

# **Impact of Lobbying on Competition in the Banking Sector**

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## **Abstract**

This paper considers the impact of lobbying activities on the degree of competition in the banking sector. It is an empirical study using the conceptual framework of the “General Equilibrium Lobbying Game with a Banking Sector” by Perez-Saiz & Semenov (2013). We test the hypothesis that stronger lobbying activities result in higher competition level and lower profit margin in the industry. We conduct a panel-data regression by analyzing the profit margin in the U.S. at the state level after financial crisis. There are significant negative impacts from dollar amount and number of lobbying contributions. The result is consistent with the hypothesis. It predicts a non-linear effect of lobbying efforts, as well as the “Local Persistent Effect”. There are two extensions: an examination of the lobbying lag effect and an analysis of the before-financial-crisis sample.

## 1. Introduction

The 2008 Financial Crisis underlined the importance of regulations in the financial industry. It is clear that before the crisis financial institutions influenced regulators and policymakers. For example, the Glass-Steagal act which prohibits creation of too-big-to-fail banks was repealed after intensive lobbying efforts. This and many other cases of lobbying (see Fisman, 2001) raise important questions:

- Do banks have power to influence the regulatory environment?
- How do banks benefit from lobbying?

The political parties and lawmakers control the banking industry at the aggregate level. A bank tries to influence legislators to create a friendly environment. On the other hand the bank wants to eliminate competitors. Banks lobby politicians to achieve these goals. By lobbying, we mean any persuading activity that some special interest groups meet politicians with intention to influence the latter's political positions in the former's favorable interests (Grossman and Helpman, 2001). In our framework, lobbying is one of the tools to change banking regulatory environment. Confirming this point, banks in the United States (U.S.) contribute large sums of money to political campaigns (Kim, 2008).

Lobbying activities have impact on banks and other corporations. In the empirical work by Chen et al. (2012), corporations on individual firm level with the highest lobbying intensity can increase their profitability compared to the peer group in the industry.

In this paper we focus on lobbying by the banking sector. We test how lobbying activities affect the banking industry on the aggregate level. The main question in the paper is to examine the link between lobbying activities and competitiveness of the banking industry. As a theoretical

framework, we use the simplified version of the model of lobbying and competition by Perez-Saez and Semenov (2013). The strong lobbying activity from local banks leads to a lower level of competition in the financial industry. The local banks maintain their local market power. On the other hand, the strong lobbying activity from outside banks increases competition by removing barriers to entry. The hypothesis suggests that outsiders tend to dominate the local banks. Therefore, stronger lobbying activities result in increase of competition in the banking sector.

This paper evaluates the effects of lobbying contributions on the average profitability of the banking industry for each state in the U.S. We conduct a panel-data regression of average profit margins of banks on lobbying ratios. The model includes other macroeconomic and financial variables as well. The main interests focus on the effect of lobbying in the after-financial-crisis time period (2010-2012). After several econometrical tests, we introduce new lobbying variables in quadratic forms. To test whether the lobbying has a lag effect, we add a regression which considers lobbying data from the previous year. As an extension of the project we consider before-financial-crisis time period (2006-2008). In this period, we test the changes in effects of lobbying on the banking sector after the 2008 financial crisis.

In all three regressions we use the average state profit margin as dependent variables. Contrary to the existing measurement of banking competition, such as Lerner Index<sup>1</sup> (Jimenez et al., 2007) or Tobin's q (Keeley, 1990), we choose the profit margin as the measurement of industry's competitiveness. This margin is used in the model as it simplifies the analysis. The average profit margin data are generated from the Uniform Bank Performance Report (UBPR).

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<sup>1</sup> The Lerner index is a measure of market power that calculates the degree to which a firm can increase their marginal price beyond their marginal cost. However, the calculation requires accurate estimates of marginal cost. For banks, deposit and loan markets are separate with different costs to measure, such as risk premium charged and cost of retails and wholesales.

We introduce constructed lobbying ratios to account for the impact of lobbying activities. The first lobbying ratio is defined as the state lobbying expenditures divided by the state local revenue. The second ratio measures the participation rate: the number of contributions divided by the state's population. The lobbying data is from the database provided by the National Institute on Money in State Politics (NIMSP).

The estimated coefficients of lobbying ratios are negative and statistically significant during the time period after-financial-crisis (2010-2012). It is consistent with the conceptual model's prediction that stronger lobbying activity reduces the banks' profit margins and increases the industry's competition level. The estimated coefficients are economically significant<sup>2</sup>. Each extra \$1,000,000 of lobbying contributions or 1,000 of lobbying contributions result in an around 2% reduction in the profit margin of the banking sector.

We find a non-linear impact of lobbying activity on the banking sector's profit margin. For this purpose we create quadratic lobbying variables. We consider the lag effect of the lobbying variables. Only the number of contributions is significant with a positive sign. This can be explained through the "Local Persistence Effect" that local banks tend to have longer influence than outsiders to enhance their profitability with lobbying activities. In the before-financial-crisis period, still only the number of contributions is significant with a positive sign. Thus the local banks dominated outside lobbying before 2008.

The rest of the paper is organized as follows. Section 2 is a literature review, which consists of theoretical and empirical papers. Section 3 characterizes the conceptual model. Section 4 provides the empirical methodology. Section 5 contains the detailed description of data

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<sup>2</sup> Economic significance means the estimated coefficients show considerable impacts. In contrast, if the estimated coefficient is too small in magnitude, we call it economically insignificant. For instance, an extremely small value of estimators suggests that the impact can be ignored.

drawing, variable generation, as well as a brief review for the U.S. banking industry and lobbying activities. Section 6 addresses the main results and extensions. Section 7 contains concluding remarks.

## **2. Literature Review**

The literature on the effect of lobbying on competitiveness of banking sector is relatively recent. The following literature review presents theoretical and empirical research.

### **2.1 Theoretical Literature**

In the seminal paper Grossman and Helpman (1994) consider a model of special interests where lobbies contribute to politicians to influence legislation and policies. It examines the political equilibrium structure of trade protection. Politicians maximize the weighted sum of social welfare and political contributions. Interest groups compete for the trade protection by choosing from alternative policy platforms. The equilibrium is efficient, i.e., it maximizes social welfare. It can be implemented in truthful strategies. That is the lobbies' contributions reflect their preferences. Then the politician maximizes total welfare.

Allen and Gale (2004) analyze the relationship between competition and financial stability of financial institutions. They examine several different models such as a model of financial intermediaries and markets, agency model etc. They conclude that there can be a trade-off between competition and stability. However, some models suggest that perfect competitive and financial stability are essential to achieve the general equilibrium. As the former view is a little bit more accepted, minimum capital requirement for banks is suggested when considering complicated financial legislations.

Kroszner and Stratmann (1998) study the behaviour of the U.S. financial industry's political action committees (PAC). They develop a theory of interest groups' influence on committee members. This theory explains the contribution patterns to different committee members. It implies that the politicians receive contributions as well as using that as a device to build their reputation. In the empirical verification of the theory they consider whether commercial banks can expand into investment banking and the insurance industry. The results from the empirical work support the theory.

Martimort and Semenov (2007) consider lobbying competition and who donates money to "buy" policymakers. They consider competition and coalition in a framework which involves asymmetric information. The final decisions regarding policies will be biased to the ideological point from the legislator when interest groups share information inefficiently. The mathematical build-up from this paper is carried on in the underlying model for our research.

Rajan and Zingales (2003) study global financial development in the twenty century. The existing financial institutions will be struggling with free cross-border trade and capital flows. They suggest that incumbent banks will use their political influence to set up entry barriers for potential competitors. Thus the trade openness is significant in the financial industry.

