A Project Report

On

Economic Analysis of Public Policies

BY

Kartik Pandey	**2021A7PS2574H**
Aditya Aggarwal	**2021A7PS2380H**
Amol Audichya	**2021A7PS1830H**

Under the supervision of

DR. Rishi Kumar Tripathi

SUBMITTED IN COMPLETE FULFILLMENT OF THE REQUIREMENTS OF

CS F376: DESIGN PROJECT

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI (RAJASTHAN)

HYDERABAD CAMPUS

(MAY 2024)

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Thank you all for being an essential part of this endeavor.

Sincerely -

Kartik Pandey

Aditya Aggarwal

Amol Audichya

Birla Institute of Technology and Science-Pilani,

Hyderabad Campus

CERTIFICATE

This is to certify that the project report entitled "Economic Analysis of Public Policies," submitted by Mr. Kartik Pandey (ID No. 2021A7PS2574H) in COMPLETE fulfillment of the requirements of the course CS F366, Laboratory Project Course, embodies the work done by him under my supervision and guidance.

Date: **May 2024**

(DR. RISHI KUMAR)

BITS- Pilani, Hyderabad Campus

ABSTRACT

In federal political systems, the dynamics between central and state governments often influence various socio-economic outcomes, including the flow and distribution of investments. This project explores the causal relationship between political alignment and investment patterns, explicitly focusing on states governed by the same political party as the central government.

Research suggests that political alignment between different levels of government may lead to preferential policy measures, facilitating more favorable investment environments and, consequently, potentially influencing the geographic distribution of investments. This project aims to analyze how this political congruence impacts investment inflow, hypothesizing that aligned states receive relatively higher investments due to better policy synchronization and resource allocation.

To establish a causal link, the study will employ rigorous econometric methods to control for confounding factors and ensure robust results. The analysis will provide insights into the investment patterns and contribute to the broader understanding of how political factors shape economic decisions and outcomes at the sub-national level.

INTRODUCTION

This study embarks on an extensive analysis of fund distribution and resource allocation among Indian states, focusing on the pre and post-GST era. The implementation of the Goods and Services Tax scheme marked a significant milestone in India's fiscal landscape, prompting a reevaluation of resource allocation strategies and their impact on regional development.

Central to our investigation is the examination of how fund allocation dynamics have evolved in response to the GST framework. By dissecting allocation patterns, we aim to discern shifts in resource distribution strategies and their implications for economic equilibrium and regional growth.

Moreover, we delve into the nuanced relationship between state and central governments to understand its influence on fund allocation. This exploration adds depth to our analysis, highlighting the political dynamics shaping fiscal federalism in India.

Leveraging a comprehensive dataset and employing regression modeling techniques in R language, we endeavor to unravel the intricate relationships between various factors and fund disbursement patterns. Through meticulous analysis and visualization, we aim to offer valuable insights into the evolving landscape of fiscal federalism in India.

DATASET EXPLANATION

The only_SameGov.R file appears to focus specifically on the effect of political alignment (represented by the Same_Gov variable) on different financial indicators. Here's a detailed breakdown of what this script does:

1. Libraries Used

plm: For working with panel data models (fixed and random effects).

gt: For creating and styling tables in R.

2. Formulas (f1 - f4)

Four formulas are defined to analyze the relationship between political alignment and specific financial indicators:

f1: Models "II.3: Centrally Sponsored Schemes" against 'Same_Gov'.

f2: Models "II.2: Central Plan Schemes" against 'Same_Gov'.

f3: Models "I.6: WMA from RBI" against 'Same_Gov'.

f4: Models "II.D.5.c.1: GST compensation" against 'Same_Gov'.

3. Column and Row Names

column_names: Lists the financial indicators analyzed ("Centrally Sponsored Schemes", "Central Plan Schemes", "WMA from RBI", and "GST compensation").

row_names: Lists the row labels that will appear in the result tables ("Same_Gov(Fixed)", "Same_Gov(Random)", "pval_Hausman").

4. Coefficient Arrays

Arrays to store the results of the analyses:

Same_Gov_coeffs_random: Stores coefficients for 'Same_Gov' from random effects models.

Same_Gov_coeffs_fixed: Stores coefficients for 'Same_Gov' from fixed effects models.

model_phtest_pvalue: Stores p-values from the Hausman test, which is used to compare fixed vs random effects models.

5. Main Analysis

For each formula in f_array (f1 to f4):

Fit both fixed and random effects models using plm().

Extract the coefficients for 'Same_Gov' from both models and store them in the respective arrays.

Perform a Hausman test to compare the two models, storing the p-value to determine which model is more appropriate.

The variable "Same_Gov" assumes the value of 1 to denote instances where the government at the state level coincided with that at the central level.

Additionally, population parameters have been incorporated to elucidate the distribution of funds among states based on their demographic size.

CONCLUSION

Analysis of Government Alignment and Funding Allocations

1. Coefficients Analysis:

- Centrally Sponsored Schemes and GST Compensation:

- Both the fixed effects and random effects models indicate positive coefficients, suggesting that the alignment of the same government at both state and central levels is positively associated with higher funding allocations in these areas.

- Central Plan Schemes:

- The fixed effects model shows a positive coefficient, while the random effects model indicates a negative coefficient. This discrepancy may point to heterogeneity in the effects across different units (e.g., states or territories).

