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Exploring the Contextual Influence of Super PAC Contributions on Legislative Voting Behavior through Hierarchical Linear Modeling

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• Abstract •

This paper is exploratory in nature which represents the first attempt to examine the influence relationship between Super PACs and legislative voting behavior using a Hierarchical Linear Modeling (HLM). Previous research had studied the relationship between PAC money, not Super PAC money and legislative voting behaviors based on regression models or mathematical models. In this study, the Oil & Gas sector was selected for HLM testing among PAC sectors, considering its significant scale. A key limitation in these single-level models is their failure to account for contextual factors, such as district interests, which may influence congressional voting decisions. Legislators' choices cannot be entirely disentangled from the interests of their constituencies. The HLM approach enables this contextual analysis. I investigated the decision-making process of senators' voting through the relationships between Super PAC contributions and party affiliation at level 1 and district interests at level 2, using the information on the 116^{th} and 117^{th} the U.S. senators such as roll-call votes, Super PACs, party affiliations, ideologies, and district interests, assembling a longitudinal panel matrix. I tested 4 HLM models, and the findings indicate two primary outcomes. Firstly, the data affirm both central hypotheses, showing that state characteristics and district interests heavily influence senators' votes on oil and gas legislation, particularly as senators with more Super PAC funding are more likely to vote pro-industry. Secondly, the intercept-and-slope-as-outcome model (Model 4) proves to be the most effective, outperforming other models according to -2LL, AIC, and BIC criteria, highlighting the value of multilevel models in analyzing the effects of Super PAC contributions on voting behavior. In summary, the influence of Super PAC money on legislative voting behavior has been confirmed through the HLM approach; that is, the HLM approach

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has been confirmed as a useful model for explaining the impact of Super PAC money on legislative voting behavior.

Key words : Super PAC money, Legislative voting behavior, HLM, Multilevel analysis, the U.S. senator

I. Introduction

The relationship between money and power has long been a political, economic, and social issue. To mitigate its negative aspects, regulations have been established not only in parliamentary-centered nations but also in presidential systems. Despite these regulations, studies on the influence of money continue to be conducted persistently. A notable example of such research is the study on the relationship between PAC money or contributions and congressional voting in the United States. The emergence of Super PACs in 2010 has significantly heightened the importance of studying the influence relationships between these entities and political decision-making.

The primary objective of this study is to evaluate the impact of Super Political Action Committee (PAC) contributions on the U.S. senators' voting behavior concerning a specific legislation within a hierarchical or multilevel framework. PACs, widely known as political committees organized for the purpose of fundraising and spending to influence election outcomes, often represent business, labor, or ideological interests.

Despite the extensive debate, there is still no consensus on whether PAC contributions directly influence legislative voting. Some argue that PACs attempt to purchase votes, while others suggest that PACs merely support candidates who already align with their interests.[1]. This divide is mirrored in academic research, where studies provide mixed evidence on the matter: some indicate that financial contributions do affect voting behavior,[2] while others refute such claims.[3]

1) Sabato, Larry J., *PAC Power: Inside the World of Political Action Committees*, New York: W.W. Norton & Company, Inc., 1984.

2) The representative papers are as follows. Davis, F. L., “Balancing the Perspective on PAC Contributions:

Research on the influence of PAC contributions on congressional voting began in the late 1970s[4]. Nearly all studies, with the exception of Luke's research (2004), have relied on single-level statistical models such as OLS,[5] probit/logit/tobit models,[6] simultaneous probit-tobit models,[7] and mathematical modes.[8] A key limitation in these single-level models is their failure to account for contextual factors, such as district interests, which may influence congressional voting decisions. Legislators' choices cannot be entirely disentangled from the interests of their constituencies. For instance, each senator may vote in line with the preferences of their district, particularly when representing the economic interests of their region.

Unlike previous studies, this paper represents the first attempt to examine the influence relationship between Super PACs and legislative voting behavior using a Hierarchical Linear Modeling (HLM). In this study, the Oil & Gas sector was selected for HLM testing among PAC sectors, considering its significant scale.

In Search of an Impact on Roll Calls." *American Politics Quarterly*, vol.21, no.2, 1993. Langbein, L.L. and M.A. Lotwis, "The Political Efficacy of Lobbying and Money: Gun Control in the U.S. House 1986." *Legislative Studies Quarterly*, vol.15, no.3, 1990. Neustadtl, A., "Interest-group PACsmenship: An Analysis of Campaign Contributions, Issues Visibility, and Legislative Impact." *Social Force*, vol.69, no.2, 1990. Wilhite, A., and John Theilmann., "Labor PAC Contribution and Labor Legislation: A Simultaneous Logit Approach." *Public Choice*, vo.53, 1987. Frendreis, J., and Richard Waterman. "PAC Contribution and Legislative Behavior: Senate Voting on Trucking Deregulation." *Social Science Quarterly*, vol.66, 1985. Welch, W. P., "Campaign Contributions and Legislative Voting: Milk Money and Dairy Price Supports." *Western Political Quarterly*, vol.35, 1982. Siberman, J. and G. C. Durden., "Determining Legislative Preferences on the Minimum Wage: An Economic Approach." *Journal of Political Economy*, vol.84, 1976.

3) The representative papers are as follows. Fleisher, R., "PAC Contributions and Congressional Voting on National Defense." *Legislative Studies Quarterly*, vol.XVIII, no.3, 1993. Grenzke, J. M., "PACs and the Congressional Supermarket: The Currency is Complex." *American Journal of Political Science*, 33(1):1-24, 1989. Wright, J. R., "Contribution, Lobbying, and Committee Voting in the U.S. House of Representatives." *American Political Science Review*, vol.84, no.2, 1990. Chappell, H., "Campaign Contributions and Congressional Voting: A Simultaneous Probit-Tobit model." *Review of Economics and Statistics*, vol.64, 1982.

4) Liu, Zihua. "PAC Campaign Contributions and Congressional Voting: Have Oil & Gas PAC Dollars Bought the Drilling Rights in ANWR?" *Midwest Conference Paper*, 2004.

5) The representative papers are as follows. Danielsen, A. L. and Paul H. Rubin, "An Empirical Investigation of Voting on Energy Issues." *Public Choice*, vol.31, 1977. Wright, *op.cit*.

6) The representative paper is Siberman, J. and C. D. Garey, *op. cit*.

7) The representative papers are as follows. Davis, F. L., *op. cit*. Fleisher, R., *op. cit*. Grenzke, J. M., *op. cit*. Wilhite, A. and J. Theilmann., *op. cit*. Welch, W. P., *op. cit*.

8) The representative papers are as follows. Konishi, H. and Chen-Yu Pan. "Silent Promotion of Agenda: Campaign Contributions and Ideological Polarization." *Public Choice*, vol.182, no.1, 2020. Holcombe, R. G., "Transitional Gains and Rent Extraction." *Public Choice*, vol.181, no.1/2. 2019.

