if Year==2001 & Quarter==1
6  by FinState: egen Start1=max(Start)//This fills all empty spots in that state with this scalar value
7  by FinState: gen HPI1=HPI/Start1 //This normalizes the data for all states to be based off 2001 period 1 position
8  by FinState: gen Peak=HPI1 if Year==2007 & Quarter==2
9  by FinState: egen Peak1=max(Peak)
10 by FinState: gen End=HPI1 if Year==2012 & Quarter==3
11 by FinState: egen End1=max(End)
12 by FinState: gen Start2=Start1/Start1
13 //////////Establishing Spread with Time
14 by FinState: gen Spread1=Peak1/Start2
15 by FinState: gen Spread3=End1/Peak1
16 drop if Quarter !=1
17 //Combine with Lobby Data
18 merge m:m FinState Year using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/2001-2012 Lobby Data.dta"
19 drop _merge
20 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/Lobby CPI Scores.dta"
21 drop _merge
22 encode FinState, generate(StateCode)
23 xtset StateCode Year
24 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/SII Detailed Lobby.dta"
25 drop _merge
26 //Collapse to cross-sectional data and generate last variables
27 collapse (sum) Bank Total (mean) Pop CPIScore PoliFinA LobDiscA Spread1 Spread3, by (FinState)
28 generate PoliFinA=PoliFin1+PoliFin2+PoliFin3+PoliFin4+PoliFin5+PoliFin6
29 generate LobDiscA=LobDisc1+LobDisc2+LobDisc3+LobDisc4+LobDisc5+LobDisc6
30 generate Bank2=Bank^2
31 generate Bank3=log(Bank)
32 generate Ratio=Bank/Total
33 //regressions
34 reg Spread1 Bank Bank2, vce(robust)
35 reg Spread3 Bank Bank2, vce(robust)
36 reg Spread1 Bank Bank2 Ratio CPIScore PoliFinA LobDiscA, vce(robust)
37 reg Spread3 Bank Bank2 Ratio CPIScore PoliFinA LobDiscA, vce(robust)

```

Table 5.4 STATA Coding for Regressions using Housing Price Index based off of maximum and minimum peak levels

```

1 //Use Housing Price Index Data
2 use "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Financial Raw/HPI.dta", clear
3 drop if Year<2001 //Because we do not have lobby data prior to this.
4 //Establishing time-based points
5 bysort FinState: gen Start=HPI if Year==2001 & Quarter==1
6 by FinState: egen Start1=max(Start)//This fills all empty spots in that state with this scalar value
7 by FinState: gen HPI1=HPI/Start1 //This normalizes the data for all states to be based off 2001 period 1 position
8 by FinState: gen Start2=Start1/Start1
9 //Generate StateWide Minimum value AFTER the Max value
10 by FinState: egen Max=max(HPI1)
11 //The minimum after the maximum value was done manually by examining the datapoints closely.
12 gen PostMin= .
13 replace PostMin= 230.48 if FinState=="AK"
14 replace PostMin= 171.59 if FinState=="AL"
15 replace PostMin= 174.27 if FinState=="AR"
16 replace PostMin= 162.53 if FinState=="AZ"
17 replace PostMin= 152.35 if FinState=="CA"
18 //..... Continued for all the states
19 generate PostMin1=PostMin/Start1 //This normalizes the data
20 //Establishing Spread with Max/Min
21 by FinState: gen Spread1=Max/Start2 //Used for measuring the ascent risk
22 by FinState: gen Spread3=PostMin1/Max //Used for measuring the descent risk
23 drop if Quarter !=1
24 //Combine with Lobby Data
25 merge m:m FinState Year using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/2001-2012
Lobby Data.dta"
26 drop _merge
27 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/Lobby CPI
Scores.dta"
28 drop _merge
29 encode FinState, generate(StateCode)
30 xtset StateCode Year
31 merge m:1 FinState using "/Users/reidgustavson/Dropbox/Ottawa life/Term Paper Raw Data/Lobby - DTA/SII Detailed
Lobby.dta"
32 drop _merge
33 //Collapse to cross-sectional data and generate last variables
34 collapse (sum) Bank Total (mean) Pop CPIScore PoliFinA LobDiscA Spread1 Spread3, by (FinState)
35 generate PoliFinA=PoliFin1+PoliFin2+PoliFin3+PoliFin4+PoliFin5+PoliFin6
36 generate LobDiscA=LobDisc1+LobDisc2+LobDisc3+LobDisc4+LobDisc5+LobDisc6
37 generate Bank2=Bank^2
38 generate Bank3=log(Bank)
39 generate Ratio=Bank/Total
40 //regressions
41 reg Spread1 Bank Bank2, vce(robust)
42 reg Spread3 Bank Bank2, vce(robust)
43 reg Spread1 Bank Bank2 Ratio CPIScore PoliFinA LobDiscA, vce(robust)
44 reg Spread3 Bank Bank2 Ratio CPIScore PoliFinA LobDiscA, vce(robust)

```

Table 5.5 STATA Coding for running tests for symptoms of heteroskedasticity, non-normality of errors, and multicollinearity

```
1 //White's test run after regression
2 imtest, white
3 //Jarques Bera
4 quietly regress VROE Bank Ratio CPIScore LobDisc1 ... LobDisc6 PoliFin1 ... PoliFin6
5 predict double uhat, residuals
6 jb6 uhat
7 //Tests for Multicollinearity
8 correlate Bank Ratio CPIScore LobDisc1 ... LobDisc6 PoliFin1 ... PoliFin6
9 coldiag2 Bank Ratio CPIScore LobDisc1 ... LobDisc6 PoliFin1 ... PoliFin6
```

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