## **2.2 Empirical Literature**

In this subsection we survey empirical works relevant to the study of business political contributions. Some approach their work in a case-study way, while others like Kim (2008) and Chen et al. (2012) use a panel-analysis approach.

The paper by Hansen and Mitchell (2000) is one of the earliest studies that examine corporate political activities. Theoretically, the paper suggests that corporate political activities

can be categorized in various dimensions, including PAC contributions, lobbying, and charitable contributions. For lobbying data, they use the number of lobbyists representing corporations in Washington D.C. offices and other counsel offices in 1988. They use the lobbyists' number data to approximate the potential for each firm's lobbying expenditure. The study focuses on *Fortune* 500 companies. One of the findings shows that the industry concentration is significant in the lobbying model. In other words, corporate lobbying depends on industry competitiveness. Another interesting finding is that foreign corporations try to adapt to local business behaviour while giving little political contributions.

The paper by Fisman (2001) is an early exploratory study that evaluates the connection between corporations and politicians. He uses an event-approach to value political connection. He analyses the response on financial performances of some giant corporations in Indonesia on rumours about Suharto's health<sup>3</sup>. The paper uses data from 1995-1997; this period includes six episodes of rumour events. It applies the Suharto Dependency Index to measure the political connections of firms. The paper shows that politically dependent firms lose more value during those special periods than less dependent firms. It suggests that the reactions from the Indonesian stock market prove the value of political relationship from the view of firms.

In a similar paper Jayachandran (2006) studies the U.S.. He examines the connections between politicians and firms by measuring the changes in the market capitalization of 500 public companies to the defection of Senator Jefford from the Republican Party in 2001. The paper examines the loss of those firms who donate more to the Republican Party and the gain from those who donate more to the Democratic Party. Each dollar donated to the Democrats or Republicans generates about \$2,300 change in the market value for this typical event. It also

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<sup>3</sup> Suharto, 2<sup>nd</sup> President of Indonesia. He had held the position for 31 years from 1967 to 1998. His health condition largely determined the government stability during that time.

shows a loss of 0.8% of the firm's market value for every \$250,000 donated to Republicans. The effect of this special event lasts over time. The study uses soft-money<sup>4</sup> contributions as the measure of firms' political connections. It suggests that the change in financial performances can be distinguished as two interpretations. First, soft-money captures the firms' political preferences. Second, politicians' moves are not guaranteed and the contributions can gain either favour or sometimes just access.

Another case study, by Kinght (2006) consider the effect of political platforms using the Bush / Gore 2000 U.S. Presidential Election. It chooses 70 public firms, including 41 firms favoured under the Bush administration and 29 firms favoured under the Gore administration. This paper suggests that favourable policies account for 3-6 percent of a firm's market value. The security prices of some sensitive sectors such as tobacco and energy fluctuate with the electoral process. This work demonstrates the importance of distributions of recourses across different sectors.

Herron et al. (1999) choose the 1992 U.S. Presidential Election to measure the political effects on 74 economic sectors broken down from the whole U.S. economy. Instead of on the corporate level, this paper emphasizes more the impact on the economy at the macro level. It finds that 15 out of 74 sectors are politically dependent on the election of the political candidates.

Kim (2008) presents a longitudinal empirical study to show how lobbying pays off at the individual firm level. The paper uses an exploratory approach to verify the hypothesis that lobbying has a positive impact on corporate financial performance. The equity return is the dependent variable and lobbying expenditures are the explanatory variables. The sample is a panel dataset including S&P 500 Index firms during 1998-2004. The lobbying expenditures are

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<sup>4</sup> Soft money was banned in 2002 by Congress in the Bipartisan Campaign Finance Reform Act, which was upheld by the Supreme Court in 2003.

taken directly from the U.S. Senate. Lobbying firms successfully exceed the average equity return of the industry. The paper studies the differences between corporate lobbying expenditure and campaign contributions. Lobbying achieves political favourable positions to firms, instead of campaign contributions which are sometimes regarded as buying more access to politicians. The paper discusses the endogeneity issue for lobbying expenditures and provides a solution with possible IV instruments, such as sales, corporate governance and concentration.

Stratmann (2002) examines the relationship of legislators' voting behaviour and firms' lobbying contributions. In order to overcome the simultaneous-equation bias<sup>5</sup>, instead of cross-sectional data, he examines a different-time-spot dataset for 1991 and 1998 regarding the contribution and voting behaviours of financial service legislations. The evidence shows that interest groups use contributions to "buy" lawmakers' votes, especially regarding some relatively junior legislation. The empirical results also show that there is a partially offsetting effect among competing interest group contributors. Thus only the net contribution stream is reflected in the voting behaviours.

Chen et al. (2012) examine the relationship of lobbying spending and firm's financial performance on the individual firm level as well as using a portfolio approach. The lobbying data is from the Center for Responsive Politics. The financial data is from COMPUSTATS and CRSP dataset. After checking the lobbying firms during 1998-2005 with several different empirical specifications, the work shows robust results supporting a significant positive relationship for lobbying expenditure and financial performance. However, when it comes to the portfolio approach, only lobbying firms in the highest lobbying intensity benchmark can significantly

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<sup>5</sup> Simultaneous-equation bias is referred as, if interest groups contribute to a politician who supports them as always, a positive significant correlation between money spending and voting cannot justify the hypothesis that money buys votes (Endersby and Munger, 1992).

outperform the industry average. And the rest earns essentially a zero or even negative return to their lobbying activity over time. Although this does not mean the outcome of lobbying is negative. Another finding is that the lobbying effect will diminish in the long term with the most benefit occurring in the short term.

Jimenez et al. (2007) pay special attention to the banking sector by examining the link between competition and financial stability. They use several measurements for competition level in the banking industry. For example they use Lerner Index for market power, number of banks in the industry and the Herfindahl-Hirschmann index for standard proxies of market concentration. The sample focuses on the Spanish banking system from 1988 to 2003. Only the results obtained using market power show significant evidence which supports the franchise value paradigm<sup>6</sup>. The result is consistent with the model by Allen and Gale (2004). The work provides guidelines for banking regulations regarding risk management and competition.

### **3. Conceptual Model**

In this section we present a simplified version of the model by Perez-Saiz and Semenov (2013).

#### **3.1 Assumptions and basic set-ups**

There are four roles in the model, entrepreneurs, banks, consumers and the government. Goods and timing of the game are also established.

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<sup>6</sup> The franchise value diagram states that the revenue that banks earn from depositors provide the only incentives to conduct policies of conservative asset side.

*Goods:* There are two goods in the economy, a numeraire good which is consumed in the first period, and a good consumed in the second period. They are subject to the endowment  $\omega$  units at the beginning.

*Entrepreneurs:* There exists a continuum of entrepreneurs indexed by their entrepreneurial skills,  $y \in [0, \bar{y}]$ . An entrepreneur 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,  $p(y)$ , follows the assumption:  $p'(y) < 0$ ,  $p''(y) \leq 0$ ,  $p(0) = 1$  and  $p(\bar{y}) = 0$ . The return from the entrepreneur is associated with the relevant risk, i.e. the riskiness of investment increases when the return becomes higher.