The selection of the Oil & Gas sector for this study is based on its substantial economic and political significance, making it an ideal case for examining the influence of Super PAC contributions on legislative voting behavior. As one of the most financially robust and politically active industries in the United States, the Oil & Gas sector plays a pivotal role in shaping energy policy and regulatory frameworks. Its geographical concentration in specific states also highlights distinct district-level interests, which are essential for hierarchical linear modeling (HLM). By focusing on this sector, the study effectively captures the interaction between Super PAC contributions and local economic dependencies, providing a nuanced understanding of how individual legislative decisions and district-level characteristics collectively influence voting patterns.[9] This alignment of the sector's attributes with the study's methodological approach justifies its selection and enhances the ability to test the hypotheses within a multilevel analytical framework.

I will test the incorporates contextual factors—specifically, district-level interests—to assess whether senators' voting decisions on oil and gas bills are influenced by Super PAC contributions within a broader context. Typically, a state's crude oil production per capita serves as a proxy for its district's interest in the oil and gas industry. Even in districts where oil production is minimal, spillover effects from nearby oil-rich areas might shape their stance due to economic ties with the industry.[10]

To test these dynamics, two hypotheses are proposed: first, that state characteristics influence senators' voting behavior on oil and gas-related bills; and second, that higher levels of Super PAC contributions lead to more consistent pro-oil and gas industry voting patterns among senators.

Ⅱ. Theoretical Background

1. PAC and Super PAC

Political Action Committees (PACs) are organizations designed to raise and distribute

9) Congressional Research Service. Oil and Gas Industry: Federal Policy and Economic Impacts. 2021 Retrieved from https://crsreports.congress.gov/

10) Liu, Zihua. *op. cit*.

funds to influence elections, often representing business, labor, or ideological interests. PACs are regulated by the Federal Election Commission (FEC), which mandates registration and enforces contribution limits—up to $5,000 per election for individual candidates and $15,000 annually for party committees.[11] Established in 1944 to support Franklin D. Roosevelt's campaign, PACs were initially created to circumvent restrictions on union contributions.[12] Over time, Leadership PACs emerged, allowing politicians to support other candidates while disclosing affiliations as required by the Honest Leadership and Open Government Act of 2007.[13]

Super PACs, or Super Political Action Committees, emerged after the 2010 U.S. Court of Appeals decision in SpeechNow.org v. FEC, which allowed unlimited independent expenditures in federal elections. Unlike traditional PACs, Super PACs cannot directly contribute to candidates or parties but can raise and spend unlimited funds to advocate for or against political candidates. These organizations are required to file regular disclosures with the Federal Election Commission (FEC), detailing their donors and expenditures, which provides a degree of transparency despite their significant financial influence.[14]

The rise of Super PACs has profoundly reshaped the U.S. political landscape by enabling corporations, unions, and wealthy individuals to exert substantial influence through large financial contributions. By 2020, over 2,100 Super PACs were active, reporting $480 million in revenue during the presidential election cycle alone. Their activities, such as heavy spending on political advertising and influencing public opinion, have heightened concerns about the disproportionate impact of money in politics. Super PACs have been linked to increased polarization and a prioritization of donor interests over those of the general electorate, cementing their role as pivotal actors in modern political campaigns and legislative policymaking.[15]

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11) Smith, J. A., *Financing Democracy: The Political Economy of Political Action Committees*. Cambridge University Press, 2021.

12) Federal Election Commission (FEC). (n.d.). FEC Record: Litigation (SpeechNow.org v. FEC). Retrieved from. http://www.fec.gov/updates/fec-record-litigation/

13) *Ibid*.

14) Federal Election Commission (FEC). (n.d.). FEC Record: Litigation (SpeechNow.org v. FEC). Retrieved from. http://www.fec.gov/updates/fec-record-litigation/

15) Harvard Magazine. Super PACs and their effect on U.S. presidential politics. Retrieved from. https://www.harvardmagazine.com/2020/01/super-pacs-us-presidential-politics. 2020.

2. Legislative voting behavior of the U.S. Senate

The legislative voting behavior in the U.S. Senate is governed by a complex set of institutional rules, procedural norms, and strategic considerations. Legislation must pass through various stages, including introduction, committee review, debate, and amendment, before reaching the voting stage. While most bills require a simple majority of 51 votes to pass (assuming all 100 senators are present), the use of a filibuster introduces an additional procedural hurdle. In such cases, a cloture vote requiring 60 votes is needed to end debate and move forward. This procedural framework highlights the importance of strategic coalition-building and negotiation in navigating Senate rules to advance or block legislation.[16)]

The volume of legislation introduced in the Senate reflects its wide-ranging responsibilities, yet only a small fraction of bills become law. For instance, during the 117th Congress (2021~2023), approximately 3,800 bills were introduced, but many stalled during committee reviews or were significantly altered through debate and amendments. This demonstrates the rigorous scrutiny that legislation undergoes and the procedural bottlenecks that prevent many bills from reaching the voting stage. The legislative process is inherently selective, requiring bills to meet high procedural and political thresholds before final passage.[17)]

Beyond procedural considerations, Senate voting behavior is influenced by a variety of internal and external factors. Senators weigh party alignment, constituency interests, personal beliefs, and external pressures, such as lobbying and public opinion, in their decision-making. While party affiliation often serves as a guiding principle, senators frequently consider the specific needs and preferences of their state constituents. Voting behavior can also be highly strategic, with senators using their votes to signal broader political positions, gain leverage in negotiations, or shape legislative priorities. Additionally, procedural elements such as filibusters, cloture votes, and the Senate's committee structure play a critical role in shaping the legislative decision-making process,

16) Silbey, J. H., "Delegates Fresh from the People: American Congressional and Legislative Behavior." *Journal of Interdisciplinary History*, vol.13, no.4, 1983.

17) OpenSecrets.org. (n.d.). PAC Contributions to Federal Candidates. Retrieved from. https://www.opensecrets.org/pacs

reflecting the multifaceted nature of Senate voting behavior.[18]

3. Research between PAC/Super PAC and legislative voting behavior

Research on Super PACs is still relatively limited, as Super PACs were officially legalized only in 2010. Therefore, studies on the relationship between Super PACs and legislative voting behavior need to first consider the existing research on PACs.

Research on the relationship between PAC contributions and legislative voting behavior, conducted since the 1980s, has primarily utilized regression analysis methods such as OLS, 2SLS, Probit, and Tobit models. These studies have generally confirmed that PAC contributions statistically influence legislative voting behavior. However, existing research reveals several gaps and opportunities for improvement. Context-specific limitations, highlighted by studies like Witko (2011), show that PAC influence varies by issue, district interests, and ideology, suggesting the need for a broader framework to generalize findings.[19] Additionally, Stratmann (1995) emphasizes the importance of timing, noting that contributions closer to a vote have greater influence, yet many studies neglect the temporal dimension.[20] The insufficient focus on multilevel effects, as noted by Ansolabehere et al. (2003), underscores the lack of exploration into how higher-level factors like district economics and party strategies interact with PAC contributions.[21] Methodologically, many studies rely on single-level regression models, which oversimplify the complexities of multilevel interactions, and lack robust instrumental variables, as seen in Wright (1990).[22] Theoretical limitations include an overemphasis on direct effects, neglecting indirect influences like agenda-setting and coalition-building, and overlooking mechanisms such as signaling and strategic behavior. Future research should adopt

18) Lee, F. E., *Beyond Ideology: Politics, Principles, and Partisanship in the U.S. Senate*. University of Chicago Press, 2009.

