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Market Concentration and Political Outcomes

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Abstract

U.S. industries have become more consolidated over the past decades. This trend has raised concerns regarding its impact on society. This paper delves into the connection between market concentration and political outcomes. By integrating lobbying data from the Center for Responsive Politics with industry-wide economic data from 2003 to 2019, I utilize several multivariate models to investigate the link between concentration and lobbying expenditures at the aggregate U.S. industry level. I also conduct three representative industry case studies: commercial banks, airlines, and general merchandise stores. The results are mixed. While there is a negative association between market concentration and lobbying expenditures in the overall and airline industry studies, there is a positive relationship in the case of general merchandise stores. I further suggest potential avenues for future research and antitrust policy.

1 Introduction

Modern corporations are becoming big enough to influence public policy and societal welfare. The economic power of large corporations is so powerful that it may be on the similar level as, or even supersede, some nations. This capability can grant them political power to be free from stringent regulations and to shape the outcomes of social policy at the expense of the public interests. When the interests of the majority are controlled by a small number of entities, democracy is under threat. History reminds us how corporate power interacted with politics at a detrimental cost to the public. During Adam Smith's time, the East India Company extended its monopoly power for 233 years by sending a £3.2 million loan to the British Treasury and engaging in continuous lobbying. This monopoly power not only resulted in higher prices and limited supply but also caused the deaths of more than 10 million Bengalis from starvation and led the British Empire to wage the Opium War against China (Zingales, 2017). In a more recent example, the Department of Justice filed criminal charges against lobbyist Jack Abramoff, in addition to civil charges. During his journey to promote business interests, Jack pushed to adopt laws that protect medical marijuana from enforcement and amend the federal tax code (Meyer, 2020). He (with the support of corporations) provided an all-expense-paid trip to Scotland, Superbowl tickets, and lots of gifts to agencies to receive favorable policy outcomes (2020). This lobbying, or more correctly, bribery, is voracious enough for the American economic and political system and should attract more people's attention to the power of large corporations.

Growing concern about market concentration in our imperfectly competitive world and its effects on society suggests the need for an in-depth analysis of the possible link between economic concentration and its effect on the political system. This relationship is important for several reasons. First, business concentration has been increasing over the past 20 years, resulting in a persistent rise in the dominance of the top 1 percent and top 0.1 percent of businesses in the U.S. (Ma, 2022). These trends have coincided with a falling labor share of income, private investment, and an increase in corporate markup, which have been shown to be stable in Europe and Asia over time (Philippon, 2021). Second, businesses play a significant role in politics, often through lobbying and campaign contributions. According to the Committee for Economic Development's (CED) 2013 survey, 75% of executives stated that "the U.S. campaign finance system is pay-to-

play." In 2020, total election spending increased to $14.4 billion, making it twice as expensive as the 2016 election, according to the data from Opensecrets.

So can market structure explain industry political activities? If yes, what does the relationship look like? Can market power beget political power? My preliminary focus is descriptive. I uncover trends in market concentration and demonstrate their correlation with the level of industry political engagement. To empirically test this potential link, I first quantify political efforts by using lobbying expenditures and market concentration by using the ratios of sales of the largest four firms to industry total sales provided by the economic census. I use data from 57 U.S. industries defined in 3-digit NAICS codes from 2003 to 2019. Then, theoretical models with controls for variations across industries and years are built on an economy-wide basis. These are similar to the structure-conduct-performance paradigm (SCPP) by Bain (1951), except the outcome of interest involves complex political dynamics. Due to the limitations and criticisms of SCPP[1], this paper further applies the new empirical industrial organization (NEIO) method (Bresnahan, 1989) by conducting three industry case studies of commercial banks, airlines, and general merchandise stores. One special work done in this study is to use industry-specific characteristics to calculate tailored concentration ratios and account for heterogeneity. This paper hopefully provides a comprehensive picture that covers both the overall U.S. economy and representative industries in predicting the relationship between market concentration and political engagement level.

Although I initially hypothesized that more lobbying expenditures would be concurrent with a higher market concentration ratio, the findings from this paper show a negative relationship between these two variables at the cross-industry level. First, the negative correlation at the aggregate level closely ties with the theory of competition among pressure groups for political influence (Becker, 1983). That is, firms lobby for their private interests and increase spending to seek favors from regulators as more firms join the competition. However, this result conflicts with the "free rider" issue stated in Olson's theory. Concentrated industries are more likely to participate in political activities because it is easier for them to minimize the "free rider" issues and thus have larger incentives to contribute (Olson, 1971). But there is little empirical research confirming whether the "free rider" issue can be minimized in concentrated industries. Additionally, efforts

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[1] See Schmalensee (1989) and Peltzman (1977).

may largely depend on the issues that motivate firms to lobby. Large firms in concentrated industries may not have collective incentives and choose to lobby individually to pursue their private interests. Then, the theory proposed by Olson converges with the competition theory of Becker. Case studies provide more insights into this relationship, analyzing who those decision makers are, issues of interest, and other unobservable industry-specific variables that are hidden behind the aggregate-level result. All in all, this paper provides a qualitative and quantitative analysis of this relationship. The results are noteworthy, but there is room for further investigation.

I begin in Section 2 with a brief theoretical background linking economic concentration to corporate political activities before describing the data and measurements in Section 3. Section 4 separately analyzes the patterns of lobbying expenditures and market concentration. Section 5 develops some multivariate models for the predictive relationship, illustrates the results, and also includes a simple test of the causal relationship. Section 6 provides robustness checks for my results. I begin with three selected industry case studies in Section 7. Section 8 discusses the implications of results from cross-industry and individual case studies and suggests potential directions for future work and antitrust policy.

2 Theoretical Background

Industry political engagement reflects its efforts to build a relationship with the government as a competitive tool for seeking favorable policy outcomes (Hillman, 2003). Involving in political activities help businesses to receive subsidies, lift higher barriers to entry, influence substitutes and compliments, and conduct price fixing in the market (Stigler, 1971). However, if the benefits mentioned are true, why are some industries engaged actively in political activities while others are not? Why do some industries overall send more resources to regulators? What economic features explain this variation? Previous studies have explored these questions and linked the economic structure of industries with political outcomes. Grossman and Helpman (1994) incorporated market concentration and formalized the trade protection policy from political equilibrium and contributions made by different entities. Huneeus & Kim (2021) modeled the relationship between firm size, lobbying, and distortions of allocation of resources across firms. McCarty & Shahshahani (2021) uncovered trends in lobbying concentration and its overlap with the economic size of the industry. They found that firm mark-ups, higher aggregate market

concentration, and larger firm inequality happen simultaneously with increases in lobbying and industry concentration. Cowgill et al. (2022) showed a positive relationship between mergers and increasing political spending by firms.

Other studies have focused on the "feedback loop" relationship between market characteristics and political strategies. For instance, Zingales (2017) proposed the "Medici vicious circle," in which firms use financial resources to obtain what they want from the political system, and then policymakers may react strategically in favor of those firms, such as through entry deterrence. Then, market power is further entrenched. Callander et al. (2021) developed an integrated model to formalize this circularity and show the positive feedback loop between market concentration and political influence.
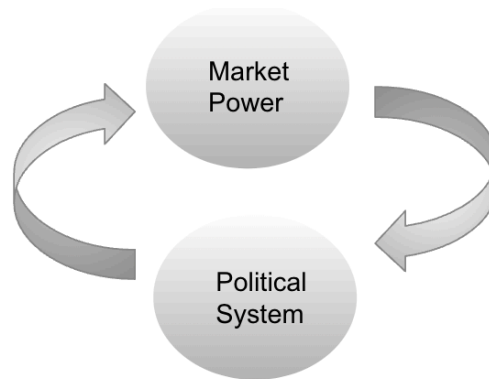
Figure 1. Medici vicious circle

There have also been many industry case studies that specifically study the impact of industry concentration, profits, and productivity on corporate political strategies. Showalter (2021) closely studied three industries and disclosed that an increasing concentration is a leading indicator of the level of lobbying expenditures in the next three or four years. Igan et al. (2011) focused on the mortgage lending market and showed lenders with higher loan-to-income ratios and faster growing portfolios lobbying more on related issues.

Following these studies, I seek to explore relationships between market characteristics, mainly market concentration, and industry political efforts. I borrow from both longstanding theories and the most recent empirical work to understand this link. But before that, I believe it is

necessary to identify the contexts in which the change in market concentration and other economic-based features may be concurrent with the change in industry political activities.

2.1 Industry Concentration

Industry concentration has received more attention than other economic features that have been linked with political engagement (Ozer & Lee, 2009). A high market concentration here is defined as market shares that are concentrated in a small number of companies and proxies less competition in the market (OECD, 2017). A wide range of research studies the impact of industry concentration on political strategies, either on the firm level or aggregate industry level. However, due to the complexity of concentration itself and endogenous issues involved with political decisions, the results are mixed. They stand in two groups: the "collective action theory" group and the "competitive theory" group.

Studies aligned with the idea of collective action theory suggest that more concentrated industries are more likely to become politically active. (Lenway and Rehbein, 1989; Schuler et al., 2002). Collective action theory (Olson, 1971) states that firms in more concentrated markets are more likely to have a higher political participation level and minimize the "free-riding" issues when the "protection-seeking" process requires groups to act together toward a common goal. The "free-riding" issue arises when firms that are not contributing through any political channels benefit from the outcomes of other firms' collective actions. In this scenario, firms may have fewer incentives since no one is willing to share their pies with a "free-rider." Thus, the more industries are able to minimize the "free-rider" issue, the more firms are willing to participate (Olson, 1971). A concentrated industry are more likely to mitigate this issue since it is easier for a small number of dominant firms to organize and monitor others' participation, thus discouraging firms from "free riding" (Schuler et al., 2002). Moreover, a few dominant firms can secure a larger share of beneficial political outcomes by sharing the burden of political costs and sending a more unified, efficient voice (Esty and Caves, 1983). Therefore, a concentrated industry provides firms with more incentives to engage in political actions.

On the other side, findings of a decrease in market concentration accompanied by an increase in political activities are more consistent with the theory of competition among pressure groups for political influence built by Gary Becker in 1983. Becker argued that increased pressure

(i.e., political activities) by group *j* might affect the marginal influence of group *i* and the group *i*'s benefits they would gain. Group *i* then might exert greater pressure that affects other groups. Groups compete until a political equilibrium is reached[2]. In this "Cournot-Nash Equilibrium" setting, the group's control of "free-riding" is not determined by its absolute pressure and efficiency but by its pressure and efficiency relative to that of other groups. A group may not control "free-riding" very well, but because it manages better than other groups, it can still compete successfully. That is, what is important is competition between interest groups, seeking to share a proportion of the pie by exerting greater political efforts than the other. Therefore, firms become more politically active when the market is more competitive and less concentrated (Agca et al., 2019).

I hypothesize that there is a positive relationship between market political participation level and market concentration. The hypothesis is made for two reasons. First is the economic explanations of the change of concentration: economics of scale and barriers to entry. Economies of scale enable large-scale firms to possess a cost advantage over small firms, supply efficiently for most of the market, and have more resources and capabilities. Since firms need to provide sufficient votes or resources to legislators to secure favorable political outcomes, smaller firms are naturally kept away from actively participating in the political process. Thus, when economies of scale drive firms to grow larger, the industry becomes more concentrated, and firms have more available resources to invest in during the legislative process.

Barriers to entry, as part of the explanations for the change in concentration, was stated in Bain's theory. According to Bain (1954), the higher the "condition of entry" – the ability of established firms to raise prices above competitive prices without attracting new rivals, the more difficult for new entries to enter the market, thus leading to a more concentrated industry. This ability may arise out of the successful implementation of political strategies. For example, it provides firms with incentives to lobby policymakers to influence policy outcomes and entrench market power by deterring new entries. Hence, we may observe a higher level of political engagement in more concentrated industries.

Second, the negative correlation between concentration and productivity growth but a positive correlation with prices in the current U.S. market suggests it is a type of "bad"

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[2] See Becker (1983).

concentration (Covarrubias et al., 2020). While "good" concentration comes from a higher elasticity of substitution, technological change, and intangible capital investment, "bad" concentration is attributed to lax antitrust regulations and lobbying (Philippon et al., 2021& Janashvili, 2002). Accordingly, I posit that a concentrated market may become more politically active during the legislation process.

Hypothesis 1: Industry concentration will be positively associated with industry political efforts.