*Banks:* Banks are assumed as risk neutral financial intermediaries, which are capable of getting involved in lobbying game. Banks exhibit as matchmakers who deliver the funds from consumers to entrepreneurs and compete for deposits. The degree of competitiveness of the banking sector follows the assumption:  $\beta \in [-1, 0]$ , where  $\beta = -1$  when the industry is perfectly competitive and  $\beta = 0$  when the industry is a monopoly. In the model, banks have limited liability. They choose their portfolio based on the entrepreneur's riskiness index  $y$  to decide who they are going to lend to.  $\hat{y}$  is defined as the upper boundary level of riskiness allowed in the economy. Given the maximum riskiness level  $\hat{y}$ , the unregulated banking sector prefers a monopoly, or  $\beta = 0$ . The bank faces the following problem:

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

where  $(y - r_D)$  is the margin of intermediation obtained by the banking sector. The bank's solution to the problem meets the first order conditions, as below:

$$y - r_D(D, y) - D \frac{\partial r_D(D, y)}{\partial D} (1 + \beta) = 0 ,$$

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

*Consumers:* Consumers use the endowment in period 1 either for consumption, or to deposit to banks and receive an interest rate  $r_D$ . Consumers face the following problem, subject to the period 2 budget constraint:

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

$$\text{s. t.} \quad c = (1 + r_D)D .$$

*The government:* The government faces a maximization problem based on the weighted sum of the consumers' surplus and banks' contribution  $C$ . The government does not take banks' profits into consideration, as the banks' profit margins are treated as deadweight losses.<sup>7</sup> Without considering lobbying contributions, the government prefers perfect competition, or  $\beta = -1$ . The government faces the following problem:

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

*Timing of the game:* There are in total four stages,  $t = 0, 1, 2, 3$ .

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<sup>7</sup> It is possible to include the banks' profits into the government's objective function as in Grossman and Helpman (1994), without affecting the main results.

Stage 0: The lobbying banks offer contribution schedules to the government. These contributions are subject to the competition level  $\beta$  and the maximum degree of riskiness in the banking sector  $\hat{y}$ . At the end of this stage, after considering the lobbying contributions, the government sets the level of competition and the maximum degree of riskiness.

Stage 1: Consumers can save a portion of the endowment and deposit it at rate  $r_D$ . The rest of the endowment is consumed in this stage.

Stage 2: Banks lend the collected deposits to entrepreneurs according to the entrepreneur's risk index  $y$ .

Stage 3: The output from the entrepreneur is generated with characteristic  $y$  and the success probability  $p(y)$ .

### 3.2 The Lobbying Game

The contribution schedule  $C(\beta, \hat{y})$  is subject to the chosen riskiness level  $\hat{y}$  and competition level  $\beta$ . According to the contribution schedule and the faced maximized problem, the government decides about the level of riskiness  $\hat{y}$  and competition  $\beta$ . After taking account of the lobbying contributions, the objective functions for both banks and governments are altered. Lobbying banks face the following problem:

$$\pi_B(\beta, \hat{y}) - C(\beta, \hat{y}).$$

The government considers the weighted sum of consumer surplus and the lobbying contributions, as follows:

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

A constraint regarding the contribution schedule from banks must satisfy the following condition. Lobbying contribution payoff to the government is not less than what government values without lobbying as below:

$$s. t. \quad U_G(\beta, \hat{y}) \geq \alpha EU(-1, \hat{y}^G),$$

where  $(\beta^G, \hat{y}^G) = (-1, \hat{y}^G)$  is the optimal choice of government without lobbying.

The banks' truthful lobbying contribution is given by:

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

where  $B$  is a non-negative constant. Therefore, certain level of competition  $\beta^L$  will be achieved by this new problem after considering the lobbying part.

$$\mathbf{Proposition 1:} \quad \beta^G = -1 < \beta^L < \beta^B. \quad (1)$$

From Proposition 1, lobbying distorts the socially efficient level of competition. With lobbying, the banking sector becomes less competitive.

### 3.3 Caps on Lobbying Contribution

The above proposition implies an increased deadweight loss due to the lobby. Congress may introduce policies to mitigate this welfare distortion. The most widely used policy is a cap on contributions. Thus we introduce another constraint of lobbying contributions,  $C(\beta, \hat{y}) \leq \bar{C}$ , where  $\bar{C}$  is a constant representing the cap on lobbying. The final truthful contribution schedule is given by the following equation:

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

It implies that the choice of competition level of banking sector is determined by the limit constraint. It suggests the equilibrium lobbying cap will be:  $\bar{C} = \pi_B(\beta^L, y^L) - B$ . The solution of the problem with cap on lobby gives the competition level,  $\beta^{\bar{C}}$ .

**Proposition 2:** For  $\bar{C} < \bar{C}^L$ , we have  $\beta^{\bar{C}} < \beta^L$ . (2)

### 3.4 Testable Implication

According to Proposition 1 & 2, the model predicts that regions with higher lobbying activities (higher lobbying cap,  $\bar{C}$ ) will result in a lower equilibrium level of competitiveness. On the other hand, lower lobbying activities result in a higher level of competition and a lower level of industry price. Since  $\beta^{\bar{C}}$  is closer to 0 where the industry is identified as monopoly, and the profit margin should be accordingly higher.

Stronger local lobbying activity reduces competitiveness of the banking sector. The profit margin ( $y - r$ ) increases with higher local lobbying contributions. On the opposite lobbying contributions from outsiders will tend to increase local competitiveness. Banks may compete by providing lower prices which lead to a lower profit margin. The assumed hypothesis states that outsiders' lobbying influence dominates the local effect. Stronger overall lobbying activities will end up with an increased degree of competition, as well as a reduced average industry's profit margin.

## 4. Empirical Methodology

In the following section we present the econometric model. We use the average of each state's profit margin as the dependent variable to describe the competition level for the banking industry. Lobbying is the key explanatory variable.

#### **4.1 Dependent Variable**

In order to measure how the competition level in the banking industry varies with total lobbying activities, we use the average profit margins at the state level. Profit margins are defined as the ratio of net income divided by the gross revenue of the institution. It increases when the industry is closer to monopoly and decreases when the industry is highly competitive.

The study will examine the effect of the U.S. lobbying activities and other economic factors on profitability in each by calculating average profit margins in specific state. The dependent variable is the average profit margins of all in-state banks in one year. The evaluation of the competitiveness of the banking industry is measured as, the higher average state profit margin is, the lower competition level that state gets.

#### **4.2 Explanatory Variables**

Lobbying must be included in the equation as the key tested variable to explain the effects on profitability. More specifically, we introduce the concept of lobbying intensity. Lobbying intensity is defined as how much the corporations get actually involved in the lobbying activities (Chen et al., 2012). It can be measured by ratios in terms of either amount of contributed dollars or number of activities adjusted by size effect. We build up two lobbying ratios, which are lobbying dollar ratio and lobbying number ratio. Certain regulations about lobby disclosure are considered as well.

Although there exists a universal corporate income tax rate for financial institutions at federal level in the U.S., different states are launching various corporate income tax schemes which shift slightly over time. Meanwhile federal deductibility is applied to some specific states

to encourage their economic development, such as Alabama and Louisiana. Thus variables regarding corporate income tax are added into the equation.

The equation should include entrepreneurial skills according to the underlying model. However, certain difficulties complicate the analysis when measuring managerial skills for each bank. We have to give up this part of explanatory variables. Instead, we measure the ability to generate funds by using the local wealth level for each state. The banks play a matchmaker role of delivering deposits from households and wholesales to where investment opportunities arise. The availability of funds that can be collected from the public for banks to operate is dependent on the local wealth level. A per-capita basis term for local state revenue measures this attribute.

Since trade openness shows significant impact on the financial development (Rajan and Zingales, 2003), we introduce an openness index to account for it. It can be explained by that the foreign funds' flows create more business opportunities as well as potential competition for local banks in both depository and loan market.