- Ways and Means Advances (WMA) from RBI:

- Both models exhibit negative coefficients, indicating that having the same government at both levels is associated with lower WMA from the Reserve Bank of India.

2. Hausman Test:

- The p-values for the Hausman test are consistently above 0.05, suggesting no significant difference between the coefficients estimated by the fixed and random effects models. This lack of significance implies that either model could be appropriate for the analysis.

- Given this, researchers often prefer the random effects model due to its efficiency and ability to handle unobserved heterogeneity. However, theoretical considerations, data characteristics, and the nature of the relationship being investigated should also inform the model choice.

3. Interpretation of Results:

- **Positive Coefficients for Centrally Sponsored Schemes and GST Compensation:**

  - Indicate that having the same government at both levels is linked to increased funding in these categories.

- **Discrepancy in Central Plan Schemes:**

  - Suggests that the relationship between government alignment and funding may vary across different states or territories.

- **Negative Coefficients for WMA from RBI**

  - Imply that government alignment is associated with a decrease in reliance on WMA from the RBI.

4. Considerations for Further Analysis:

- **Differences Between Models:**

  - The variation in coefficients between fixed and random effects models for certain variables warrants further investigation to understand the underlying causes.

- **Robustness Checks:**

  - Additional analyses, such as sensitivity checks or exploring alternative model specifications, could validate the findings and provide deeper insights.

Overall, this analysis highlights how government alignment at both levels influences funding allocations, emphasizing both positive associations and complexities that require further exploration.

Tax Revenue and Government Alignment Analysis

1. Effect of Same Government at Both Levels (Same_Gov):

- **Fixed Effects Model:**

  - Shows varied impacts on different funding allocations, with positive coefficients for Centrally Sponsored Schemes and WMA from RBI, suggesting increased funding with government alignment.

  - Negative coefficients for Central Plan Schemes and GST Compensation, indicating decreased funding when the same government is in power at both levels.

2. Effect of Tax Revenue:

- **Positive Coefficients:**

  - Across all funding allocations, suggesting that higher tax revenue is associated with increased funding, regardless of government alignment.

  - The inclusion of tax revenue helps isolate its independent effect on funding allocations, providing a clearer understanding of its role.

3. Model Comparison (Hausman Test):

- **P-values Greater Than 0.05:**

  - For most funding allocations, indicating no significant difference between fixed and random effects models.

- **GST Compensation:**

  - Significant difference suggests that the choice of model is crucial for this funding allocation.

4. Implications:

- **Comprehensive Analysis:**

  - Including tax revenue offers a more nuanced understanding of funding allocation drivers.

- **Model Selection:**

- Comparing coefficients and significance levels aids in assessing the relative importance of government alignment and tax revenue in explaining funding allocations.

- **Interaction Effects:**

- Understanding how these variables interact provides insights into the mechanisms of policy and economic influence on funding decisions at state and central levels.

Matching Variables and Their Rationale

1. Population:

- Controls for differences in funding needs based on population size.

2.Developmental Expenditure (A + B):

- Reflects government investment in development projects, influencing funding allocations.

3. Tax Revenue (A + B):

- Indicates financial resources available, affecting fiscal capacity and funding distributions.

4. Medical and Public Health Expenditure:

- Accounts for differences in healthcare infrastructure and priorities.

5. Urban Development Expenditure:

- Controls for urbanization levels and related investment needs.

6. Rural Development Expenditure:

- Reflects government efforts in rural areas, impacting funding distribution.

7. Total Expenditure (I + II + III):

- Ensures comparability in overall government spending across regions.

These variables are crucial for propensity score matching to reduce bias and confounding, ensuring a more accurate estimation of the causal effect of government alignment on funding allocations.

Analysis of Matched vs Unmatched Data

1. Coefficients Reduction:

- Decrease in coefficients for Same_Gov after matching, indicating reduced bias and confounding.

2. Consistency of Tax_Revenue Effects:

- Minor changes suggest stable effects of tax revenue before and after matching.

3. Hausman Test Results:

- Post-matching significance for Central Plan Schemes and GST Compensation, supporting the appropriateness of fixed effects for these categories.

Interpretation:

- **Same_Gov Influence:**

- Matching reduces the apparent influence of government alignment, highlighting the importance of controlling for confounding variables.

- **Tax_Revenue Impact:**

- Consistent role of tax revenue indicates its importance in funding decisions.

- **Model Selection:**

- Post-matching Hausman test results favor fixed effects for certain funding allocations, emphasizing model appropriateness.

Comparison of Matched and Unmatched Data Graphs

Matched1 vs Unmatched1:

- **Unmatched Graph:**

  - Shows closer alignment in funding distributions, suggesting uniform funding across states.

- **Matched Graph:**

  - Indicates more variability and distinction between government alignment categories, reflecting potential differences in funding strategies.

Matched2 vs Unmatched2:

- **Matched Graph:**

  - Suggests even distribution of Central Plan Schemes investments, indicating consistent policy application.

- **Unmatched Graph:**

  - Higher concentration among aligned governments, suggesting preferential funding.

Matched3 vs Unmatched3:

- **Matched Graph:**

  - More uniform distribution of WMA investments, indicating consistent needs across states.

