Supplementary Materials for "The Effect of Legislature Size on Public Spending: A Meta-Analysis"

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A A Brief Introduction to the "Law of *1/n*" and the "Reverse Law of *1/n*"

Here we present the intuition behind the "law of $1/n$", as well as the alternative "reverse law of $1/n$" proposed by Primo and Snyder (2008).

In their seminal paper, Weingast et al. (1981) argue that a high number of legislators will increase public spending beyond the optimal economic benchmark. They suggest that politicians have an incentive to over-provide concentrated benefits to their constituencies, spreading the costs across all constituencies through generalised taxation. The corollary of their model is that larger legislatures generate more public spending.

In their model, every local public goods project of size x generates a concave benefit $b(x)$, and there are convex costs associated with the project[1]. The first type of cost, $c_1(x)$, comprises the expenses within the constituency (e. g., hiring a local company for the project). The second type of cost, $c_2(x)$, captures the expenses outside the constituency (e. g., hiring a company from another state). Finally, the third cost, $c_3(x)$, captures the externalities generated by the project (e. g., how much prices shift because local economic factors are being used to provide the project). The total cost is equal to $c(x) = c_1(x) + c_2(x) + c_3(x)$. The tax burden generated by the project is equal to $T(x) = c_1(x) + c_2(x)$.

Projects are economically efficient when the marginal costs are equal to the marginal benefits of the project size. This leads to the economic optimal project size, x^E, which is defined as $b'(x^E) - c_1'(x^E) - c_2'(x^E) - c_3'(x^E) = 0$. However, the projects that are actually implemented have a different structure. First, assume that the constituency in question has a tax burden $t = 1/n$, where n represents the number of constituencies. Also, suppose that benefits are distorted by the fact that costs within the constituency ($c_1(x)$) become investments in local firms. Therefore, the costs and benefits of implementing a project with size x have the following structure:

$$N(x) = b(x) + c_1(x) - \frac{1}{n}[c_1(x) + c_2(x)] - c_3(x)$$

Differentiating $N(x)$ with respect to x gives us the first order condition for an optimal project implementation.

$$b'(x) + c_1'(x) - \frac{1}{n}[c_1'(x) + c_2'(x)] - c_3'(x) = 0$$

Totally differentiating x with respect to n gives us the following:

$$b''(x)\frac{dx}{dn} + c_1''(x)\frac{dx}{dn} - \frac{1}{n}[c_1''(x) + c_2''(x)]\frac{dx}{dn} + \frac{1}{n^2}[c_1'(x) + c_2'(x)] - c_3''(x)\frac{dx}{dn} = 0$$

[1]The concavity assumption implies that $b' > 0$ and $b'' < 0$. A similarly convex assumption would mean that $c' > 0$ and $c'' > 0$. We assume that the derivatives are well defined throughout the analysis. Moreover, we drop the constituency index to make the model more intuitive, so the reader should assume that we always employ a symmetric Nash equilibrium.

And rearranging the terms, we find the following expression for $\frac{dx}{dn}$:

$$\frac{dx}{dn} = -\frac{n^{-2}[c_1'(x) + c_2'(x)]}{b''(x) + c_1''(x) - n^{-1}[c_1''(x) + c_2''(x)] - c_3''(x)}$$

Note that the numerator is always positive, as the marginal investment costs inside and outside the district increase according to the project size. The "law of $1/n$" holds when the denominator is negative. $b''(x) < 0$ by assumption, and $-n^{-1}[c_1''(x) + c_2''(x)] - c_3''(x) < 0$ as $c_1'', c_2'', c_3'' > 0$. Then, the *law of 1/n* is true when $c_1''(x)$ is smaller than $n^{-1}[c_1''(x) + c_2''(x)] + c_3''(x) - b''(x)$.

As the above condition suggests, the "law of $1/n$" holds only in specific situations. Primo and Snyder (2008) advance that theory by considering other situations where the "law" may not hold, and they also argue that there are cases in which a "reverse law of $1/n$" may exist, that is, where larger legislatures may lead to lower public expenditures.

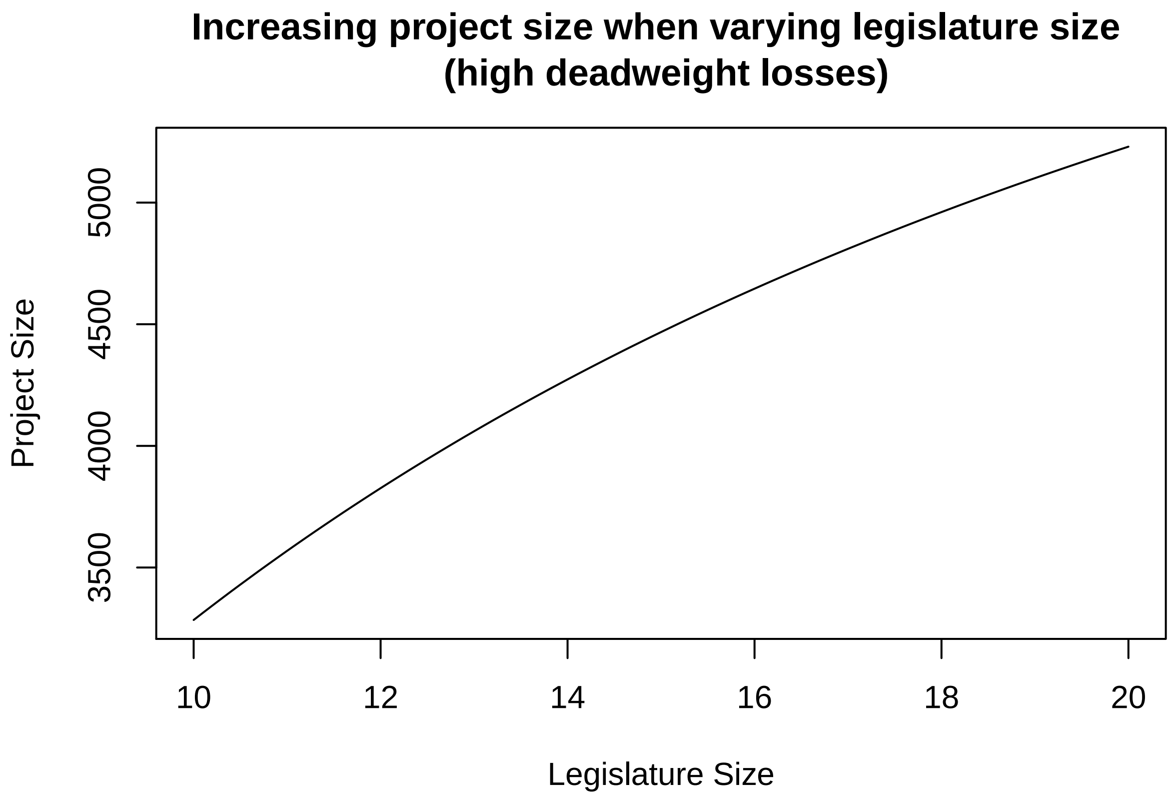
Following Primo and Snyder (2008), let n be the number of districts, m the number of citizens in each district, and nm the total population in the country. Consider a local public good that generates a per capita benefit of $b(x, m) = x^{\alpha} m^{\beta-1}$ according to size x, where β is the degree of congestion of the public good, that is, how much the addition of individuals reduce the benefits for other individuals (note that the lower the β, the higher the congestion). In terms of costs, consider a linear cost function $C(x) = x$, and in terms of taxation, assume that the people in the district pay both local and federal government taxes. The degree that taxes are shared is denoted by s. Moreover, there is a deadweight loss of the taxes $\theta \geq 1$. The tax then becomes: $t = \left(\frac{(n\text{˘}ns + s)x + (ns\text{˘}s)X}{nm}\right)^{\theta}$. Therefore, the citizens receive the following net benefit of a project with size x:

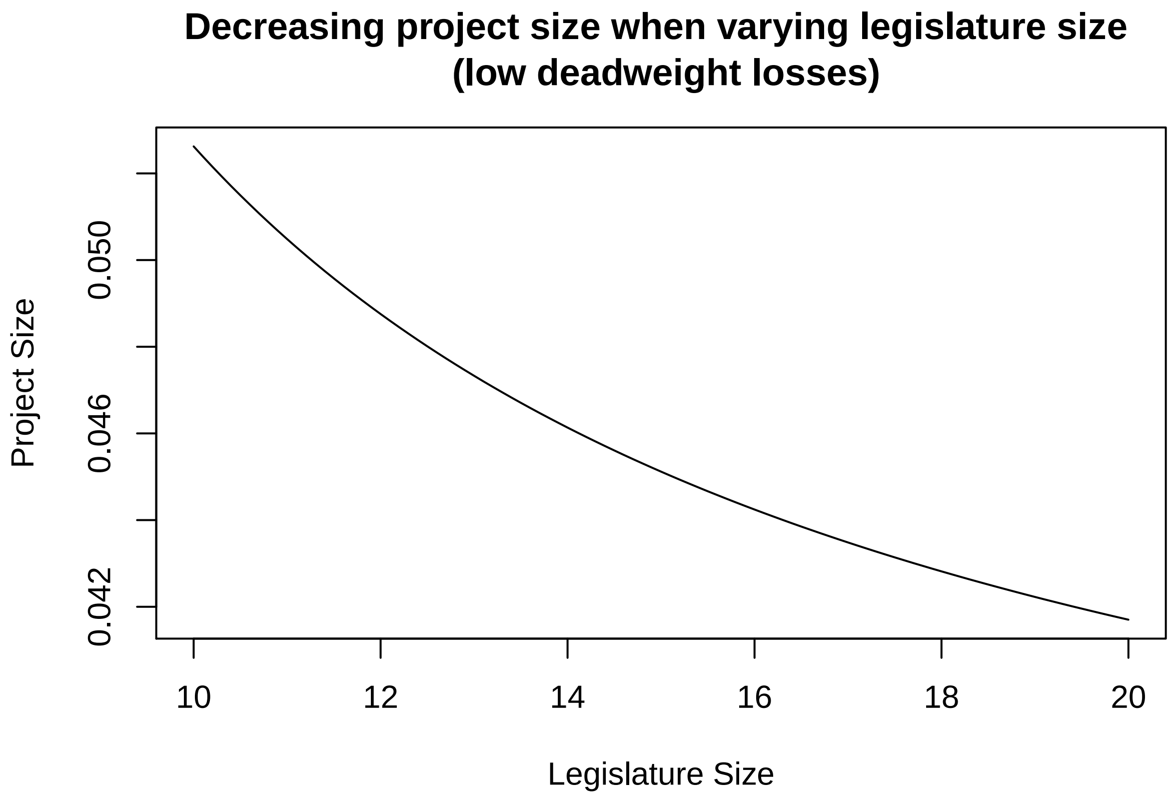
$$\pi = x^{\alpha} m^{\beta-1} - \left(\frac{(n\text{˘}ns + s)x + (ns\text{˘}s)X}{nm}\right)^{\theta}$$

Maximising this function, and solving for the symmetric Nash equilibrium where $x = X$ for all projects, we find the following optimal project size:

$$x^* = \left[\left(\frac{\alpha}{\theta}\right)^{\dfrac{1}{\theta - \alpha}}\right]\left[(nm)^{\dfrac{\beta + \theta - 1}{\theta - \alpha}}\right]\left[\left(\frac{n^{2-\beta-\theta}}{n - ns + s}\right)^{\dfrac{1}{\theta - \alpha}}\right]$$

And in the graph below, we show simulations for n varying from 10 to 20, holding constant $\beta = 0.35$, $\theta \in \{0.65, 0.75\}$, $s = 0.5$, $m = 100$, and $\alpha = 0.7$.





Thus, we see that both the "law of $1/n$" and its reverse formulation are equally plausible. Here we show how the results change just by changing the levels of deadweight losses, but authors have suggested other reasons why the "law of $1/n$" may not apply, such as bicameralism (Chen and Malhotra 2007), popular initiatives (Matsusaka 2005), type of government (Coate and Knight 2011), supermajorities (Lee 2015), political fragmentation (Lledo 2003), and ideology (Bjedov et al. 2014).

B Search Criteria

The first step in our systematic review consisted in gathering a study sample. We started our data collection with a manual search based on a set of keywords we scouted from the distributive politics literature. This search produced a database with many entries that were unrelated to our subject of investigation. To reduce the number of false positives in our sample, we restricted our search to studies that cited Weingast, Shepsle and Johnsen's 1981 paper "*The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics*", which is the fundamental contribution to the field. Although Google Scholar reports the article has received 2,180 citations, our search resulted in 2,664 records on the 21st of November 2019.

We webscraped three large academic databases: Google Scholar (n = 1001); Microsoft Academic (n = 927); and Scopus (n = 736). The `R` script we wrote extracted the article title, abstract, authors, year, journal of publication, and database from which the record originated. Our code is in the `R` script available in this repository. We then filtered these results and selected only articles that were written in English. While we included unpublished papers in our search, we excluded book chapters and doctoral theses from our sample.

We complemented this process by doing a term search on Google Scholar after having finished the entire eligibility procedure in the first sample. We formulated the search string based on the terms and expressions that appeared most frequently in the articles included in our meta-analysis. The choice of string translates the central point of our inquiry: the relationship between legislature size and public spending. The search string was as follows: `("upper chamber size" OR "lower chamber size" OR "council size" OR "parliament size" OR "legislature size" OR "number of legislators" OR "legislative size") AND ("spending" OR "expenditure" OR "government size")`. We scraped Google Scholar on March 5th, 2021. Using the titles of this new database's records, we fuzzy-matched those articles with the database of Weingast et al. (1981) citations mentioned previously to check for duplicates. We then performed the exact same eligibility procedures, further explained below. This resulted in 3,041 additional records. Combining the two search strategies, we assessed a total of 5,705 records.

C Article Selection

The selection process was conducted by two authors in three phases. In the first phase, we excluded all titles that were clearly unrelated to our topic of interest. This was only a preliminary step, as we were not able to eliminate a large number of entries. Then, we read all abstracts. We kept all publications whose main topics were either government expenditure or legislative structures. Abstracts that indicated that the paper discussed or estimated the impacts of representative institutions, elections, or chamber dynamics were included. This allowed us to significantly reduce our sample.

In the second phase, we assessed full texts. To remain in our sample, the paper should (i) conduct a quantitative analysis, (ii) report data on the number of legislators, and (iii) also include data on public expenditure. If the publication had all three, we kept it in our sample. Disagreements in this phase were discussed among the authors, and a third investigator was consulted when needed.

The third phase consisted of filling out tables for each of the remaining articles to systematically evaluate their eligibility. Since authors use different measures for government spending and the number of lower/upper house members, we extracted all coefficients that provided this information. In this phase, we also collected information on whether the paper had been published, and if it explicitly discussed the "law of $1/n$". Upon choosing the variables, we excluded two studies from the first sample, as they did not have the dependent/independent variables we collected for our meta-analysis. We then included the 2 papers we found in the second search, as both conformed to our criteria, and compiled our final sample of 30 articles.

C.1 Exclusion Analysis

We selected the final pool of articles based on two criteria, namely the independent and the dependent variables employed in the paper. The categories follow below:

1. Independent variables:

- *N*: Lower Chamber Size
- *logN*: Log Lower Chamber Size
- *K*: Upper Chamber Size

2. Dependent variables:

- *ExpPC*: Expenditure Per Capita
- *logExpPC*: Log Expenditure Per Capita
- *PCTGDP*: Expenditure as Percentage of GDP

If a paper did not use a combination of these variables, we excluded it from the meta-analysis.

C.2 Flow Chart

The diagram below shows each step of our article selection process. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement to conduct our study[2]. The column to the right depicts the amount of articles excluded in each phase, and the one to the left shows the number of records evaluated.

[2] More information about the PRISMA statement is available at http://www.prisma-statement.org.

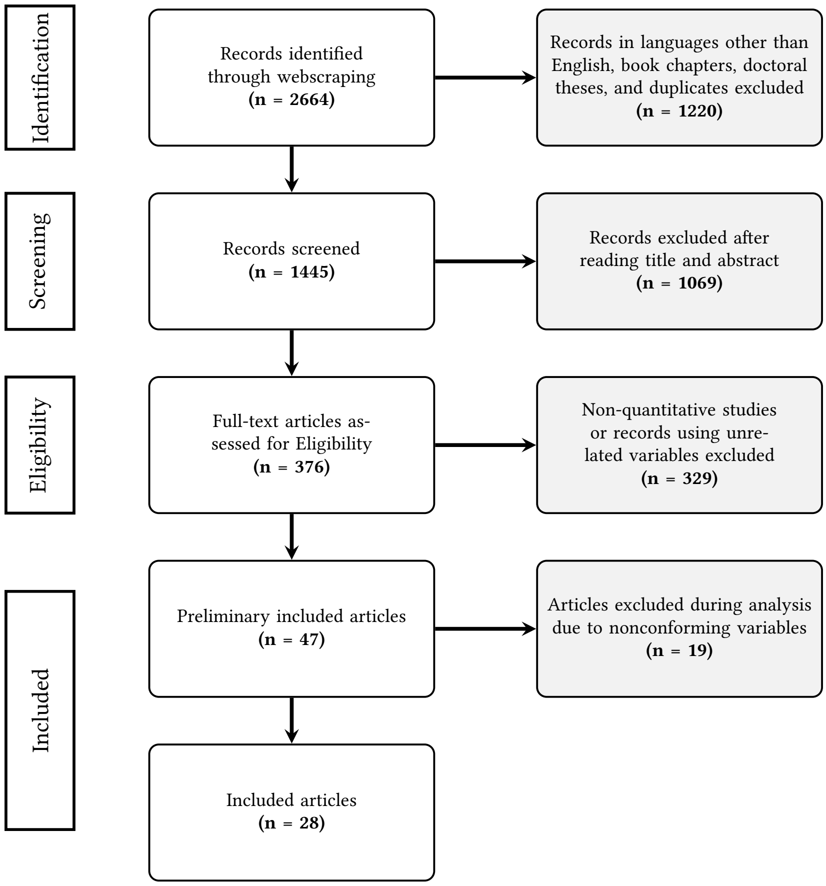


Figure 1: PRISMA Flow Chart for First Search Strategy: Weingast et al. Citations

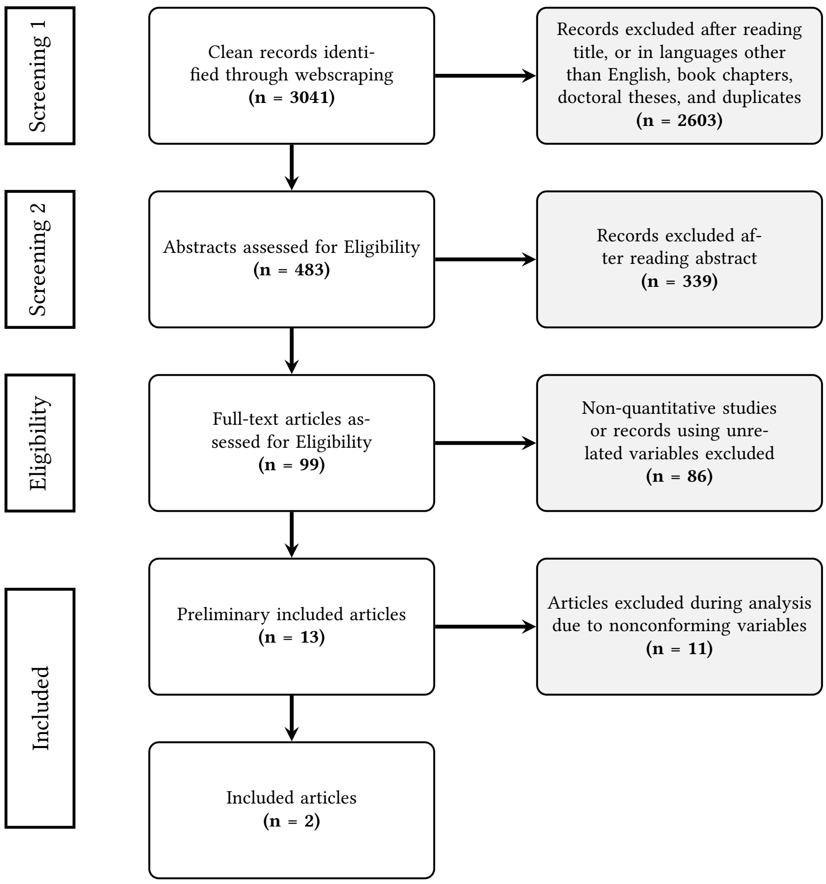


Figure 2: PRISMA Flow Chart for First Search Strategy: Search String with Terms

D Meta-Analysis Dataset

Our meta-analytic data are comprised of two datasets. The first dataset has the main coefficients reported in the selected studies. These data include only the most rigorous model from each paper, that is, those estimated with the largest sample size, most control variables, and fixed effects if the authors added them. If the article employed a regression discontinuity design, we chose the coefficient from the optimal bandwidth or from the intermediate one. This sample encompasses 45 estimates, as 12 articles analysed two dependent or independent variables of interest. Our second sample, in contrast, contains all the 162 effect sizes reported in the 30 papers.