19) Witko, J. C., "Campaign Contributions, Access, and Government Contracting", Journal of Public Administration Research and Theory, vol.21, Issue 4, 2011.

20) Stratmann, T., "Campaign Contributions and Congressional Voting: Does the Timing of Contributions Matter?", *The Review of Economics and Statistics*, 1995, vol.77, issue1, 1995.

21) Ansolabehere, S., de Figueiredo, J. M., and Snyder, J. M., "Why is there so little money in U.S. politics? *Journal of Economic Perspectives*, 17(1), 2003.

22) Wright, J. R., "Contribution, Lobbying, and Committee Voting in the U.S. House of Representatives." *American Political Science Review*, vol.84, no.2, 1990.

multilevel analyses, such as hierarchical linear modeling (HLM), to integrate individual and group-level factors, while also examining timing, contextual variables, and causal clarity using advanced statistical methods. Expanding the focus to indirect effects, such as how PAC contributions shape legislative negotiations and broader political strategies, would provide a more comprehensive understanding of their influence on policymaking.

The influence of Super PACs on American politics has been extensively studied, providing valuable insights into their effects on voter behavior, legislative decision-making, and policy outcomes. Fowler et al.(2018) quantified the impact of Super PAC advertisements on voter behavior using big data analytics, illustrating the significant role of political advertising in shaping public opinion.[23] Dowling and Miller(2020) extended this line of inquiry by employing machine learning to analyze the effectiveness of Super PAC messages, shedding light on how these communications influence voter evaluations and electoral outcomes.[24] These studies underscore the pervasive influence of Super PACs at the voter level, setting a foundation for exploring their impact further along the political chain, including legislative behavior.

At the legislative level, Herrnson(2016) examined the correlation between Super PAC expenditures and legislators' voting patterns, highlighting financial contributions as a potential driver of legislative alignment with specific interests.[25] La Raja and Schaffner(2019) further emphasized the systemic effects of Super PACs, demonstrating their role in shaping policy agendas and fostering political polarization.[26] Together, these studies reveal gaps in understanding the multilevel dynamics of Super PAC influence. To address these gaps, this study employs hierarchical linear modeling (HLM), enabling a comprehensive analysis of how Super PAC contributions interact with contextual factors, such as district interests, to influence legislative voting behavior. This approach advances

23) Fowler, E. F., Franz, M. M., & Ridout, T. N., *Political Advertising in the United States*. Westview Press, 2018.

24) Dowling, C. M., and Miller, M. G., "Experimental Evidence on the Relationship Between Candidate Funding Sources and Voter Evaluations." *Journal of Experimental Political Science*, vol.7,no.1, 2020.

25) Herrnson, P. S., The Impact of Organizational Characteristics on Super PAC Financing and Independent Expenditures. Bipartisan Policy Center, 2016. Retrieved from. https://bipartisanpolicy.org/download/?file=%2Fwp-content%2Fuploads%2F2019%2F05%2FThe-Impact-of-Organizational-Characteristics-on-Super-PAC-Financing-and-Independent-Expenditures.pdf

26) La Raja, R. J., and Schaffner, B. F.. *Campaign Finance and Political Polarization: When Purists Prevail*. University of Michigan Press. 2019.

the existing literature by integrating voter-level and district-level insights into a unified analytical framework, providing a nuanced perspective on the complexities of Super PAC influence.

4. Hierarchical Linear Modeling (HLM)

Hierarchical Linear Modeling (HLM) addresses the limitations of traditional regression analysis by offering a statistical framework that recognizes the variability of regression models across groups or individuals, rather than assuming a single fixed model for all subjects. Traditional regression models rely on assumptions such as linearity, normality, homoscedasticity, and independence; however, research has shown that these assumptions often fail in multilevel data structures. For example, Aitkin and Longford (1986) demonstrated that aggregating individual-level data to the group level can yield misleading results, as this process eliminates individual-level variability, which often accounts for the majority of total variance.[27] Conversely, disaggregating group-level data to the individual level can violate the independence assumption, further distorting relationships between variables.[28] Both strategies—aggregation and disaggregation—have been widely criticized for undermining the accuracy of statistical inferences.[29]

HLM overcomes these challenges by explicitly modeling hierarchical data structures, such as students nested within schools or employees within organizations, while accounting for variability at both individual and group levels. Unlike traditional regression, which assumes uniform error structures and single-level relationships, HLM allows for the examination of cross-level interactions and varying error distributions across levels. This flexibility enhances the ability to analyze complex relationships, such as the interplay between individual outcomes and group-level contextual variables, offering insights that would otherwise be obscured. Moreover, researchers such as Holt, Scott, and Ewings (1980) have shown that failing to account for hierarchical sampling structures in traditional

27) Aitkin, M., and Longford, N., "Statistical Modeling Issues in School Effectiveness Studies (with Discussion). *Journal of the Royal Statistical Society*, vol.A, no.149, 1986.

28) Holt, D., Scott, A.J. and Ewings, P.D., "Chi-Squared Tests with Survey Data," *Journal of the Royal Statistical Society. Series A* (General), vol.143, 1980.

29) Bryk, Congdon, et al., *HLM 5: Hierarchical Linear and Nonlinear Modeling*. Scientific Software International, 2001.

analyses can result in significant inferential errors, further underscoring the importance of HLM in such contexts.[30] By capturing multilevel dynamics and disentangling variable effects across levels, HLM provides a robust framework for analyzing nested data and understanding the complexities of hierarchical systems.

〈Table 1〉 The difference between HLM and regression analysis[31]

	Hierarchical Linear Modeling HLM)	Traditional Regression Analysis
Data Structure	Handles hierarchical or multilevel data, such as students within schools within districts.	Assumes independence among data points, analyzing each at the same level without hierarchical relations.
Contextual Effects	Can analyze individual-level outcomes alongside group-level contextual variables, examining influences across different levels.	Primarily analyzes individual-level data; limited in modeling direct contextual effects.
Flexibility in Analysis	Offers flexibility to disentangle effects of variables at various levels, enhancing the understanding of complex relationships.	Focuses on single-level relationships, typically examining correlations among individual-level variables.

Ⅲ. Data and Method

1. Data

This study analyzes data from the 116th and 117th Congresses, focusing on roll-call votes, Super PAC contributions, party affiliations, ideologies, and district interests to create a longitudinal panel matrix. The dependent variable is the individual-level voting proportion, measuring how often senators voted pro-oil & gas from 2019 to 2023,

30) Holt, D., Scott, A. J. and Ewings, P. D., "Chi-Squared Tests with Survey Data," *Journal of the Royal Statistical Society. Series A* (General), vol.143, 1980.