- **Unmatched Graph:**

  - Greater variability and extremes, suggesting instability in funding for non-aligned states.

Matched4 vs Unmatched4:

- **Matched Graph:**

- Stronger disparity in GST compensation, indicating preferential treatment for aligned states.

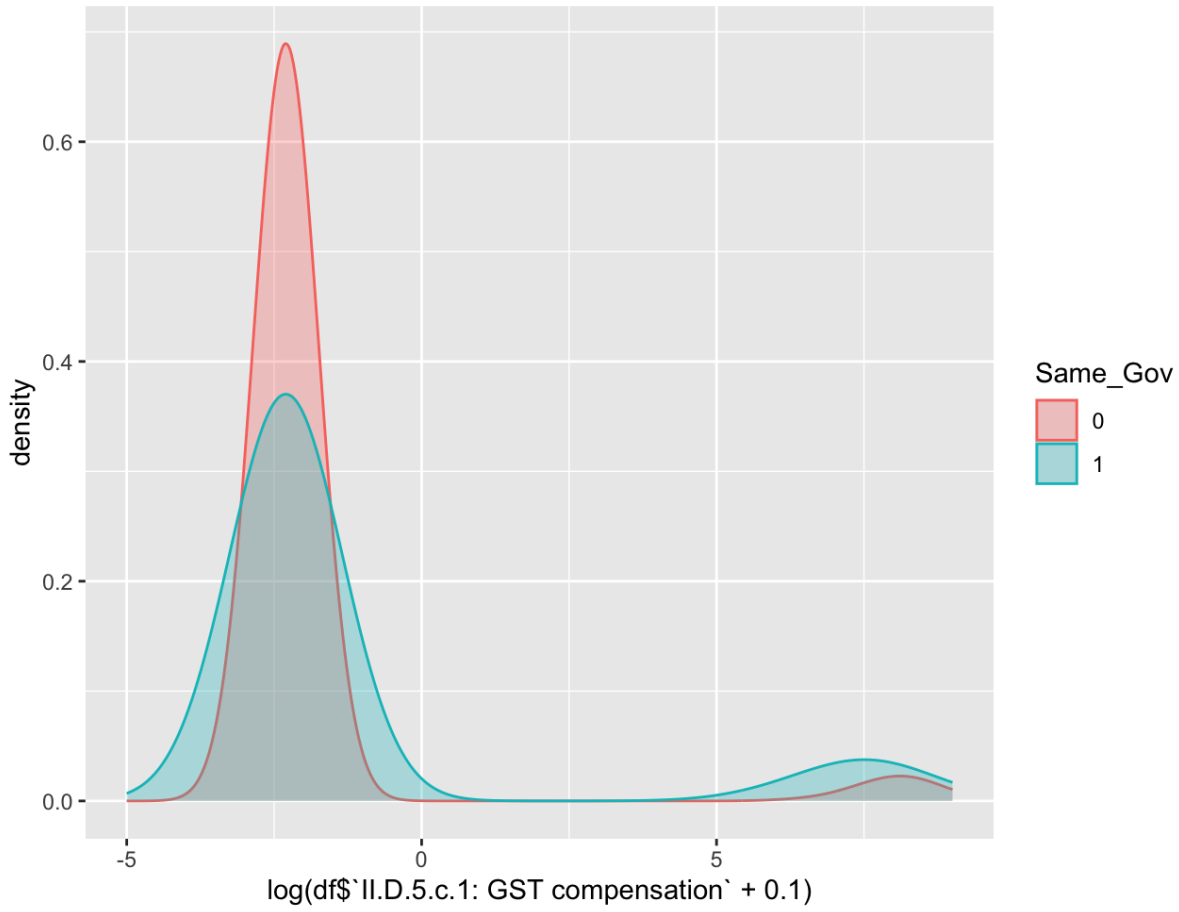
- **Unmatched Graph:**

- Slightly less pronounced disparity, suggesting broader distribution approach.

Conclusion:

- Matching reduces bias and highlights the nuanced impacts of government alignment on funding allocations, with consistent tax revenue effects and a preference for fixed effects models post-matching for certain categories. The graphical analysis underscores the differences in funding strategies and the need for careful control of confounding variables.