In the main text, we focus on the results for our restricted sample as we consider them more robust, but the findings are very similar when we use the extended dataset. Here we present the results of all tests performed in both reduced and full samples.

E Descriptive Statistics

Here we show the descriptive statistics for our sample. We focus on the following paper characteristics: study year; paper publication; the electoral system mentioned in the publication; and the distribution of the dependent and independent variables of interest.

E.1 Study Year

The average year of publication in our sample is 2009 with standard deviation of 6.54. The oldest study included in the paper is from 1998, while the most recent paper was written in 2019. Therefore, we cover 21 years of tests of the "law of $1/n$".

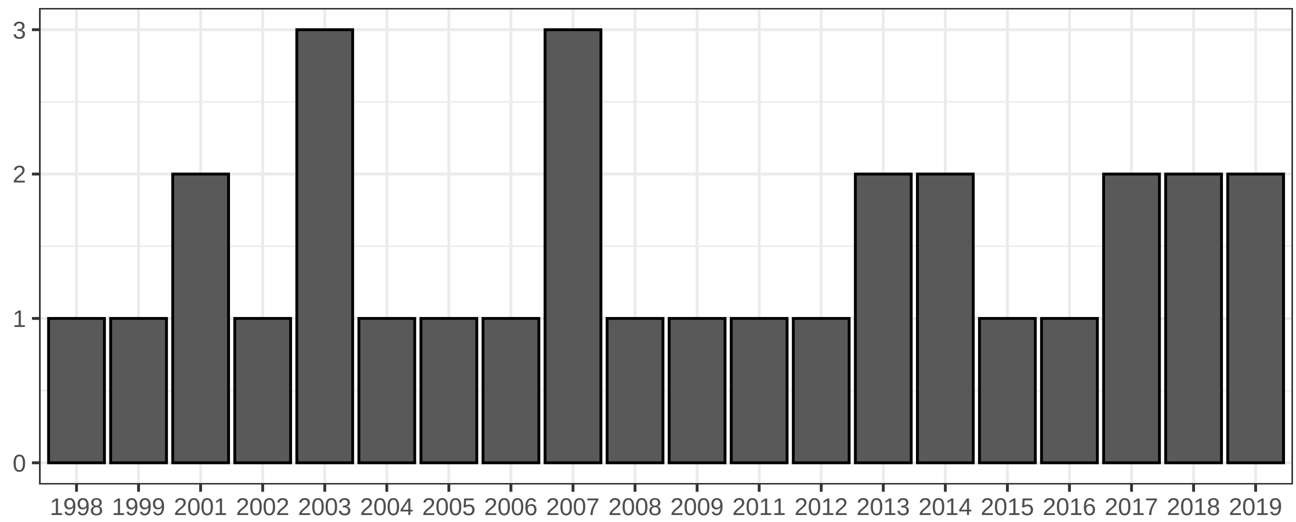


Figure 3: Study Year Frequencies

E.2 Frequency of Published Papers

Studies were included in our sample regardless of their publication status. From the 30 papers in the sample, 25 were published while 5 were not published.

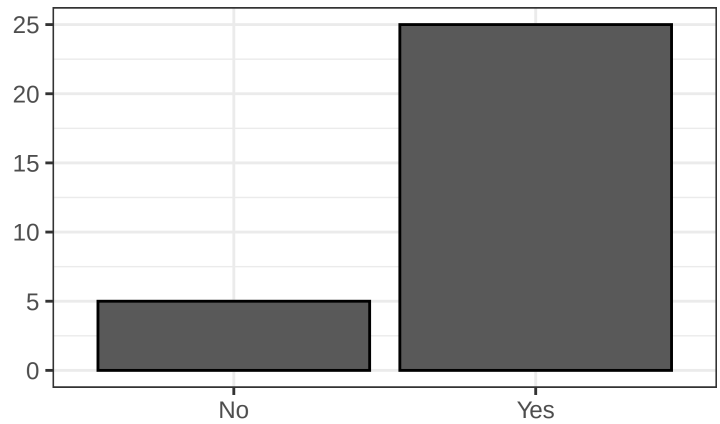


Figure 4: Was the study published?

E.3 Electoral System

Our sample differs considerably in regards to research design. One remarkable difference is that several authors apply the logics of the "law of $1/n$", which was built with majoritarian systems in mind, to non-majoritarian democracies. In the sample, 14 of the papers study *Majoritarian* systems while 16 study *Non-Majoritarian* electoral systems[3].

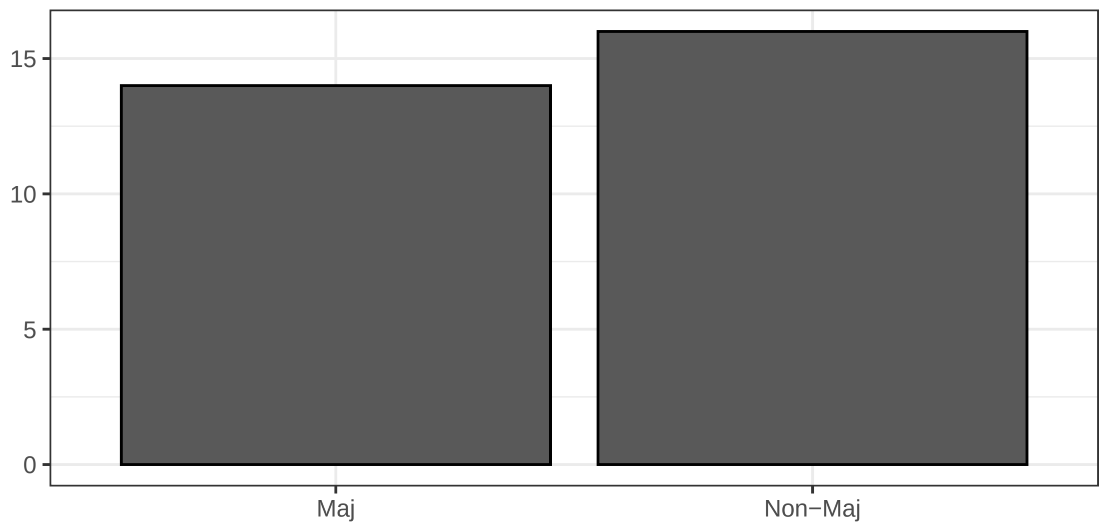


Figure 5: Electoral Systems

E.4 Dependent Variables

The dependent variables included in the paper are:

[3]Note that for the "law of $1/n$" to be valid in a non-majoritarian system, we need to assume that despite the fact that politicians are able to campaign in every place in the district, votes are geographically concentrated. The concentration facilitates politicians to use pork-barrel projects to captivate their electoral supporters.

- 16 Expenditure Per Capita papers
- 9 Expenditure as a Percentage of the GDP papers
- 8 Log of Expenditure Per Capita papers

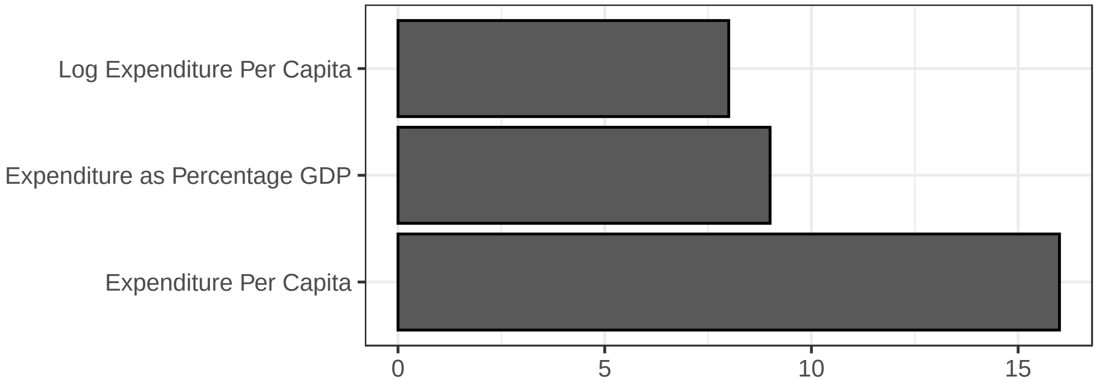


Figure 6: Dependent variables across the law of 1/n studies

E.5 Independent Variables

Most papers in our sample analyse the number of legislators in the lower chamber (26). The second most frequent independent variable is the number of legislators in the upper chamber (12). Finally, the minority of papers use the natural log of the number of legislators in the lower chamber as an independent variable (7). As we noted above, some papers had multiple coefficients, and thus the total number of coefficients is 45, while the number of papers is only 30.

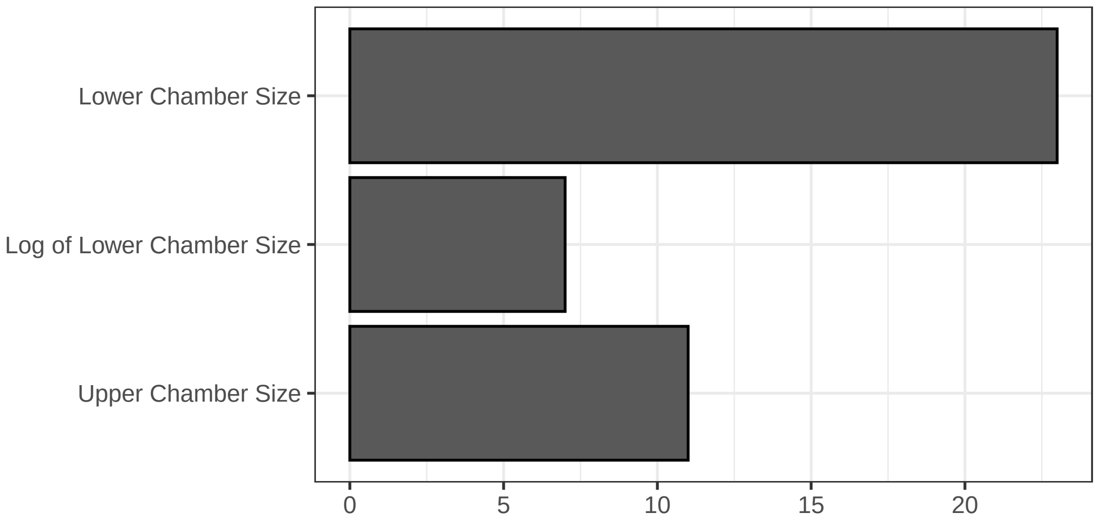
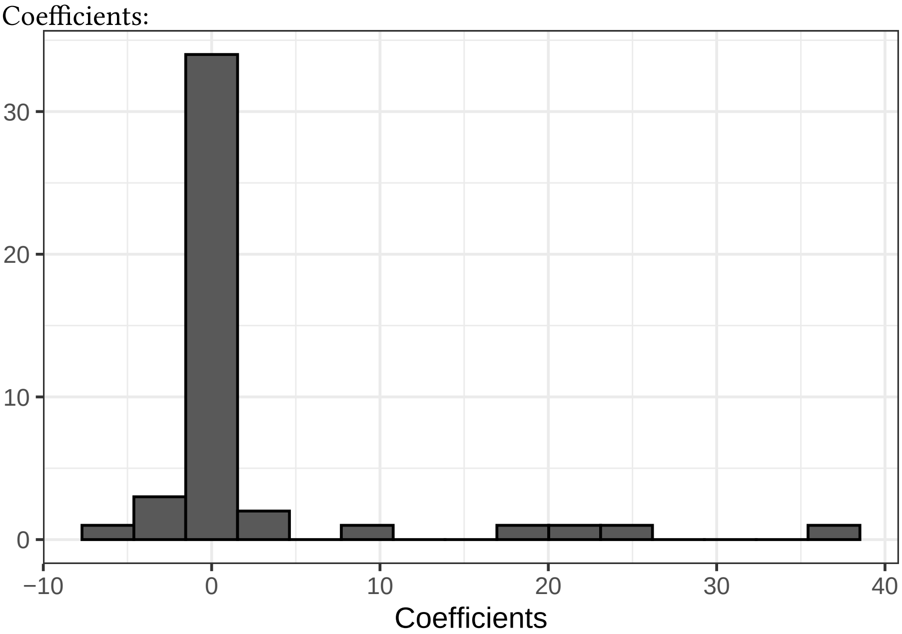


Figure 7: Independent variables across the law of 1/n studies

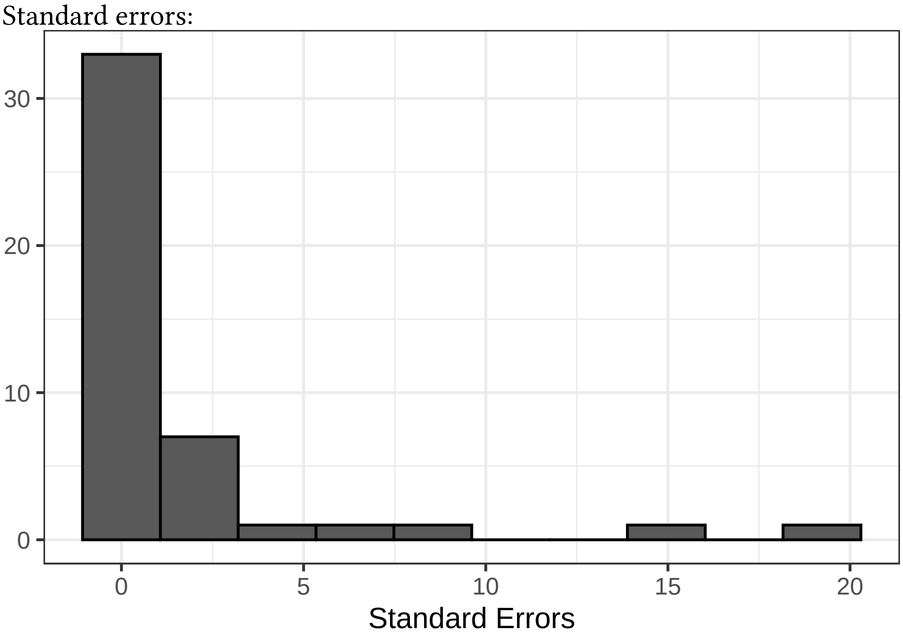
E.6 Histogram of the Coefficients and the Standard Errors

The coefficients in the papers vary considerably. We plot a histogram of the coefficients for all measurements included in the meta-analytic dataset. Most coefficients and standard deviations are close to zero.

Coefficients:



Standard errors:



E.7 Sign Coefficients

One simple statistic that we can compute to assess the validity of the "law of $1/n$" is the frequency of positive and negative estimates in the study sample. Below we plot the frequency for all papers included in the meta-analytic dataset.

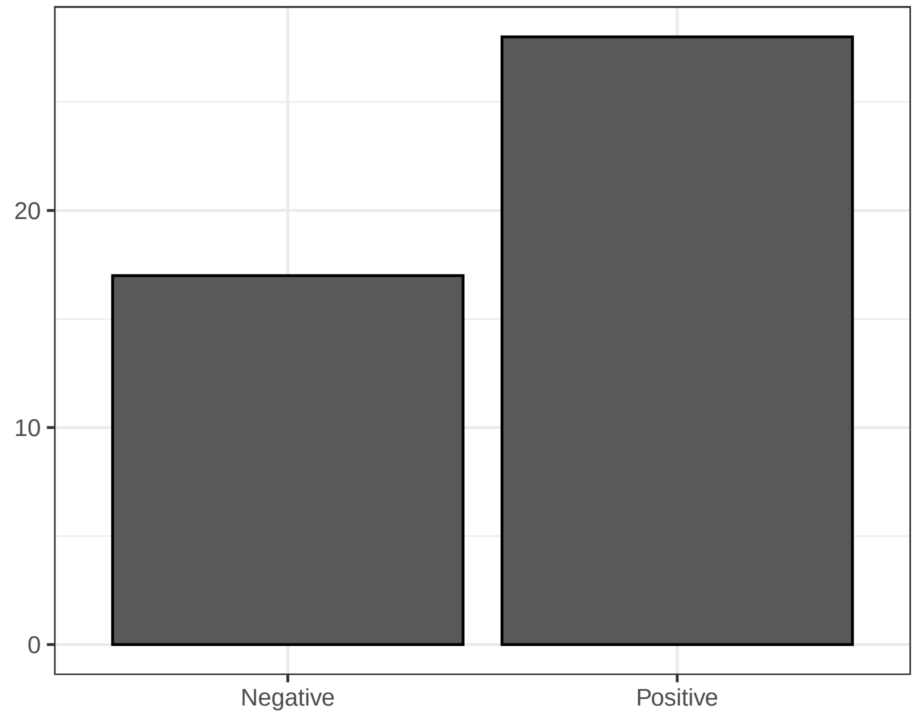


Figure 8: Coefficient Sign

F Descriptive Statistics of Moderators

We chose a set of moderators that frequently appear in the literature and may help us interpret our results. We included them in our meta-regressions alongside an indicator for the type of independent variable used in the original study: lower chamber size; natural logarithm of lower chamber size; or upper chamber size. The additional moderators are: publication year; whether the paper was published in an academic journal; the estimation method used in the paper; the institutional design in terms of the division of legislative power; and the electoral system.

Table 1: Descriptive Statistics of Moderators

	Main Sample	Extended Sample
	N=45	N=162
Independent Variables:		
Log of Lower Chamber Size	7 (15.6%)	33 (20.4%)
Lower Chamber Size	26 (57.8%)	82 (50.6%)
Upper Chamber Size	12 (26.7%)	47 (29.0%)
Year	2009 (6.54)	2008 (6.15)
Published work:		
No	6 (13.3%)	17 (10.5%)

Table 1: Descriptive Statistics of Moderators *(continued)*

	Main Sample	Extended Sample
Yes	39 (86.7%)	145 (89.5%)
Estimation method:		
OLS	9 (20.0%)	49 (30.2%)
PANEL	25 (55.6%)	83 (51.2%)
IV	7 (15.6%)	19 (11.7%)
RDD	4 (8.89%)	11 (6.79%)
Institutional Design:		
Bicameral	17 (37.8%)	49 (30.2%)
Mixed	12 (26.7%)	50 (30.9%)
Unicameral	16 (35.6%)	63 (38.9%)
Electoral system:		
Majoritarian	22 (48.9%)	73 (45.1%)
Non-Majoritarian	23 (51.1%)	89 (54.9%)

G Binomial Tests for Coefficient Signs

The "law of $1/n$" posits that we should expect a positive influence of legislature size on public expenditures. A general test of the theory could investigate whether the papers find a higher frequency of positive coefficients in their estimations. In statistical terms, consider a random variable representing the coefficient sign for the papers. As each sign of the paper is a Bernoulli trial, the aggregate result for all papers follows a Binomial distribution with parameters n equals the number of papers, and p the chance of a positive sign. The "law of $1/n$" can be reformulated as the chance of $p > 0.5$, which facilitates the testing of the theory. The null statistical hypothesis for such a test is that:

- H_0: the proportion of positive and negative signs are statistically equal ($p = 0.5$).

We take an agnostic approach and acknowledge that either the "law of $1/n$" ($p > 0.5$), or the "reverse law of $1/n$" ($p < 0.5$) may be true. In this case, the alternative hypothesis is $p \neq 0.5$. To perform this test, we run binomial exact tests in `R`, using the function `binom.test(.)`.

This test has two advantages. First, the binomial test ignores the design discrepancies and focuses on the overall reported effect. This is an important feature as papers analyse different countries, samples, and have distinct characteristics, such as whether they were published or not. Second, this test has the advantages of requiring few assumptions and being easy to interpret. The disadvantage is that the test is not as informative as the meta-regressions, as we shall see in the next sections.

For the lower chamber size, the results follow below.

method	alternative	estimate	p.value
Exact binomial test	two.sided	0.5	1

Under the null hypothesis of $p = 0.5$, we find that 13 out of 26 studies have a positive sign. The chance of a distribution with $p = 0.5$ generate this sample is equal to p-value = 1. Thus, we reject the hypothesis that $p \neq 0.5$.

For the log of lower chamber size, the results are as follows:

method	alternative	estimate	p.value
Exact binomial test	two.sided	0.7143	0.4531

Out of 7 studies, 5 have a positive sign. The chance of a distribution with $p = 0.5$ generate this sample is equal to p-value = 0.453. So we reject the hypothesis that $p \neq 0.5$.