31) The source is as follows: Raudenbush, S. W. and Bryk, A. S., "A Hierarchical Model for Studying School Effects." *Journal: Sociology of Education*, vol.59, no.1, 1986. Goldstein, H., *Multilevel Statistical Models* (4th ed.). Wiley, 2011. Snijders, T. A., and R. J. Bosker, *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*, London: Sage Publications, 2012.

calculated as the ratio of pro-industry votes to total energy-related issues. The dataset includes 21 relevant bills and amendments, with $14.47 million in Super PAC contributions linked to the oil & gas sector. Predictors include party affiliation (coded as 1 for Republicans and 0 for Democrats), Super PAC contributions (in thousands), and district interests (per capita crude oil production in 2014). This multilevel model captures data from 200 senators across 50 states, accounting for variations in Super PAC funding and state-level economic disparities.

〈Table 2〉 Descriptive Statistics of Level 1 and Level 2 (unit: $1,000)

	N	Mean	SD	Min	Max
Level 1					
Voting percentage	200	0.55	0.46	0.00	1.00
Party	200	0.50	0.50	0.00	1.00
Super PAC Money	200	380.73	19.89	68.75	1,499.93
Level 2					
District's Interests	50	22.71	98.52	0.00	684.09

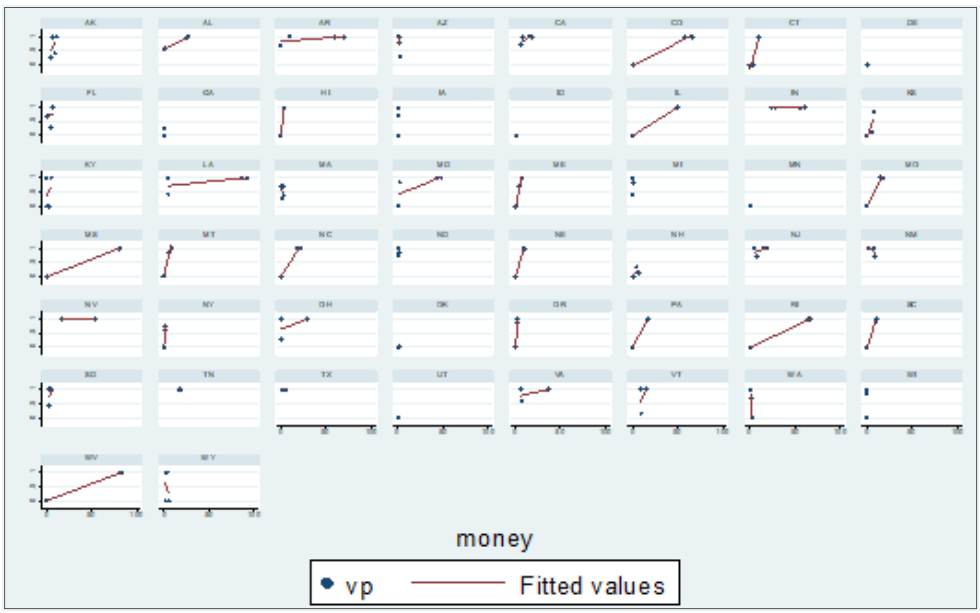
The data for the variables at each level are sourced from a variety of websites including the United States Senate, The Washington Post, OpenSecrets.org, National Journal.com, and StateMaster.com. Specifically, information on each senator's party affiliation and their roll call votes on oil and gas issues is gathered from the United States Senate and NationalJournal.com. Data concerning Super PAC contributions are obtained from OpenSecrets.org, while information regarding the interests of different districts comes from StateMaster.com. The specified HLMs are analyzed using the HLM software developed by Raudenbush and his colleagues.

2. Model building

1) Multilevel model justification

The necessity of a multilevel or hierarchical model for this study can be justified from three evidences in detail – empirical, statistical, and theoretical evidence. The first evidence

can be checked from Figure 1



〈Figure 1〉 OLS Fits of Voting Percentage and Money for 50 States

The chart illustrates that as Super PAC contributions increase, so does the voting percentage. It also highlights significant variability across states. The intra-class correlation coefficient (ICC) offers concrete empirical evidence, calculated as 0.0545/(0.1552+0.0545) = 0.2698 (refer to Table 3), indicating that state factors contribute to 27% of the variance in senators' voting behaviors. This moderately high ICC underscores the potential utility of a multilevel modeling approach that incorporates state attributes.

The necessity for a multilevel model is further substantiated by the inherent statistical structure of the data. Standard single-level, ordinary least squares (OLS) models presume independence among observations and errors, a condition often breached in datasets with nested structures. This dataset’s significant ICC suggests interdependence among observations. Theoretically, multilevel models are also justified, especially in examining how state characteristics might shape a legislator's stance on oil-and-gas legislation, as legislators within the same state are likely to exhibit more similarities in their voting patterns than

those from differing states. Luke's (2004) research also indicates state-wise variability and intrastate legislator similarities.

Employing a single-level model would likely introduce two major issues. First, unaccounted contextual data might be erroneously aggregated within individual error terms, leading to correlated errors among individuals from the same context—this breaches a fundamental assumption of multiple regression.

Secondly, disregarding contextual differences assumes uniform applicability of regression coefficients across all situations, promoting a misleading uniformity in processes across diverse contexts. This would likely understate the standard errors of the coefficients, increasing the risk of Type I errors, as noted in studies by Luke (2004)[32] and Raudenbush and Bryk (2002).[33]

2) Multilevel models

To investigate senators' voting behavior, four distinct two-level models are utilized: the unconditional model (Model 1), the random intercept model (Model 2), the intercept-as-outcome model (Model 3), and the intercept-and-slope-as-outcome model (Model 4). In these models, senators are treated as level-1 units and states as level-2 units. The level-1 predictor, "Money," is grand-mean centered across the conditional models (Models 2 to 4), which aids in testing the research hypothesis concerning the variation in Super PAC money received by individual senators relative to the senatorial average.

(1) Model 1: Unconditional model

To gauge the magnitude of variation between states in voting behavior, an unconditional equation model (a model with no predictors at either level) is constructed as follows:

Level-1mdoel

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Level-2 model

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

32) Luke, D. A., *Multilevel Modeling. Thousand Oaks*, CA: Sage Publications, Inc. 2004.

33) Raudenbush, S. W. and Bryk, A. S., *op. cit.*

Mixed Model:

$$Y_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

where Y_{ij} is the voting percentage for a senator i within a state j, β_{0j} is average voting percentage within state j, γ_{00} is the grand mean across all senators, u_{0j} is the variability between states, and r_{ij} means the variability within a state j.