2.2 Economics Features

To test the independent effect of market concentration on political engagement, it is important to consider the effects of other industry economic features. One important characteristic is industry profits. Previous research has shown the relationship between profits and concentration (Ornstein, 1972; Sauer, 2000; Kennedy, 2020). But profit is also likely to impact political efforts independently of concentrations because a higher profit may imply the availability of resources that are necessary for political actions. Moreover, a more profitable industry may have more incentives to seek protection from regulators due to the larger gains from turning the policies in their favor (Salamon & Siegfried, 1977). The Stigler-Peltzman model of regulation derives an industry profit function and shows that a higher industry profit elicits more political activities (Hillman, 1984).

However, it is also possible that industries with higher profits are less likely to send money to legislators since they may be afraid that such political actions would attract public attention to their monopoly positions in the market that yield them these high benefits (1977). Overall, I favor the first explanation and expect a positive relationship between profits and political participation levels.

Hypothesis 2: Industry profitability will be positively associated with industry political efforts.

2.3 Potential Causal Link

In this paper, I will further examine the potential causal relationship between the involvement of industries in politics and market concentration. I utilized a political theory of the firm proposed by Zingales (2017). There are two types of regimes: one uses political power to grant economic power by allowing monopoly rights to operate certain businesses, while the other lets rich business sectors control the political system directly or indirectly. One thing in common is that these two main regimes allow big businesses to determine their political efforts to secure and enhance their benefits. In addition, Stigler (1971) stated that every industry with enough political involvement would seek control of new entries, and the corresponding instituted regulation would effectively stagnate the growth rate of new firms for these industries. Due to the lack of previous empirical evidence on this causality, I try to bridge this gap by implementing a simple statistical tool called Granger Causality[3].

Hypothesis 3: Industry concentration does Granger Cause industry political efforts.

3 METHOD

3.1 Data

Data comes from three main sources. First, I use lobbying expenditures from 2003 to 2019 to measure industry political involvement in this study. Lobbying is used by companies to deliver persuasive information in private meetings with political parties and gain potential benefits from it (Shcherbakova & Wakefield, 2021). It has been the dominant form of political activity for businesses to shape political outcomes (Drope & Hansen, 2009). Hence, it is reasonable to assume that more lobbying expenditures represent a higher level of active political participation. The basis of the lobbying data comes from the lobbying disclosure reports filed with the Secretary of the Senate's Office of Public Records (SOPR). Lobbying firms and corporations are required to file their lobbying-related income and relevant expenditures each quarter[4]. Lobbying spending data

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[3] Granger causality is a statistical tool to examine causality based on predictions. According to Granger causality, if a signal X_1 granger causes a signal X_2, then the past values of X_1 should predict additional information about the past values of X_2 than the information contained in the X_2 alone (Seth, 2007).
[4] Lobbying firms do not have to report incomes that are less than $3,000. Organizations that hire in-house lobbyists do not have to report expenditures that are less than $12,500.

was selected and compiled from the Center for Responsive Politics website[5]. I choose the period of 2003 to 2019 so that more available data can be incorporated. This time interval also includes several presidential elections, which allows me to test and account for the variations across different election cycles. The data source for industry concentration was the Census Bureau's economic census, conducted every five years from 2002 to 2017 and provided by North American Industry Classification System (NAICS) codes. Third, the Bureau of Economic Analysis (BEA) provides industry economic feature statistics, such as industry profits and industry size. They contain consistent information and minimize the problem of missing data.

3.2 Measures

The dependent variable is the lobbying expenditures by industry, which are calculated by adding spending from individual corporations. In the case where both parent and subsidiaries hire lobbyists, each subsidiary is considered independent from its parent company and is counted within its own industry. After including all industry lobbying data from 2003 to 2019, each year's lobbying expenditures were manually adjusted for inflation using data from the U.S. Department of Labor's Consumer Price Index. This ensures that each year's dollar expenditure properly reflects its effective value at the time of expenditure. This inflation-adjusted expenditure for each industry is used as the final dataset for lobbying spending in this research.

Market concentration is difficult to construct. One must define industries, allowing firms to compete in various markets and accounting for significant variations across firms and industries (Ganapati, 2021). To simplify the analysis, I follow the NAICS code conducted by the US Census and identify each industry at the three-digit NAICS code[6]. Finer levels of industry definition (e.g. six-digit NAICS) are problematic since they make the classification of each firm harder and more arbitrary. A more general NAICS code, three-digit in this case, helps mitigate errors and obviates changes in the six-digit codes since 1997 (McCarty & Shahshahani, 2021). To be consistent, lobbying expenditures by industry also use the three-digit NAICS code. I measure the market concentration using the sales/value of shipments/revenue of the four largest firms in that industry (CR_4). In addition, I interpolate values within each five-year interval assuming a linear relationship.

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[6] Several examples of three-digit NAICS codes are "221-Utilities" and "452-General Merchandise Stores".

For example, the utility industry had a CR$_4$ of 12.5 in 2007 and a CR$_4$ of 15 in 2012. I set the beginning value as 12.5 and the ending value as 15, then used linear interpolation to fulfill values from 2008 to 2011 with automated step values.

Some studies argue that the Herfindahl-Hirschman Index (HHI), the sum of the squares of each firm's market share, is a better measurement of market concentration. However, I argue that CR$_4$ fits better in this paper for the following reasons: 1) its simplicity and data availability allow it to be the most used measure of concentration compared to the limited records of the HHI index (Bombardini & Trebbi, 2009; Salamon & Siegfried, 1977; Ganapati, 2021); 2) studies have shown a highly positive correlation between CR$_4$ and the HHI index. Thus, with limited access to detailed firm-level information and HHI data, CR$_4$ is the ideal choice in this study to examine the relationship between market concentration and lobbying expenditures.

While market concentration is the main variable of interest in this study, prior research suggests that other industry economic features may influence a firm's decisions on lobbying. The first important characteristic is the industry size. Larger industries may have a comparative advantage by sending more resources to legislators. Comparing lobbying expenditures across industries without accounting for industry size leads to a scale issue. In this study, I use the total dollar values of that industry's output from the Bureau of Economic Analysis (BEA) as a proxy for industry size[7]. There are two ways to incorporate industry size: 1) generating an industry lobbying intensity index, which simply equals total lobbying spending divided by the total dollar values of that industry's output; 2) adding industry size as a control variable. I use the first measurement since the intensity index can directly show the dollar value amounts of expenditures per million dollars of industry output.

The second economic factor is industry profitability, as mentioned in *Hypothesis 2*. The measurement of profitability is difficult and heterogeneous across industries. In the cross-industry study, data on value added (in millions) by industries from BEA provides a reliable and consistent way of estimation[8]. For a given industry, value added equals the difference between industry gross output (consisting of operating income, commodity taxes, and inventory change) and the cost of its intermediate inputs (such as energy, raw materials, and services that are purchased from all

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[7] https://www.bea.gov/itable/gdp-by-industry
[8] https://www.bea.gov/itable/gdp-by-industry

sources). To be consistent and account for industry size, I use each industry's profitability divided by the gross value of that industry's output. All data is at the three-digit NAICS level.

This combined dataset has the lobbying intensity index[9], CR_4, and industry profitability per output by industry and are manually adjusted for inflation. The data covers 57 US industries from 2003 to 2019. I report summary statistics in Table 1.

Table 1: Summary Statistics from 2003 to 2019

| Variables	Obs	Mean	Std. Dev.	Min	Max
CR_4	913[10]	18.84	15.75	2.3	80.4
Industry profitability per output (in millions)	969	0.51	.15	0.08	0.88
Lobbying intensity index	969	116.32	114.39	0	596.32
Output (in millions)	969	498495.35	550001.94	17407.73	3676208

4 LOBBYING AND CONCENTRATION TRENDS

4.1 Lobbying Patterns

Although previous articles have shown the trends of total lobbying spending by industries over time, their lack of adjustment for industry size fails to reveal how much industries spend on political activities proportional to their gross output[11]. Figure 1 shows a highly right-skewed distribution of lobbying expenditures in the U.S. economy. Figure 2 shows the average lobbying expenditures per million dollars of output by industries from 2003 to 2019.

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[9] The following paper will use lobbying intensity, lobbying, and lobbying expenditures interchangeably.
[10] Oil and gas extraction, Mining, except oil and gas, Support activities for mining, Construction industries miss CR_4 data from 2003-2015; Utilities industry miss CR_4 data from 2003-2006.
[11] See the unadjusted total lobbying expenditures by industries in Appendix.
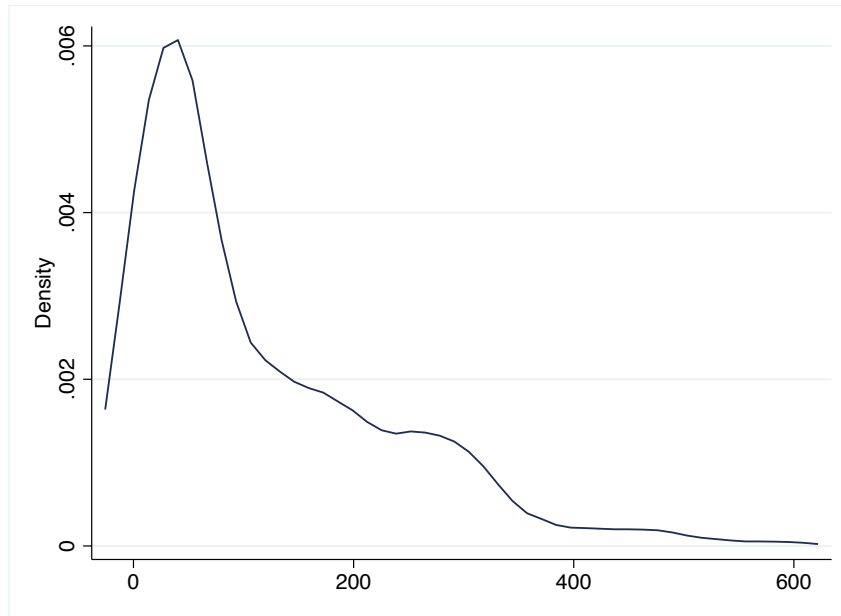
Figure 1: Lobbying expenditures distribution, 2003-2019
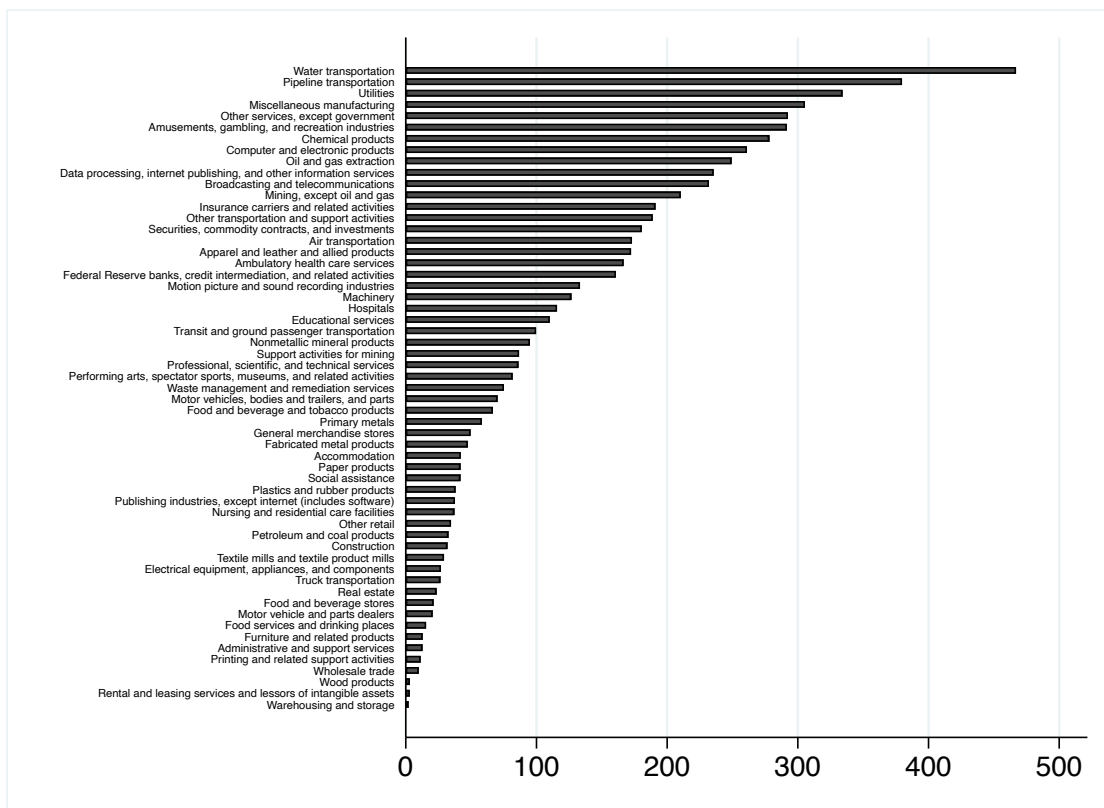
Figure 2: Average lobbying expenditures per output sorted by industries, 2003-2019

Water transportation, pipeline transportation[12], and utilities ranked as the top three industries. The water transportation industry provides water transportation of passengers and cargo using watercraft, such as ships, barges, and boats; the pipeline transportation sector uses transmission pipelines to transport products, such as crude oil and natural gas. Specific issues of interest, such as border protection, energy, tariffs, and trade, provide large incentives for these industries to become more politically active in order to receive favorable outcomes during the legislative process (Rodriguez, 2015).