Finally, for upper chamber size, the results are:

method	alternative	estimate	p.value
Exact binomial test	two.sided	0.8333	0.03857

Here we see that 10 out of 12 studies have a positive sign. The p-value for this test is 0.039. Therefore, we accept the hypothesis that $p \neq 0.5$. This is the only test that presents evidence of an association between the legislature size and expenditure.

We also tested the possibility that the signs change depending on whether the study analyses unicameral or non-unicameral legislative bodies. This analysis does not take into consideration the size of the upper house, as it would indicate that the cases in the paper have a non-unicameral legislature. The results for this analysis follow below. They show that there is no significant change in the sign of the relationship between public spending and legislature size, when controlling by the institutional design.

Indep. Variable	Legislative Inst.	estimate	p.value
Lower House Size	Unicameral	0.5	1
Lower House Size	Non-unicameral	0.5	1
Log of Lower House Size	Unicameral	0.6667	0.6875
Log of Lower House Size	Non-unicameral	1	1

H Meta-Analysis (Main Sample)

H.1 Estimation Method

In general terms, there are two main ways to conduct a meta-analysis. Scholars either use fixed effects or random effects models. The fixed effects model assumes that there exists a single true effect and all estimates are an attempt to uncover this effect. The random effects model, in contrast, assumes that there is a distribution of true effects, and that the coefficients vary based on sampling and tests characteristics.

In this paper, we employ a random effects model. The empirical papers testing the *law of 1/n* are very diverse. We tried to capture some of this diversity by considering the main dependent and independent variables separately, but they have at least three other important sources of dispersion:

1. **Study sample**: Counties, Municipalities, States, Provinces, Countries.
2. **Electoral systems**: Majoritarian, PR, Mixed.
3. **Modelling strategies**: Panel data, Standard OLS, IV, RDD.
4. **Institutional design**: Unicameral, Bicameral, or a Mix of both Unicameral and Bicameral.

These sources of heterogeneity have two implications. First, they make our estimates notably disperse. Second, the amount of heterogeneity makes fixed effects estimates unrealistic and biased. Thus, we opt for the random effects model.

Assume that each study has an effect of T_i. In a random effects model, we can decompose this effect into two components, the true effect that the study with the same specifications as i comes from, θ_i, and a within-study error ε_i:

$$T_i = \theta_i + \varepsilon_i$$

And the random effects model assumes that the θ_i varies from study to study, having a true parameter μ, plus a between-study error, ξ_i:

$$T_i = \mu + \xi_i + \varepsilon_i$$

And the random effects model estimates the parameter μ, under the challenge of estimating both the within-and-between-study sampling errors.

Another crucial assumption in meta-analysis is that the coefficients should be independent (Harrer et al. 2019; Cheung 2019; Veroniki et al. 2016; Borenstein et al. 2011). This assumption states that for our findings to be consistent, the coefficients must come from different sources of variation. However, in the political economy literature, authors frequently use similar datasets, and almost all papers fit more than one model with similar variables. While our restricted dataset contains 45 estimates, our full dataset has 162 coefficients. This is because the papers report an average of 5.4 coefficients. To correct for the violation of the study independence assumption, we use a multilevel random effects model (Cheung 2014). We add two extra levels to the regular random effects model, one that indicates the publication ID and another that indicates the data used in the original article. These levels are assumed to remove dependence structures in the data, therefore improving the estimates of our coefficient of interest, which is the effect of legislature size on public spending.

There are two levels in the main models. First, we build a common index for papers that share the same data specifications. The papers with common indexing are:

Publication ID	Source of Dependence
3, 42, 132, 165, 439, 441, 467, 505	US States Data
408, 208, A258	US Municipalities Data
849, 578	US Municipalities Data and Same Author in Two Different Studies

All of the remaining papers received a unique index. As the number of papers with these dependencies is not very high, and many characteristics within papers vary (e. g., state-wise ad-hoc exclusions, start and end points variations, region selection, etc), we show that it makes little difference to change from this index to the paper IDs. In regard to the full dataset, the results change considerably, because authors fit several models within the same paper. In any case, we use multilevel random effects for all the estimated models in this paper.

To check the possibility of publication bias, we add a funnel plot and an Egger et al. (1997) test for distribution asymmetry for every model. Funnel plots display the possibility of having a file-drawer effect, meaning that null results are under-represented in our sample. In this type of plot, under the assumption of no file-drawer effect, the coefficients are expected to lie symmetrically around the mean observed outcome. If they are asymmetric, it provides evidence for a file-drawer effect.

We use the `R` packages `meta` and `dmetar` in all estimates (Harrer et al. 2019). We employ the *Restricted Maximum Likelihood Estimator* to assess the variance of the true effect size (τ^2), which in our formulation represents the variance of ξ_i. The literature regards this estimator as the most precise when analysing continuous measures, such as the ones we have in our data (Veroniki et al. 2016).

We combine the three independent variables (Lower Chamber Size, Log of Lower Chamber Size, and Upper Chamber Size) with our dependent variables of interest (Expenditure Per Capita, Log of Expenditure Per Capita, Expenditure as a Percentage of the GDP). This formed a 3×3 table, yet not all combinations are available in the data. The results are shown below.

H.2 Lower Chamber Size and Expenditure Per Capita

The results for the meta-analysis that compares lower chamber size and expenditure per capita are available below.

```
## Warning in rma.mv(coef, VAR, data = aux,
## slab = paste(authoryear), test = "t", :
## Ratio of largest to smallest sampling
## variance extremely large. May not be able
## to obtain stable results.

##
## Multivariate Meta-Analysis Model (k = 16; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.1228  0.3504      9     no
## sigma^2.2  0.0000  0.0000     16     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 15) = 114.9561, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.0217  0.1302  0.1666  0.8699  -0.2559  0.2992
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

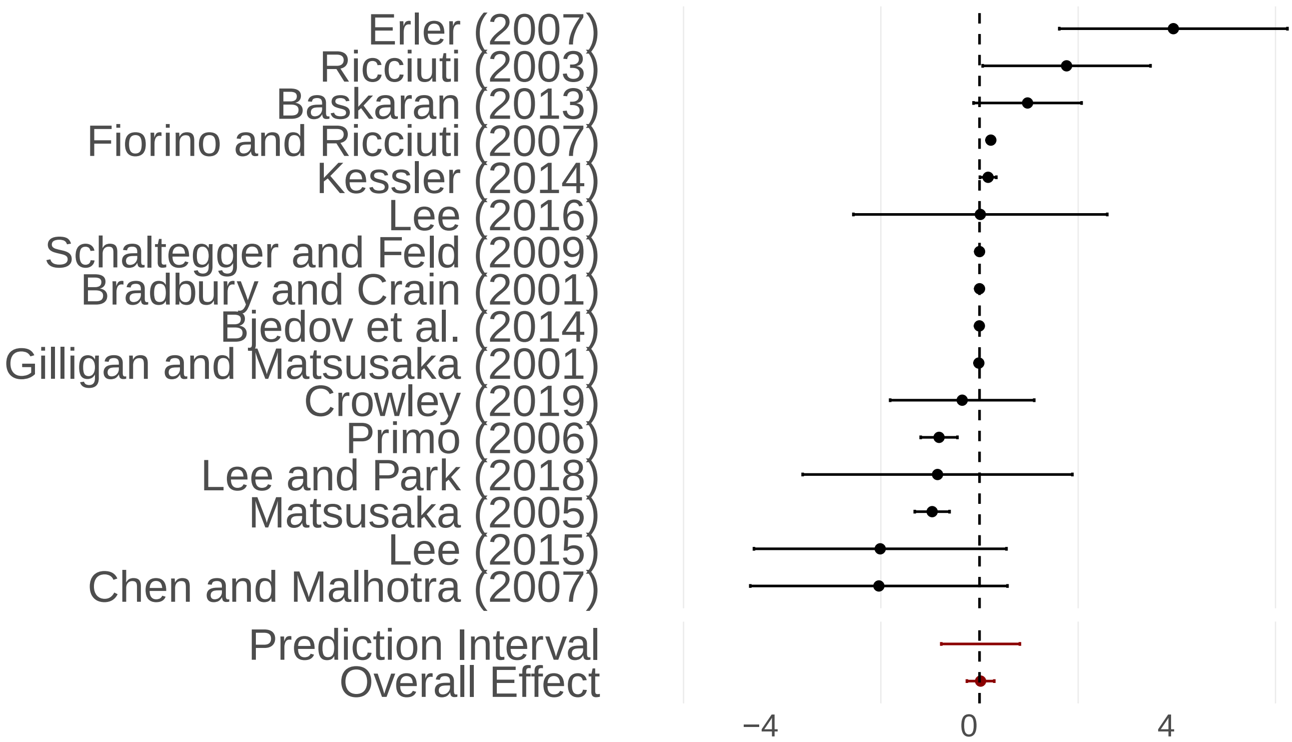


Figure 9: Effect of Lower Chamber Size on Expenditure Per Capita

And to assess the possibility of publication bias, we add the funnel plot below:

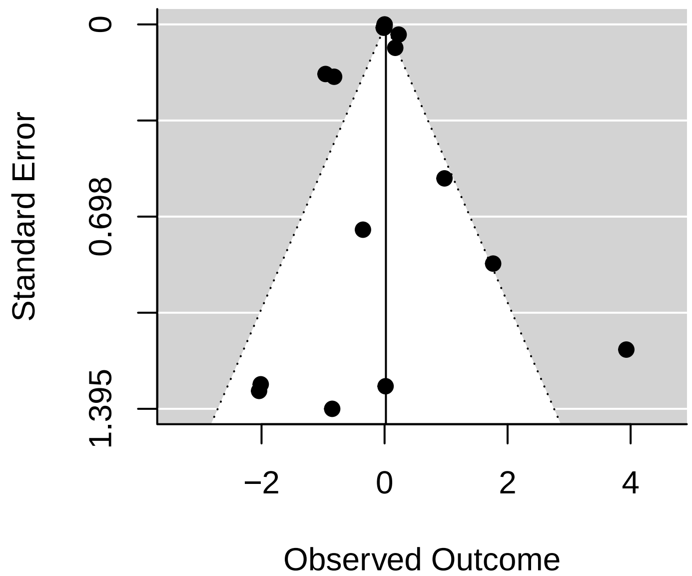


Figure 10: Funnel Plot – Effect of Lower Chamber Size on Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 114.96$.
2. The estimated SMD in the random effects model is $g = 0.02$ ($SE = 0.13$).
3. The prediction interval ranges from -0.77 to 0.82. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.2.1 Electoral System Subgroup Analysis

The *law of 1/n* was introduced to describe majoritarian systems, but the theory has also been applied to non-majoritarian electoral systems. We estimated a subgroup analysis using a binary indicator for electoral system. The results may be seen below.

We find little evidence that either majoritarian or non-majoritarian systems produce systematically positive effects on expenditure per capita. Both coefficients are not statistically significant, and they reassure us that the absence of effect is not caused by pooling multiple types of electoral systems.

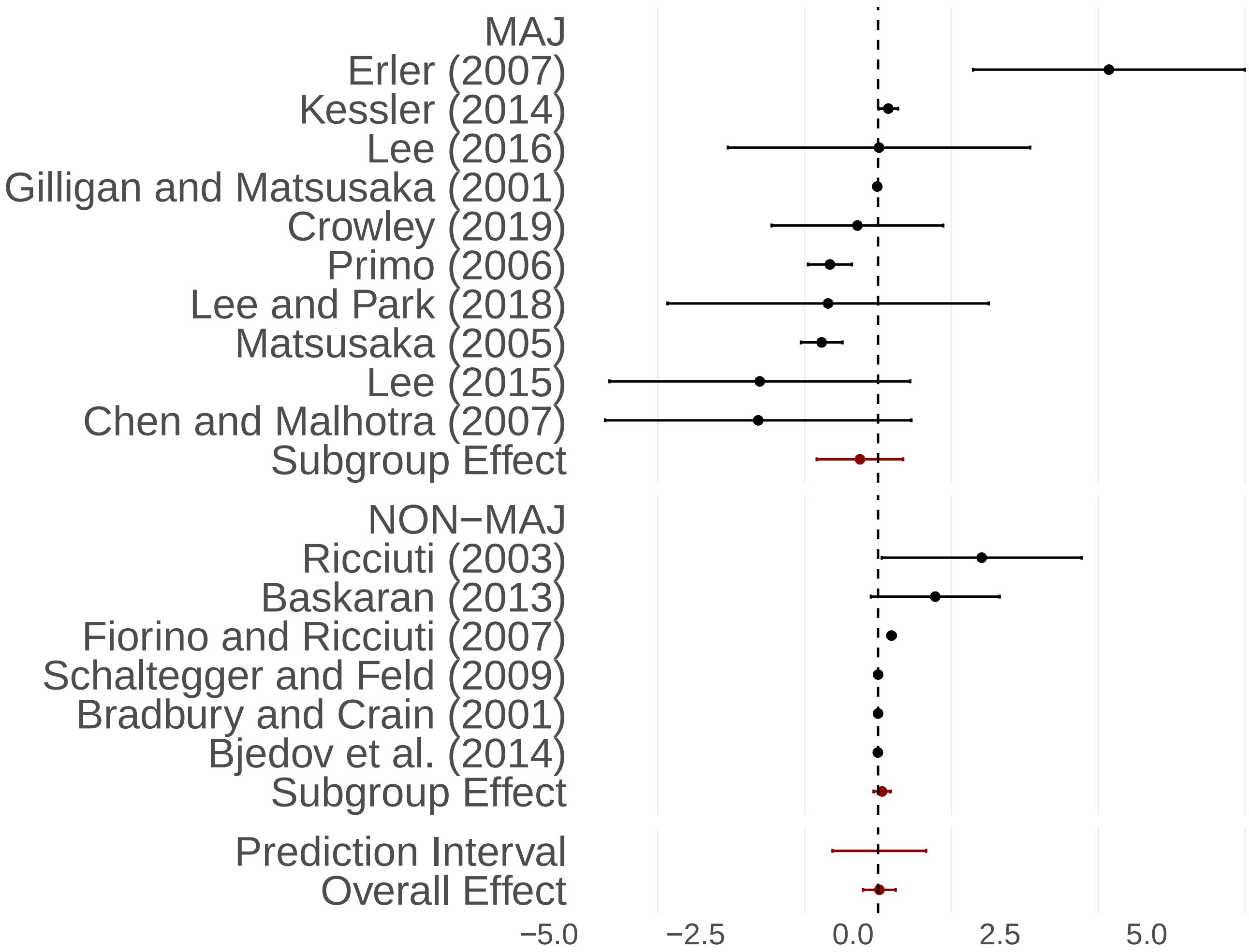


Figure 11: Subgroup Analysis of Lower Chamber Size x Expenditure Per Capita, Controlling by Electoral System

H.2.2 Institutional Design Subgroup Analysis

The *law of 1/n* was conceived to explain the expected effect of chamber size on public expenditure. However, papers such as Chen and Malhotra (2007) demonstrated that the relationship is mediated by the size of the upper chamber. Their finding suggests that the institutional design of the legislature influences the empirical predictions in the sample we study. To test this possibility, we estimated a subgroup analysis using a binary indicator for institutional design. The results may be seen below.

We find little evidence that either unicameral or non-unicameral legislative institutions produce systematically positive effects on expenditure per capita. However, the coefficients tend to be weakly positive for unicameral studies, suggesting that there might be a relationship, that is masked by the low statistical power.

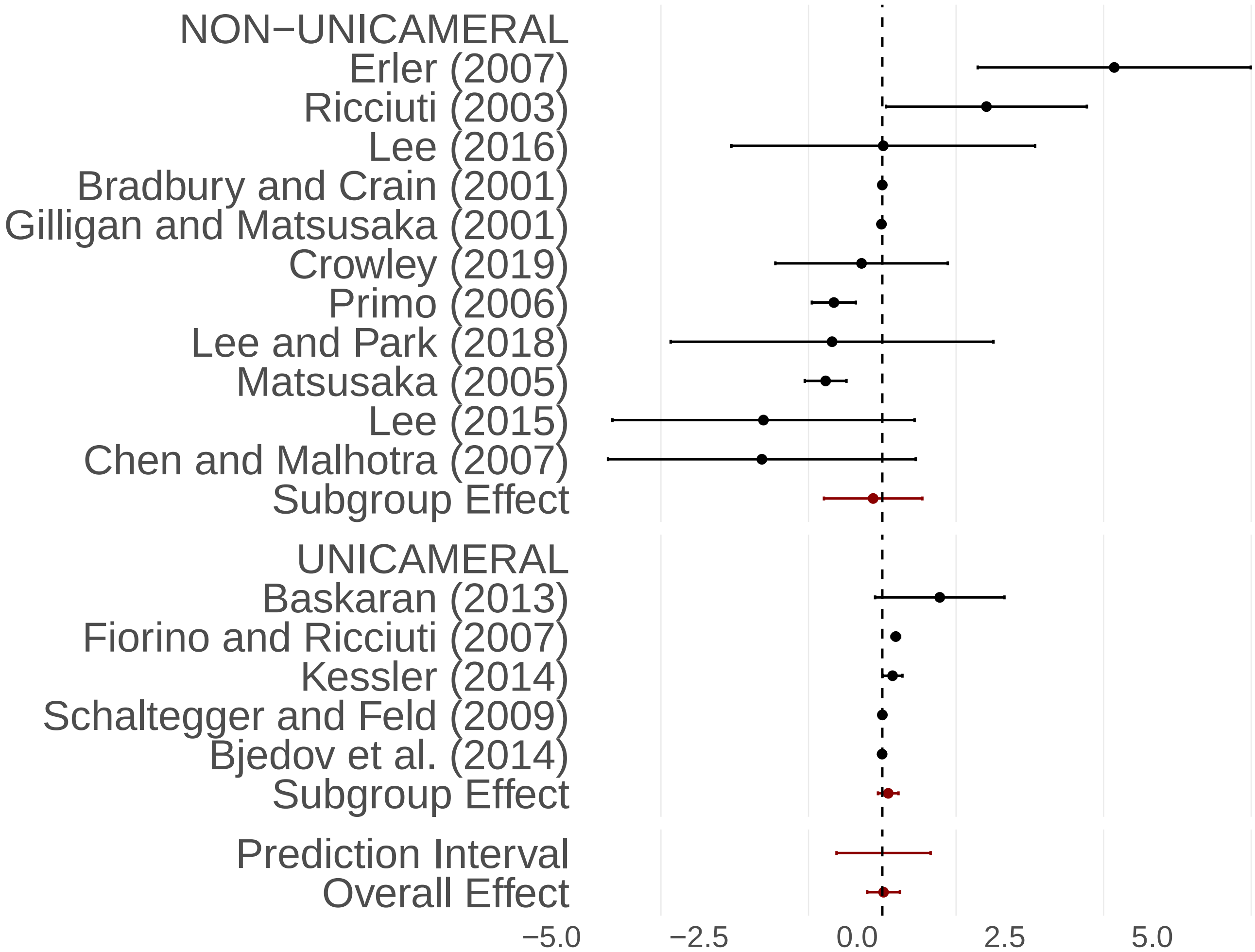


Figure 12: Subgroup Analysis of Lower Chamber Size x Expenditure Per Capita, Controlling by Institutional Design

H.3 Log of Lower Chamber Size and Expenditure Per Capita

There are no studies that have per capita expenditure as the dependent variable and log of lower chamber size as the independent variable.

H.4 Upper House Size and Expenditure Per Capita

Now we look into the upper chamber size. In this model, we investigate the effect of upper house size on expenditure per capita.

```
## Warning in rma.mv(coef, VAR, data = aux,
## slab = paste(authoryear), test = "t", :
## Ratio of largest to smallest sampling
## variance extremely large. May not be able
```

```
## to obtain stable results.