### **4.3 The Econometric Model**

This study basically uses three models, based on the above discussed variables, in order to estimate the average state bank's profitability. OLS method is applied. Since there are varied characteristics across 50 states in our sample, we try to avoid the potential heteroskedasticity problem. Econometrically, the option of robust standard errors is applied in all regressions. In the main regression equation below, noted as specification (i), each state is indexed by  $i$  and the year is indexed by  $t$ :

$$P_{i,t} = \beta_0 + L_{i,t}\beta_l + X_{i,t}\beta_x + \varepsilon_{i,t} \quad (3)$$

where  $P_{i,t}$  is the average bank's profit margin in state  $i$  for year  $t$ ;  $L_{i,t}$  is a vector of lobbying variables in state  $i$  for year  $t$ , including money ratio, number ratio and lobby regulation index;  $X_{i,t}$

is a vector of all other explanatory variables in state  $i$  of year  $t$ , including state tax schemes, state wealth level and trade openness index,  $\varepsilon_{i,t}$  is the error term which represents the unexplained component of the equation. The following module, noted as specification (ii), has the same structure as above:

$$P_{i,t} = \beta_0' + L_{i,t}\beta_l' + LQ_{i,t}\beta_{lq}' + X_{i,t}\beta_x' + \varepsilon_{i,t}' \quad (4)$$

where  $LQ_{i,t}$  is an additional set of lobbying variables in quadratic form, based on existing lobbying variables.

In the extension part about lobbying lag effect, there is another set of one-year lag term of lobbying variables. Specification (iii) described as below uses the same methodology as specification (i):

$$P_{i,t} = \beta_0'' + L_{i,t}\beta_l'' + L_{i,t-1}\beta_l'' + X_{i,t}\beta_x'' + \varepsilon_{i,t}'' \quad (5)$$

where  $L_{i,t-1}$  represents a vector of lobbying variables in state  $i$  for year  $t-1$ .

## 5. Data and Sample

### 5.1 Sample Definition

I examine the 50 states in the U.S. in time period of 2010-2012 and 2006-2008. The most recent period 2010-2012, as the post financial crisis period, is of crucial importance. The data are from several sources, mostly from the NIMSP database, the UBPR and the U.S. Census Bureau website. Due to the availability of lobbying data, there are in total 147 observations in the sample of the post financial crisis period, 2010-2012.<sup>8</sup> When considering the lag effect of lobbying, the

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<sup>8</sup> There are 50 states in the U.S.. Lobbying data are missing for some states in some year, such as Wyoming in 2011, Virginia and New Jersey in 2010. But the missing part is quite small compared to the whole sample. This should not alter the main findings.

sample only consists of the years 2011 and 2012, with 97 observations.<sup>9</sup> There are 113 observations for the pre financial crisis period, 2006-2008.<sup>10</sup>

## **5.2 Lobbying Contribution Data and Variable Generation**

The NIMSP database provides two possible approaches to measure the effect of lobbying on industry competition. In the contribution section of the state overview, numbers of activities reported and dollar amounts of lobbying contributions are provided for all industries. In our research, only the banking sector is concerned. We choose the following variables to account for lobbying contributions for each year and state. There are in total 8 subsectors, “Banking & Lending Institutions”, “Commercial Banks”, “Finance & Credit Companies”, “Miscellaneous Finance”, “Miscellaneous Finance, Insurance & Real Estate”, “Investment Holding Companies”, “Savings & Loans”, and “Securities & Investment” in the banking sector<sup>11</sup>. There are possible overlaps of companies from other sectors. For instance, securities or real estate companies may also be concerned by relevant legislations about “Miscellaneous Finance, Insurance & Real Estate” and “Securities & Investment”. Yet, this is unavoidable according to the design of the database. But certain sectors such as insurance and real estate have been excluded from the sample.

The National Institute on Money in State Politics is a non-profit organization that reveals the influence of campaign money on state-level elections and public policy for all 50 states. Its database receives data from the state disclosure agencies where political candidates directly file

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<sup>9</sup> Several lobbying data for the year 2009 are missing. Therefore, lobbying data with one previous year are not available for the year 2010.

<sup>10</sup> Missing entries are common in lobbying data in the year 2007, this may limit the validity of the findings in the discussion regarding the pre financial crisis period.

<sup>11</sup> Note that for most of states in some years, there can exist partial components of sectors. For example, in 2011, Alaska receives only lobbying contributions regarding “Commercial Banks” and “Securities and Investment”. This can be explained by that during that year banks in that state are only concerned about some particular legislations or no changes are planned to be discussed on relevant legislations.

their report. It collects information regarding all state-level primary and general elections. And then its researchers standardize and code occupation and employer information about contributors and lobbyists for economic interests.

By adding up all relevant lobbying entries of the banking sector, we have data about the dollar amount of lobbying contributions and the number of lobbying activities for each state yearly. In order to fix the size effect due to bigger states experiencing bigger lobbying activities, we generate two lobbying intensity ratios to mitigate this effect. We accomplish it by either dividing the dollar sum by the State Local Revenue or dividing the number of activity times by State Population. And then we multiply the respective average values back to the quotients. For a better understanding, the equations for Lobbying Dollar Ratio and Lobbying Number Ratio are shown as below:

$$\text{Lobbying Dollar Ratio} = \text{Dollar Amount of Lobbying Contribution} / (\text{State Revenue} / \text{Average State Revenue}),$$

$$\text{Lobbying Number Ratio} = \text{Number of Lobbying Activity} / (\text{State Population} / \text{Average State Population}),$$

where both ratios are corresponding with each state of each year. After this manipulation, the lobbying data still keep their original units (dollars and times), but adjusted by each state size.

### **5.3 Profit Margin Data Manipulation**

The raw data for the profit margin is drawn from the UBPR, provided by the Federal Financial Institutions Examination Council (FFIEC). The raw dataset includes over 7,000 banks in each period.<sup>12</sup> For the most recent research interests, we choose the time period after the 2008

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<sup>12</sup> The term “banks” here includes all banks required to file a call report.

financial crisis. We select 2010, 2011 and 2012 as the main research target years. We also use years of 2006, 2007 and 2008 as an extension.

The UBPR is a financial analysis report of commercial banks and saving institutes. Its sample consists of all banks that file the Consolidated Report of Condition and Income, which is usually referred as the “Call Report”. A call report for each calendar quarter is required by FEIEC from every National Bank, State Member Bank and Non-member bank. It includes earnings, balance sheet, asset quality, liquidity and capital. The reason why we select UBPR as the original dataset is because of the nature of the statistics of the call report. Every bank in it provides clear state information, which coincides with the data needed for in our research.

For each bank, the profit margin is specified as net income divided by total interest income, as follows:

$$\textit{Profit Margin} = \textit{Net Income} / \textit{Total Interest Income},$$

where the data for net income of each bank is available in the original UBPR dataset; total interest income is generated by summing up all related accounting entries. Then we take the ratio between them to get the profit margin for each bank. Some individual observations have extremely large (either positive or negative) values of profit margin which should be excluded from the analysis. For instance, the followings cases can possibly occur. It can be simulated that a seriously ‘squeezed’ bank would have a negative profit margin of, say -250%, during a special period, maybe due to a lawsuit; or a very well organized bank in a ‘fantasy’ season may have an unusual profit margin of, say 90%. However, the following cases should be excluded from the raw sample. There is no way to have profit margin over 100%.<sup>13</sup> Additionally, a seriously negative profit margin below, say -300%, that does not cause any forms of dissolution of the

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<sup>13</sup> Except when a bank receives tax returns, and credits exceeding its fees and expenses, which is definitely not possible in the real world

bank is doubtful. These phenomena may be due to the incompleteness of the data (i.e. lack of the main revenue entry data). By dropping those outliers and observations with incomplete income data, the state profit margin is calculated as the average in each state in each year to measure the competitiveness of the banking industry. After the above data manipulation, there are 50 observations for the state average profit margin in each year, corresponding with relevant lobbying data.