(2) Model 2: Random intercept model

In Model 2, the examination of senators' voting behavior incorporates the contextual effect where the level-one intercepts and slopes differ across states, but without incorporating level-2 predictors. This model allows for variability in the intercepts and slopes across states but does not include any unique modifications to the slope of the variable 'Party' associated with any specific state. According to existing literature, party affiliation typically dictates a consistent voting stance for senators, as evidenced by studies from Fleisher (1993)[34], and Davis (1993)[35]. Therefore, in this model, the slopes of the Party variable, β_{1j}, are permitted to vary solely based on the level-1 structure without any additional random components attributed to level-2 predictors.

Level-1model:

$$Y_{ij} = \beta_{0i} + \beta_{1i}X_{1ij} + \beta_{2i}X_{2ij} + r_{ij}$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$
$$\beta_{1j} = \gamma_{10}$$
$$\beta_{2j} = \gamma_{20} + u_{0j}$$

Mixed model:

$$Y_{ij} = \gamma_{00} + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + u_{0j} + u_{2j} + r_{ij}$$

where X_{1ij} means the senator i's party in district j, and X_{2ij} means the senator i's Super PAC money from Oil & Gas interest groups in district j. β_{0j} is now the mean outcome for each state adjusted for differences among states in X_{ij}. The regression

34) Fleisher, R., *op. cit*.

35) Davis, F. L., *op. cit*.

coefficients, β_{1j} and β2j indicates how outcome, voting percentage of senator i within state j is distributed in state j as a function of the measured person characteristics X_s. The effect of X_{1ij} is constrained to be the same fixed value for each level-2 unit. Lastly, u_{oj} is the unique increment to the intercept associated with state j.

(3) Model 3: Intercept-as-outcome model

In Model 3, the characteristics of a state, specifically the district's interests in oil and gas, are incorporated into the level-2 equation of Model 2. In this setup, the district's interests exclusively affect the intercept (β_{0j}) of the level-1 prediction equation. The model is designed to assess how much of the interstate variability in voting behavior is attributable to the prevalence of the oil and gas sector within each state. This approach isolates the influence of state-level economic factors on legislative decisions, specifically focusing on how deeply embedded the oil and gas industry is within the state's economic structure.

Level-1model:

$$Y_{ij} = \beta_{0i} + \beta_{1i}X_{1ij} + \beta_{2i}X_{2ij} + r_{ij}$$

Level-2 model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j}$$
$$\beta_{1j} = \gamma_{10}$$
$$\beta_{2j} = \gamma_{20} + u_{2j}$$

Mixed model:

$$Y_{ij} = \gamma_{00} + \gamma_{01}W_j + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + u_{0j} + u_{2j} + r_{ij}$$

where W_j is the district's interests, and γ_{01} is the voting percentage difference between the district's interests. Whereas the random variable u_{oj} had been the deviation of state j's mean from the grand mean, it now represents the residual.

(4) Model 4: Intercept-and-slope-as-outcome model

In Model 4, the focus extends to examine not only how district interests might influence average voting behavior within a state but also whether these interests interact with other level-one covariates, such as the amount of Money received from Super PACs.

To explore this interaction, district interests are incorporated into the slope of the level-1 predictor, Money. This modification allows the model to assess how district economic dependencies on the oil and gas sectors may modify the impact of financial contributions on senators' voting patterns.

Level 1:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + r_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j}$$
$$\beta_{1j} = \gamma_{10}$$
$$\beta_{2j} = \gamma_{20} + \gamma_{21}W_j + u_{2j}$$

Mixed Model:

$$Y_{ij} = \gamma_{00} + \gamma_{01}W_j + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + \gamma_{21}X_{2ij}W_j + u_{0j} + u_{2j}X_{2ij} + r_{ij}$$

where W_i is the district's interests, and γ_{21} is the indicator of cross-level interactions where a level-2 characteristic may influence a level-1 relationship.

Ⅳ. Results

1. Fit unconditional model

Model 1 from Table 3 shows a significant average voting percentage of 54% in favor of pro-oil & gas issues, with statistical significance at the 1% level. It highlights substantial interstate variability in voting, with a 95% plausible range of 0.4395 to 0.6575, and an intra-class correlation coefficient (ICC) of 0.2698, indicating that 27% of the variability stems from state-level differences. This supports the use of multilevel modeling to incorporate state-level factors.

To test hypotheses, contextual effects such as district interests are added to models alongside level-1 variables (Super PAC contributions and party affiliation), with random slopes for Super PAC money included to examine cross-level variability. Reliability testing confirms the validity of these random slopes in Models 2 to 4, with reliability above

0.05. In Model 3, a random intercept is added for district interests at level 2, while Model 4 includes both a random intercept and slope, showing minimal slope variability linked to district interests. This refined approach emphasizes the importance of random effects in understanding legislative behavior.

〈Table 3〉 Parameter Estimation and Model Fit for Unconditional Model (Model1)

	Unconditional Model			
	Model 1			
Fixed Effects	Coef.	SE	T	p
For Intercept (β_{0j})				
Intercept (γ_{00})	0.5485	0.0432	12.6910	0.000
District Interest(γ_{01})				
For Party slope (β_{1j})				
Party (γ_{10})				
For Money slope (β_{2j})				
Money (γ_{20})				
District's Interest (γ_{21})				
Random Effects	S.D.	var. comp	χ^2	p
Intercepts (u_{oj})	0.2337	0.0545	117.9830	0.000
Money slope (u_{2j})				
Level-1 (r_{ij})	0.3939	0.1152		
Model Fit	Deviance	Parameter	AIC	BIC
	240.45	4	248.5	261.6

2. Fit conditional models

Based on the ICC results and other technical findings detailed above, conditional multilevel models can be systematically constructed. This study proposes examining three such models (Model 2 to Model 4) to assess the influence of Super PAC contributions on

senators' voting decisions across different states. The results from these models, each tailored to the specific data collected, are outlined as follows:

The initial conditional model, Model 2, adds two level-1 covariates to Model 1. In Model 2, the estimated fixed effect for γ_{00} is 0.3488, indicating the expected voting percentage for Democratic senators on pro-oil & gas issues when receiving an average amount of Super PAC money—34.8%. The coefficient γ_{10} is 0.4035, illustrating that being a Republican increases the likelihood of voting pro-oil & gas by approximately 40.4% compared to Democrats, aligning with previous findings that Republicans are more likely to support pro-oil & gas policies. Additionally, γ_{20} = 0.0094 suggests that for every additional $1,000 received from Super PACs, there is an expected increase in pro-oil & gas voting by about 0.094%. The substantial variance components at both level-1 (0.0545) and level-2 (0.0220) suggest potential benefits from incorporating more predictors into the model.

In Model 3, the intercept model, district interests only affect the intercept (β_{oj}) of the level-1 prediction equation. Super PAC contributions remain significant predictors at level-1, controlling for political party. The effect of district interests on voting percentage is statistically significant at the 1% level but has a minimal impact.