##
## Multivariate Meta-Analysis Model (k = 9; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1  33.6704  5.8026      4     no
## sigma^2.2  52.3772  7.2372      9     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 8) = 41.4521, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb    ci.ub
##   3.6581  4.2989  0.8509  0.4195  -6.2553  13.5714
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

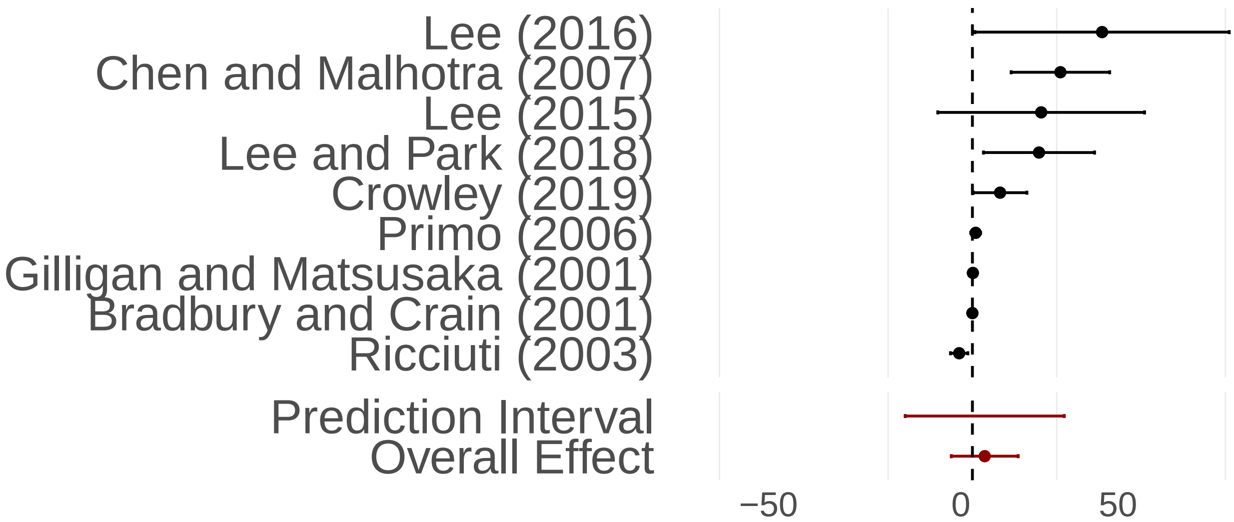


Figure 13: Effect of Upper Chamber Size on Expenditure Per Capita

We see no evidence of publication bias:

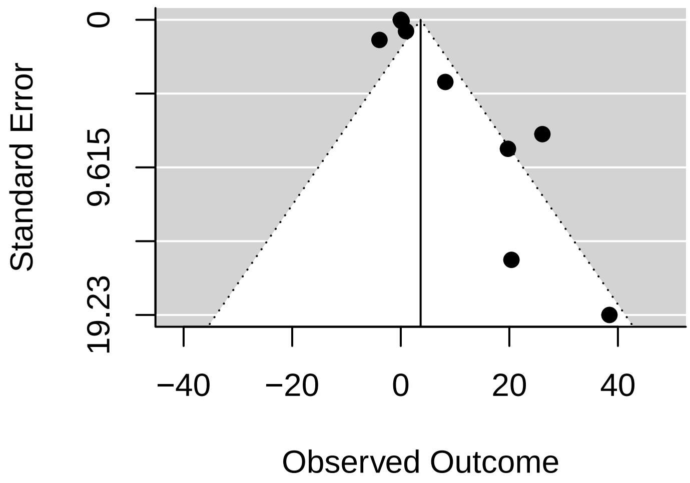


Figure 14: Funnel Plot – Effect of Upper Chamber Size on Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 41.45$.
2. The estimated SMD in the random effects model is $g = 3.66$ ($SE = 4.299$).
3. The prediction interval ranges from -19.92 to 27.23. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.5 Lower Chamber Size and Log of Expenditure Per Capita

This model estimates the effect of lower chamber size on log of expenditure per capita.

```
##
## Multivariate Meta-Analysis Model (k = 4; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1   0.0046  0.0681      4     no
## sigma^2.2   0.0046  0.0681      4     no
##                          factor
## sigma^2.1             id_level1
## sigma^2.2   id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 3) = 36.2575, p-val < .0001
##
## Model Results:
##
## estimate      se     tval     pval     ci.lb    ci.ub
```

```
## -0.0306  0.0495  -0.6188  0.5799  -0.1880  0.1268
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot is as follows:

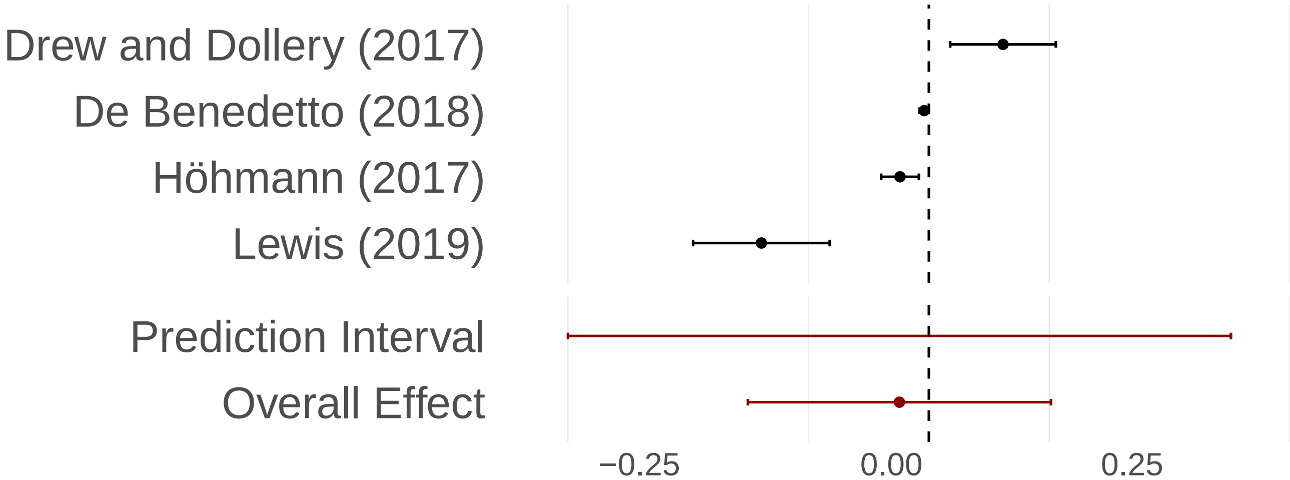


Figure 15: Effect of Lower Chamber Size on Log of Expenditure Per Capita

The funnel plot shows no evidence of publication bias.

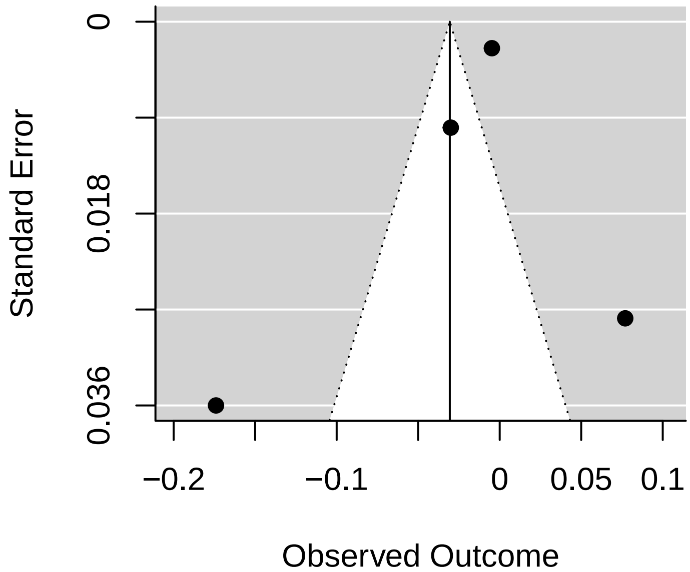


Figure 16: Funnel Plot – Effect of Lower Chamber Size on Log Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: Q = 36.26.
2. The estimated SMD in the random effects model is g = -0.03 (SE = 0.049).
3. The prediction interval ranges from -0.37 to 0.31. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.6 Log of Lower Chamber Size and Log of Expenditure Per Capita

In this specification, we measure how changes in the log of lower chamber size impact the log of per capita expenditure.

```
##
## Multivariate Meta-Analysis Model (k = 5; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0289  0.1701      3     no
## sigma^2.2  0.0085  0.0924      5     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 4) = 70.4596, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.0777  0.1089  0.7132  0.5151  -0.2248  0.3802
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

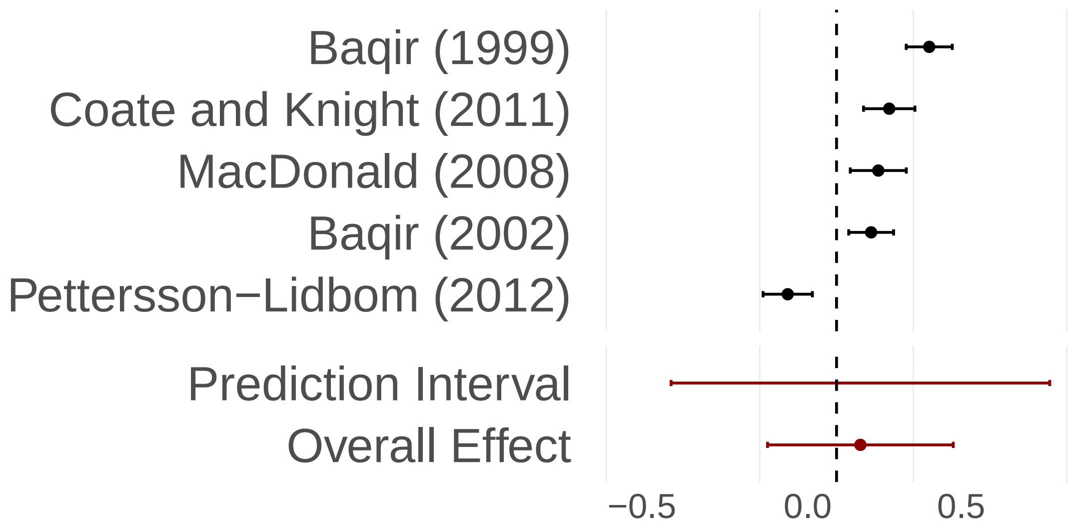


Figure 17: Effect of Log Lower Chamber Size on Log Expenditure Per Capita

And the funnel plot:

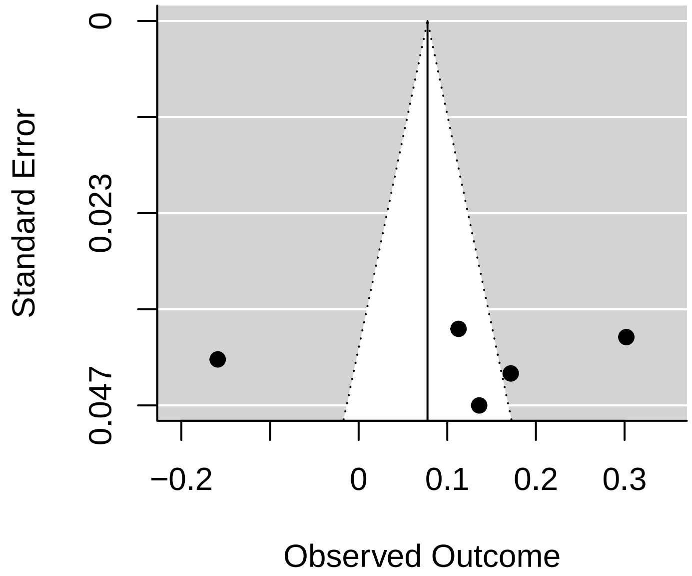


Figure 18: Funnel Plot – Effect of Log Lower Chamber Size on Log Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 70.46$.
2. The estimated SMD in the random effects model is $g = 0.08$ ($SE = 0.109$).
3. The prediction interval ranges from -0.54 to 0.69. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.7 Upper Chamber Size and Log of Expenditure Per Capita

No studies correlate the log of per capita expenditure with the size of the upper chamber.

H.8 Lower Chamber Size and Expenditure as Percentage of GDP

This model evaluates the relationship between lower house size and percentage of GDP as public expenditure.

```
##
## Multivariate Meta-Analysis Model (k = 6; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1   0.0003  0.0168      6     no
## sigma^2.2   0.0003  0.0168      6     no
##                          factor
## sigma^2.1             id_level1
```

```
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 5) = 42.9051, p-val < .0001
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0065  0.0104  -0.6194  0.5628  -0.0333  0.0204
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Below, you may find the forest plot:

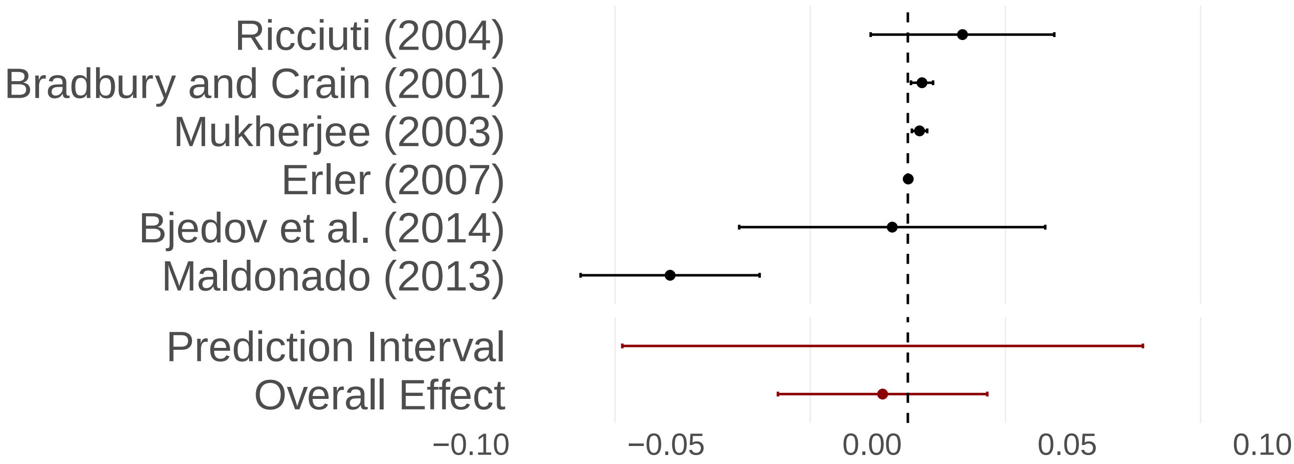


Figure 19: Effect of Lower Chamber Size on Expenditure as Percentage of GDP

The funnel plot to test for publication bias:

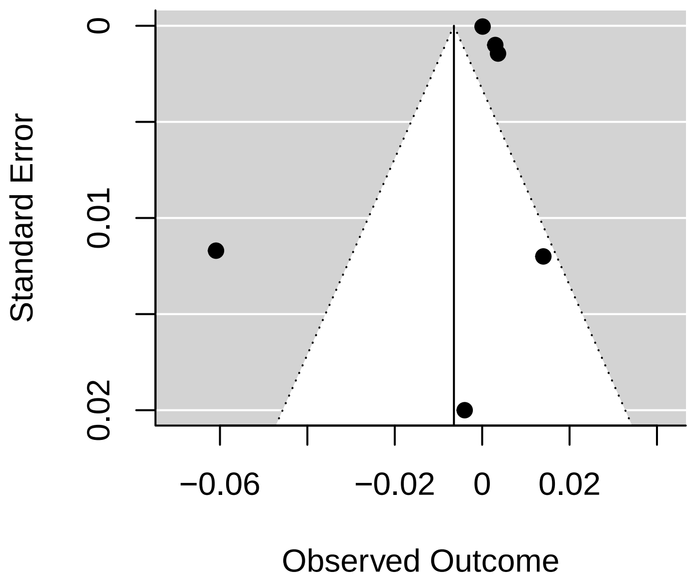


Figure 20: Funnel Plot – Effect of Lower Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: Q = 42.91.
2. The estimated SMD in the random effects model is g = -0.01 (SE = 0.01).
3. The prediction interval ranges from -0.07 to 0.06. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.9 Log Lower Chamber Size and Expenditure as Percentage of GDP

This model correlates the percentage of GDP as public expenditure as the dependent variable and the log lower chamber size as the independent variable.

```
##
## Multivariate Meta-Analysis Model (k = 2; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1   3.7290  1.9311      2     no
## sigma^2.2   3.7290  1.9311      2     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 1) = 3.0767, p-val = 0.0794
##
## Model Results:
##
## estimate      se     tval    pval     ci.lb    ci.ub
##  -1.5756  2.2228  -0.7088  0.6074  -29.8196  26.6683
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

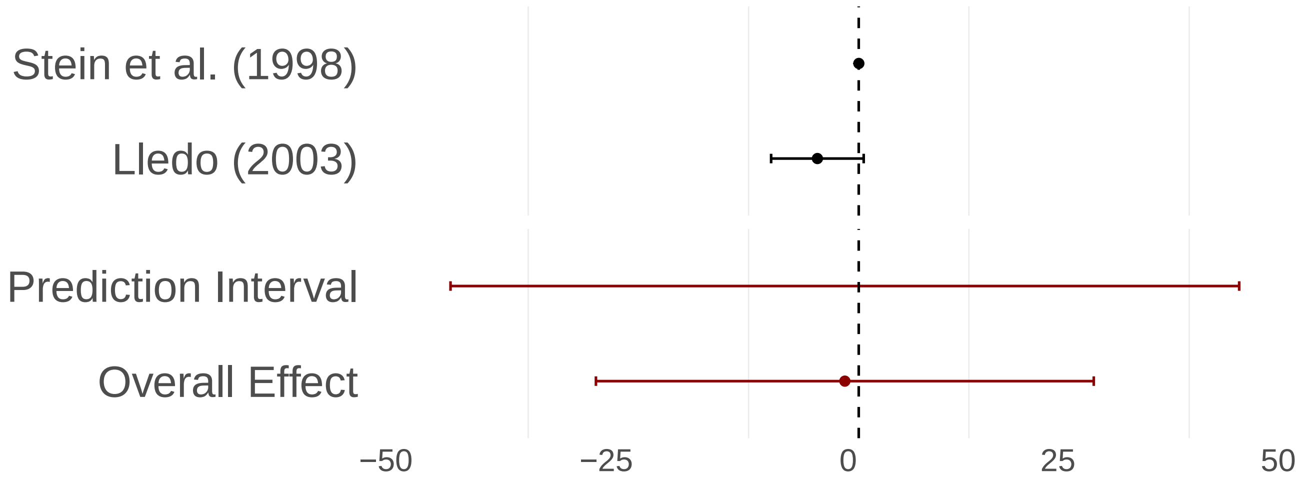


Figure 21: Effect of Log Lower Chamber Size on Expenditure as Percentage of GDP

Funnel plot:

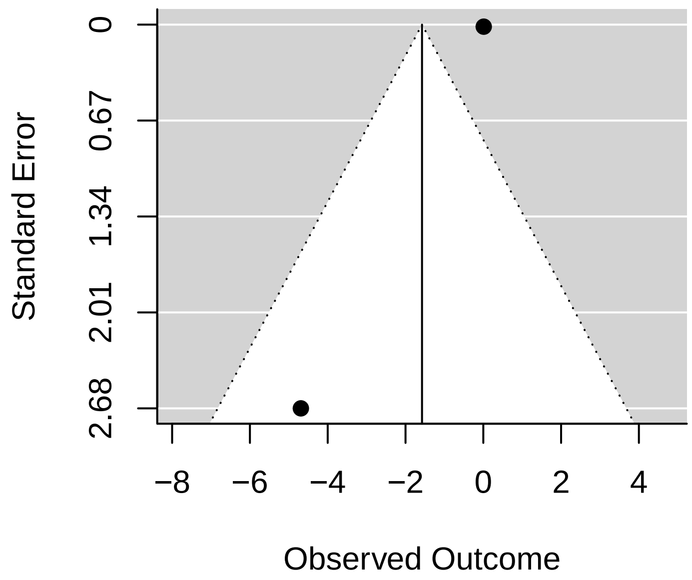


Figure 22: Funnel Plot – Effect of Log of Lower Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: Q = 3.08.
2. The estimated SMD in the random effects model is g = -1.58 (SE = 2.223).
3. The prediction interval ranges from -46.32 to 43.17. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.10 Upper Chamber Size and Expenditure as Percentage of GDP