#### **5.4 Data for Other Explanatory Variables**

According to the paper of Chari et al. (2006), a CPI score is generated by the Centre for Public Integrity (CPI). It rates all 50 states based on lobbying disclosure regulations. Eight key questions regarding lobbying legislations are addressed, such as individual spending disclosure, employer spending disclosure, public access to a registry lobbyist and so on. The higher the score is, the more lobbying legislations are regulated. Unfortunately, this CPI score does not repeat its work yearly. Only one set of 50 states data used for all years is added to our sample.

There are two tax variables, the federal deductibility rate and state tax rates in the equation. Profit margin is net income after all tax procedures, including corporate income tax and tax credits or the equivalent (i.e. federal deductibility). Thus all tax instruments conducted by the government either at the state or the federal levels should be considered. Since the federal corporate tax is universal across all states except for some tax deductibility for some states, we make the federal tax credit deductibility as the dummy variable with value 1 for those states that have the federal deductibility and 0 otherwise. In U.S., financial institutions have different tax rules from other firms' tax. The rates for all required years and states are available from the Federal Tax Administrator (FTA) and the Tax Foundation.

We now turn to the data for the variable of local wealth. Banks generate revenues by operating on their available funds pool. Different locations have different levels of available wealth. Especially for the U.S., individuals and firms from different states are not equally rich, they are quite different in the available amount of funds that they can deposit or invest with financial institutions. GDP per capita is used to measure personal wealth at the national level. Similarly, we use the state & local tax revenue per capita. It is based on the income approach which reveals the amount of funds retained in each state. By taking the ratio of total state revenue to the population, we obtain how much funds an individual can use on hand. The data source is <http://usgovernmentrevenue.com> which summarizes the data from the U.S. Census Bureau. Data entries are yearly at the state level. There are in total 147 observations added to the post financial crisis period sample.

Banks do not receive funds only from local firms and individuals, they also generate money from foreign firms that have business with locals. By using a method similarly to Rajan and Zingales (2003), we measure the trade openness by the sum of exports and imports divided by the Gross State Product (GSP) for each state. The data is downloaded from the U.S. Census Bureau.

## **5.5 Descriptive Statistics**

Table 1 presents the means and standard deviations for all eight variables used in both sample periods.<sup>14</sup> Focusing on the post financial crisis sample, the average state profit margin is 18.85% with a standard deviation of 18.55%. The bank lobbying dollar ratio has an average of \$1.19 million with a standard deviation of \$1.61 million at the state level. The bank lobbying

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<sup>14</sup> The two additional lag terms representing one year previous lobbying variables are obtained using the same data as the lobbying variables summarized in Table 1.

Table 1 Descriptive Statistics

Sample Period:	2010-2012	2006-2008
	Mean (Std. Dev.)	Mean (Std. Dev.)
State Average Profit Margin (%)	18.85 (18.55)	12.57 (11.78)
Lobbying Dollar Ratio (\$ million)	1.19 (1.61)	1.84 (1.44)
Lobbying Number Ratio (thousand time)	1.09 (1.37)	1.49 (1.11)
CPI Score	59.38 (10.31)	59.28 (10.45)
State Tax Rate (%)	6.52 (2.67)	6.69 (2.46)
Federal Deductibility (Dummy)	0.088 (0.285)	0.075 (0.260)
State Revenue per Capita (\$)	8488.23 (2509.96)	6987.85 (2549.83)
Trade Openness	14.56 (37.02)	12.77 (27.04)
Observations	147	113

Source: Uniform Bank Performance Report, National Institute of Money on State Politics, Center for Public Integrity, U.S. Census Bureau, Federal Taxation Administrator and Tax Foundation.

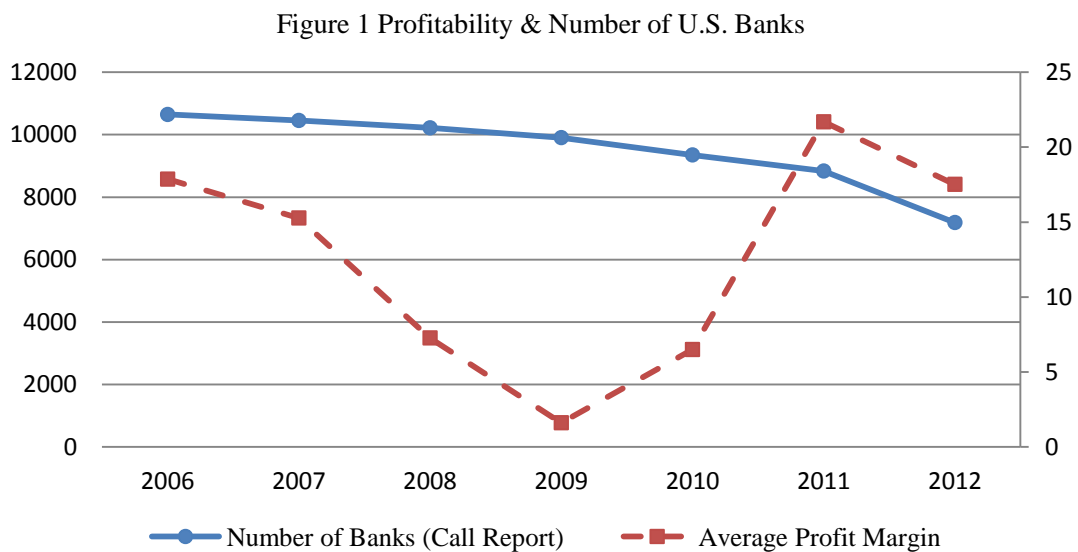
number ratio averages 1,090 times of lobbying activities with a standard deviation of 1,370 times at the state level. The state tax rate for banks has an average of 6.52%. According to federal deductibility, only less than 9% of states can enjoy the tax credit over the period of 2010-2012. Every citizen shares about \$8488 revenue from their local firms and governments, with a standard deviation of \$2510 over states. The trade openness index takes an average of 14.56 and a standard deviation of 37.02. There are in total 147 observations in the main sample.

Regarding the pre financial crisis period of 2006-2008, the average profit margin is slightly lower than the main sample, standing at 12.57%. However, it experiences higher lobbying ratios whose means are \$1.84 million and 1,490 times, respectively for lobbying dollar

ratio and lobbying number ratio. This phenomenon shows a preliminary evidence for the hypothesis that overall stronger lobbying activities reduce profit margin and increase the sector's competition. However, it can be argued that instead of a lobbying effect, the lower level of banks' profitability is caused mainly by changes in other factors, such as local wealth level and trade openness over time. A regression analysis will sort out these competing explanations.