Rental services and warehousing and storage industries spent the least on lobbying[13]. The rental services industry includes firms that provide a wide range of tangible goods, such as computers, and intangible goods, such as patents, to customers for a rental period. The warehousing and storage sector includes firms that provide facilities to store goods. Without active government regulations and issues of interest that affect operations and performances, corporations in these industries may have fewer incentives to implement political strategies. But this ranking can only speak for lobbying as one corporate political strategy. It is possible that industries that were at the bottom of this list may use other channels to exert political influence, such as providing votes and contributions to political action committees (PACs).

Notably, one pattern revealed by both the unadjusted and adjusted total lobbying expenditures is that those top ranked industries: chemical products, telecommunication, water transportation, and banking are also among the most regulated industries in the U.S. (Lellis, 2022). Regulatory burden is certainly one of the factors that influence lobbying levels when heavily-regulated industries try to free themselves from federal restrictions that may impede their growth. Section 8 discusses more about the necessity of further investigation on regulations.

4.2 Concentration Patterns

The largest firms have grown dominantly in size over the last almost three decades (Leong, 2020). Figure 3 illustrates a right-skewed distribution of concentration ratios for all industries over the years, similar to the lobbying distribution pattern in Figure 1. While most industries have a CR_4 below 20% and spend less than $200 per million of output, some industries fall into the large

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[12] Water transportation (NAICS 483) and pipeline transportation (NAICS 486) would be in the same sector if I use the two-digits NAICS code (NAICS 48-Transportation).

[13] Rental and leasing services and lessors of intangible assets (NAICS 532); warehousing and storage (NAICS 493)

spending and high CR_4 range. I will explore whether industries with high concentration ratios also spend more on lobbying. Figure 4 shows the average market share of the largest four firms (CR_4) across industries from 2003 to 2019. Since census data are available in every five-year interval, I recover the change within each interval through interpolation. For example, from 2007 to 2012, the largest four firms increased their market share by an average of 3.6 percent. This rise in sales concentration reflects the increased specializations of large firms that are getting bigger and dominating the industry (Autor et al., 2020).
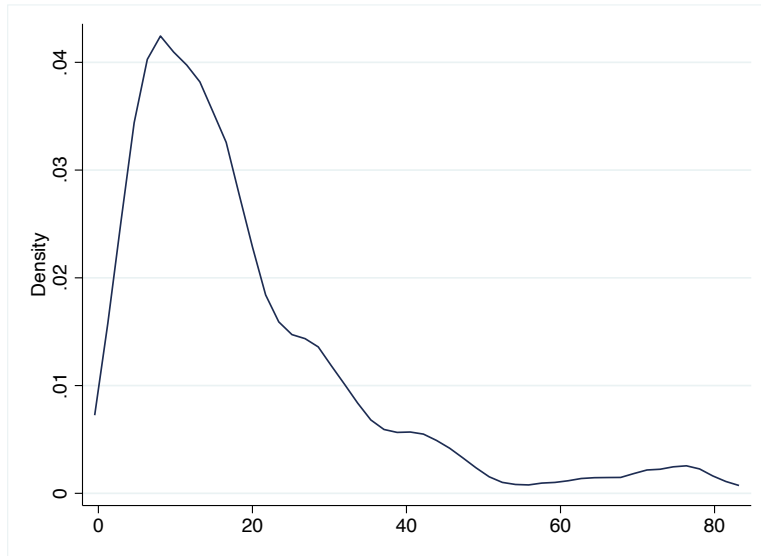

Figure 3: Largest four-firm concentration ratios distribution, 2003-2019
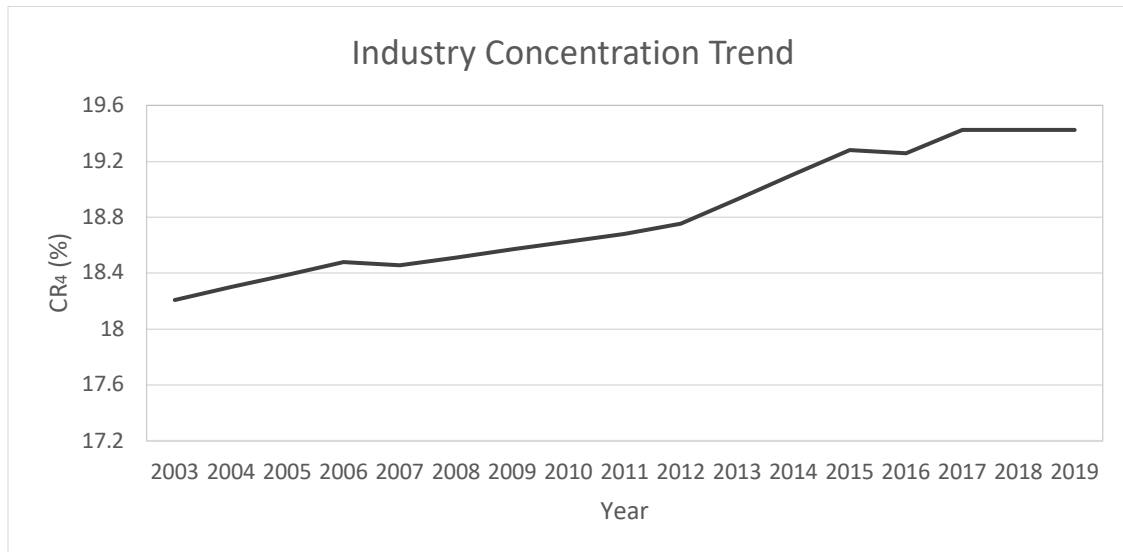
Figure 4: Industry Concentration Trend (%), 2003-2019

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In Figure 5, I rank industries by their average CR$_4$ over the years. The top three industries are Federal reserve banks, credit intermediation, and related activities; General merchandise stores; Air transportation. Federal reserve banks, credit intermediation, and related activities is a subsector under Finance and Insurance and includes companies such as Bank of America and Fidelity National Financial Inc. The 75.3% CR$_4$ indicates that it is a highly concentrated and anti-competitive market. Declining total numbers of firms and increasing mergers and acquisitions have often been attributed to this high level of concentration (D'Erasmo, 2020). The general merchandise store industry, which includes firms such as Walmart and Target, is the second most concentrated industry. One reason for this may be the role of the national expansion of multi-market firms (Smith & Ocampo, 2021). Similarly, the concentration of the air transportation sector has an upward trend and remains at the top of the ranking list each year. This may be due to the existence of fewer and larger carriers caused by bankruptcies, many merger activities, and barriers to entry (Johnston & Ozment, 2011).
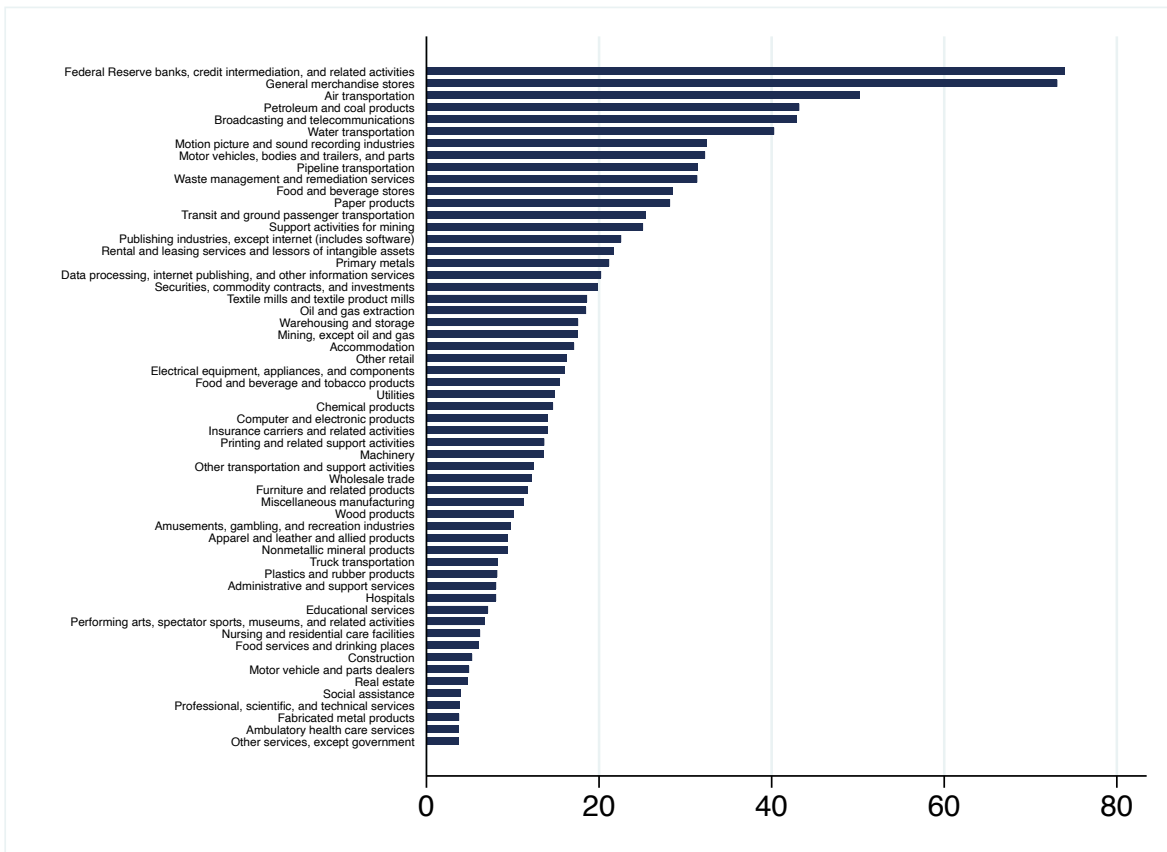
Figure 5: Average CR$_4$ (%) by Industry, 2003-2019

5 MARKET CONCENTRATION AND POLITICAL OUTCOMES

5.1 Cross-industry Model

The model used is of the following form:

$$Y_{it} = \beta_0 + \beta_1 CR4_{it} + \beta_2 Profit_{it} + \beta_3 ElectionYear_t + \beta_4 ElectionYear_t * CR4_{it} + \delta_i + \gamma_t + \epsilon_{it}$$

Y_{it} represents the lobbying intensity of industry i during year t. The coefficient of interest is β_1, capturing the largest four-firm concentration ratios. To estimate the effects of important economic factors and systematic characteristics across industries and years, I also include industry profitability per million dollars of output and a presidential election year indicator[14] (equals to 1 if that year is an election year: 2004, 2008, 2012, 2016; 0 otherwise). The coefficient β_4 shows how the relationship between CR$_4$ and lobbying intensity changed during election years. The fixed effect δ_i controls for the three-digit NAICS industry and γ_t accounts for variations across years. ϵ_{it} is the error term. The form is simple and can implement with available data to test my initial hypotheses.

Table 2 shows the results of the regressions. Models 1 and 2 separately include CR$_4$ and profitability with both industry and year fixed effects. To further explore more detailed information about how lobbying spending varied in different election years, I list out each election year as an individual variable and use 2003 as the base year in model 4. Model 5 adds an interaction term between CR$_4$ and the election year, estimating how the relationship between CR$_4$ and lobbying expenditures may change if it is an election year. Model 6 assumes the existence of heterogeneity and clusters standard errors by three-digit NAICS industries. In Model 7, I add a linear industry trend, which allows more flexibility than the fixed effects model. It can capture variables that are changing over time but may be unmeasurable, as well as omitted variable bias stemming from aggregate variables (Time trends, 2023).

Results on my main variables of interest are similar across model specifications: increases in industry concentration are significantly correlated with lower lobbying expenditures.