Model 4 incorporates a slope model to examine cross-level interactions between Super PAC contributions and district interests within the oil & gas sector. The model reveals that district interests significantly shape the average state voting levels while also moderating the influence of Super PAC contributions on voting behavior. The interaction's positive coefficient(γ_{21}) indicates that the presence of oil & gas interests amplifies the effect of financial contributions on voting behavior, contrary to a simple linear additive assumption. Notably, the inclusion of this cross-level interaction substantially increases the estimate for the district interests' direct effect on the intercept(γ_{01}), although the overall magnitude of this effect remains modest. This highlights the nuanced role of district-level contextual factors in legislative decision-making processes.

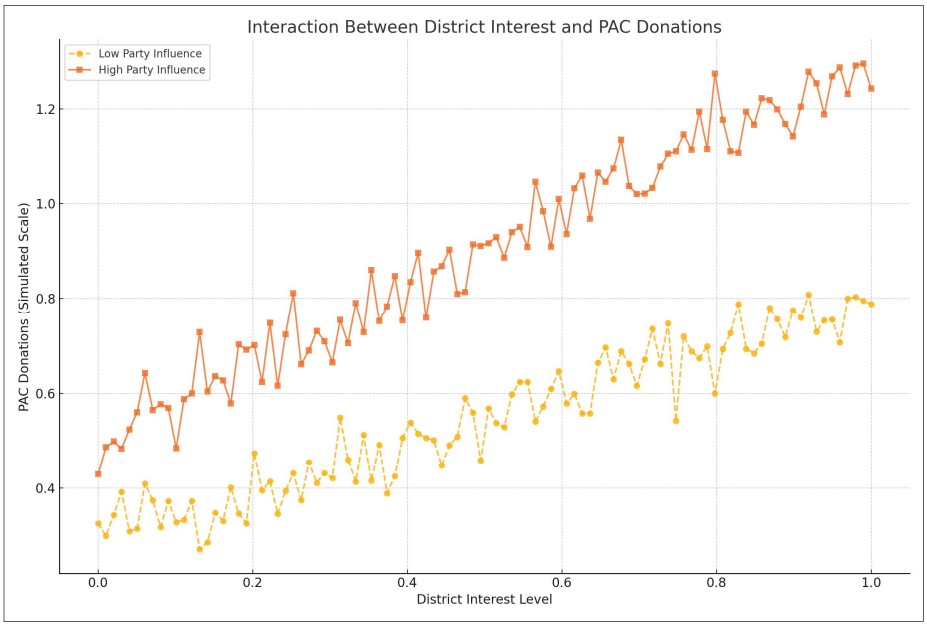
Overall, while Democratic senators are more likely to vote pro-oil & gas with increased Super PAC contributions, the state's oil & gas economy mediates this relationship. In states with a stronger oil & gas economy, higher pro-oil & gas voting rates are observed, but individual senator contributions have a diminished impact. Model 4 reveals that a

〈Table 4〉 Parameter Estimation and Model Fit for Conditional Models (Model2 to Model4)

	Conditional Models											
	Model 2				Model 3				Model 4			
Fixed Effects	Coef.	SE	T	p	Coef.	SE	T	p	Coef	SE	T	p
For Intercept (β_{oj})												
Intercept (γ_{00})	0.3488	0.0584	6.6660	0.000	0.3884	0.0688	5.6420	0.000	0.3871	0.0589	6.5760	0.000
District Interest(γ_{01})					0.000009	0.000002	4.3000	0.0010	0.0002	0.000051	4.0000	0.0000
For Party slope (β_{1j})												
Party (γ_{10})	0.4035	0.0537	8.9280	0.000	0.4812	0.0800	6.0150	0.000	0.4800	0.0540	8.8840	0.000
For Money slope (β_{2j})												
Money (γ_{20})	0.0094	0.0042	5.3590	0.000	0.0227	0.0044	5.1750	0.000	0.0221	0.0043	5.1210	0.000
District's Interest (γ_{21})									0.00078	0.00008	5.7600	0.0000
Random Effects	S.D.	var. comp	χ^2	p	S.D.	var. comp	χ^2	p	S.D.	var. comp	χ^2	p
Intercepts (u_{oj})	0.2741	0.0251	133.0479	0.000	0.2792	0.0220	133.3654	0.000	0.2786	0.0176	132.1770	0.000
Money slope (u_{2j})	0.0182	0.0003	249.0641	0.000	0.0182	0.0003	250.2873	0.000	0.0181	0.0003	236.1533	0.000
Level-1 (r_{ij})	0.2376	0.1151			0.2375	0.1564			0.2388	0.1147		
Model Fit	Deviance	Parameters	AIC	BIC	Deviance	Parameters	AIC	BIC	Deviance	Parameters	AIC	BIC
	133.906915	9	151.9	181.6	121.520837	10	141.5	174.5	116.402355	11	138.4	174.7

$1,000 increase in Super PAC contributions boosts the average pro-oil & gas voting by 0.221%, a slight decrease from Model 3. These findings are consistent with Luke's studies on tobacco voting, suggesting that Model 4 explains 68% of the total variance in parameters among states regarding the mean level of pro-oil & gas voting percentage.

The following simulated graph illustrates the interaction between district interest and Super PAC donations, highlighting significant political implications. In regions with high party influence, Super PAC donations increase more sharply as district interest rises, whereas in areas with low party influence, the growth in donations is comparatively modest. This underscores the critical role of district interest in shaping Super PAC contributions, particularly in contexts with strong party influence, where the alignment between political priorities and financial support becomes more pronounced. Conversely, in regions with weaker party influence, Super PAC donations are less responsive to district interest, reflecting a relative political disconnection and potential marginalization of such areas in the broader political and financial landscape.



〈Figure 2〉 Interaction between district interest and Super PAC contributions

4. Assess model goodness-of-fit where relevant

In assessing the proportion of variation among models, a crucial aspect of model specification and evaluation involves determining the degree to which a model aligns with the data. Maximum Likelihood (ML) estimation in multilevel modeling utilizes the likelihood statistic, which represents the criterion minimized during estimation. A key derived measure from the likelihood is the deviance, calculated as -2 times the natural log of the likelihood (-2LL). Deviance quantifies the discrepancy between the model and the observed data, serving as an indicator of model fit.

While the deviance of a single model does not offer interpretative value in isolation, it is instrumental when comparing the fit of different models. The comparative difference in deviance between models follows a chi-squared distribution, contingent upon the difference in the number of parameters each model estimates. For instance, Model 2 exhibits a deviance of 133.9, while Model 3 shows a lower deviance of 121.5, suggesting a better fit for Model 3 given its lower deviance. The deviance reduction between Models 2 and 3 is approximately 12.4, compared under a chi-squared distribution with one degree of freedom, indicating a non-significant difference ($p=.001$), hence supporting the superior fit of Model 3 over Model 2. Conversely, Model 4, which integrates the district's oil and gas interests as predictors for both the slope and intercept at level-2, displays an even lower deviance of 116.4, significantly improving upon Model 3 (Δdeviance=-5.1, df=1, $p<.001$).