### 5.6 Review of the Banking Sector and Lobbying Activities during 2006-2012

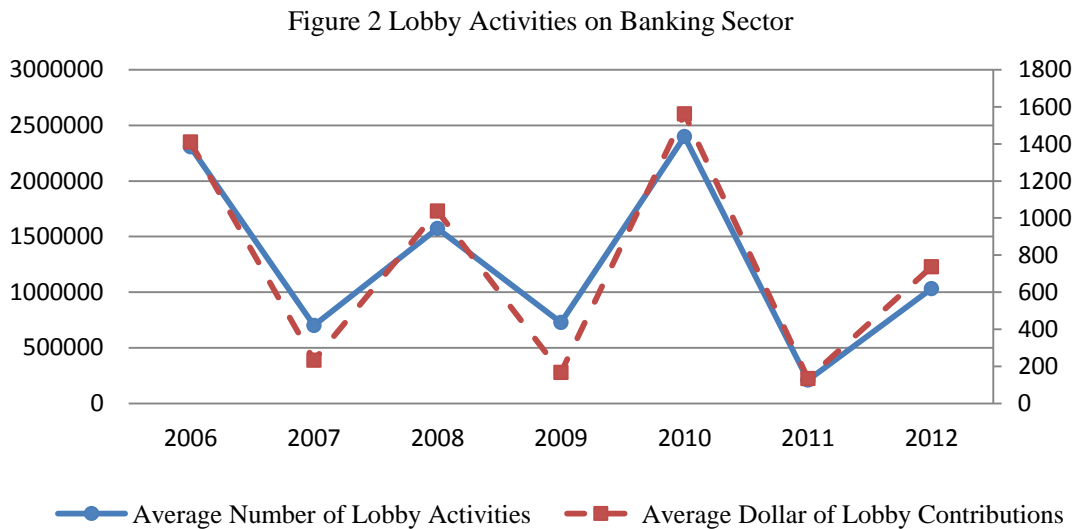
Figure 1 covers the period 2006-2012. The blue line represents the number of banks. The dashed line in red represents the average profit margin for each year based on the UBPR. There were over 10,600 individual banks filing a call report in 2006. This number dropped to 7,186 in 2012. Interestingly, the year with the highest frequency of quits is not 2008 in which the financial crisis occurred, but the most recent year, 2012. Except for the case of incomplete data, this large reduction in banks and saving institutes could be mainly due to normal competition and quick failures of suffering from the 2008 Financial Crisis. If those banks failed during this time exercise a significantly lower level of lobbying, this supports our hypothesis. Unfortunately, such



Source: Uniform Bank Performance Report from FEIEC

an approach is not applicable due to our data source limitations. The national average profit margin was about 18% in 2006, and then it dropped to below 2% in 2009. After the recovery from the financial crisis, the industry began to boom strongly, peaking over 20% in 2011.

Figure 2 shows the average lobbying activities in the banking sector over all states during 2006-2012.<sup>15</sup> The average number of lobbying activities shows very similar patterns as the average dollar of lobbying contributions with slight variations over time. Specifically, lobbying becomes more frequent during the year of U.S. Presidential Election. In 2010, both lobbying dollar amount and number of times reached a peak with around \$2,400,000 and 1562, respectively. In the followed year of 2011, banks' lobbying efforts dropped to the bottom with only \$210,000 and 134 per state.



Source: National Institute on Money in State Politics Database

<sup>15</sup> The data for years 2007 and 2009 are not actual averages; they are estimated based on the limited available states' data.

## **6. Results**

In this section, the main results and extensions are discussed. First, a negative and significant relationship between lobbying and the profit margin is consistent with the expectations. This section discusses some possible econometric problem as well, including residual normality, heteroskedasticity and an extended specification model by introducing a non-linear impact of lobbying effort. The second part includes some extensions of our study. It discusses the lobbying lag effect and compares the findings before and after the crisis.

### **6.1 Main Results**

The dependent variable is the average profit margin of U.S. banks across all states. Column 1 in Table 2 presents the regression results by specification (i), equation (3) in Section 4. An additional \$1,000,000 of lobbying contributions reduces the average state profit margin by 1.76%. An additional 1,000 times of lobbying activities reduces the sector's profit margin by 2.25%. Both relationships are significant. Both estimated coefficients are economically significant as well. Around 2% reduction in the sector's profit margin per million dollars of contributions is economically meaningful. So is the case for lobbying number variable on a thousand times of lobbying activities base. One thing about interpretation is that the lobbying influence is analyzed at the state level. If a full shift for the whole federal banking sector's profitability is assumed, the lobbying effort needs to be multiplied by the number of states in the U.S.

The results suggest that increased overall lobbying activities will result in a decrease in the banking sector's profit margin. Therefore the competitiveness of the industry increases because of the low service prices. This is consistent with the hypothesis implied by the model.

Table 2 Main Regression Results

Sample	2010-2012	2010-2012
Variables	Estimated Coefficients (i)	Estimated Coefficients (ii)
Lobbying Dollar Ratio (\$ million)	-1.759* (0.915)	-6.005** (2.878)
Lobbying Number Ratio (thousand time)	-2.246** (1.004)	-6.207** (2.663)
Lobbying Dollar Square	–	0.430* (0.248)
Lobbying Number Square	–	0.529 (0.437)
Lobbying Product	–	1.028* (0.551)
CPI Score	-0.217 (0.144)	-0.141 (0.141)
State Tax Rate (%)	0.750 (0.666)	0.535 (0.666)
Federal Deductibility (Dummy)	8.773** (3.645)	9.481** (3.820)
State Revenue per Capita (\$)	0.00198*** (0.000624)	0.00193*** (0.000566)
Trade Openness	-0.052** (0.024)	-0.0422* (0.0218)
Constant	14.557 (12.114)	15.249 (11.654)
R <sup>2</sup>	0.2019	0.2557
Observations	147	147

Note: Robust standard errors are in parentheses. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

The coefficient on CPI score is negative but insignificant. The CPI score measures the lobbying disclosure laws; the higher the score is, the better it is regulated. It is a proxy for the cap restriction in the lobbying model. The negative sign suggests that the better regulated states tend to have a lower profit margin in the banking sector. On the other hand, the lower cap on lobbying results in lower prices, and a higher level of competition. This is consistent with Proposition 2 in Section 3.

The estimated coefficient for the state's tax rate is insignificant. The federal deductibility dummy shows a positive significant relationship. If a state is eligible for the federal tax deductibility, banks in that state enjoy an average 8.8% bonus. The proxy variable for the local wealth level, state revenue per capita, is significant and positive. It matches the theoretical expectation. The estimated coefficient for trade openness is significant and shows a negative relationship with the banking sector's profitability. This suggests that when the state trade and the flow-in/out money are higher, the sector suffers a lower profitability by facing more outside competitors. According to the Rajan and Zingales (2003) financial firms tend to set barriers to prevent entry by potential competitors in order to maintain their local monopoly power. Our findings on trade openness support this statement.

Table 3 presents the tests results for specification (i). The normality of error distribution is tested by the Jarque-Bera test (JB test). The value of the Chi-square statistic, which is 2.668, suggests that we cannot reject the null hypothesis of normality at any level of significance. Thus the residuals are normally distributed. The histogram for their distribution is shown in Figure 3. The normality distribution in residuals will ensure the validity of the following tests.

Table 3 Tests Results for Specification (i)

Tests	Statistics Value	P-value	Degree of Freedom
JB test	2.668	0.263	2
Breusch-Pagan-Godfrey	16.80	0.0188	7
Ramsey RESET	4.08	0.008	3, 136

In Table 3, we include the Breusch-Pagan-Godfrey test for the existence of heteroskedasticity. The F-statistics value is 16.8 with a degree of freedom of 7. It rejects the null

hypothesis of homoskedasticity at the 5% level.<sup>16</sup> The explanatory variables used show heteroskedasticity across states in the sample. This suggests that to improve the empirical model it is necessary to include more variables of state characteristics. Since the main focus is on the impact of lobbying activities, usage of the heteroskedasticity-consistent standard errors (robust option in Stata) will ease the heteroskedasticity problem.