This model measures the effect of upper chamber size on the public expenditure share of the GDP.

```
##
## Multivariate Meta-Analysis Model (k = 3; method: REML)
```

```
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0004  0.0201      3     no
## sigma^2.2  0.0004  0.0201      3     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 2) = 14.0739, p-val = 0.0009
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0027  0.0175  -0.1570  0.8896  -0.0781  0.0726
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

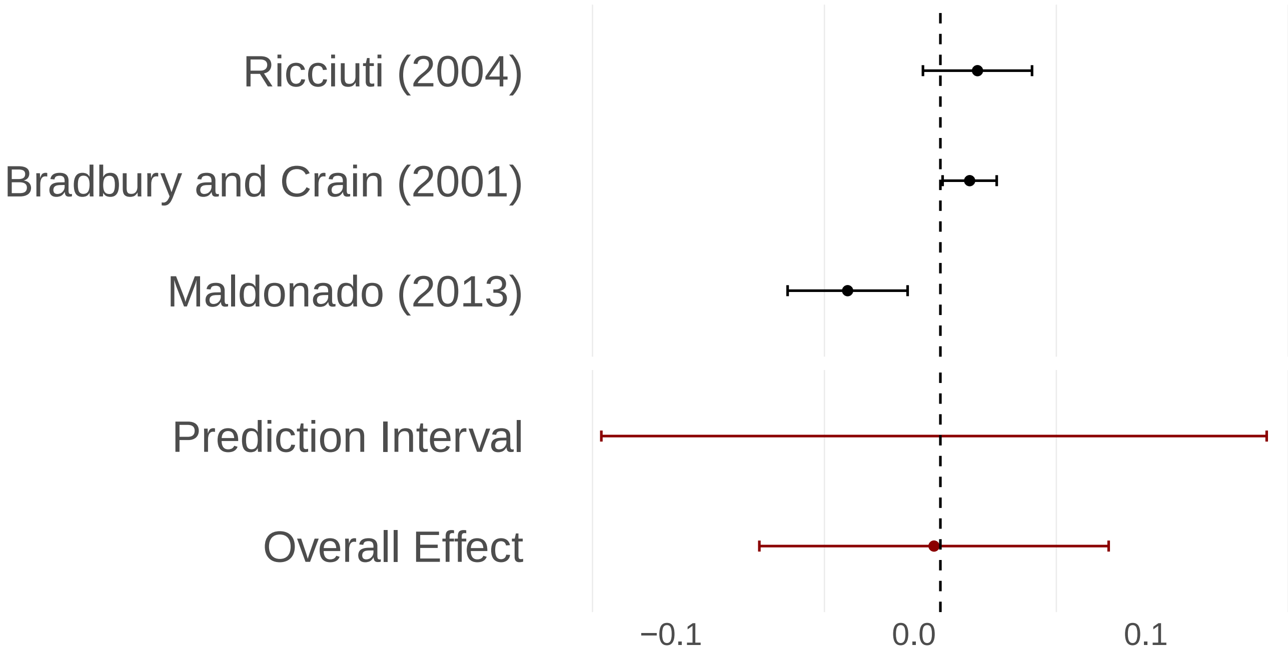


Figure 23: Effect of Upper Chamber Size on Expenditure as Percentage of GDP

As in our previous estimations, we find no evidence of file-drawer effect.

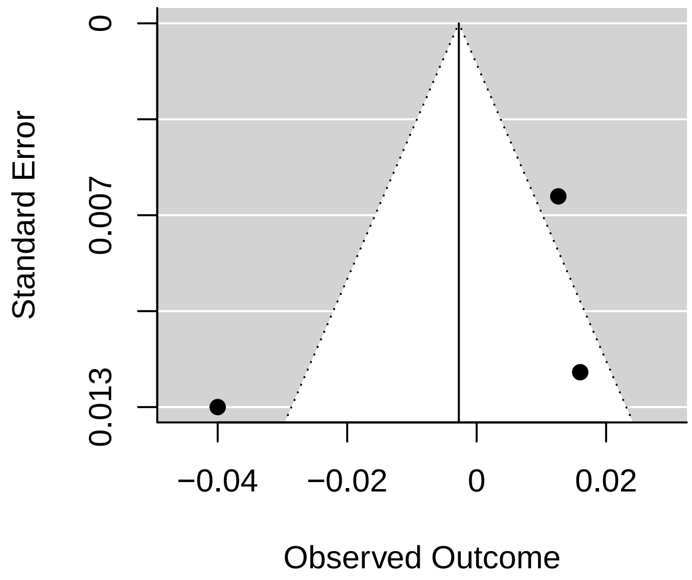


Figure 24: Funnel Plot – Effect of Upper Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: $Q = 14.07$.
2. The estimated SMD in the random effects model is $g = 0$ ($SE = 0.018$).
3. The prediction interval ranges from -0.15 to 0.14. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.11 Lower Chamber Size and Expenditure per Capita (Instrumental Variables Only)

Here we estimate a meta-analysis of the papers which use instrumental variables. The results may be seen below.

```
##
## Multivariate Meta-Analysis Model (k = 5; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.7896  0.8886      3     no
## sigma^2.2  0.0000  0.0000      5     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 4) = 46.7149, p-val < .0001
```

```
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.0006  0.5431  0.0011  0.9992  -1.5074  1.5085
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

And the forest plot:

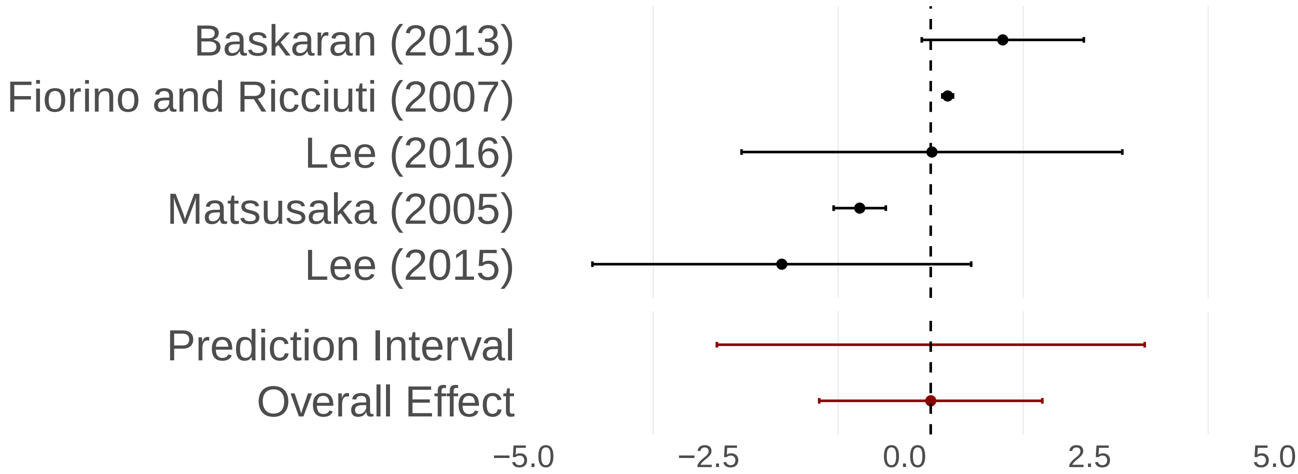


Figure 25: Effect of Lower Chamber Size on Expenditure Per Capita (IV Only)

No evidence of publication bias, as shown in the following funnel plot:

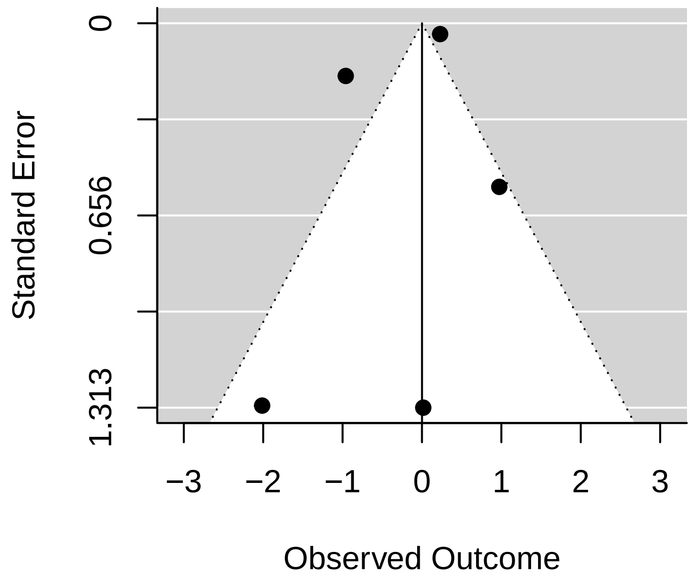


Figure 26: Funnel Plot – Effect of Lower Chamber Size on Expenditure Per Capita (IV Only)

Highlights:

1. The results are highly heterogeneous: $Q = 114.96$.

2. The estimated SMD in the random effects model is $g = 0.02$ ($SE = 0.13$).
3. The prediction interval ranges from -0.77 to 0.82. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

H.11.1 Regression Method Subgroup Analysis

Over time, the literature evolved to use causally identified techniques to determine the effect of legislature size on the expenditure per capita. To study whether the method had an effect on the estimated coefficients, we fit a subgroup analysis using the method employed in each paper.

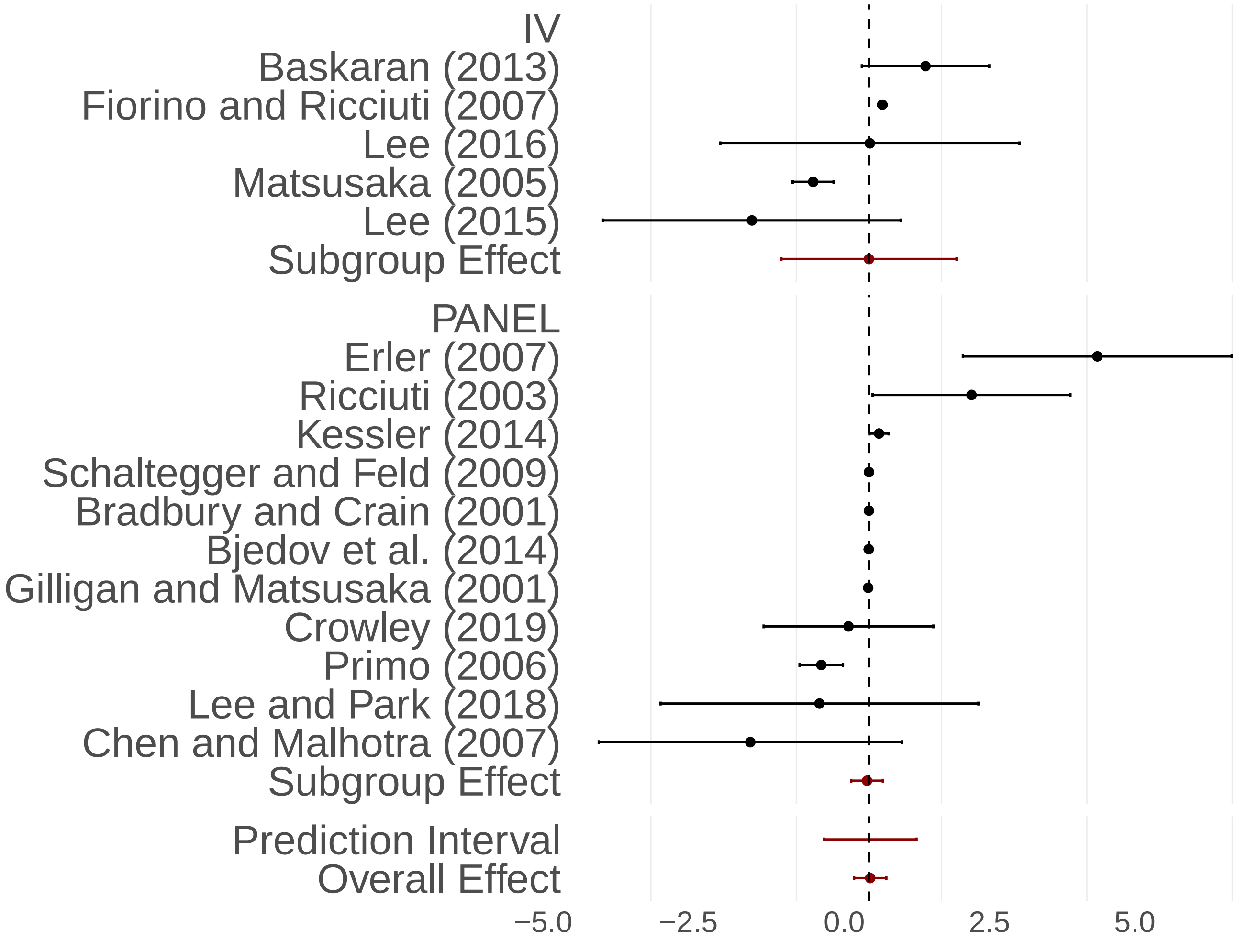


Figure 27: Subgroup Analysis of Lower Chamber Size x Expenditure Per Capita, Controlling by Estimation Method

Although all methods generate a null effect, the IV method seems to be well distributed, with two papers with positive effects and two papers displaying negative effects. The random effects model for the subgroup is 0.22, which is negative but non-significant. Improving the estimation technique, for the case of IVs, still renders a null effect of legislature size on per capita government expenditure.

H.12 Lower Chamber Size and Log of Expenditure per Capita (Regression Discontinuity Design Only)

In this subsection, we run a meta-analysis with papers that include regression discontinuity designs.

```
##
## Multivariate Meta-Analysis Model (k = 3; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0035  0.0593      3     no
## sigma^2.2  0.0035  0.0593      3     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 2) = 27.3176, p-val < .0001
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0640  0.0499  -1.2838  0.3279  -0.2785  0.1505
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Forest plot:

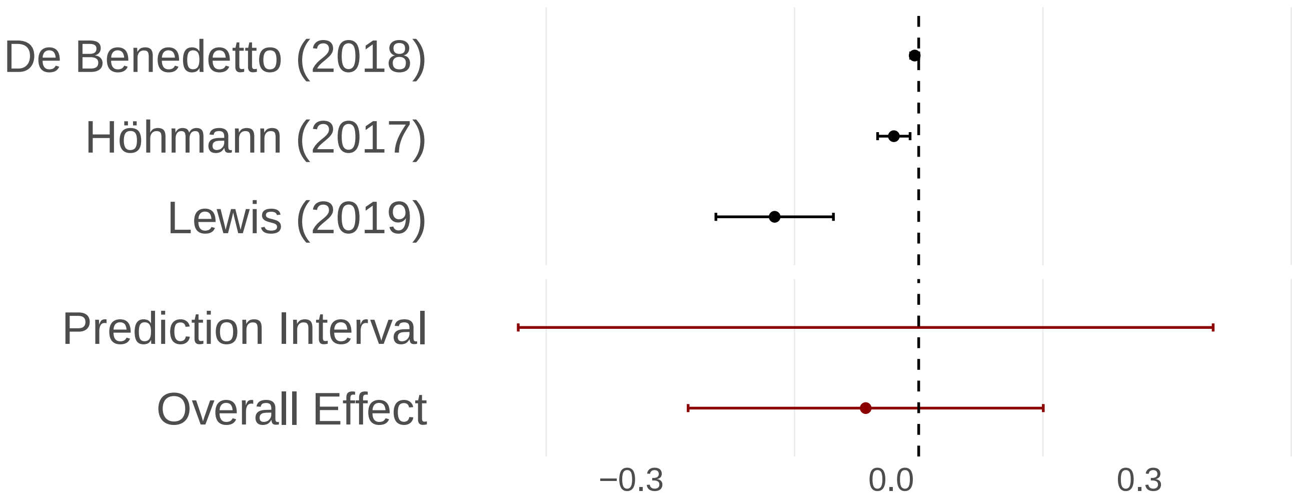


Figure 28: Effect of Lower Chamber Size on Expenditure Per Capita (RDDs)

Highlights:

1. The results are highly heterogeneous: Q = 27.32.
2. The estimated SMD in the random effects model is g = -0.06 (SE = 0.05).
3. The prediction interval ranges from -0.48 to 0.36. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.
5. One notable absence in the analysis is the seminar paper by Pettersson-Lidbom (2012). This is because the author uses Log of Expenditure Per Capita x Log of Legislature Size.

I Meta-Analysis (Extended Sample)

I.1 Lower Chamber Size and Expenditure Per Capita

Here we estimate the relationship between expenditure per capita as a dependent variable, and the lower chamber as the independent variable.

```
##
## Multivariate Meta-Analysis Model (k = 48; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.3624  0.6020      9     no
## sigma^2.2  0.0031  0.0555     48     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 47) = 798.6513, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.1074  0.2128  0.5048  0.6160  -0.3206  0.5355
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

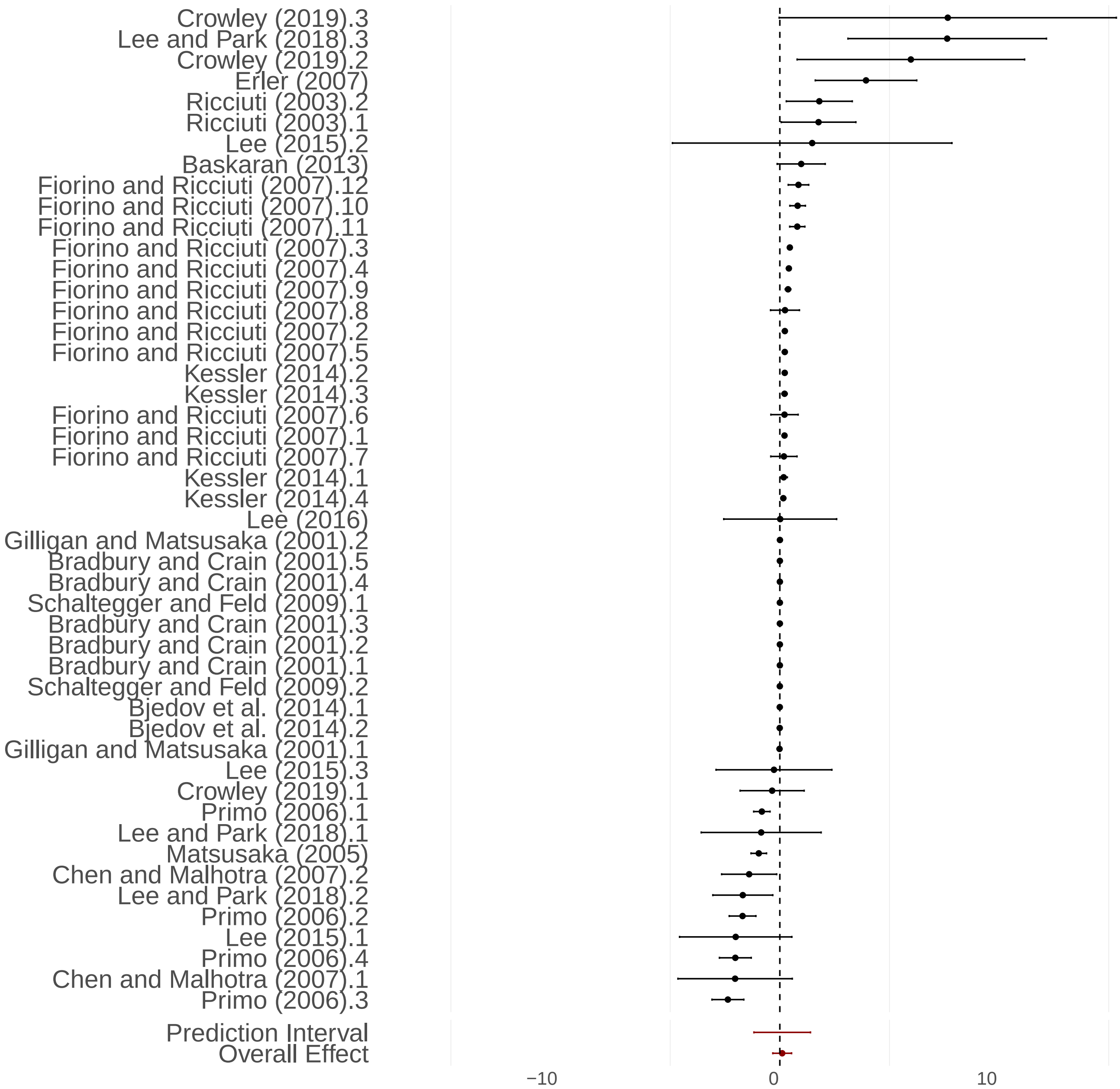


Figure 29: Effect of Lower Chamber Size on Expenditure Per Capita

And to assess the possibility of publication bias, we add the funnel plot below:

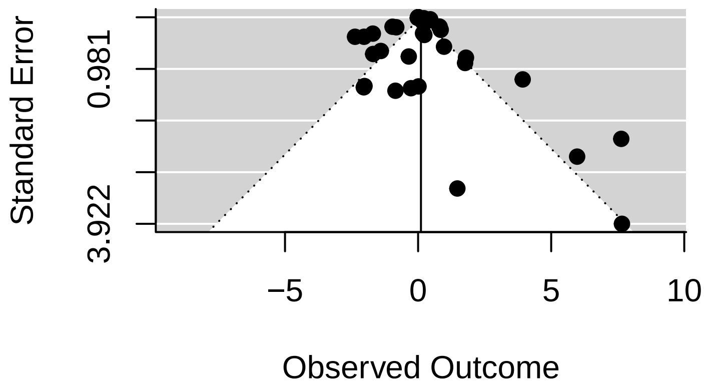


Figure 30: Funnel Plot – Effect of Lower Chamber Size on Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 798.65$.
2. The estimated SMD in the random effects model is $g = 0.11$ ($SE = 0.213$).
3. The prediction interval ranges from -1.18 to 1.4. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.1.1 Electoral System Subgroup Analysis

The *law of 1/n* was formulated to analyse the budgetary allocation in majoritarian systems. In the theoretical section below, we explain why the argument has potential issues when applied to non-majoritarian electoral systems. We estimated a subgroup analysis using a dummy variable indicating the electoral system included in each model.