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[14] Election year can cause a shock to industries' lobbying expenditures. During an election year, there is typically more political uncertainty and industries may increase their lobbying expenditures to influence policy outcomes and protect their interests. Additionally, the election year may bring new issues to the forefront, leading to increased lobbying expenditures in specific areas.

Specifically, Model 5 estimates that, on average, a one percent increase in CR_4 is associated with a drop of $1.952 in lobbying expenditures per million dollars of industry output. This relationship, summarized by the above form, is also illustrated in the bin-scatter plot in Figure 6.

It is a surprising result and is the opposite of *Hypothesis 1*. It also contrasts with the "free rider" problem started by Olson (1971). Common sense tells us that concentrated industries are more likely to participate in political activities because it is easier for them to minimize the "free rider" effect during collective action processes and thus have larger incentives to contribute. However, few studies provide empirical demonstrations that overcoming the free-rider problem becomes more difficult as industries become less concentrated. Indeed, the findings from Pecorino (2001) and Bombardini (2009) indicate the opposite of the "free rider" effect: the low concentrated industries might still have incentives to lobby since they can participate in the game through the Chamber of Commerce and other business associations that help them to send information to regulators and provide them with more benefits, such as receiving a higher return on the initial political costs. Thus, low concentration may not necessarily link to less industry lobbying expenditures.

My result is consistent with Becker's theory of competition among pressure groups for political influence (1983). When lobbying is driven by individual interests and an incentive to obtain a larger share of the pie, firms compete, and industries become more competitive when more firms join the game. Firms may spend more on lobbying to distinguish themselves from each other and win the game. Thus, lobbying efforts increase with the competition. Furthermore, it is also plausible that concentrated industries provide important and omnipresent products and services to government and private households in a way that shapes their political clout (Cuenco, 2019). Their affluent positions make the government and the public subservient to their favorable side, which makes lobbying less necessary for them.

In Hypothesis 2, I predict a positive association between industry profitability and industry political participation. The result strongly supports this hypothesis, showing that a one million dollar increase in industry profitability is linked to a $108.9 increase in industry lobbying expenditures per million dollars of output. This finding aligns with existing literature, indicating that industries with higher profits are more likely to invest in efforts to influence legislative and bureaucratic decisions in favor of their benefits due to sufficient resources and greater incentives.

The election year indicator in Model 5 weakly suggests that industries increased their lobbying expenditures per output by \$1.496 during the presidential election year. This small increase implies that industries tended to spend more and exert political influence when certain changes happened in the political system. Another noticeable finding is the variations of lobbying expenditures in each presidential election year. Political spending was the highest in the 2008 election year. According to data collected from the Federal Election Commission, Hilary Clinton ranked as the top recipient of contributions from lobbyists, followed by John McCain and Barack Obama. "Lobbying appears to be recession-proof," said Sheila Krumholz, the Center's executive director. "Even when companies are scaling back other operations, many view lobbying as a critical tool in protecting their future interests, particularly when Congress is preparing to take action on issues that could seriously affect their bottom lines" (Levinthal, 2010). In addition, the coefficient of the interaction term indicates that the negative relationship between CR_4 and lobbying expenditures still exists even in presidential election years. However, this small and insignificant outcome does not provide sufficient evidence to draw this conclusion.
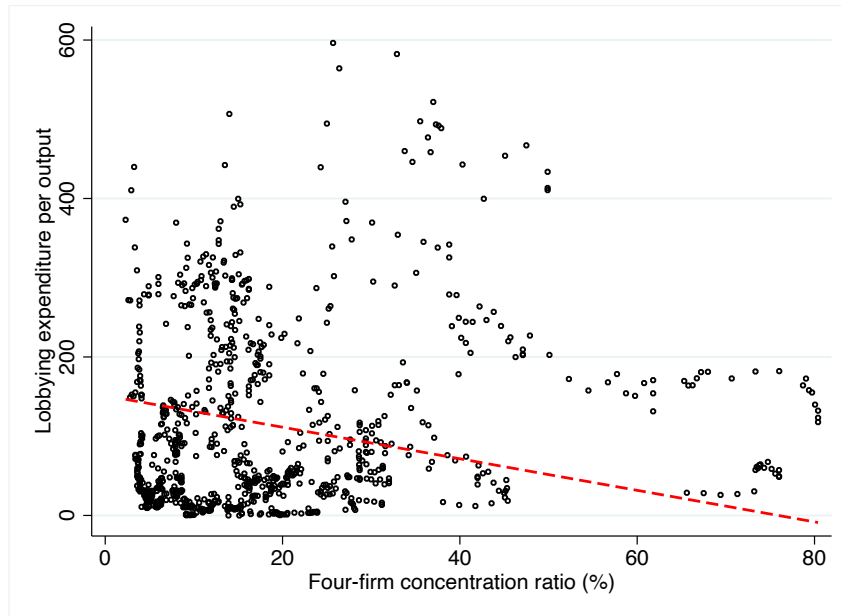
In Table 2, I conduct two robustness checks: clustering standard errors in column (6) and adding an industry trend in column (7). Even though these relationships are simply correlational, the results are still robust. In sum, findings in Table 2 reject *Hypothesis 1* and support *Hypothesis 2*.

Table 2: Fixed effect estimate of impact of concentration ratios on lobbying expenditures per output with controls.

VARIABLES	Dependent Variable: Lobbying Expenditures (per output)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CR_4	-1.832***		1.952***	-1.760***	-1.943***	-1.943*	-1.752*
	(.347)		(0.343)	(0.320)	(0.347)	(1.011)	(0.957)
Profitability		130.964***	108.9***	116.8***	108.9***	108.9*	116.8**
		(22.18)	(20.99)	(19.78)	(21.00)	(55.96)	(57.27)
Election Year			1.097		1.496		
			(1.957)		(3.053)		
Year 2004				-2.719			
				(5.324)			
Year 2008				20.39***			
				(5.330)			
Year 2012				16.34***			
				(5.308)			
Year 2016				1.797			
				(5.250)			
CR_4 * Election Year					-0.0212	-0.0212	-0.0200
					(0.124)	(0.0544)	(0.0544)
Constant	148.291***	49.47***	94.61***	77.92***	94.43***	94.43***	
	(6.62)	(11.37)	(12.18)	(12.05)	(12.23)	(30.87)	
Observations	913	969	913	913	913	913	913
R-squared_within	0.031	0.037	0.061	0.220	0.061	0.061	0.069
R-squared_between	0.025	0.004	0.013	0.011	0.013	0.013	
R-squared_overall	0.020	0.005	0.010	0.002	0.010	0.010	0.948
F	27.83***	34.85***	18.59 ***	13.12***	13.93***	2.00	2.13
F_f	215.75	198.00	222.11	262.08	221.85		
Number of BEA	57	57	57	57	57	57	57
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Industry Trend	NO	NO	NO	NO	NO	NO	YES

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 6: Correlation of lobbying expenditures per output to market concentration

5.2 Causal Test

Table 3 shows the results of a causal test of the relationship between CR_4 and lobbying spending. Given the large p-value of all two lag periods used in this test, we fail to reject that CR_4 does not Granger Cause lobbying spending. The bidirectional hypothesis of lobbying spending not granger cause CR_4 performs a weak result, as the coefficients remain zero for all lag variables. Overall, this test provides insufficient evidence to indicate there is a causal link between CR4 and lobbying spending. The granger causality test accounts for pairs of variables but may generate misleading results when three or more variables are involved in a relationship. But either lobbying expenditures or market concentration may be attributed to recipients' and contributors' locations, profits, and a combination of other indicators (Salamon & Siegfried, 1977). Figure 7 visualizes factors that could be involved in this relationship. Political strategy is such a dynamic game that further advanced tests are needed for examining this causal relationship.

Table 3: Granger causality test of the causal relationship between concentration ratios and lobbying spending per output[15].

Null hypothesis	F-statistic	Prob>F
CR_4 does not Granger Cause lobbying spending	1.38	0.263
Lobbying spending does not Granger Cause CR_4	0.12	0.887
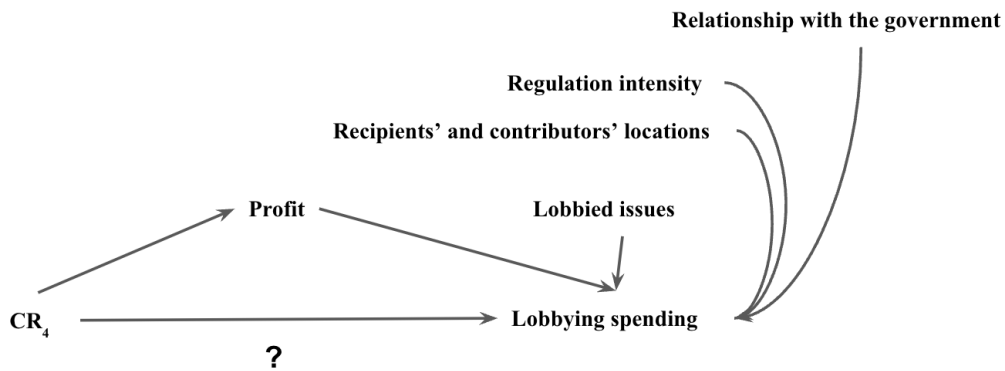
Figure 7: Directed Acyclic Graph

6 ROBUSTNESS CHECK

One of the explanations for the negative relationship between market concentration and lobbying expenditures is that less concentration does not necessarily mean less political spending of firms (Bombardini, 2009). Small firms may choose to lobby through pro-business organizations, such as the US Chamber of Commerce, since the returns relative to the initial lobbying cost may be higher and their voices are more likely to be heard by legislators than if they lobby individually (2009). In this case, the lobbying expenditures of these firms do not go into their own industry but into the industry of business associations. In my dataset, business associations are under the Other Services (except Public Administration) industry[16]. Figure 2 and Figure 5 show that this industry has high lobbying expenditures but low industry concentration. Including the industry of business

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[15] Raw concentration data is used without the linear interpolation.
[16] NAICS code: 813

associations in the cross-industry model may influence the direction of this relationship.

Table 4: Fixed effect estimate of impact of concentration ratios on lobbying expenditures per output with controls, excluding the "other services, except government" industry

	Dependent Variable: Lobbying Expenditures (per output)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
CR_4	-1.789***		-1.909***	-1.716***	-1.920***	-1.920*	-1.727*
	(0.335)		(0.331)	(0.310)	(0.335)	(1.010)	(0.960)
Profitability		130.4***	108.0***	117.9***	108.0***	108.0*	117.9**
		(21.61)	(20.25)	(19.20)	(20.27)	(56.13)	(57.54)
Election Year			0.378		-0.0946		
			(1.906)		(2.998)		
Year 2004				-3.377			
				(5.209)			
Year 2008				18.79***			
				(5.215)			
Year 2012				13.46***			
				(5.194)			
Year 2016				0.296			
				(5.135)			
CR_4 * Election Year					0.0247	0.0247	0.0258
					(0.121)	(0.0287)	(0.0289)
Constant	144.477***	46.82***	91.97***	75.33***	92.17***	92.17***	
	(6.48)	(11.04)	(11.76)	(11.71)	(11.81)	(30.90)	
Observations	896	952	896	896	896	896	896
R-squared_within	0.033	0.039	0.065	0.216	0.065	0.065	0.074
R-squared_between	0.037	0.002	0.024	0.021	0.024	0.024	
R-squared_overall	0.031	0.003	0.019	0.008	0.019	0.019	0.949
F	28.42	36.45	19.26***	12.55***	14.44***	1.84	2.27
F_f	221.16	203.47	228.64	267.35	228.37		
Number of BEA	56	56	56	56	56	56	56
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Industry Trend	NO	NO	NO	NO	NO	NO	YES

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

However, the lobbying spending of these associations cannot be traced back to the originating donors, and this issue affects all the research that uses lobbying data from the disclosure reports (Cowgill et al., 2022). The best I can do to further examine the relationship is to exclude this industry. Table 4 shows the result. The link between CR_4 and lobbying spending turns positive during election years, but this coefficient is too weak to provide valid insight into how this relationship might change.

7 CASE STUDY

As revealed by the above results, market's decision on how much to spend on lobbying is a dynamic game, and there is significant heterogeneity across industries. Industries' performances, relationships to social networks (e.g. trade associations), and government dependency all may play roles for decision makers. Moreover, factors including who those decision makers are, why they lobby, and where the money goes are critical and may affect the relationship between lobbying and market concentration. These factors are often industry-specific. Thus, one concern about the previous section's analysis is that it aggregates all these factors into national-industry-level measures and fails to capture the nuances of lobbying decisions within each industry.