Because of the low R-square in the first regression ( $R^2 = 0.20$ ) it is possible that we have omitted variables. We run the Ramsey RESET test to see whether there are any non-linear relationships for the explanatory variables. The F-statistics value is 4.08 corresponding with a P-value of 0.008, which rejects the null hypothesis of no omitted variables. The result shows there are possible powers of independent variables, or products of any of them.

We generate three variables: the power of Lobbying Dollar Ratio, the power of Lobbying Number Ratio, and the product of Lobbying Dollar Ratio and Lobbying Number Ratio. The followings are the definitions:

$$\text{Lobbying Dollar Square} = (\text{Lobbying Dollar Ratio})^2,$$

$$\text{Lobbying Number Square} = (\text{Lobbying Number Ratio})^2,$$

$$\text{Lobbying Product} = \text{Lobbying Dollar Ratio} * \text{Lobbying Number Ratio}.$$

By introducing these three new variables into the regression we expect the specification errors pointed by the Ramsey RESET test to be fixed or improved. This regression is associated with the specification (iii), and Column (ii) in Table 2 which represents the new regression results. Some of the new variables are significant. The lobbying dollar square and the lobbying product variables are both significant at a level of 10%. And the existing lobbying dollar ratio and lobbying number ratio are significant. The lobbying dollar ratio variable becomes significant

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<sup>16</sup> Although it can be argued that it cannot reject the null at 1% significance, we prefer to be econometrically conservative.

at 5% instead of 10% in the original specification. And the R-square is improved to 26% in specification (ii).

In Table 4, the result for the Jarque-Bera normality test shows that the new residuals in specification (ii) follow a normal distribution; the associated histogram is shown in Figure 4. This normality assumption allows us to investigate the tests. According to the results of the Breusch-Pagan-Godfrey test, heteroskedasticity still exists. But there is a major change in the results from the Ramsey RESET specification test. The statistics' value becomes much smaller, with a P-value of 0.27, which means we cannot reject the null of no omitted variables. This suggests that by adding these new three lobbying variables the model has no other non-linear relationships as major impacts.

Table 4 Tests Results for Specification (ii) with Lobbying Square Variables

Tests	Statistics Value	P-value	Degree of Freedom
JB test	4.521	0.1043	2
Breusch-Pagan-Godfrey	19.91	0.0301	10
Ramsey RESET	1.32	0.2706	3, 133

Both sets of existing and new lobbying variables contain significant variables. Two of the new variables, lobbying dollar square and lobbying product, are significant. Unexpectedly the sign of all new variables are positive. Fortunately, the existing lobbying dollar and number ratios still stick by the expected sign by being significantly negative. And the magnitude of both impacts has increased to over 6%, which far exceeds the three new variables' magnitudes. Overall, the results are still consistent with the expectations mentioned previously.

The interpretation of the two new significant lobbying variables is as follows. The significance of the dollar square variable indicates that lobbying contribution is not only valued

in linear form. The larger lobbying contributions gain extra influence in a quadratic way. The significance of the product variable is straightforward. Cumulative lobbying influence is measured by considering both continuing lobbying activities and reasonable amounts of contributions. While regarding the new quadratic lobbying variables, results show a positive sign. This is inconsistent with the underlying hypothesis. According to the theory, the positive relationship suggests that local lobbying efforts dominate. This result is possibly explained by the following reasons. First, there exists a cancel-out effect on lobbying impacts from in-state banks and outsiders. Local banks tend to introduce barriers to entry to enhance their monopoly power and lower the level of competition. But out-of-state banks tend to enter the market with lower service prices to increase the level of competition. The local banks enjoy closer access and more frequent contacts to lobby. Thus when there are large lobbying contributions and persistent efforts, politicians may favour local banks over outsiders. Even though the overall influence on the sector is still dominated by the large contributions from outside-state banks. The influence of each dollar and each lobbying attempt are valued more for the locals than outsiders. This may explain why the lobbying dollar square and product variables show a positive relationship. Second, since this area of study is relatively fresh, the functional form approximation used in the paper may have problems. Econometrical theory states that a wrong functional form with limited data sample can generate the wrong estimated sign. Better data and further research in modeling may help resolve the issue. In general, either explanation requires more research on the impact of lobbying at the state level.

In conclusion, the salient findings are: (1) the empirical model matches the conceptual model with a statistically significant negative relationship between the banking sector's profit margin and lobbying activities, in terms of both dollar amount and number of activities; (2) the

lobbying impact is also economically significant; an additional \$1,000,000 lobbying contribution or 1,000 lobbying activities reduces the sector's profit margin by around 2%; (3) as the state is more open and free in fund flows, the in-state banks face a small negative impact on profitability; (4) residuals of the sample are normally distributed, but the sample has a heteroskedasticity problem; (5) a non-linear relationship of lobbying impact is found, and the new specified model with three additional lobbying variables yields results in accordance with expectations; (6) large contributions and continuing efforts may gain extra influence in quadratic form; (7) the positive signs of the new lobbying square and product variables possibly suggest local banks have stronger influence in some cases, but this issue requires further investigations.

## **6.2 Extensions**

In this subsection, we consider two extensions. First, we will examine the lobbying lag effect by analyzing whether previous years' lobbying effort affects the banking sector among states. In the second part, we conduct a regression on the pre financial crisis sample during 2006-2008. We compare it with the previous main sample to check any changes in lobbying impact from the 2008 Financial Crisis.

By examining the lobbying lag effect, the regression uses specification (iii). It is approached by adding two lag lobbying terms to specification (i). These two lag terms represent the respective dollar amount and the number of lobbying activities in the specification (i). Since the use on quadratic lobbying variables in specification (ii) is new; no previous literatures apply quadratic forms of any lobbying variables. And specification (i) is better underlined by the conceptual model. Table 5 shows the estimated coefficients and robust standard errors for the lobbying-lag-effect regression on the 2010-2012 sample. According to the regression results, only the lag lobbying number ratio is significant. However, its positive sign contradicts the

underlying theory. The rest of lobbying variables including lobbying dollar ratio, lobbying number ratio and lag lobbying dollar ratio are insignificant. Both current and lag lobbying dollar variables have the expected negative sign. As in the previous example, variables of CPI score and state tax rate are insignificant. The rest of the explanatory variables are significant.

The lag effect in specification (ii) does not show satisfactory results, since only one positive relationship shows a significance regarding lobbying variables. The empirical results of

Table 5: Lobbying Lag Effect Regression Results

Sample	2010-2012, lag effect
Variables	Estimated Coefficients (iii)
Lobbying Dollar Ratio (\$ million)	-0.314 (0.651)
Lobbying Number Ratio (thousand time)	0.108 (0.805)
Lag Lobbying Dollar Ratio (\$ million)	-0.604 (1.301)
Lag Lobbying Number Ratio (thousand time)	3.090* (1.575)
CPI Score	-0.0675 (0.172)
State Tax Rate (%)	0.701 (0.825)
Federal Deductibility (Dummy)	12.165** (4.905)
State Revenue per Capita (\$)	0.00168*** (0.000615)
Trade Openness	-0.0946*** (0.0359)
Constant	8.045 (14.258)
R <sup>2</sup>	0.2342
Observations	97

Note: Robust standard errors are in parentheses. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

lag effects fail to match the underlying hypothesis. There are possible reasons. First, this may be explained similarly as in the previous finding. In-state banks enjoy advantages of closer contacts and better access while lobbying. By combining this phenomenon and the previous one found in the main results, it suggests a local effect about the impact of lobbying on the banking sector. We call this a “Local Persistence Effect” which says that local banks tend to have longer and stronger influences by lobbying efforts in some special cases. This occurs when banks send large contributions, and continue persistent lobbying activities with a reasonable amount of contributions. Secondly, according to Chen et al. (2012), the effect of lobbying tends to vanish over time. The lobbying lag effect on the banking sector may not be significant. Possibly neither lag terms should be included in the regression. This is perhaps the reason why specification (iii) is not consistent with the conceptual model.