We see that majoritarian systems do not have a clear positive effect on budgetary spending. The majoritarian systems in the sample had a random effects model estimate of -0.25, while the random effects model in the non-majoritarian subgroup fitted a value of 0.08. Both are not statistically significant, but they reassure us that the absence of effect is not caused by pooling multiple types of electoral systems.

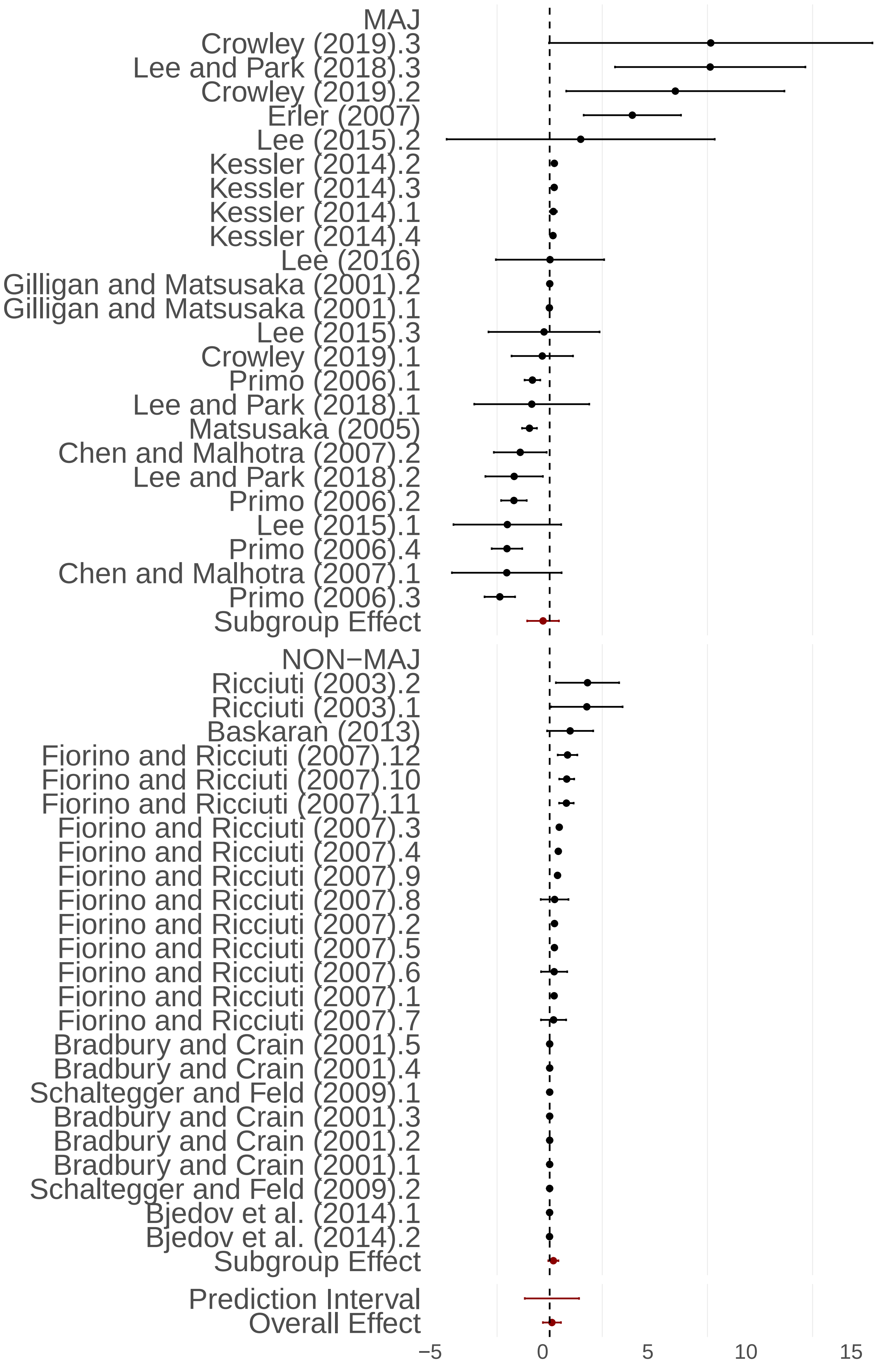


Figure 31: Subgroup Analysis of Lower Chamber Size x Expenditure Per Capita, Controlling by Electoral System

I.1.2 Institutional Design Subgroup Analysis

The *law of 1/n* was conceived to explain the expected effect of chamber size on public expenditure. However, papers such as Chen and Malhotra (2007) demonstrated that the relationship is mediated by the size of the upper chamber. Their finding suggests that the institutional design of the legislature influences the empirical predictions in the sample we study. To test this possibility, we estimated a subgroup analysis using a binary indicator for institutional design. The results may be seen below.

We find little evidence that either unicameral or non-unicameral legislative institutions produce systematically positive effects on expenditure per capita. However, the coefficients tend to be weakly positive for unicameral studies, suggesting that there might be a relationship that is masked by the low statistical power.

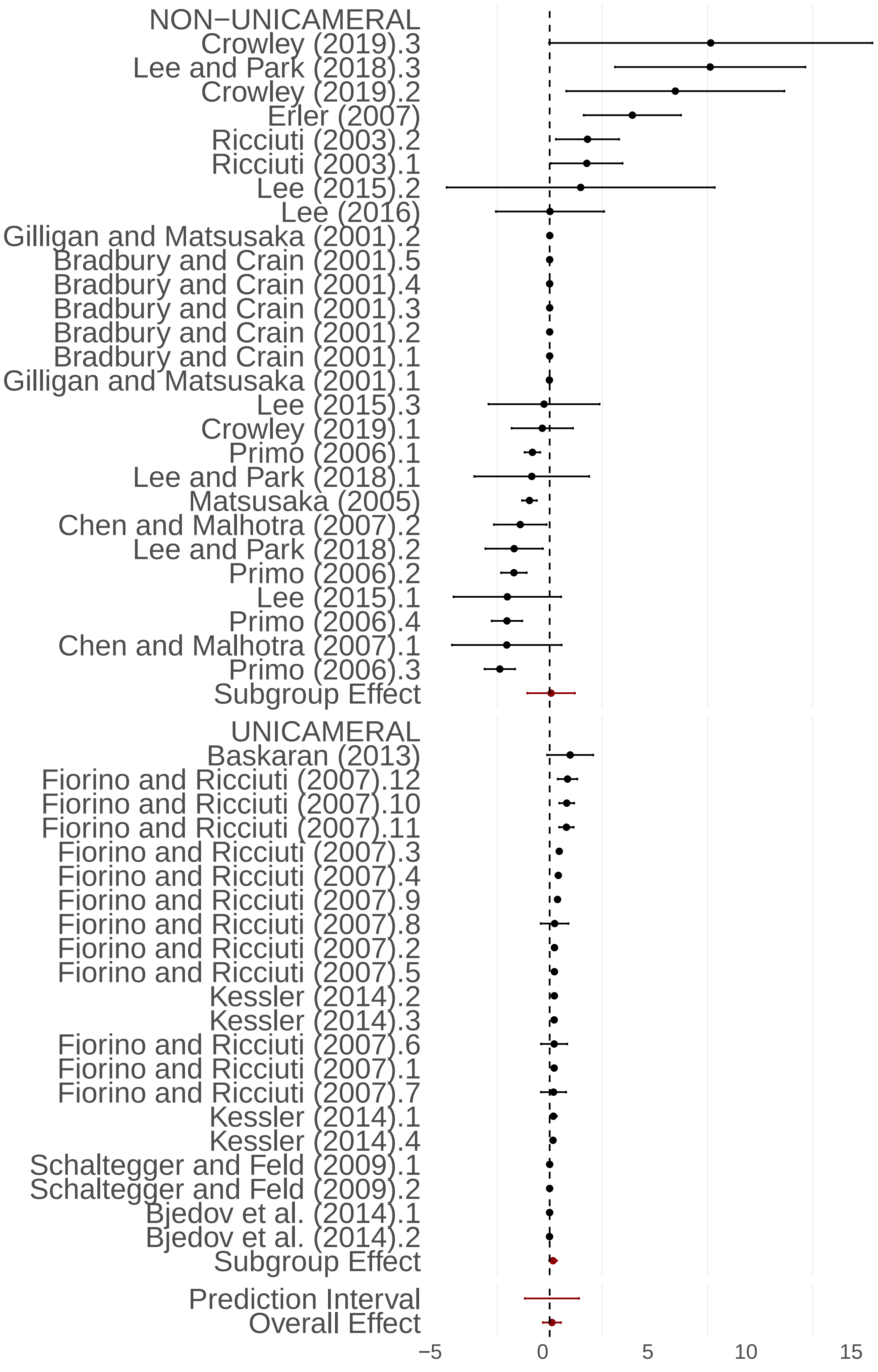


Figure 32: Subgroup Analysis of Lower Chamber Size and Expenditure Per Capita, Controlling by Institutional Design

I.2 Log of Lower Chamber Size and Expenditure Per Capita

There are no studies that have per capita expenditure as the dependent variable and log of lower chamber size as the independent variable.

I.3 Upper Chamber Size and Expenditure Per Capita

Now we investigate the effect of the upper chamber size on expenditure per capita.

```
##
## Multivariate Meta-Analysis Model (k = 34; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1  16.3711  4.0461      4     no
## sigma^2.2   2.5825  1.6070     34     no
##                       factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 33) = 204.3490, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.7372  2.0935  0.3522  0.7270  -3.5219  4.9964
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

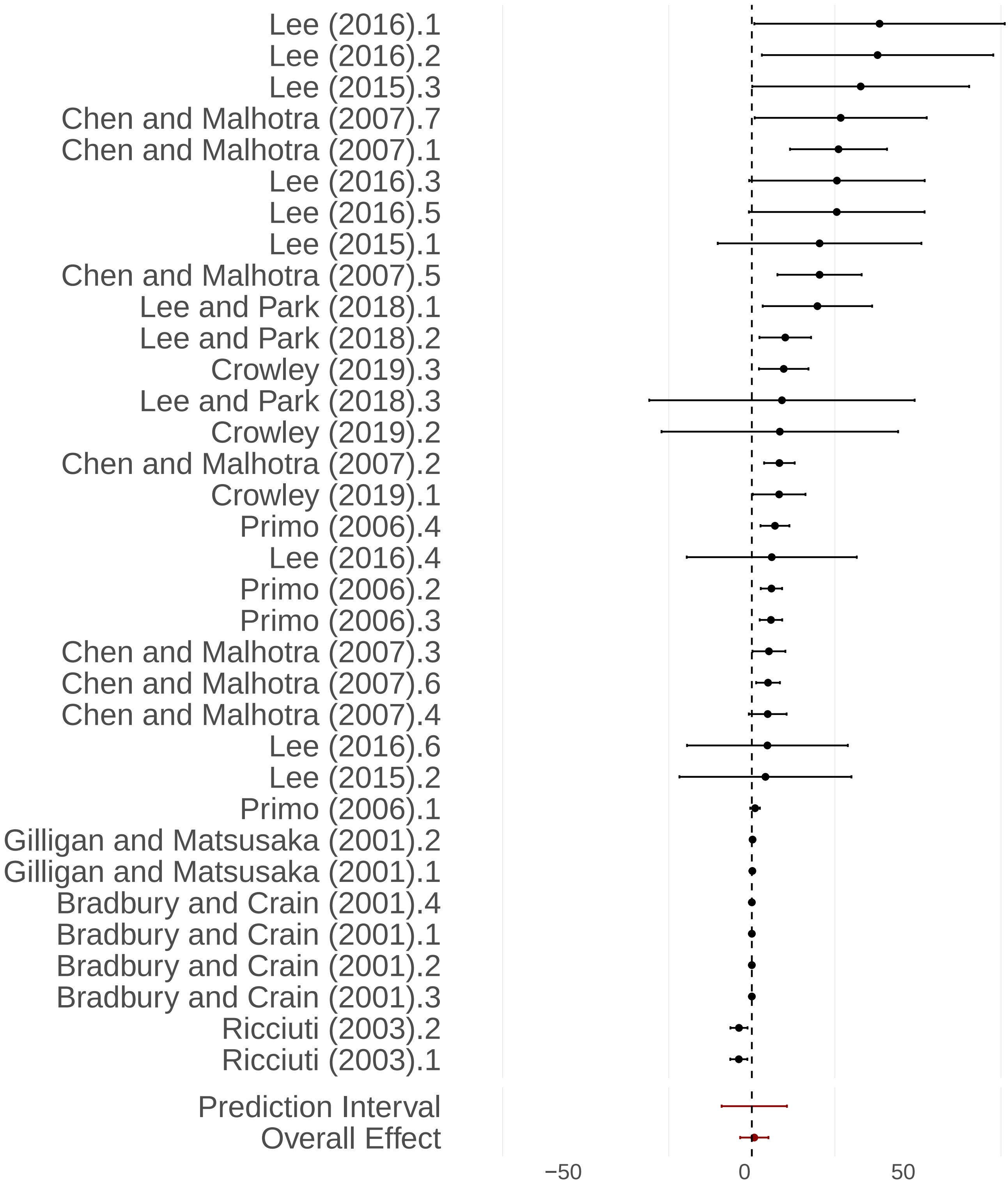


Figure 33: Effect of Upper Chamber Size on the Per Capita Government Expenditure

The funnel plot suggests no publication bias.

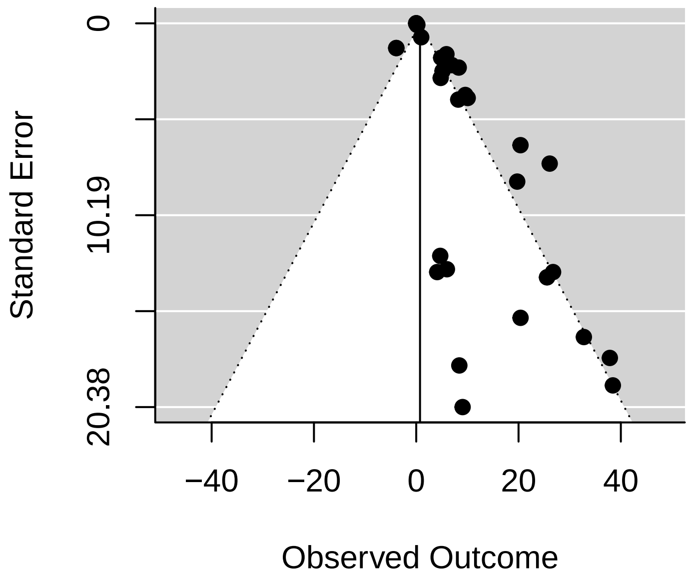


Figure 34: Funnel Plot – Effect of Upper Chamber Size on Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 204.35$.
2. The estimated SMD in the random effects model is $g = 0.74$ ($SE = 2.093$).
3. The prediction interval ranges from -9.09 to 10.57. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.4 Lower Chamber Size and Log of Expenditure Per Capita

Here we test the relationship between log of per capita expenditure and the number of lower chamber legislators.

```
##
## Multivariate Meta-Analysis Model (k = 8; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0075  0.0867      4     no
## sigma^2.2  0.0000  0.0000      8     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 7) = 48.0890, p-val < .0001
```

```
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0360  0.0444  -0.8105  0.4443  -0.1410  0.0690
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot is shown below:

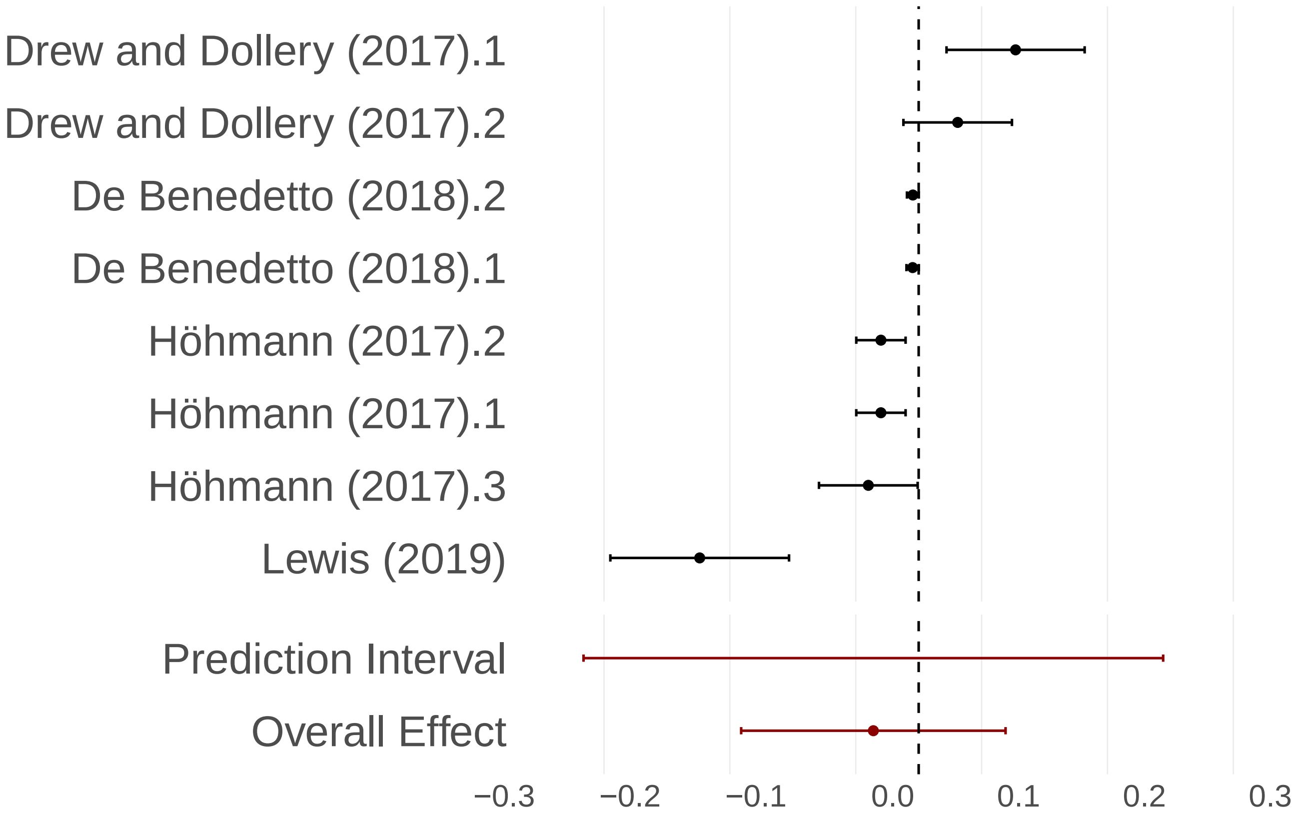


Figure 35: Effect of Lower Chamber Size on Log Expenditure Per Capita

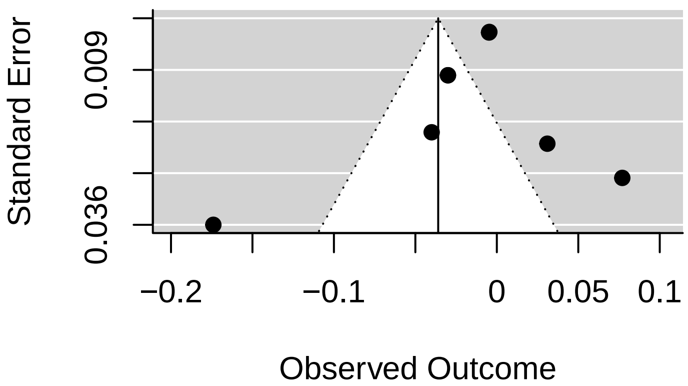


Figure 36: Funnel Plot – Effect of Lower Chamber Size on Log Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 48.09$.
2. The estimated SMD in the random effects model is g = -0.04 (SE = 0.044).
3. The prediction interval ranges from -0.27 to 0.19. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.5 Log of Lower Chamber Size and Log of Expenditure Per Capita