To deal with this issue, I use the NEIO method (Bresnahan, 1989) by assessing the relationship between market concentration and lobbying expenditures in several representative U.S. industries. In addition, with available data on individual firms in selected industries, I can calculate market concentration ratios in ways designed for specific industries and validate the results with HHI. In doing so, I can more directly have an in-depth appreciation of what determinants may influence this relationship in a real-life context. It is also helpful in complementing the cross-industry study in the previous section.

In determining which three industries to include in this case study, I took care to select industries in which variables change continuously over the years and are generally representative of the U.S. economy. For this study, three industries are chosen: commercial banks, air transportation, and general merchandise stores[17]. The basis for lobbying data is the same as the previous aggregate-level data source -- lobbying disclosure reports filed with the Secretary of the

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[17] Commercial banks NAICS code: 522110; scheduled passenger airline NAICS code: 481111; general merchandise stores NAICS code: 452

Senate's Office of Public Records (SOPR) selected from the Center for Responsive Politics website. The sources for calculating market concentrations are distinct for each industry and are introduced separately in the following section.

7.1 Case study: Commercial Banks

The first industry case study focuses on commercial banks. This industry fits well because it is a well-established American industry which has a significant impact on the U.S. economy and has been through changes in market concentration and firms lobbying over years. It is hard to deny that the banking industry is getting more concentrated, where too-large-to-fail firms grow and occupy the majority of the market. The four largest firms in the U.S.--Bank of America, JPMorgan Chase Bank, Wells Fargo Bank, and Citibank[18]-- have about 40% industry's total assets. The other 60% are divided into around 6,000 institutions (Giglio, 2018). In terms of political expenditures, this sector has lobbied heavily to exercise political power and minimize the increased regulatory oversight imposed by relevant laws, such as the Dodd-Frank Act. In 2015, the industry spent more than $67 million on lobbying (Glorioso, 2016). All these make this sector a natural choice for case study in examining the relationship between market concentration and lobbying expenditures.

The source for the commercial banking data is the Consolidated Report of Condition and Income (known as Call Reports) that insured banks submit to the bank regulatory agencies. Then, I use each firm's statistics to manually calculate the market share of the top 4 firms (CR_4). Different definitions are used to calculate industry concentration of commercial bank sector. While some research defines the market share as the share of assets held by the U.S. total insured commercial banks (the Global Economy, 2021; Ilsr, 2019), other articles use the share of total domestic deposits (Corbae & D'Erasmo, 2009). This paper applies both fashions. I further use HHI index to confirm the trend of concentration. The final dataset consists of the inflation-adjusted lobbying expenditures, two CR_4 measurements (using the share of total assets and share of total domestic deposits), and HHI (using the share of total deposits) from 2003 to 2019.

Figure 8 appears to show lobbying expenditures per million dollars of output. Interestingly, lobbying expenditures remained high before 2013. One of the explanations for periods between

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[18] The four largest firms were Bank of America, JPMorgan Chase Bank, Wells Fargo Bank, and Wachovia Bank until Wells Fargo and Wachovia merged in 2008.

2008 and 2013 is that banks were lobbying hard to minimize the effects of intensified regulations imposed by Dodd Frank Act (Tarbet, 2021).
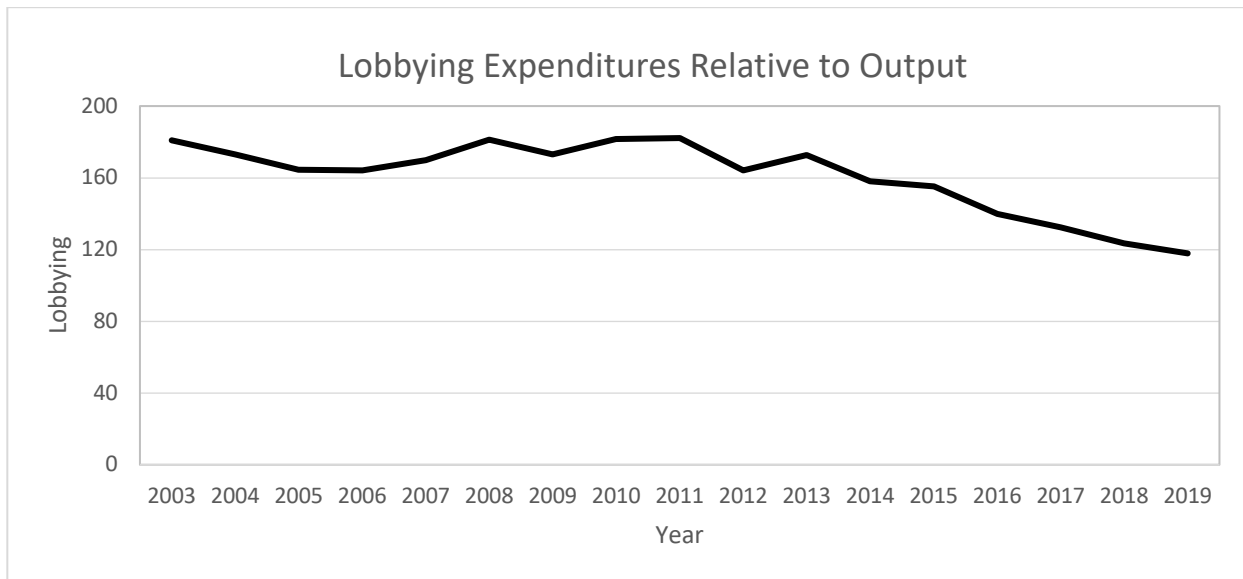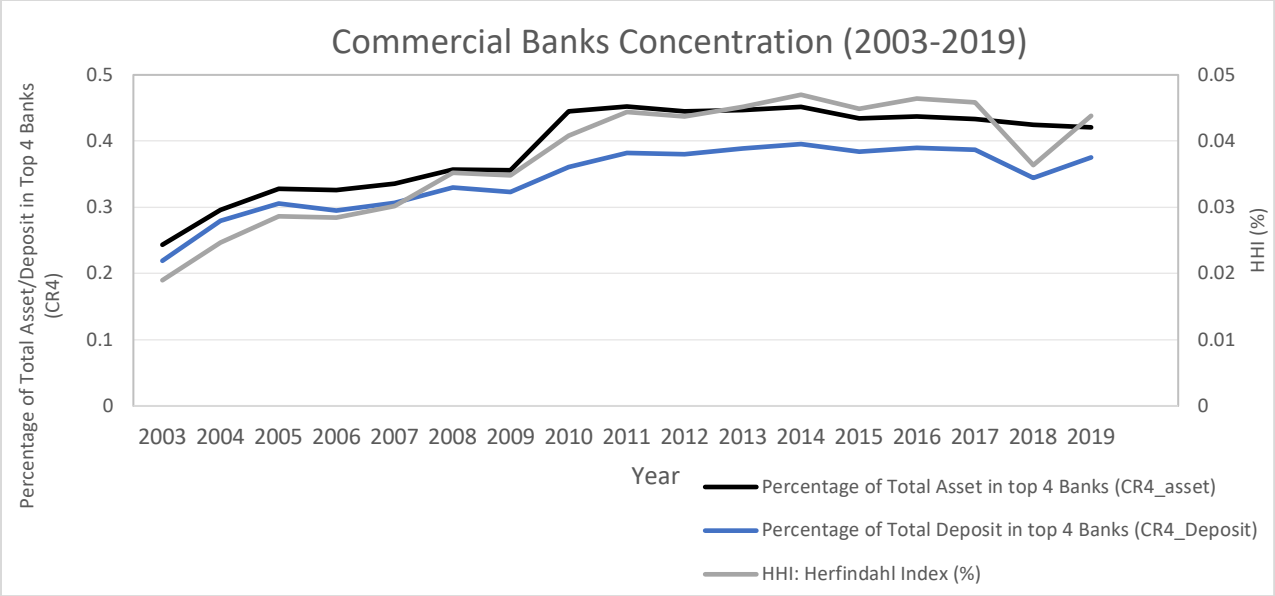

Figure 8: Commercial banks lobbying expenditure relative to output (in millions) from 2003-2019. Each year lobbying expenditures was manually adjusted for inflation using data from the U.S. Department of Labor's Consumer Price Index.

Figure 9 shows a continuous drop in the total number of banks in the U.S. In 2003, there were about 8,000 banks and this number decreased to less than 5,000 in 2019. When I decomposed this trend, I found that it was a consequence of the continuous decrease in the entry rate since 2007 and the consistent increase in the exit rate. The exit rate was largely due to mergers & acquisitions and bank failures. There are several explanations: 1) 2009 FDIC policy required a longer supervisory period, higher capital requirements, and more frequent examinations: before the Great Recession, regulators approved an average of 156 new banks each year but only one new bank – Bank of Bird-in-Hand – since the end of 2010; 2) the zero interest rate policy in 2008 harmed the profits earned by the small bank since their major profit came from the difference between the interest they pay on deposit and the interest they earn on loans while mega banks are not that sensitive to this change since they earn more income from fees and speculative ventures (Gonzalez, 2018). These makes it hard for small banks to stay in the market and reduces new entries.
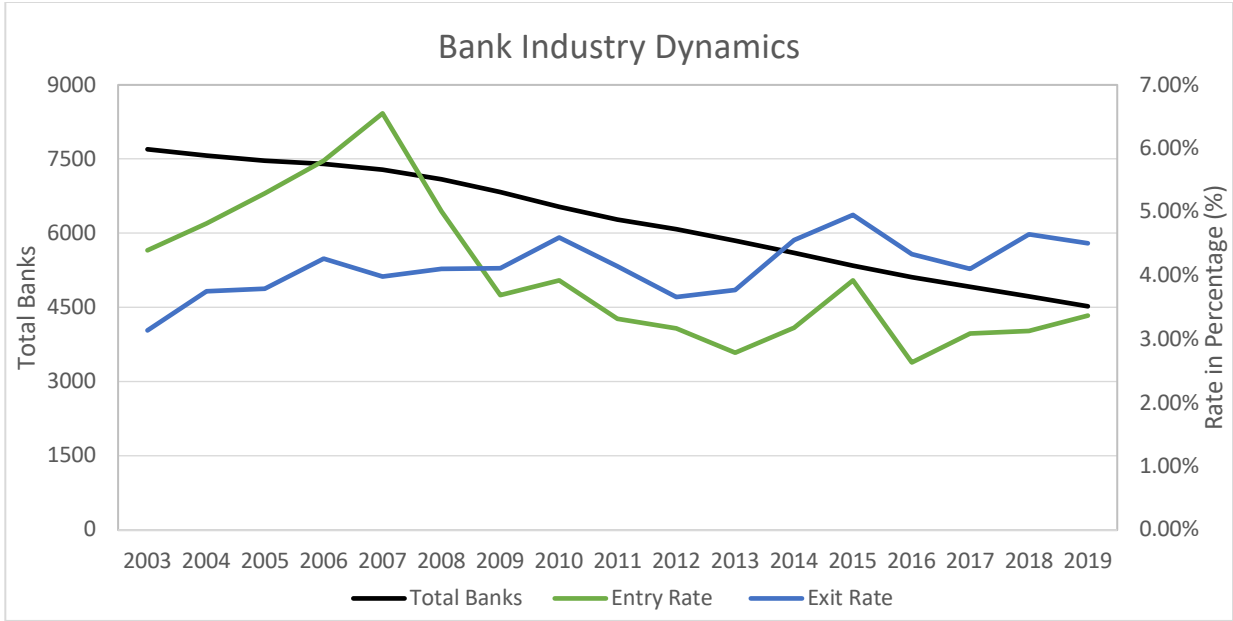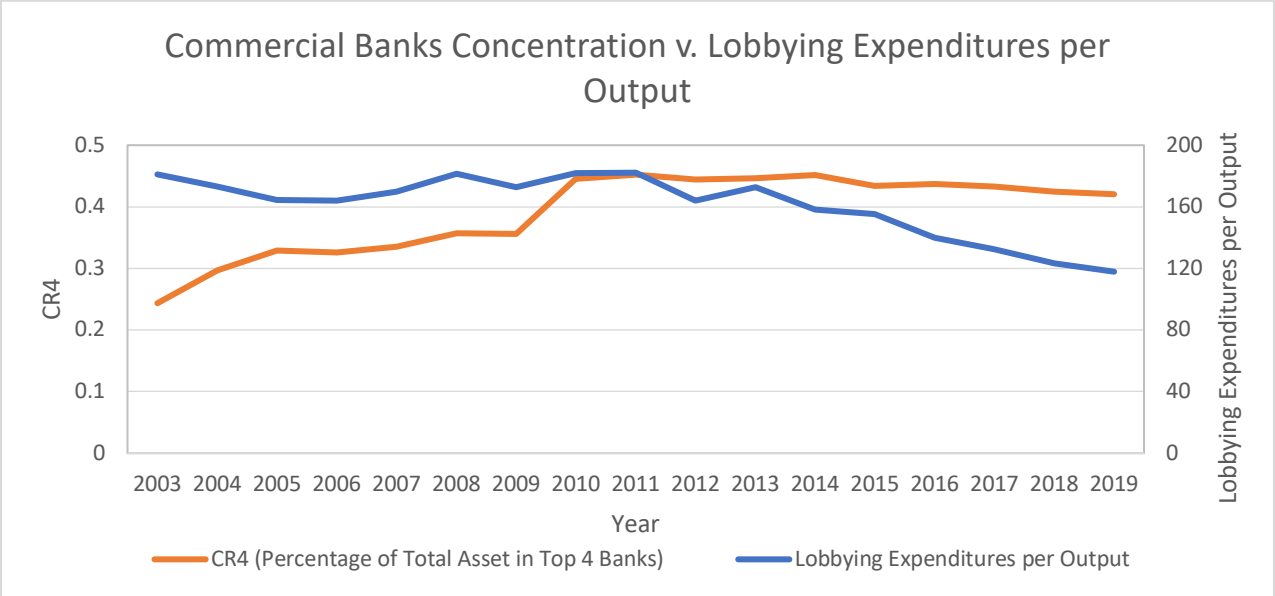
Figure 9: Commercial banks industry dynamics: total commercial banks in the U.S. from 2003 to 2019. Entry corresponds to new charters and conversions. Exit corresponds to failures and unassisted mergers.