Despite these insights, it is essential to acknowledge a limitation associated with deviance: models with more parameters tend to show reduced deviance, potentially misleading in terms of fit quality (Luke 2004:34). To circumvent this, alternative fit indices such as the Akaike Information Criterion (AIC) and Schwarz's Bayesian Information Criterion (BIC) are employed. These indices balance goodness-of-fit with model parsimony, penalizing excessive complexity. Lower values in AIC or BIC denote a preferable model fit. According to Table 4, Model 4 is selected as the most fitting model, despite a marginally higher BIC compared to other models, because it achieves the lowest values across both AIC and BIC criteria.

V. Conclusion

This study investigates the influence of Super Political Action Committee (Super PAC) contributions on U.S. senators' voting behavior using Hierarchical Linear Modeling (HLM). Previous research primarily examined Political Action Committees (PACs) and their impact using single-level statistical models, which often failed to account for contextual factors such as district interests. This study focuses on the Oil & Gas sector, which represents a significant economic and political area, analyzing data from the 116th and 117th U.S. Congresses, including senators' voting records, Super PAC contributions, party affiliations, and district-level characteristics.

The analysis of four Hierarchical Linear Models (HLM) yielded significant findings regarding the influence of state and district-level factors on senators' legislative behavior. State characteristics and district interests emerged as critical determinants of voting patterns on oil and gas legislation. Senators with greater Super PAC funding displayed a marked propensity to support pro-industry legislation. Notably, this relationship was moderated by district-level characteristics, such as economic dependence on the oil and gas sector, which amplified or mitigated the effects of financial contributions. These insights underscore the complexity of legislative decision-making, where both individual financial influences and broader economic contexts interplay.

The results also highlighted the methodological strength of multilevel modeling in examining political behavior. Unlike single-level models, HLM effectively captured hierarchical data structures and cross-level interactions, offering a nuanced understanding of contextual effects. Among the models tested, the intercept-and-slope-as-outcome model (Model 4) demonstrated superior explanatory power, integrating variations at both the individual and state levels. This model provided valuable insights into how district interests shape the impact of Super PAC contributions, revealing that states with stronger oil and gas economies exhibited higher pro-industry voting rates, even as individual-level contributions played a diminished role. These findings validate the efficacy of HLM in addressing the multidimensional nature of legislative behavior.

This study makes significant academic contributions by advancing methodological, contextual, and sector-specific insights. It represents a pioneering application of Hierarchical

Linear Modeling (HLM) to examine the influence of Super PAC contributions, overcoming the limitations of single-level models by incorporating both individual-level and contextual variables. By emphasizing the critical role of district interests, the research provides a nuanced perspective on how local economic dependencies interact with national political behaviors to shape legislative decisions. Furthermore, its focus on the Oil & Gas sector delivers valuable sector-specific insights into the interplay between financial contributions and policymaking, offering a foundation for comparative analyses across other industries with substantial Super PAC activity.

However, this study presents notable limitations that warrant attention and provide directions for future research. First, the dataset's limited clustering at the state level restricts the generalizability of findings. While the analysis includes data from the 116th and 117th Congresses, the small sample size of 50 states and the inclusion of only two senators per state reduce statistical power at level-2. To enhance robustness, future research should consider developing a more extensive longitudinal dataset or incorporating House representatives at level-1 to increase data granularity and diversity. Second, the current models do not account for social processes among senators, such as interactions and resource-sharing within committees and informal networks, which are critical factors influencing legislative decisions. Incorporating these dynamics at both state and individual levels could provide deeper insights into the mechanisms shaping voting behavior.

Additionally, the study's focus on the Oil & Gas sector, while significant, may not fully capture the broader spectrum of Super PAC influence. Expanding the analysis to other industries with substantial Super PAC activity could yield comparative insights and strengthen the external validity of the findings. Lastly, the inclusion of additional control variables in the level-1 model is essential. Currently, only political party affiliation is controlled for, leaving out other influential factors such as seniority, age, committee assignments, leadership priorities, and media attention. Incorporating these variables in future studies would allow for a more nuanced and comprehensive understanding of the factors driving legislative voting behavior.

References

Aitkin, M. and N. Longford, “Statistical Modeling Issues in School Effectiveness Studies (with Discussion). *Journal of the Royal Statistical Society,* vol.A, no.149, 1986.

Ansolabehere, S., de Figueiredo, J. M., & Snyder, J. M., “Why is there so little money in U.S. politics? *Journal of Economic Perspectives,* 17(1), 2003.

Bryk, Congdon, et al., *HLM 5: Hierarchical Linear and Nonlinear Modeling.* Scientific Software International, 2001.

Chappell, H., “Campaign Contributions and Congressional voting: A Simultaneous Probit-Tobit model.” *Review of Economics and Statistics*, vol.64,1982.

Chappell, H., “Campaign Contributions and Voting on the Cargo Preference bill: A Comparison of Simultaneous models.” *Public Choice*, 1981.

Congressional Research Service, Oil and Gas Industry: Federal Policy and Economic Impacts, 2020. Retrieved from https://crsreports.congress.gov/

Danielsen, A. L., and Paul H. Rubin, “An Empirical Investigation of Voting on Energy Issues.” *Public Choice*, vol.31, 1977.

Davis, F. L., “Balancing the Perspective on PAC Contributions: In Search of an Impact on Roll Calls.” *American Politics Quarterly*, vol.21, no.2, 1993.

Dowling, C. M., and Miller, M. G.,"Experimental Evidence on the Relationship Between Candidate Funding Sources and Voter Evaluations." *Journal of Experimental Political Science*, vol.7, no.1, 2020.

Federal Election Commission (FEC). (n.d.). “Campaign Guide for Corporations and Labor Organizations”, Retrieved from. http://www.fec.gov/resources/cms-content/documents/corp_and_labor.pdf

Federal Election Commission (FEC). (n.d.). “Campaign Guide for Nonconnected Committees”, Retrieved from. http://www.fec.gov/resources/cms-content/documents/nonguide.pdf

Federal Election Commission (FEC). (2010). SpeechNow.org v. FEC (U.S. Court of Appeals Decision). Retrieved from. http://www.fec.gov/law/litigation/speechnow.shtml

Federal Election Commission (FEC). (n.d.). FEC Record: Litigation (SpeechNow.org v. FEC). Retrieved from. http://www.fec.gov/updates/fec-record-litigation/

Fleisher, R., “PAC Contributions and Congressional Voting on National Defense.” *Legislative Studies Quarterly*, vol.XVIII, no.3, 1993.

Fowler, E. F., Franz, M. M., & Ridout, T. N., *Political Advertising in the United States.* Westview Press, 2018.

Frendreis, J. and Richard Waterman. “PAC Contribution and Legislative Behavior: Senate Voting on Trucking Deregulation.” *Social Science Quarterly*, vol.66, 1985.

Goldstein, H., *Multilevel Statistical Models* (4th ed.). Wiley, 2011.

Grenzke, J. M., “PACs and the Congressional Dupermarket: The Currency is Complex.” *American Journal of Political Science,* 33(1):1-24, 1989.