RESULTS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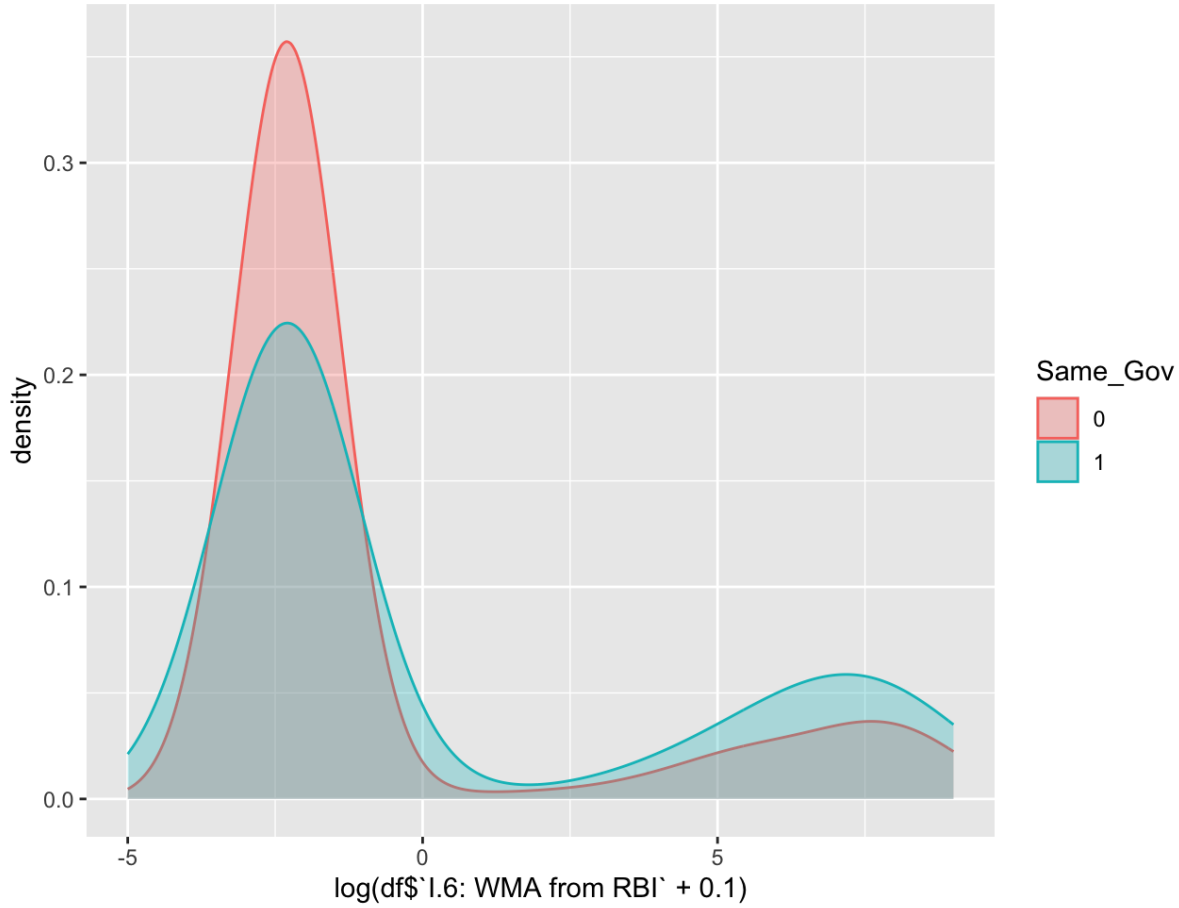
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