Figure 10 illustrates an increasing commercial banks concentration trend, regardless which measurements I use. That concentration increased dramatically in 2010 may be because a large number of banks participating in mergers and acquisitions as a response to the Dodd-Frank Act (Corbae & D'Erasmo, 2009). Figure 11 reveals that concentration and lobbying expenditures of the industry did not move in tandem over years.

Figure 10: Commercial banks concentration from 2003 to 2019

Figure 11: Commercial Banks Concentration V. Lobbying Expenditures per Output from 2003 to 2019

Table 6: Estimation of the impact of lobbying expenditures on industry concentration in the commercial banks industry using the largest four-firm asset concentration ratio.

	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (CR4_asset)	-.282
	(0.137)
Constant	4.802***
	(0.000)
Observations	17
R-squared	0.141
Adj R-squared	0.084

Note: Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

To examine the relationship between lobbying and market concentration, I take the logarithm of both lobbying and concentration data to regularize the scale of change and regress the growth rate of lobbying expenditure per output on the growth rate of economic concentration ratios of the largest four banks, the results of which are presented in Table 6[19].

This simple model implies that, at average levels of firm lobbying, for every one percent increase in CR_4, lobbying expenditures drop about 0.28 %. I then plot these data points against one another. More explicitly, the log of lobbying expenditures relative to output is plotted against the log of concentration ratios. Figure 12 displays a downward linear relationship. However, the result is from a single industry and is not statistically significant. One of the possible reasons that might be expected is the revolving-door theory, which illustrates migration patterns circulating between Wall Street and Capitol Hill (Ginsberg, 2014). As regulators may become the regulated group or vice versa, the built relationships may cut some lobbying spending that would have to be billed for seeking rents or disseminating information to agencies. In addition, the subprime mortgage crisis, the Great Recession, the Dodd-Frank Act, and other landmark events may add noise to this relationship (McCarty & Shahshahani, 2021). Further research is needed to examine the effects of relevant landmark events on this relationship. The following airline and general merchandise cases offer more insights into this relationship.

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[19] Simple regression model shows a similar result. See results of different measurements for market concentration in Appendix. Both measurements indicate a negative relationship, but the outcomes are statistically insignificant.
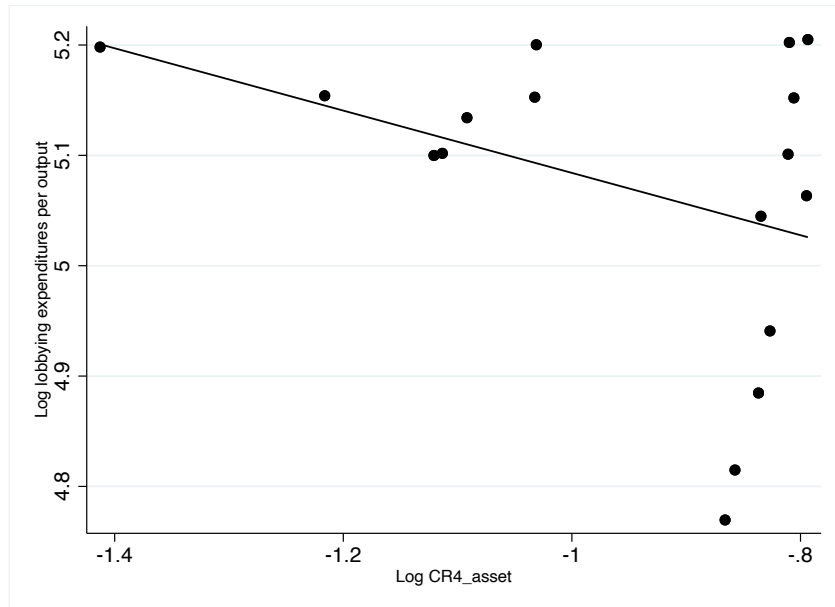
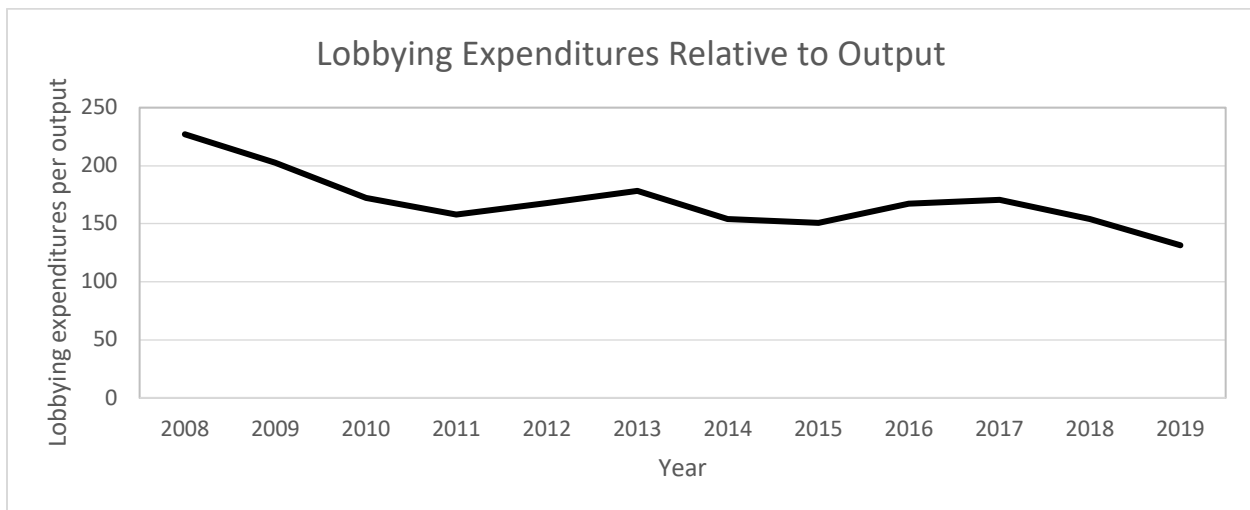**Figure 12:** Log lobbying expenditures per output V. log CR$_4$_asset

7.2 Case study: Airlines

The airline industry is one of the few industries that shows large variations in concentration levels from 2003 to 2019. In 1978, the Airline Deregulation Act deregulated the industry, allowing more new entrants and increasing market competition, according to Federal Aviation Administration. However, the industry endured a sustained loss between 1977 and 2009, particularly after the terrorist attack of September 11, 2001 and at the start of the Great Recession. As a result, bankruptcy and merger activities underwent between 2005 and 2015, shrinking from nine leading businesses to just four: American, United, Delta, and Southwest. These firms shared 80 percent of the industry in total in 2015 (Wolla & Backus, 2018).

The industry also sends money to regulatory officials extensively to alleviate regulations and get approval for certain actions from the government, such as mergers. The industry spent nearly $31 million on lobbying efforts in 2008 and donated nearly $3.6 million at the federal level during the 2014 election cycle (Lazar, 2015). Issues they lobby for include tax cuts for corporations, airline security, and labor issues (BASS, 2020). These facts make the airline industry a natural candidate to explore a relationship between market concentration and lobbying spending.

The source for airline data is the Bureau of Transportation Statistics[20]. It includes performances, such as revenue passenger miles and operating revenues, by airlines. Similarly, to the commercial banks case study, I then manually calculate CR_4 and HHI for each year. To be industry-specific, I follow Wolla and Backus (2018) and use revenue passenger mile (RPM) to measure airline market share. RPM describes the cumulative distance of all paying passengers and is the backbone of the transportation metrics. Due to the availability of the data, the final dataset consists of the inflation-adjusted lobbying spending, CR_4, and HHI from 2008 to 2019.

Figure 13 shows airline lobbying expenditures per million dollars of output. One interesting pattern shown from the data is that lobbying expenditures fluctuated as they increased between 2011-2013 and 2015-2017. These periods happened to be the time before and during several large merger transactions (e.g., Southwest Airlines & AirTran Airways in 2011, US Airways & American Airlines in 2013, and FedEx & TNT Express in 2016). Airline businesses may not lobby consistently but may increase efforts intensively if needed, such as getting approvals for merger activities, due to the belief that the power of money can buy regulators to rule in their favor.

Figure 13: Airline lobbying expenditures relative to million dollars of output from 2008-2019. Each year lobbying expenditures was manually adjusted for inflation using data from the U.S. Department of Labor's Consumer Price Index.

Figure 14 displays an increasing market concentration and shows that CR4 and HHI are highly correlated. Figure 15 highlights that lobbying expenditures moved in the opposite direction to CR_4 for most of the years. Table 7 applies statistical results to confirm a negative relationship

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[20] See https://www.bts.gov/topics/annual-airline-rankings.

between market concentration and lobbying spending[21]. This model implies that, at average levels of firm lobbying, for every one percent increase in CR_4, lobbying drops about 0.75%.

This negative relationship supports the outcome of my previous industry study. One of the reasons may be the abundance of mergers and acquisitions that happened throughout the airline's history (Johnston & Ozment, 2011). As businesses consolidate, market concentration increases but may drive down total lobbying spending. This echoes the theory of competition among pressure groups for political influence. Since merged firms unify voices, they did not need to exert more political efforts to compete for a larger share of the pie. It is also plausible that the airline industry is already highly-concentrated and there is no room for further consolidation, which makes lobbying or other political activities less necessary.

The general merchandise market provides more angles on the correlation between lobbying and concentration. More data from other industries may help confirm, challenge, or validate this predictive correlation.
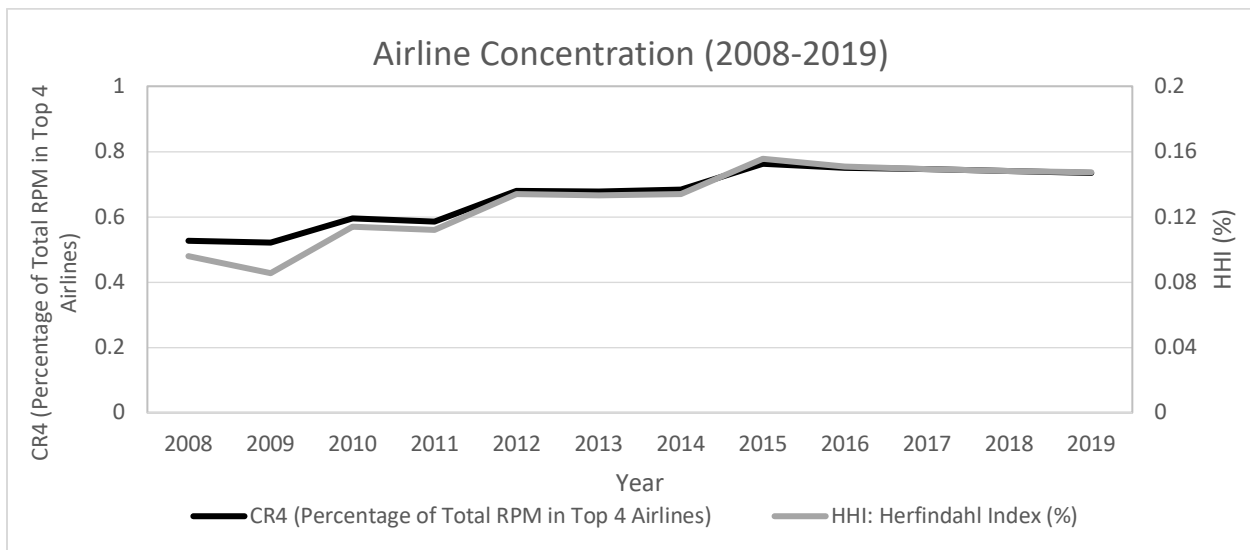
**Figure 14:** Airline industry concentration from 2008 to 2019

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[21] See the similar results for HHI measurement in Appendix.