The comparison between before the 2008 Financial Crisis and afterwards draws our curiosity. We tend to be conservative for the same reasons as above when choosing an empirical model. We stick with specification (i), which is better defined under the conceptual framework. Table 6 presents the relevant regression results.<sup>17</sup> There is a significant relationship of lobbying number ratio on the profit margin of the banking sector across states, with a magnitude of 2.94% for an additional thousand times of lobbying activities. Meanwhile the other lobbying dollar ratio has a positive sign with a magnitude of 0.96%.

The results may seem contradictory to the underlying hypothesis. But there are reasons behind this paradox. One notable thing is the special time period of the chosen sample (2006-2008). It is the peak period just before and on the 2008 Financial Crisis. Because it was just

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<sup>17</sup> The regression work regarding specification (ii) with quadratic form of lobbying variables was attempted as well, some consistent significances show up. Since lobbying effects on riskiness of banking sector is required in the model, due to the limit of this paper, more detailed empirical discussion is left for future research by combining the model of competition and riskiness.

before the 2008 Financial Crisis, the U.S. banking industry was regulated inefficiently. Hence during this period without extra attention on controlling the risk, lobbying in total was somehow blindly increasing the monopoly power of the local banks. Meanwhile all banks were about to pursue higher short-term profits regardless of risk. This led to a temporary boost in profitability, but the seed of default risk was planted with payback in the future. Figure 1 shows that many banks have failed after the financial crisis. During the development of the financial industry, smaller local banks tend to be acquired by bigger ones (Rajan & Zingales, 2003), such as those on Wall Street. It is mainly the local banks that fail from intense competitions. Since there were more local banks during 2006-2008 than the recent period, the in-state lobbying effect had stronger impact on the overall degree of competitiveness in the banking sector than post financial crisis period. At last the results can be misleading because of the usage of profit margin as a

Table 6 Before-Financial-Crisis Regression Results

Sample	2006-2008
Variables	Estimated Coefficients (i)
Lobbying Dollar Ratio (\$ per \$Million)	0.964 (0.735)
Lobbying Number Ratio (per Million)	2.943*** (1.067)
CPI Score	-0.140 (0.105)
State Tax Rate (%)	-0.197 (0.550)
Federal Deductibility (Dummy)	8.216*** (2.550)
State Revenue per Capita (\$)	0.00485*** (0.000347)
Trade Openness	0.176*** (0.054)
Constant	9.760 (8.887)
R <sup>2</sup>	0.2049
Observations	113

Note: Robust standard errors are in parentheses. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

proxy of the industry's competition degree. During special periods such as just before the 2008 Financial Crisis, a state's average profit margin may not be a good proxy to account for the industry's competition level. For instance, even though the level of competition has increased, a higher profit margin shows up due to the global monopolized banking industry. This discussion requires the involvement of riskiness, which is being examined under another related topic (Gustavson, 2013). By combining all of these reasons, the before-financial-crisis sample regression results do not contradict the theoretical model.

## **7. Conclusions**

We followed the conceptual framework of a General Equilibrium Lobbying Game with a single Banking Sector (Perez-Saiz & Semenov, 2013). Then we conducted an empirical investigation in how lobbying activities affect the banking sector's competition level. Regression analysis was performed by measuring the degree of competitiveness as the industry profit margin among states in the U.S. on the post financial crisis sample.

The following summarizes the salient findings regarding the main research sample. The regression results show a significant negative relationship between lobbying and the aggregate-level profit margin of the banking sector. Each additional \$1,000,000 of lobbying contributions or 1,000 times of lobbying activities lead to a 2% decrease in the profit margin. Heteroskedasticity data problem was found in the sample. As we identified omitted non-linear variables, we introduced the square and the product of the lobbying number ratios and the lobbying dollar ratios. And some of the quadratic form variables showed significant positive effects. This suggests a "Local Persistence Effect" for the in-state banks under some special

cases. For instance, this occurs when banks donate a large amount of contribution funds and make persistent lobbying effort.

We examined the lag effect as an extension to the model. The results suggest a “Local Persistence Effect” or insignificant lobbying lag effect on the banking sector. As in the pre financial crisis sample, the results present an unexpected positive relationship between lobbying and the sector’s profit margin. There are promising explanations, such as to include the discussion of riskiness, or the inappropriate usage of state profit margin as proxy of the degree of competition in the banking industry.

Both the theoretical and the empirical models need further improvement. The major drawback of this paper is the incomplete database of lobbying contributions. Econometrical issues such as heteroskedasticity and omitted variables may weaken the universality of our findings. Moreover the lobbying variables have an endogeneity problem caused by reversal causality and omitted variables (Kim, 2008). To include the discussion of endogeneity of lobbying data in future research may achieve promising improvement to the model.

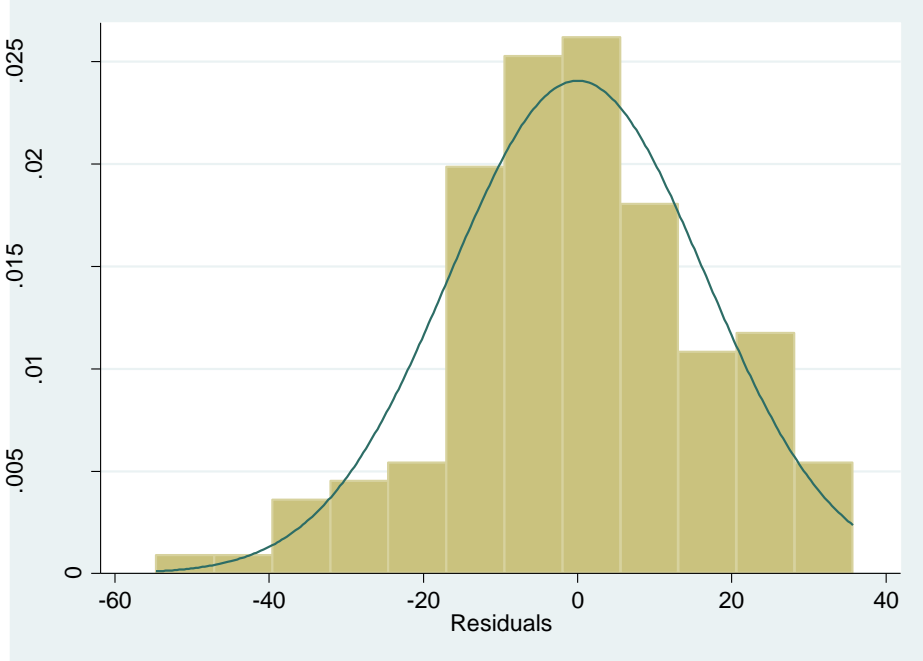
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# Appendix

**Figure 3: Residual Distribution, 2010-2012, Specification (i)**



**Figure 4: Residual Distribution, 2010-2012, Specification (ii) with Lobbying Square Variables**