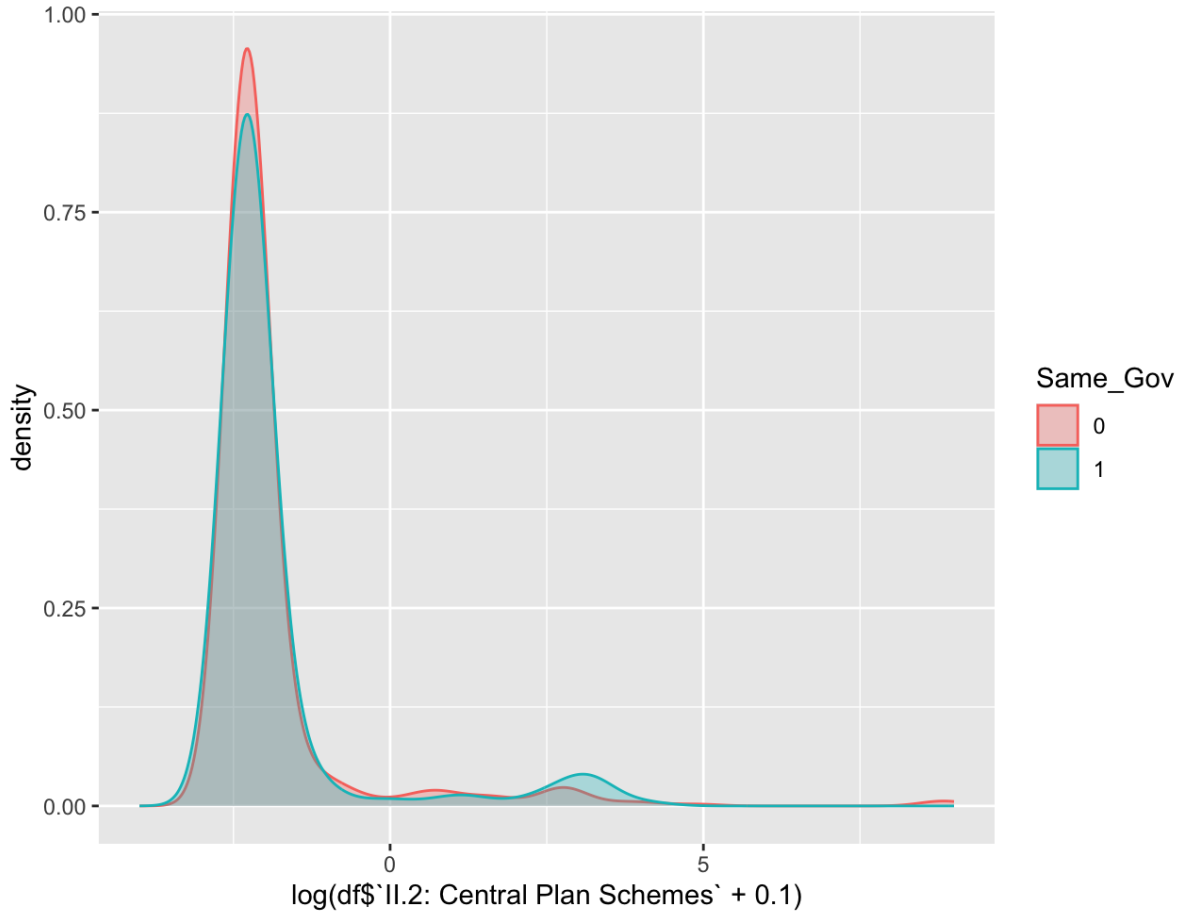
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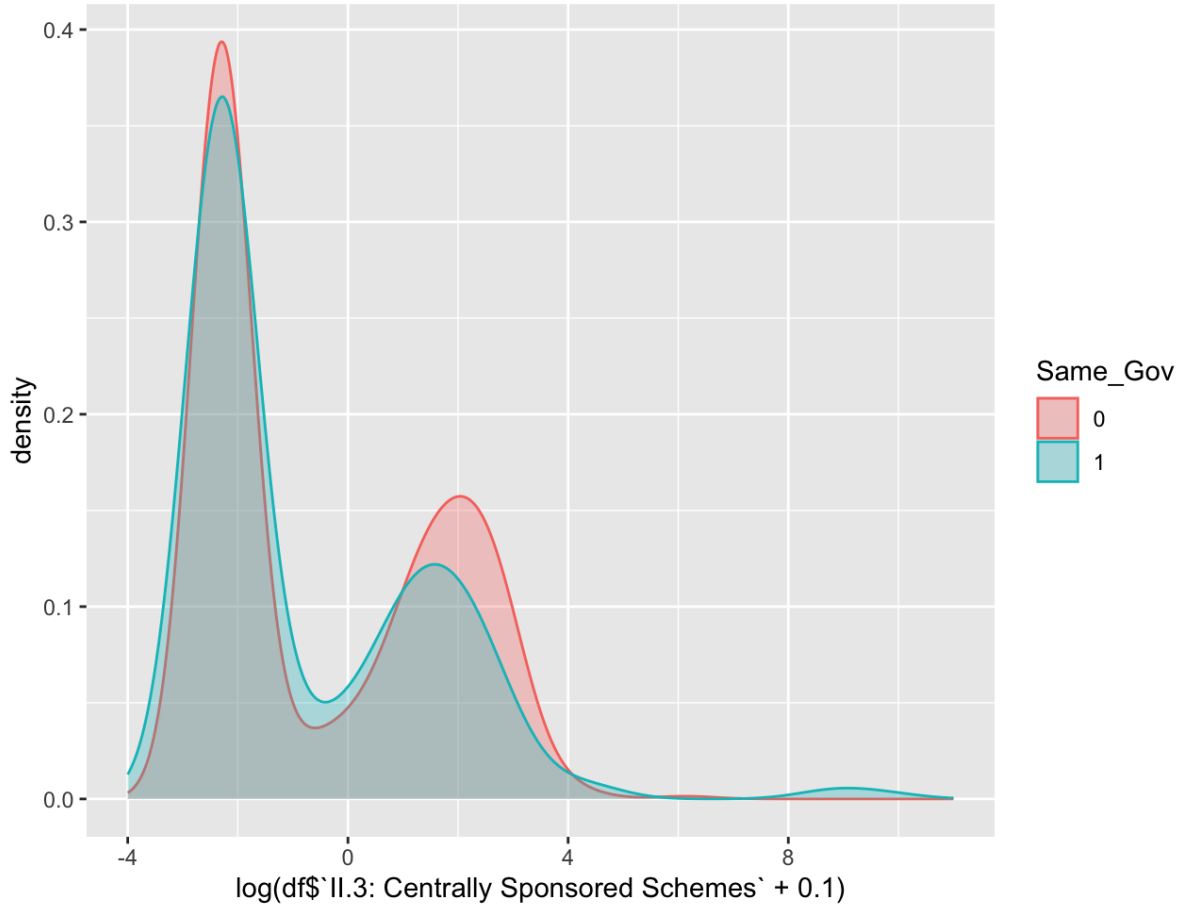
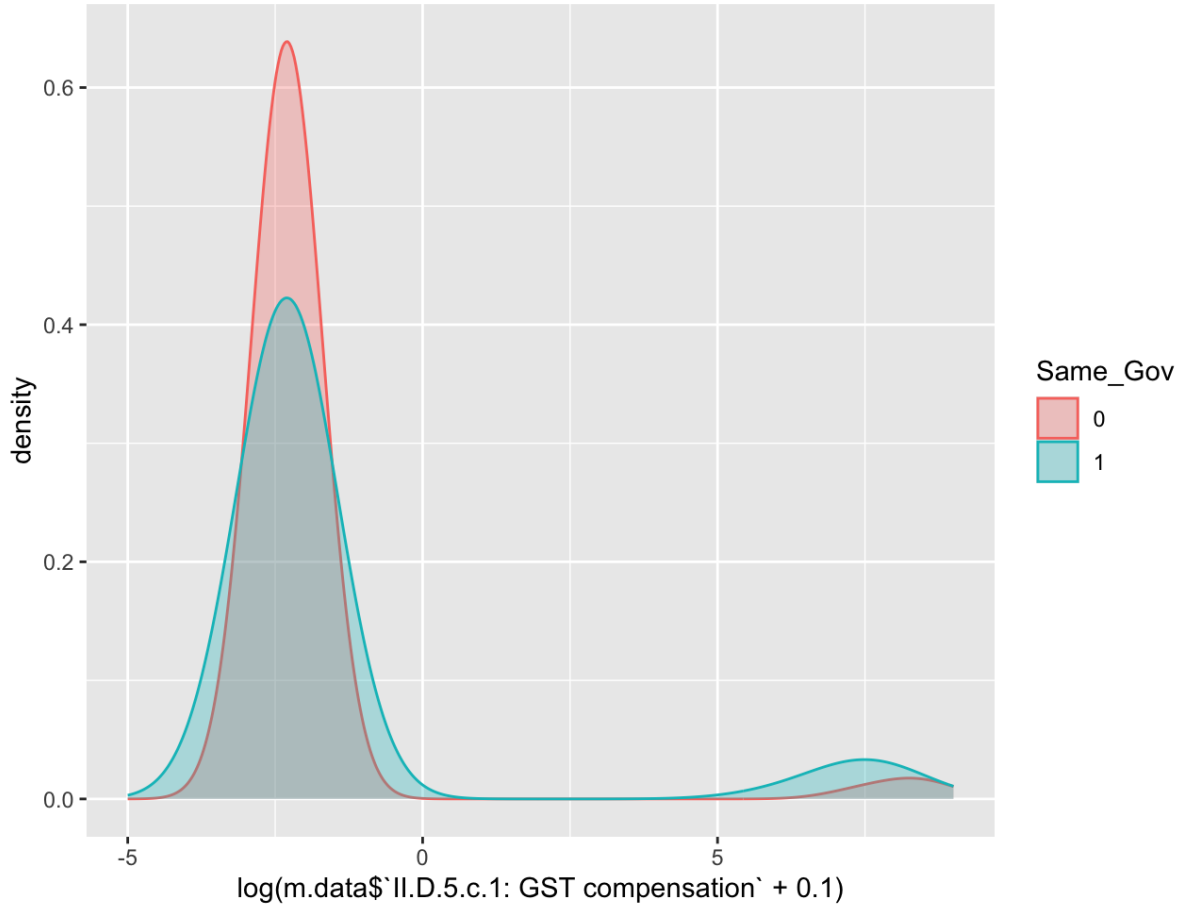