Table 7: Estimation of the impact of lobbying expenditures on industry concentration in the airline industry by using largest four-firms RPM concentration ratios
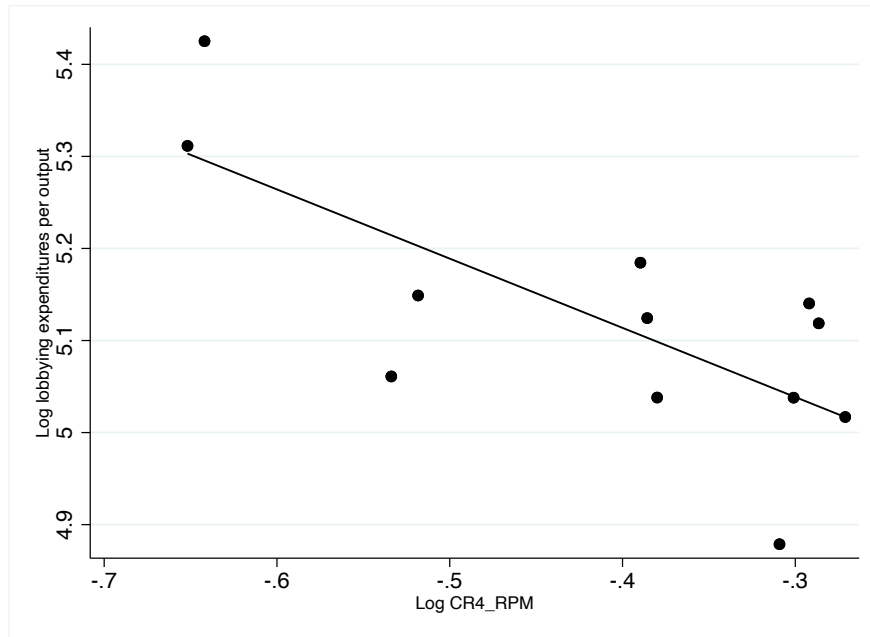
	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (CR4_RPM)	-.752***
	(0.006)
Constant	4.813***
	(0.000)
Observations	12
R-squared	0.542
Adj R-squared	0.496

Note: Standard errors in parentheses

    *** $p<0.01$, ** $p<0.05$, * $p<0.1$
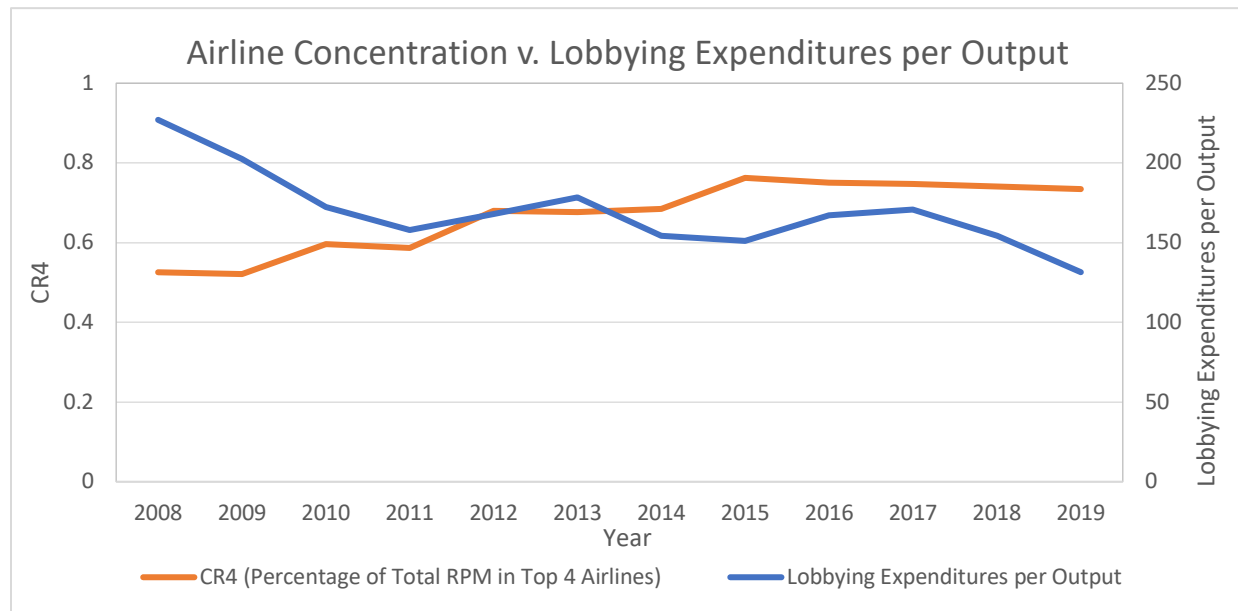
Figure 15: Airline Concentration V. Lobbying Expenditures per Output from 2008 to 2019

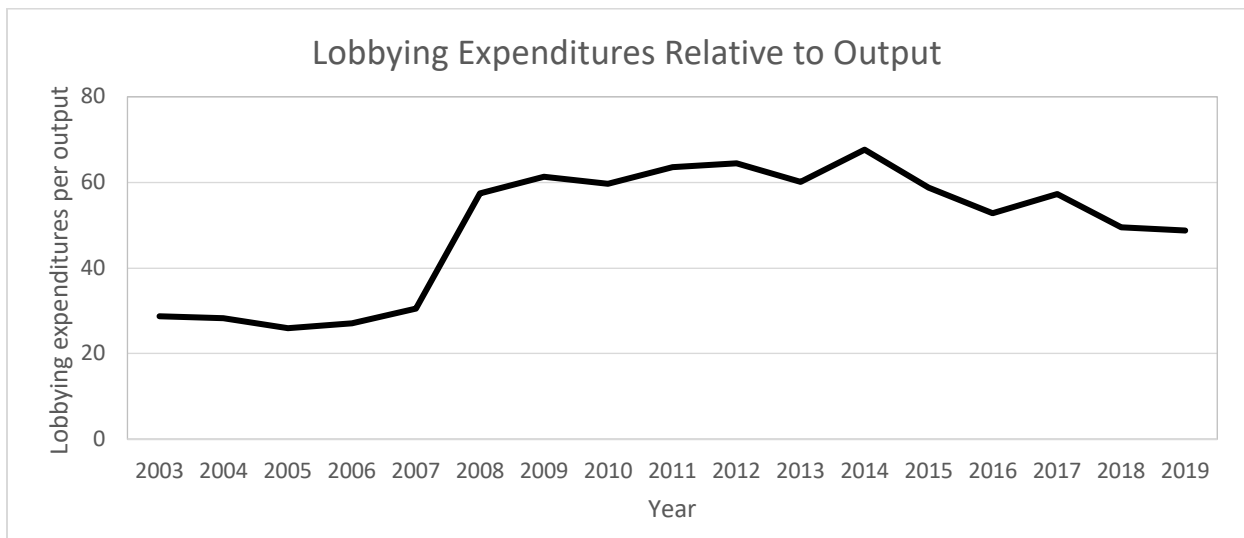**Figure 16:** Log lobbying expenditures per output V. log CR_4_RPM

7.3 Case study: General Merchandise Stores

The general merchandise market (GM), a subsector under the two-digit NAICS retail sector[22], offers some benefits for predicting the relationship between market concentration and lobbying. This industry is a vital part of the U.S. economy and an essential source of employment. Any changes in the industry may affect the overall economy, so attention has been given to the industry's conduct to ensure benefits for the whole society and to address antitrust concerns. But inevitably, with the expansions of Walmart, Amazon, and other giants in recent years, market concentration has consistently increased (Hortaçsu et al., 2015). Based on the 2017 economic census data, the four largest firms accounted for 76 percent of total sales. Moreover, political expenditures in this market have also increased over the past few years. Big players spent $30 million on elections and lobbying during the 2014 election cycle, almost six times more than the money they sent to Washington DC in 2000 (Ruetschlin & McElwee, 2014). In particular, Walmart and Home Depot have been ranked among the top spenders since 1989. Taxes, trade, antitrust, and workplace regulations are the main issues that drive this industry to lobby (Lazar, 2015).

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[22] Retail sector: 45 NAICS code

Following Hortaçsu et al. (2015) and Ebens (1993), I use sales to calculate concentration ratios since the main source of revenue of the firms is the sale of merchandise (1993). The Census Bureau's economic census provides sales of the largest four-firm in years ending in 2 and 7. Similar to the previous two industry case studies, the final dataset includes inflation-adjusted lobbying spending and CR_4 between 2003 and 2019[23].

Figure 17 shows lobbying expenditures by general merchandise companies. A significant increase occurred during the 2008 election year. As Democrats dominated Congress, firms actively lobbied to fight against the pro-labor/unionization bill supported by Barack Obama (D'innocenzio, 2008). Obtaining U.S. bailout money, issues like consumer product safety, tax reduction, and trade all urged firms to leverage their economic capabilities to exert political power on Capitol Hill[24]. Another finding is that while commercial banks and airlines regularly spent over \$150 on lobbying per million dollars of output, GM spent less than \$70 over the years. Relationships with legislators, lobby incentives, and other endogeneities may largely explain this variation.
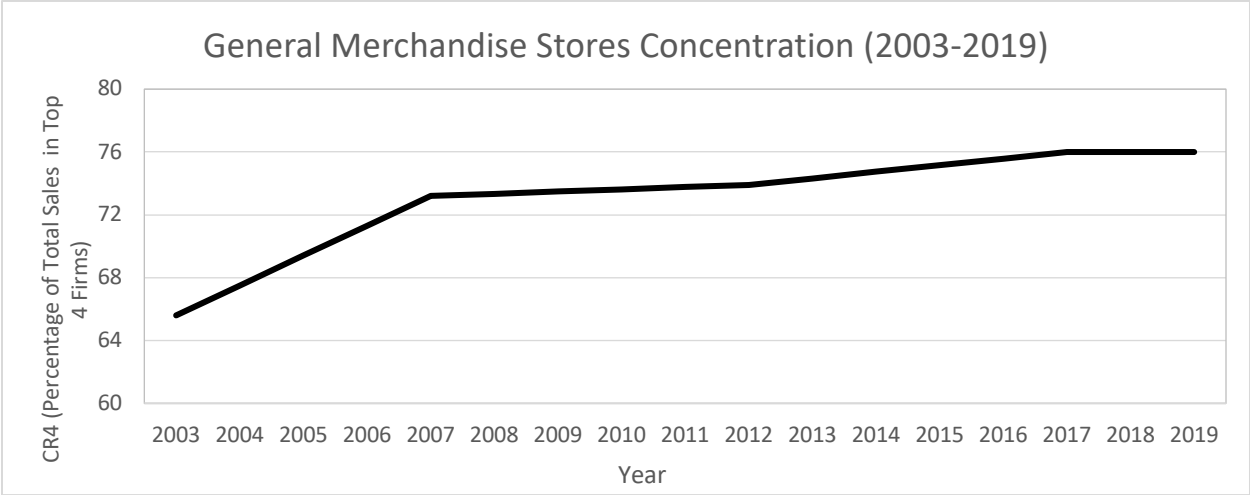

Figure 17: General merchandise stores lobbying expenditures relative to million dollars of output from 2003-2019. Each year lobbying expenditures was manually adjusted for inflation using data from the U.S. Department of Labor's Consumer Price Index.