In this specification, we analyse log of per capita expenditure as a function of the log of lower chamber size.

```
##
## Multivariate Meta-Analysis Model (k = 29; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0241  0.1553      3     no
## sigma^2.2  0.0089  0.0945     29     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 28) = 469.5613, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.1211  0.0918  1.3195  0.1977  -0.0669  0.3090
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

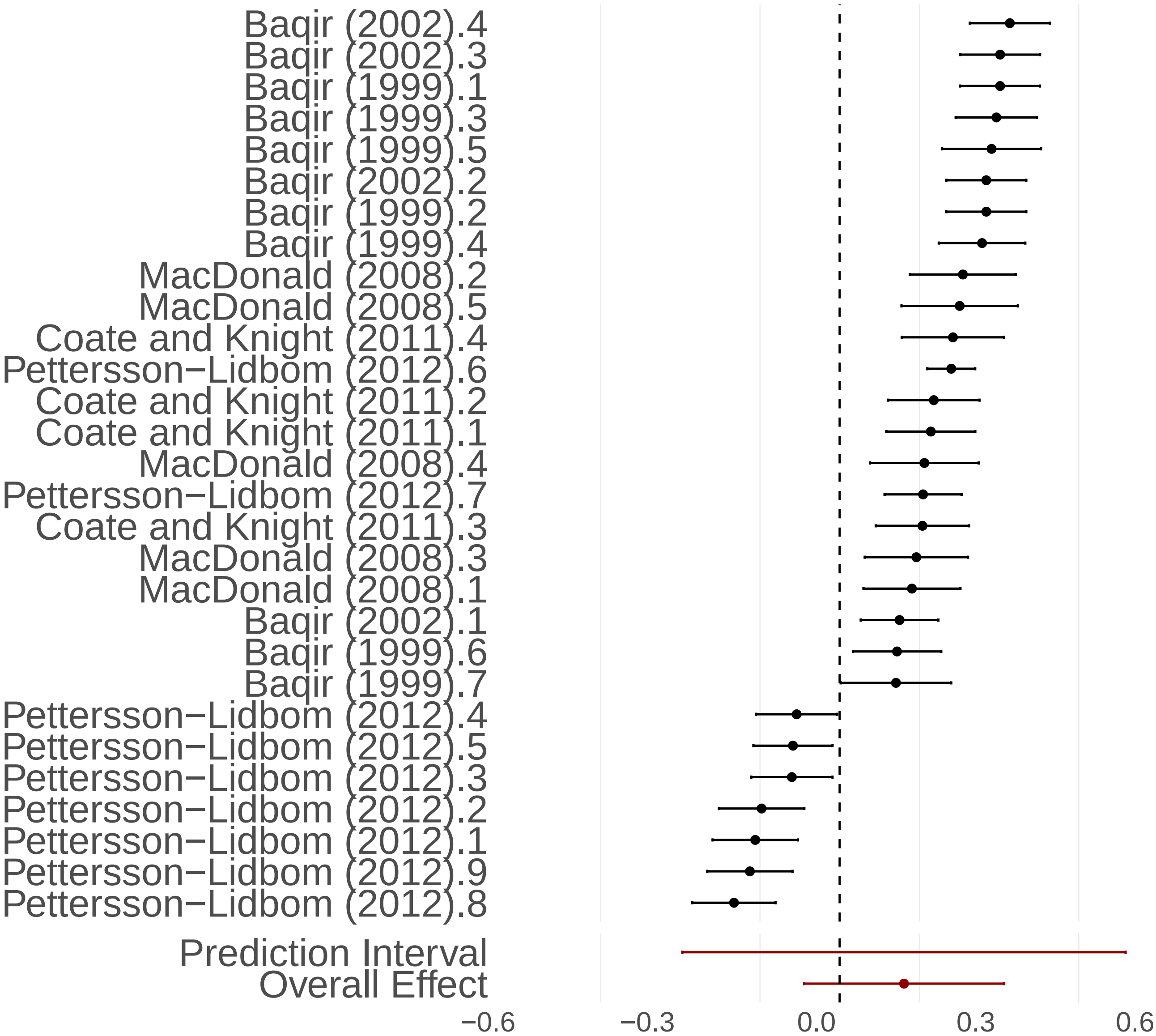


Figure 37: Effect of Log of Lower Chamber Size on Log of Expenditure Per Capita

And the funnel plot:

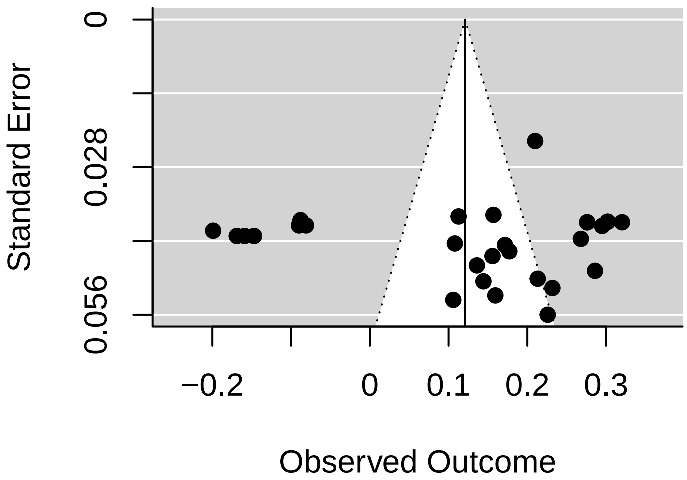


Figure 38: Funnel Plot – Effect of Log of Lower Chamber Size on Log of Expenditure Per Capita

Highlights:

1. The results are highly heterogeneous: $Q = 469.56$.
2. The estimated SMD in the random effects model is $g = 0.12$ ($SE = 0.092$).
3. The prediction interval ranges from -0.3 to 0.54. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.6 Upper Chamber Size and Log of Expenditure Per Capita

No studies correlate log of per capita expenditure with the size of upper chamber.

I.7 Lower Chamber Size and Expenditure as Percentage of GDP

Here we test how lower house size impact public expenditures as a percentage of GDP.

```
##
## Multivariate Meta-Analysis Model (k = 26; method: REML)
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1   0.0001  0.0078      6     no
## sigma^2.2   0.0002  0.0124     26     no
##                          factor
## sigma^2.1             id_level1
## sigma^2.2   id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 25) = 3255.2193, p-val < .0001
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.0058  0.0046  1.2666  0.2170  -0.0036  0.0152
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Here is the forest plot:

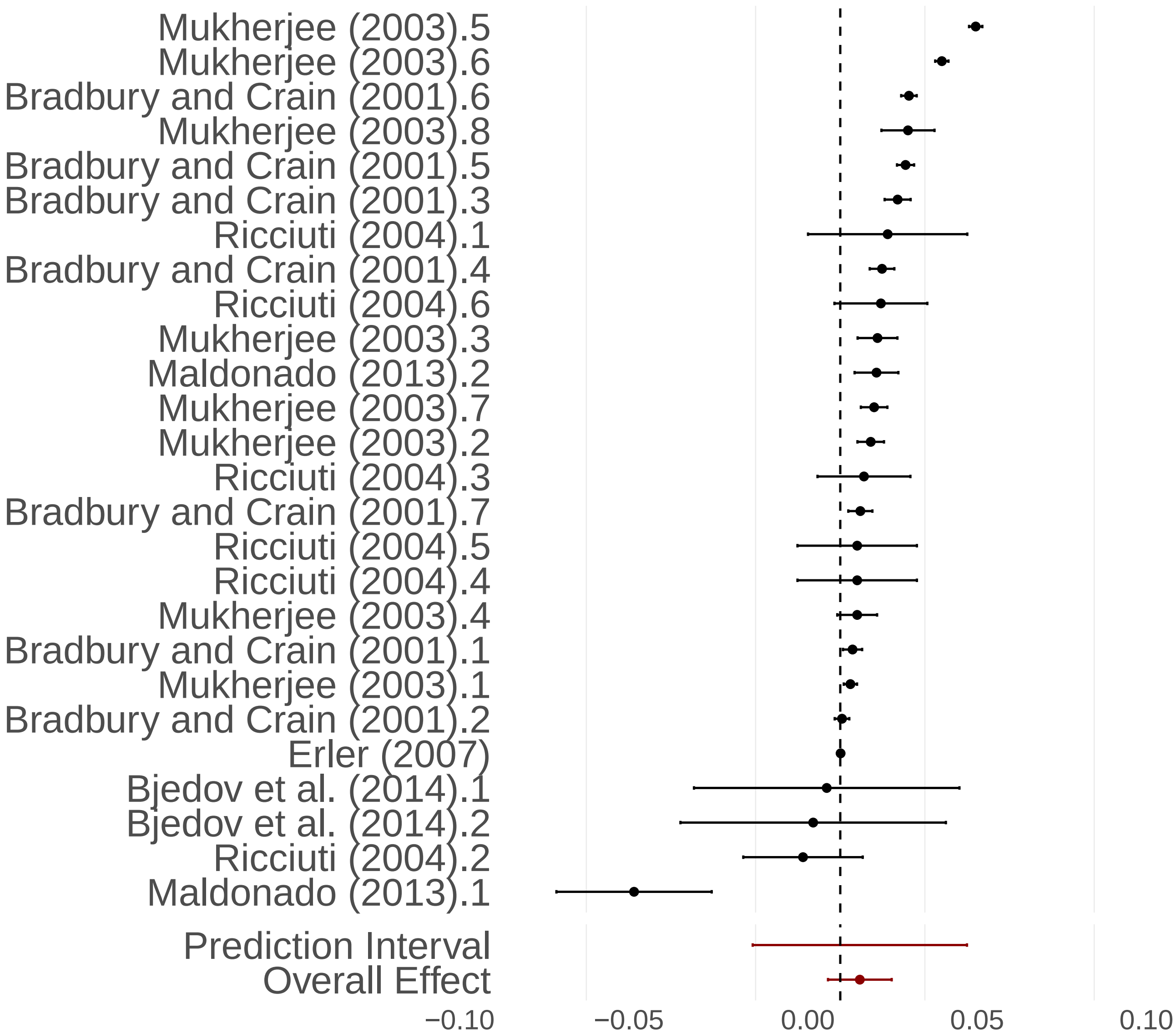


Figure 39: Effect of Lower Chamber Size on Expenditure as Percentage of GDP

And here is the funnel plot to assess the possibility of publication bias:

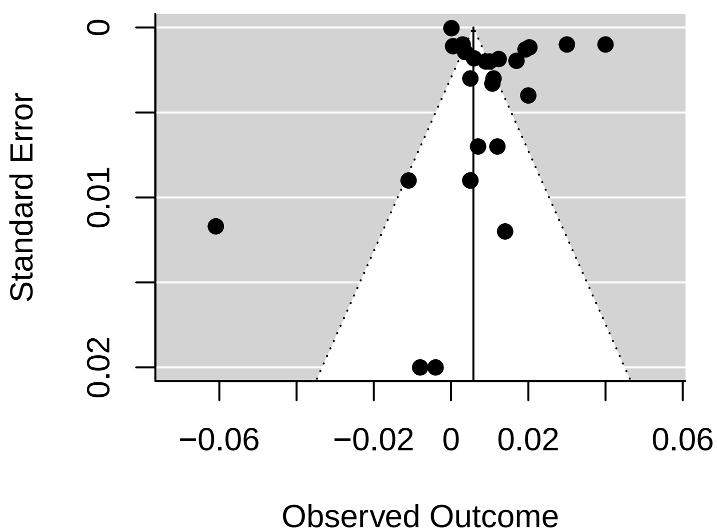


Figure 40: Funnel Plot – Effect of Lower Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: $Q = 3255.22$.
2. The estimated SMD in the random effects model is $g = 0.01$ ($SE = 0.005$).
3. The prediction interval ranges from -0.03 to 0.04. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test confirmed the hypothesis of publication bias.

I.8 Log of Lower Chamber Size and Expenditure as Percentage of GDP

This meta-regression assesses how public expenditure as a percentage of GDP varies according to log of lower chamber size.

```
##
## Multivariate Meta-Analysis Model (k = 4; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  11.3765  3.3729      2     no
## sigma^2.2   0.0000  0.0000      4     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 3) = 11.0320, p-val = 0.0116
##
## Model Results:
##
## estimate      se     tval    pval     ci.lb   ci.ub
##  -2.2616  2.4911  -0.9078  0.4309  -10.1894  5.6663
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The forest plot:

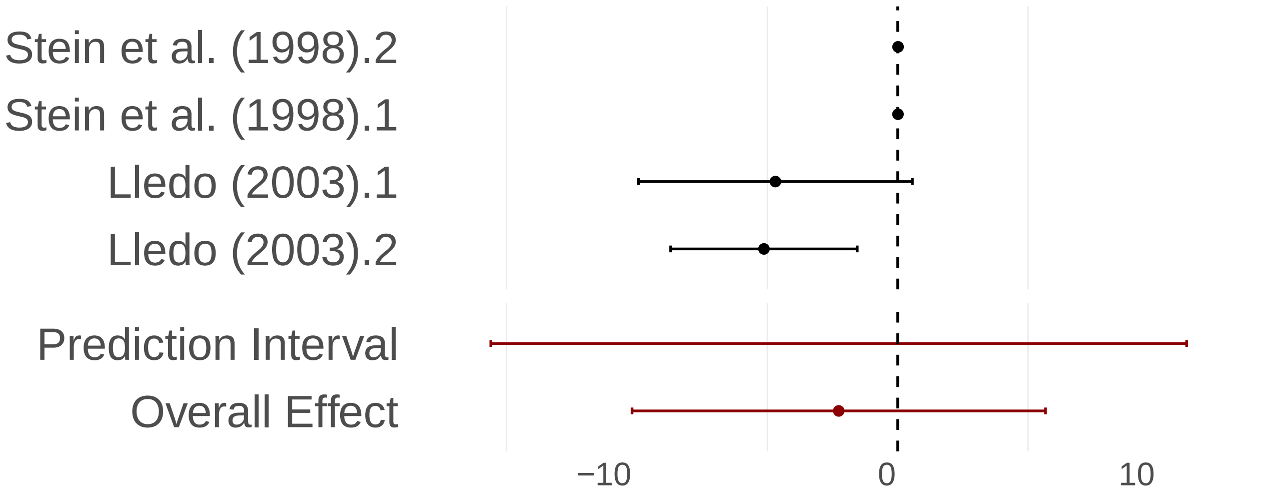


Figure 41: Effect of Log Lower Chamber Size on Expenditure as Percentage of GDP

And the funnel plot:

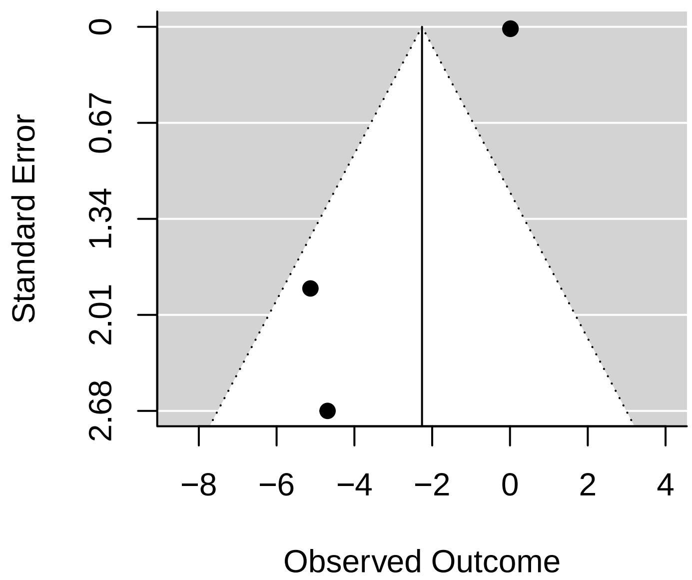


Figure 42: Funnel Plot – Effect of Log Lower Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: Q = 11.03.
2. The estimated SMD in the random effects model is g = -2.26 (SE = 2.491).
3. The prediction interval ranges from -15.61 to 11.08. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.9 Upper Chamber Size and Expenditure as Percentage of GDP

This model measures the effect of upper chamber size on the expenditure as a percentage of the GDP.

##

```
## Multivariate Meta-Analysis Model (k = 13; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0006  0.0238      3     no
## sigma^2.2  0.0001  0.0080     13     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 12) = 63.1946, p-val < .0001
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0057  0.0147  -0.3848  0.7071  -0.0377  0.0264
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

And the forest plot:

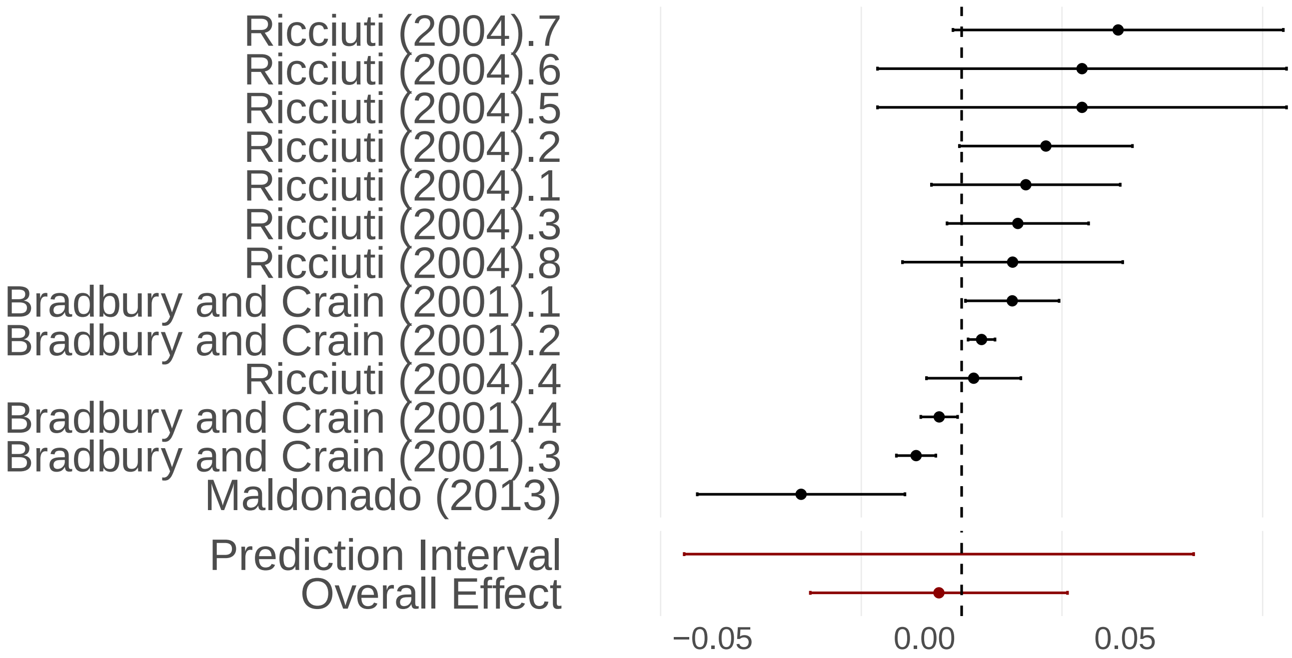


Figure 43: Effect of Upper Chamber Size on Expenditure as Percentage of GDP

And to assess the possibility of publication bias, we add funnel plot below:

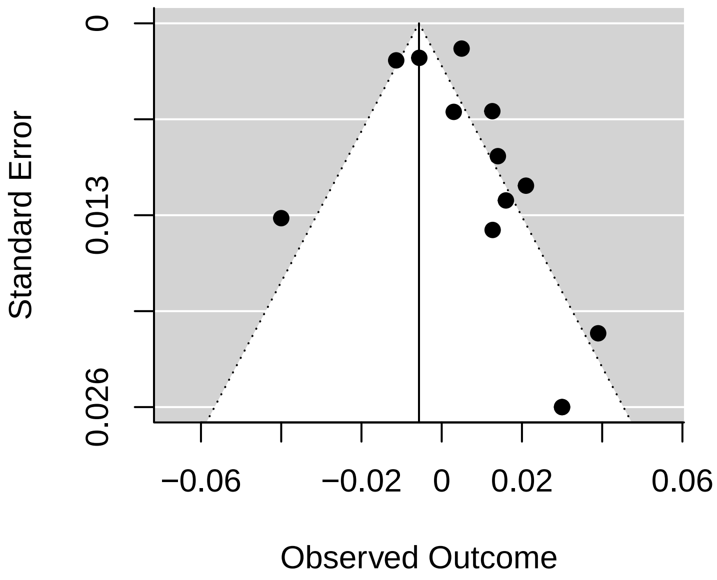


Figure 44: Funnel Plot – Effect of Upper Chamber Size on Expenditure as Percentage of GDP

Highlights:

1. The results are highly heterogeneous: Q = 63.19.
2. The estimated SMD in the random effects model is g = -0.01 (SE = 0.015).
3. The prediction interval ranges from -0.07 to 0.06. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.10 Lower Chamber Size and Expenditure per Capita (Instrumental Variables Only)