	Centrally Sponsored Schemes(Rs. Crore)	Central Plan Schemes(Rs. Crore)	WMA from RBI(Rs. Crore)	GST compensation(Rs. Crore)
Same_Gov(Fixed)	1.597482e+01	-2.382858417	-1.679373e+03	-2.003661e+02
Tax_Revenue(Fixed)	7.732805e-04	0.001118856	3.652234e-02	2.046691e-02
Same_Gov(Random)	9.244802e-04	0.001257368	3.605495e-02	1.630757e-02
Tax_Revenue(Random)	2.097490e+01	-24.967908160	-1.896855e+03	-2.159887e+02
pval_Hausman	5.914194e-01	0.019564178	3.730249e-01	3.092775e-04

	Centrally Sponsored Schemes(Rs. Crore)	Central Plan Schemes(Rs. Crore)	WMA from RBI(Rs. Crore)	GST compensation(Rs. Crore)
Same_Gov(Fixed)	82.278437032	-19.536302260	-1.816780e+03	-4.001311e+01
Tax_Revenue(Fixed)	0.005244132	0.001271779	4.166885e-02	2.177250e-02
Same_Gov(Random)	0.005107747	0.001259663	3.987378e-02	1.838610e-02
Tax_Revenue(Random)	81.360495568	-31.264348453	-1.859251e+03	2.789703e+01
pval_Hausman	0.771064774	0.540665394	1.791120e-01	3.874561e-06

	Centrally Sponsored Schemes(Rs. Crore)	Central Plan Schemes(Rs. Crore)	WMA from RBI(Rs. Crore)	GST compensation(Rs. Crore)
Same_Gov(Fixed)	17.3892331	-0.336343769	-1612.569319	-100.2562735
Same_Gov(Random)	22.6200050	-22.681101841	-1848.616637	-86.1571986
pval_Hausman	0.6403308	0.005072203	0.141535	0.8301456