Harvard Magazine. Super PACs and their effect on U.S. presidential politics. Retrieved from. https://www.harvardmagazine.com/2020/01/super-pacs-us-presidential-politics. 2020

Herrnson, P. S., The Impact of Organizational Characteristics on Super PAC Financing and Independent Expenditures. Bipartisan Policy Center, 2016. Retrieved from. https://bipartisanpolicy.org/download/?file=%2Fwp-content%2Fuploads%2F2019%2F05%2FThe-Impact-of-Organizational-Characteristics-on-Super-PAC-Financing-and-Independent-Expenditures.pdf

Holcombe, R. G., "Transitional Gains and Rent Extraction." *Public Choice*, vol.181, no.1/2. 2019.

Holt, D., Scott, A. J. and Ewings, P. D., "Chi-Squared Tests with Survey Data," *Journal of the Royal Statistical Society. Series A* (General), vol.143, 1980.

Konishi, H. and Chen-Yu Pan. "Silent Promotion of Agenda: Campaign Contributions and Ideological Polarization." *Public Choice*, vol.182, no.1, 2020.

La Raja, R. J., and Schaffner, B. F.. *Campaign Finance and Political Polarization: When Purists Prevail*. University of Michigan Press. 2019.

Langbein, L. L. and M. A. Lotwis, "The Political Efficacy of Lobbying and Money: Gun control in the U.S. House 1986." *Legislative Studies Quarterly*, vol.15, no.3, 1990.

Lee, F. E., *Beyond Ideology: Politics, Principles, and Partisanship in the U.S. Senate*. University of Chicago Press, 2009.

Liu, Zihua, "PAC Campaign Contributions and Congressional Voting: Have Oil & Gas PAC Dollars Bought the Drilling Rights in ANWR?" *Midwest Conference Paper*. 2004.

Luke, D. A., *Multilevel Modeling. Thousand Oaks*, CA: Sage Publications, Inc. 2004.

Neustadtl, A., "Interest-group PACsmenship: An Analysis of Campaign Contributions, Issues Visibility, and Legislative Impact." *Social Force*, vol.69, no.2, 1990.

OpenSecrets.org. (n.d.). PAC Contributions to Federal Candidates. Retrieved from. https://www.opensecrets.org/pacs

Raudenbush, S. W., and Anthony S. Bryk. *Hierarchical Linear Models: Applications and Data Analysis Methods*. Thousand Oaks, CA: Sage Publication, Inc., 2002.

Raudenbush, S. W., and Bryk, A. S., "A Hierarchical Model for Studying School Effects." *Journal: Sociology of Education*, vol.59, no.1, 1986.

Rabe-Hesketh, S. and Anders Skrondal, *Multilevel and Longitudinal Modeling Using Stata.* College Station, TX: Stata Press Publication. 2005.

Sabato, L. J., *PAC Power: Inside the World of Political Action Committees*, New York: W.W. Norton & Company, Inc., 1984.

Siberman, J. and C. D. Garey, "Determining Legislative Preferences on the Minimum Wage: An Economic Approach." *Journal of Political Economy*, vol.84, 1976.

Silbey, J. H., "Delegates Fresh from the People American Congressional and Legislative Behavior." *Journal of Interdisciplinary History*, vol.13, no.4, 1983.

Smith, J. A., *Financing Democracy: The Political Economy of Political Action Committees*. Cambridge University Press., 2021.

Snijders, T. A., and R. J. Bosker, *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*, London: Sage Publications, 2012.

Stratmann, T., "Campaign Contributions and Congressional Voting: Does the Timing of Contributions

Matter?", *The Review of Economics and Statistics*, 1995, vol.77, issue1, 1995.

Welch, W. P., "Campaign Contributions and Legislative Voting: Milk Money and Dairy Price Supports." *Western Political Quarterly*, vol.35, 1982.

Witko, J. C., "Campaign Contributions, Access, and Government Contracting", *Journal of Public Administration Research and Theory*, vol.21, Issue 4, 2011.

Wilhite, A., and John Theilmann., "Labor PAC Contribution and Labor Legislation: A Simultaneous Logit Approach." *Public Choice*, vo.53, 1987.

Wright, J. R., "Contribution, Lobbying, and Committee Voting in the U.S. House of Representatives." *American Political Science Review*, vol.84, no.2, 1990.

Wright, J. R., "PACs, contribution, and roll calls: An Organizational Perspective." *American Political Science Review*, vol.79, no.2, 1985.

【국문요약】

HLM 기반 Super PAC 자금이 입법 투표 행위에 미치는 영향에 대한 탐색적 연구

김 대 중

본 논문은 계층적 선형 모델링(HLM)을 사용하여 슈퍼 PAC과 입법 투표 행위 간의 영향 관계를 방법론적으로 연구한 탐색적 성격의 논문이다. 기존 연구에서는 회귀 모델이나 수학적 모델을 기반으로 PAC 자금(슈퍼 PAC 자금이 아닌)과 입법 투표 행동 간의 관계 연구가 이루어졌다. 이 연구에서는 슈퍼 PAC 자금 규모를 고려하여 PAC 부문 중 석유 및 가스 부문을 HLM 테스트 대상으로 하였다. 기존 모델의 주요 한계는 의회 투표 결정에 영향을 미칠 수 있는 지역구의 이해관계와 같은 맥락적 요인을 고려하지 못하였다. 입법자의 선택은 그들의 선거구의 이해관계와 완전히 분리될 수 없기 때문이다. HLM 접근법은 이러한 맥락과 이해관계적 분석을 가능하게 한다. 이 논문에서는 116대와 117대 미국 상원의원들의 정보를 토대로 1단계에서 슈퍼 PAC 기부금과 정당 소속 관계, 2단계에서 지역구의 이해관계를 통해 상원의원들의 투표 결정 과정을 조사·분석하였다. 4가지 HLM 모델을 테스트하였고, 두 가지 주요 결과가 확인되었다. 첫째, 데이터는 두 가지 주요 가설을 뒷받침하며, 주의 특성과 지역구의 이해관계가 석유 및 가스 법안에 대한 상원의원들의 투표에 크게 영향을 미친다는 것이다. 특히 슈퍼 PAC 자금을 많이 받은 상원의원들은 산업에 유리하게 투표할 가능성이 더 높았다. 둘째로, 결과-절편 및 경사 모델(모델 4)이 다른 모델들을 능가하여 -2LL, AIC, BIC 기준에서 가장 효과적인 것으로 나타났다. 요약하자면, 슈퍼 PAC 자금이 입법 투표 행위에 미치는 영향이 HLM 접근을 통해 확인되었고. 이는 곧 HLM 접근법은 슈퍼 PAC 자금이 입법 투표 행위에 미치는 영향을 설명하는 데 있어 기존 모델보다 유용한 모델이 될 수 있음이 확인되었다.

주제어 : 슈퍼 PAC, 입법 투표 행위, 계층적 선형 모델링(HLM), 다층모델, 미국 상원의원

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