In Figure 18, an increasing concentration trend is shown. It rose fastest from 2003 to 2007, partly due to the reduction in the number and size of young firms (Hortaçsu et al., 2015). Figure

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[23] Due to unavailability of data, only CR_4 is included in this case study. But previous work ensure that CR_4 and HHI generate a similar trend of general merchandise market concentration (Nissan & Carter, 2007).
[24] See https://www.opensecrets.org/federal-lobbying/top-spenders

19 reveals that concentration and lobbying expenditures in the GM industry moved in similar directions throughout the years. And the coefficient of interest displayed in Table 8 tells us that, at average levels of firm lobbying, for every one percent increase in CR_4, lobbying increased by about 6.28%. While the previous studies see a negative correlation between lobbying expenditures and market concentration, this is not true in the GM industry, suggesting a different pattern relative to the overall U.S. market and significant heterogeneity across industries. This reinforces that, while cross-industry analysis is important as it reveals a pattern on an economic-wide basis, studying selected industries is also critical in uncovering specific interactions between different market structures and political efforts. These findings may not be definitive, but they are suggestive for this predictive relationship.

**Figure 18:** General merchandise stores concentration from 2003 to 2019
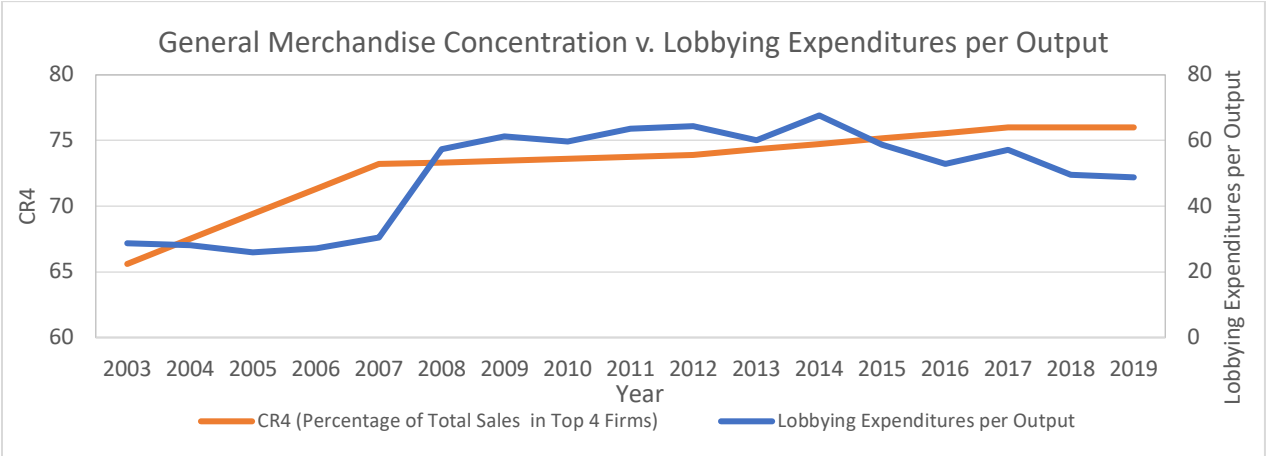
Figure 19: General merchandise stores concentration v. lobbying expenditures per output from 2003 to 2019

Table 8: Estimation of the impact of lobbying expenditures on industry concentration in the general merchandise market by using largest four-firms sales concentration ratio

	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (CR4_sales)	6.286***
	(0.000)
Constant	-23.126***
	(0.002)
Observations	17
R-squared	0.568
Adj R-squared	0.539

Note: Standard errors in parentheses
    *** $p<0.01$, ** $p<0.05$, * $p<0.1$
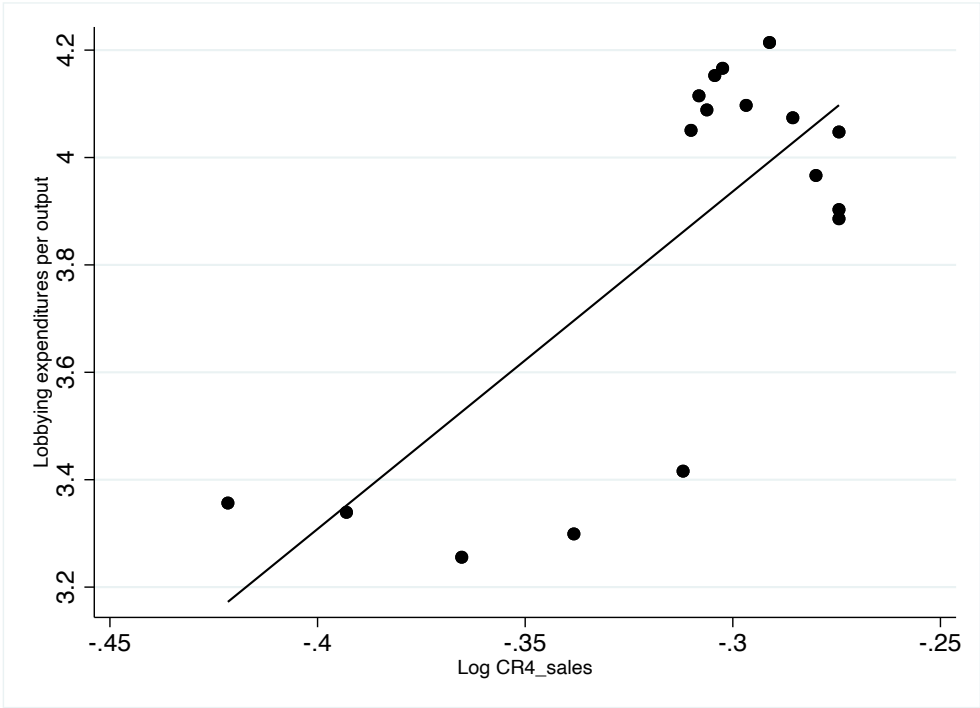
Figure 20: Log lobbying expenditures per output v. log CR_4_sales

8 Discussion

This paper aims to provide another piece of evidence in the lively debate over the increase in market concentration and its political outcomes. I first separately sort industries by their average lobbying spending and concentration between 2003 and 2019, with brief analyses of the rankings. I then categorize the conflicting results from previous work into two groups and propose my hypotheses based on economic theories. Although common sense tells us that industry concentration could lead to more political efforts, as proxied by lobbying spending in this paper, my cross-industry data suggests the opposite: concentration increases do not correlate with a rise in political expenditures. This study further designs comprehensive industry case studies to minimize the issues of SCPP and considers industry-specific features. Three selected industries: commercial banks, airlines, and general merchandise stores, are chosen to represent variation and change in the U.S. economy. The data on airlines demonstrates a story consistent with the overall study, but the general merchandise store industry shows a different result. This suggests substantial heterogeneity among industries and the need to test this relationship with more case studies.

The negative result is surprising and suggests that this predictive relationship may be more complicated than previously thought. Most previous works studied this relationship without considering other important factors. This paper points out that the type of lobbied issues may be a critical determinant. Suppose the political outcomes of lobbying for certain issues benefit individual entities more. In that case, the competition theory of Becker may have a dominant effect on this correlation, which explains my result. However, according to Olson (1971), concentrated industries are more likely to have active political participation since it is easier for firms to minimize the "free-rider" problem. So far, few empirical studies have provided robust results to validate this claim. Future research should incorporate detailed data on issues of interest. Additionally, Bombardini's findings (2009) indicate that lower concentration may not necessarily mean less political efforts since small firms can disseminate information to regulators through business organizations, such as the U.S. Chamber of Commerce, and compete with the influence exerted by big firms. Thus, studying firms' participation level of preference could also help to test the relationship between market concentration and political actions.

The qualitative analysis of the overall concentration patterns and individual case study suggests that the regulatory burden of each industry is a crucial factor in this relationship and

requires further investigation. This is because industries may increase lobbying efforts to free from more stringent regulations. However, there is currently no consistent method for measuring regulation. Developing a reliable and scientific way to quantify industry regulation is difficult and should become one of the priorities in multiple fields of study.

Although this work is not conclusive, I hope it still provides new perspectives on the relationship between economic features and political efforts and highlights potential avenues for future research. In addition to the points mentioned above, better data on market concentration, causal tests, and other measurements of political efforts (e.g., campaign contributions) could further enhance our understanding of the political effects of economic structures. In turn, the effectiveness of political efforts and their impacts on industry performance could represent another extension of this study.

Finally, it is hope that this article stresses the importance of reevaluating the U.S. antitrust policy and its core regulation criteria. Not only can consumer prices and product quality impact societal welfare, but non-price factors, such as potential political outcomes revealed in this study, could be an additional dimension of harm to society and even democracy.

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Appendix
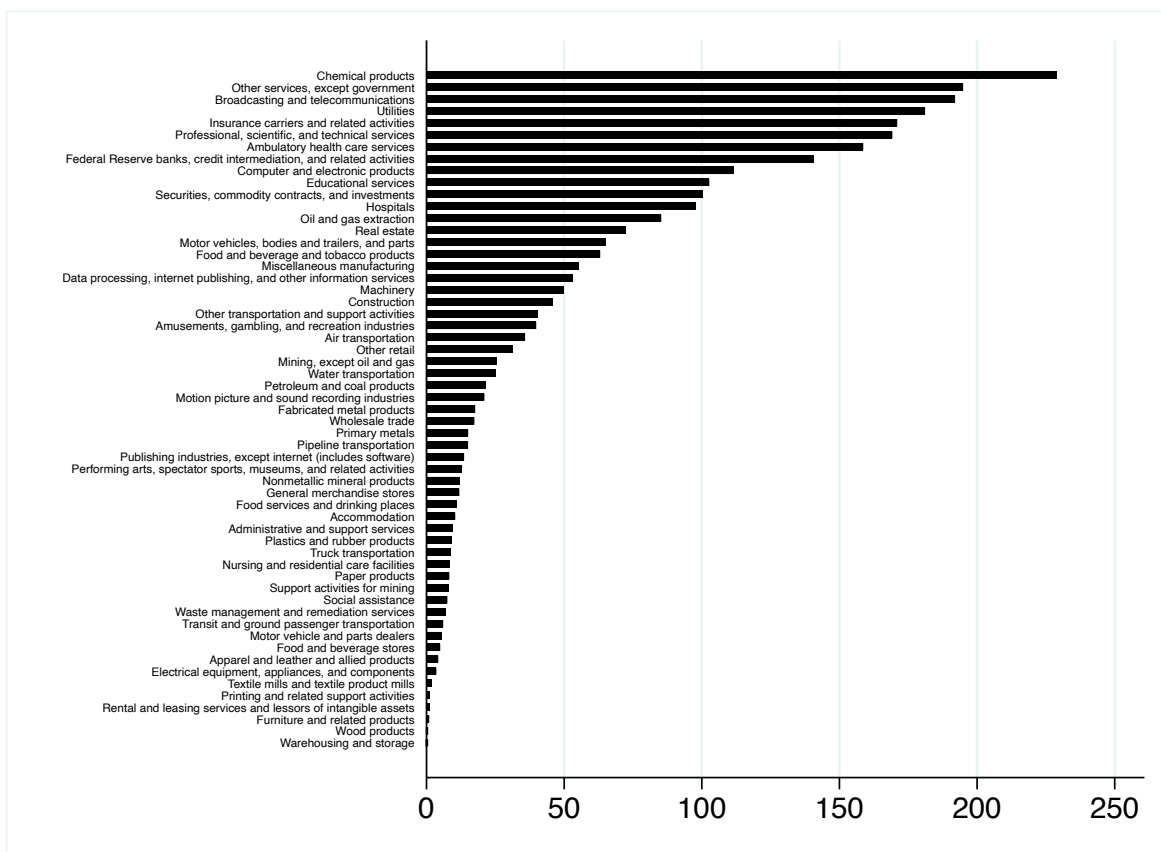
Figure 21: Average unadjusted lobbying expenditures (in millions) sorted by industries, 2003-2019

Table 9: Estimation of the impact of lobbying expenditures on industry concentration in the commercial banks industry by using largest four-firm deposit concentration ratio.

	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (CR4_deposit)	-.335
	(0.125)
Constant	4.711***
	(0.000)
Observations	17
R-squared	0.150

Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Estimation of the impact of lobbying expenditures on industry concentration in the commercial banks industry by using HHI.

	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (HHI)	-.198
	(0.133)
Constant	4.417***
	(0.000)
Observations	17
R-squared	0.144

Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Estimation of the impact of lobbying expenditures on industry concentration in the airline sector by using HHI.
Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

	Dependent Variable: Log (Lobbying Expenditures per Output)
Log (HHI_RPM)	-.544***
	(0.006)
Constant	4.005***
	(0.000)
Observations	12
R-squared	0.554
Adj R-squared	0.509