	Centrally Sponsored Schemes(Rs. Crore)	Central Plan Schemes(Rs. Crore)	WMA from RBI(Rs. Crore)	GST compensation(Rs. Crore)
Same_Gov(Fixed)	162.9696749	0.03251066	-1175.6230730	211.5883458
Same_Gov(Random)	143.9164528	-15.96243940	-1322.6379583	167.2475306
pval_Hausman	0.3553224	0.16602177	0.2752425	0.4405314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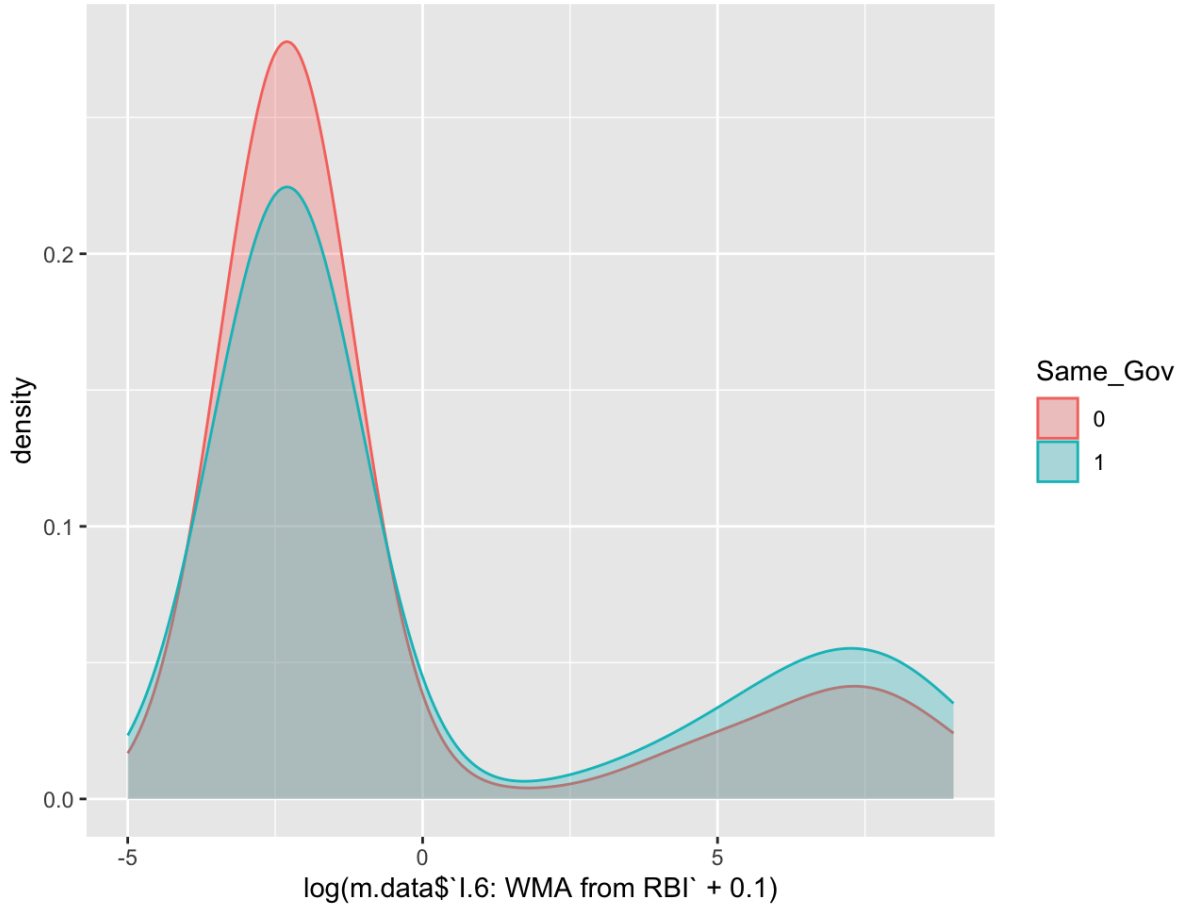
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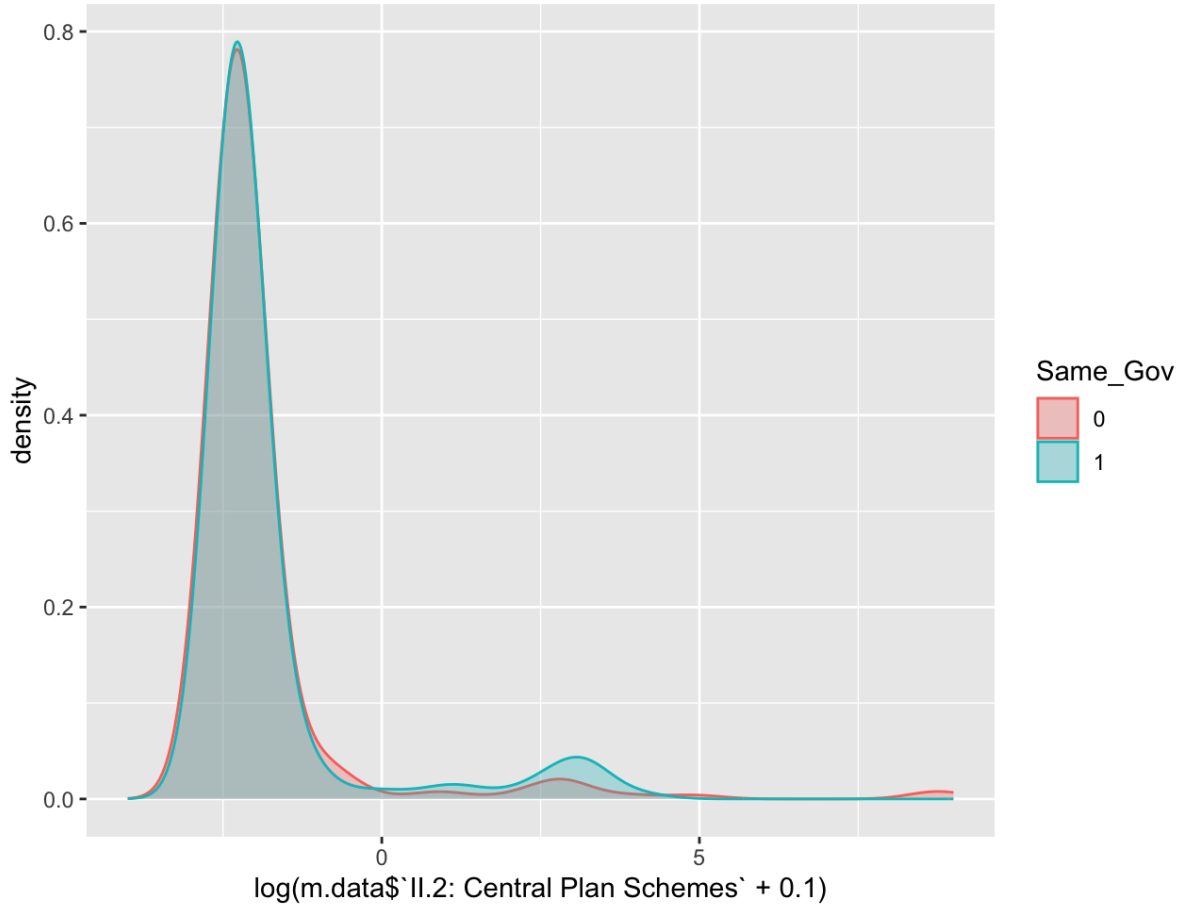
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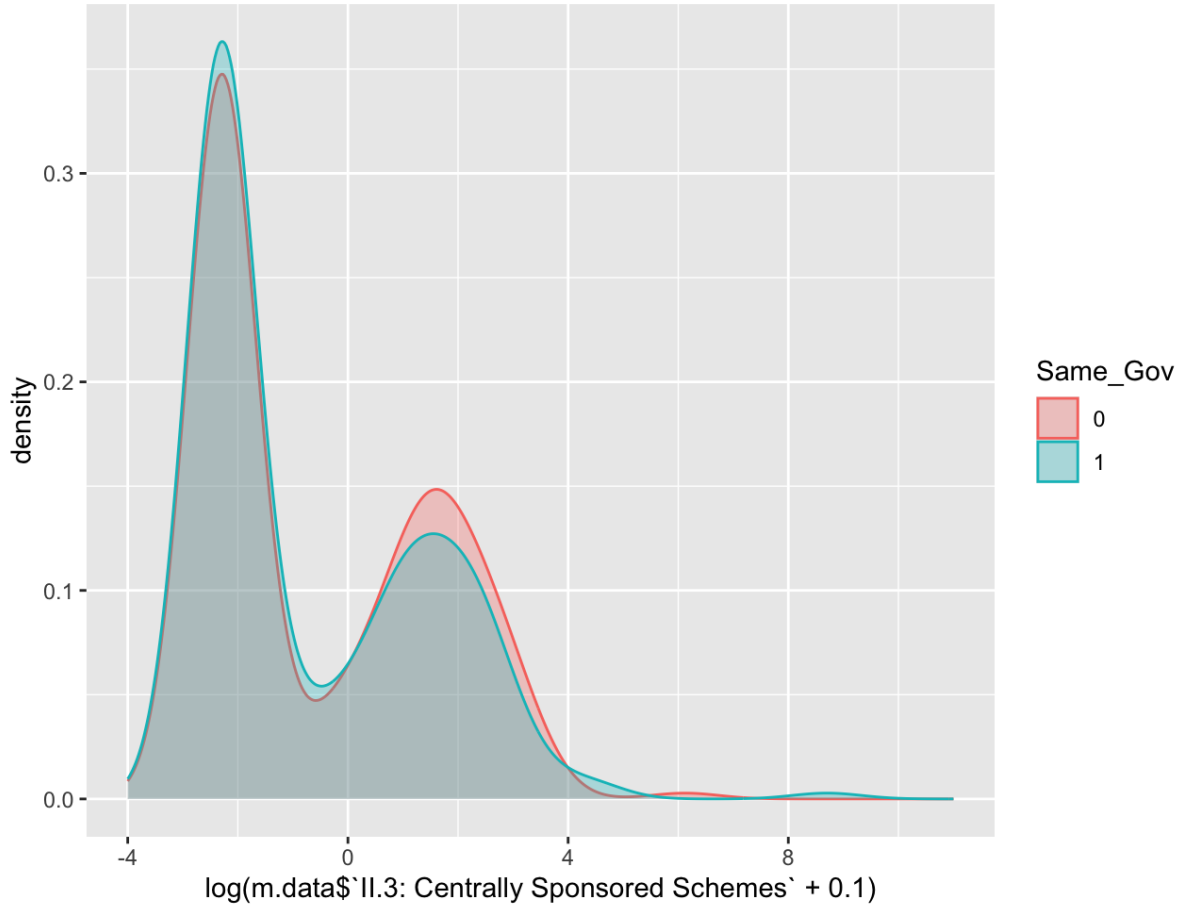
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