The model below evaluates only papers that use instrumental variables and correlate lower chamber size with public expenditure per capita.

```
##
## Multivariate Meta-Analysis Model (k = 9; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.7962  0.8923      3     no
## sigma^2.2  0.0141  0.1188      9     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 8) = 94.1278, p-val < .0001
```

```
##
## Model Results:
##
## estimate      se    tval    pval    ci.lb   ci.ub
##   0.0435  0.5478  0.0794  0.9386  -1.2197  1.3068
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

And the forest plot:

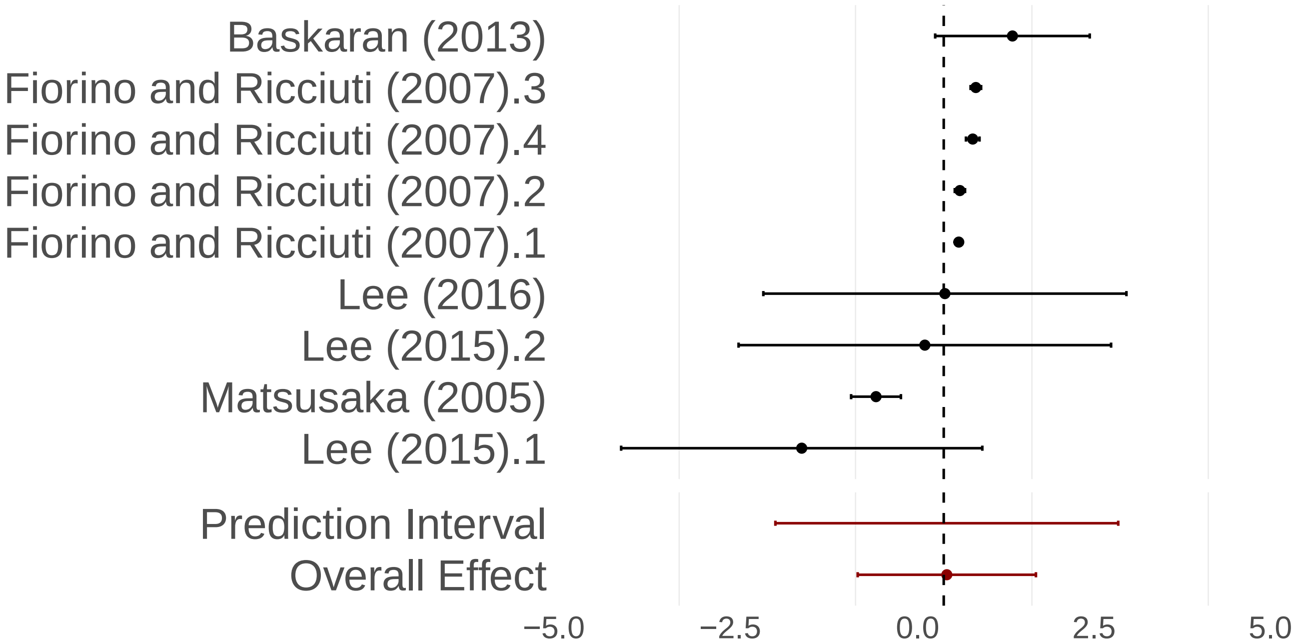


Figure 45: Effect of Lower Chamber Size on Expenditure Per Capita (IV Only)

And to assess the possibility of publication bias, we add funnel plot below:

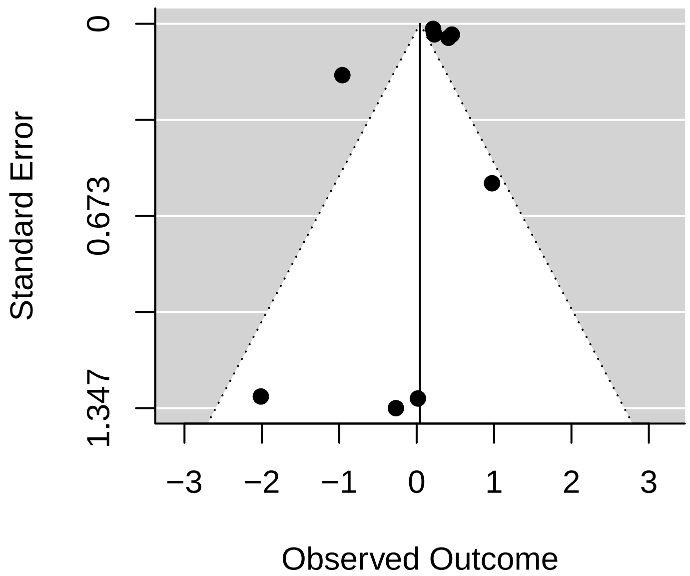


Figure 46: Funnel Plot – Effect of Lower Chamber Size on Expenditure Per Capita (IV Only)

Highlights:

1. The results are highly heterogeneous: $Q = 94.13$.
2. The estimated SMD in the random effects model is $g = 0.04$ ($SE = 0.548$).
3. The prediction interval ranges from -2.39 to 2.47. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

I.11 Lower Chamber Size and Log of Expenditure Per Capita (Regression Discontinuity Designs Only)

Lastly, we run a meta-analysis with papers that use regression discontinuity designs and assess the effect of lower house size on log of expenditure per capita.

```
##
## Multivariate Meta-Analysis Model (k = 6; method: REML)
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0070  0.0836      3     no
## sigma^2.2  0.0000  0.0000      6     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Heterogeneity:
## Q(df = 5) = 36.3029, p-val < .0001
##
## Model Results:
##
## estimate      se     tval    pval    ci.lb   ci.ub
##  -0.0642  0.0496  -1.2939  0.2522  -0.1918  0.0634
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

And the forest plot:

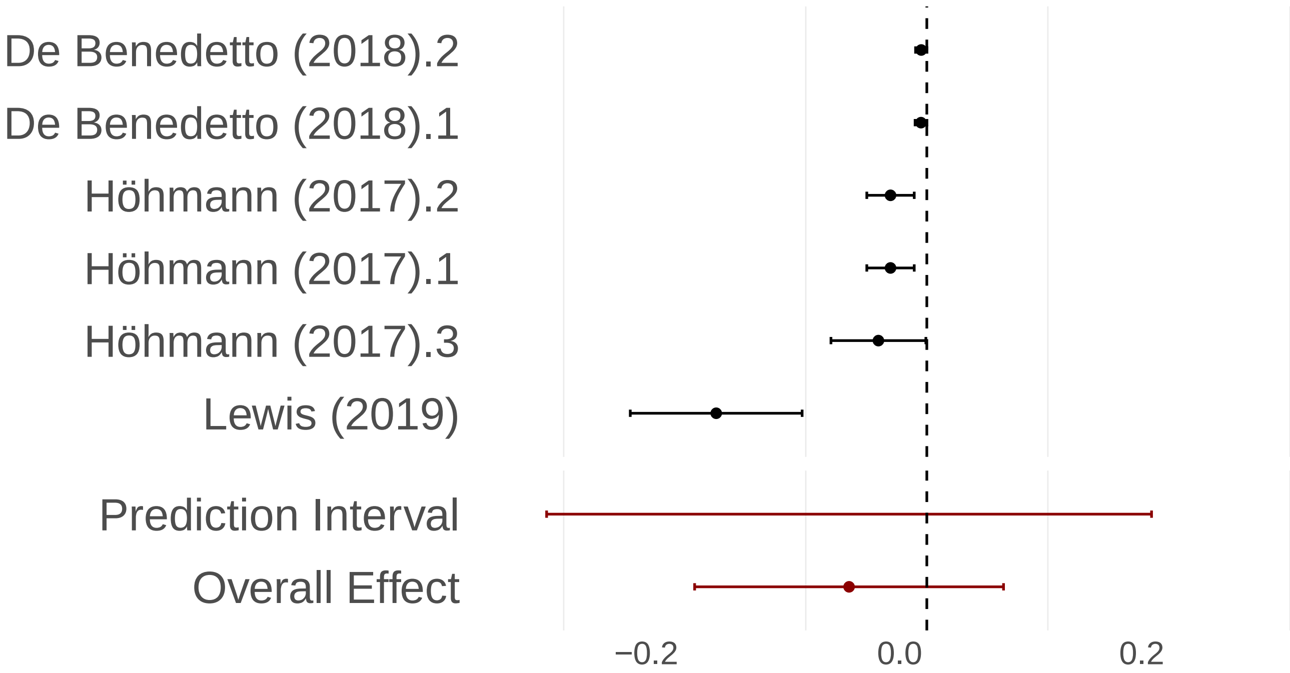


Figure 47: Effect of Lower Chamber Size on Log Expenditure Per Capita (RDD Only)

And to assess the possibility of publication bias, we add funnel plot below:

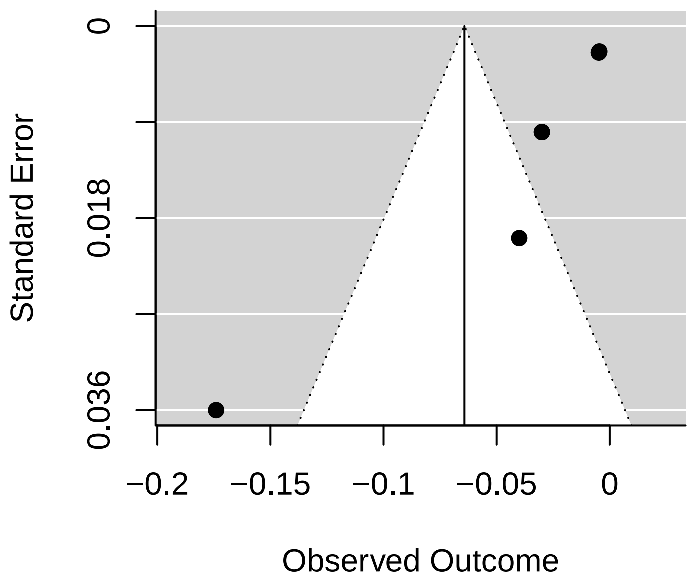


Figure 48: Funnel Plot – Effect of Lower Chamber Size on Log Expenditure Per Capita (RDD Only)

Highlights:

1. The results are highly heterogeneous: Q = 36.3.
2. The estimated SMD in the random effects model is g = -0.06 (SE = 0.05).
3. The prediction interval ranges from -0.31 to 0.19. Therefore, it emcompasses zero.
4. The Egger et al. (1997) test rejected the hypothesis of publication bias.

J Meta-Regressions

In the meta-regressions, we study the effects of a group of moderators on the reported government spending data. We select the following moderators:

1. The independent variable (variable `indepvar2`):

- `K`: Upper Chamber Size
- `N`: Lower Chamber Size
- `logN`: Log of Lower Chamber Size

2. Year that the paper was published (for working papers, the year it was posted online; variable `year`)

3. A dummy indicating whether the paper was published or not (variable `published`).

4. A dummy for non-majoritarian electoral systems (variable `elecsys2`).

5. A variable describing the papers' institutional design, with:

- `Bicameral`: a legislative system comprised of two chambers (e.g. US Federal Senate and House).
- `Unicameral`: a system with only a lower chamber (e.g. US Municipalities).
- `Mixed`: more than one system in the same sample (cross-country regressions).

6. The estimation method used in the papers (variable `method`):

- `OLS`: Ordinary-Least Squares in Cross-Sectional data.
- `PANEL`: Time-Series Cross-Section models, with estimated fixed effects.
- `IV`: Instrumental Variables models.
- `RDD`: Regression Discontinuity Designs.

The results follows below for the three dependent variables: expenditure per capita, log of expenditure per capita, and expenditure as a percentage of GDP.

J.1 Meta-Regressions for Expenditure Per Capita

Here we study the impact of our moderators on expenditure per capita.

```
##
## Multivariate Meta-Analysis Model (k = 25; method: REML)
##
##   logLik  Deviance       AIC       BIC
```

```
## -51.3600  102.7199  122.7199  131.0521
##     AICc
## 159.3866
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0000  0.0001      9     no
## sigma^2.2  2.3627  1.5371     25     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 17) = 122.9315, p-val < .0001
##
## Test of Moderators (coefficients 2:8):
## F(df1 = 7, df2 = 17) = 0.2083, p-val = 0.9788
##
## Model Results:
##
##                       estimate        se
## intrcpt               -67.2913  163.0781
## indepvar2N             -0.7794    1.0446
## year                    0.0334    0.0812
## publishedYes            0.7119    1.7248
## elecsys2Non-Maj         0.4546    1.8140
## methodPANEL             0.4907    0.9749
## instdesignMixed        -0.7388    2.2327
## instdesignUnicameral   -0.1547    1.7178
##                          tval    pval
## intrcpt               -0.4126  0.6850
## indepvar2N            -0.7461  0.4658
## year                   0.4109  0.6862
## publishedYes           0.4128  0.6849
## elecsys2Non-Maj        0.2506  0.8051
## methodPANEL            0.5033  0.6212
## instdesignMixed       -0.3309  0.7448
## instdesignUnicameral  -0.0901  0.9293
##                           ci.lb     ci.ub
## intrcpt               -411.3560  276.7735
```

```
## indepvar2N             -2.9833    1.4245
## year                   -0.1379    0.2047
## publishedYes           -2.9270    4.3509
## elecsys2Non-Maj        -3.3726    4.2818
## methodPANEL            -1.5663    2.5476
## instdesignMixed        -5.4494    3.9718
## instdesignUnicameral   -3.7789    3.4694
##
## intrcpt
## indepvar2N
## year
## publishedYes
## elecsys2Non-Maj
## methodPANEL
## instdesignMixed
## instdesignUnicameral
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

For the meta-regressions of expenditure per capita, we find no significant moderator. We also run the meta-regressions adding all coefficients included in the papers. The results follow below:

```
##
## Multivariate Meta-Analysis Model (k = 82; method: REML)
##
##    logLik   Deviance        AIC
## -200.3491   400.6982   422.6982
##       BIC       AICc
##  447.8932   427.0260
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0000  0.0003      9     no
## sigma^2.2  2.8394  1.6851     82     no
##                          factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 73) = 622.3226, p-val < .0001
```

```
##
## Test of Moderators (coefficients 2:9):
## F(df1 = 8, df2 = 73) = 3.0605, p-val = 0.0050
##
## Model Results:
##
##                        estimate        se
## intrcpt               -282.7606  120.4731
## indepvar2N              -2.5898    0.6428
## year                     0.1420    0.0600
## publishedYes             0.9456    1.1495
## elecsys2Non-Maj          0.8185    1.1811
## methodPANEL             -0.3606    0.9770
## methodIV                -0.5645    0.8940
## instdesignMixed         -1.2615    1.3882
## instdesignUnicameral    -0.9454    0.9997
##                          tval    pval
## intrcpt               -2.3471  0.0216
## indepvar2N            -4.0287  0.0001
## year                   2.3645  0.0207
## publishedYes           0.8226  0.4134
## elecsys2Non-Maj        0.6930  0.4905
## methodPANEL           -0.3691  0.7131
## methodIV              -0.6314  0.5297
## instdesignMixed       -0.9087  0.3665
## instdesignUnicameral  -0.9457  0.3474
##                           ci.lb     ci.ub
## intrcpt               -522.8632  -42.6580
## indepvar2N              -3.8710   -1.3086
## year                     0.0223    0.2616
## publishedYes            -1.3453    3.2366
## elecsys2Non-Maj         -1.5354    3.1724
## methodPANEL             -2.3078    1.5865
## methodIV                -2.3463    1.2172
## instdesignMixed         -4.0281    1.5051
## instdesignUnicameral    -2.9377    1.0469
##
## intrcpt                 *
## indepvar2N            ***
## year                    *
## publishedYes
```

```
## elecsys2Non-Maj
## methodPANEL
## methodIV
## instdesignMixed
## instdesignUnicameral
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

With all coefficients, the results of the effect sizes on the expenditure per capita regressions are the following:

1. Compared with upper chamber size, models with lower chamber size tend to detect significantly smaller effects.
2. Year has now a positive effect on coefficient sizes.
3. All other moderators were statistically insignificant.

J.2 Meta-Regressions for Log of Expenditure Per Capita

The next meta-regression models use log of expenditure per capita as the dependent variable.

```
##
## Multivariate Meta-Analysis Model (k = 9; method: REML)
##
##   logLik  Deviance       AIC       BIC
##   4.1666   -8.3333    7.6667    0.4556
##     AICc
## 151.6667
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0068  0.0825      7     no
## sigma^2.2  0.0000  0.0000      9     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 3) = 18.7892, p-val = 0.0003
```

```
##
## Test of Moderators (coefficients 2:6):
## F(df1 = 5, df2 = 3) = 5.3057, p-val = 0.1001
##
## Model Results:
##
##                  estimate       se
## intrcpt           -0.0305  23.6518
## indepvar2logN     -0.0351   0.1338
## year               0.0002   0.0118
## publishedYes      -0.1667   0.0577
## elecsys2Non-Maj   -0.2995   0.1338
## methodPANEL        0.2000   0.1039
##                     tval    pval     ci.lb
## intrcpt          -0.0013  0.9991  -75.3011
## indepvar2logN    -0.2621  0.8102   -0.4607
## year              0.0157  0.9884   -0.0373
## publishedYes     -2.8883  0.0631   -0.3504
## elecsys2Non-Maj  -2.2388  0.1111   -0.7253
## methodPANEL       1.9245  0.1500   -0.1307
##                    ci.ub
## intrcpt          75.2402
## indepvar2logN     0.3906
## year              0.0376
## publishedYes      0.0170  .
## elecsys2Non-Maj   0.1263
## methodPANEL       0.5308
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The only significant result suggests that published papers tend to report a smaller coefficient than unpublished papers.

Below we also run the meta-regressions with all coefficients included in the papers.

```
##
## Multivariate Meta-Analysis Model (k = 37; method: REML)
##
##   logLik  Deviance       AIC       BIC
##  39.5224  -79.0448  -59.0448  -45.3718
##     AICc
```

```
## -46.8226
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0083  0.0909      7     no
## sigma^2.2  0.0014  0.0369     37     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 29) = 84.4113, p-val < .0001
##
## Test of Moderators (coefficients 2:8):
## F(df1 = 7, df2 = 29) = 11.3190, p-val < .0001
##
## Model Results:
##
##                  estimate       se
## intrcpt           10.4322  20.2150
## indepvar2logN     -0.1280   0.1239
## year              -0.0050   0.0101
## publishedYes       0.0093   0.0451
## elecsys2Non-Maj    0.0064   0.1335
## methodPANEL       -0.3539   0.0497
## methodIV          -0.0517   0.0501
## methodRDD         -0.3076   0.0410
##                     tval    pval     ci.lb
## intrcpt           0.5161  0.6097  -30.9122
## indepvar2logN    -1.0330  0.3102   -0.3813
## year             -0.5005  0.6205   -0.0256
## publishedYes      0.2070  0.8375   -0.0829
## elecsys2Non-Maj   0.0483  0.9618   -0.2665
## methodPANEL      -7.1205  <.0001   -0.4555
## methodIV         -1.0319  0.3106   -0.1542
## methodRDD        -7.5024  <.0001   -0.3915
##                    ci.ub
## intrcpt          51.7766
## indepvar2logN     0.1254
## year              0.0155
```

```
## publishedYes      0.1016
## elecsys2Non-Maj   0.2794
## methodPANEL      -0.2522  ***
## methodIV          0.0508
## methodRDD        -0.2237  ***
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

When we include all coefficients in the meta-regression, we see that papers that use panel data or regression discontinuity designs have smaller effects than articles that employ simple OLS regressions. All other results are insignificant.

J.3 Meta-Regressions for Expenditure as a Percentage of GDP

Here we conduct the same analysis, but using public spending as a percentage of GDP as our dependent variable.

```
##
## Multivariate Meta-Analysis Model (k = 11; method: REML)
##
##    logLik  Deviance       AIC       BIC
##    7.3644  -14.7288    3.2712   -2.2522
##      AICc
## 183.2712
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0001  0.0095      8     no
## sigma^2.2  0.0000  0.0000     11     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 4) = 22.8814, p-val = 0.0001
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 4) = 3.3089, p-val = 0.1334
##
```

```
## Model Results:
##
##                  estimate      se     tval
## intrcpt           13.6215  3.8841   3.5070
## indepvar2logN     -0.0471  0.0281  -1.6784
## indepvar2N        -0.0093  0.0055  -1.7007
## year              -0.0068  0.0019  -3.5111
## elecsys2Non-Maj    0.0430  0.0276   1.5577
## methodPANEL       -0.0180  0.0170  -1.0621
## instdesignMixed   -0.0736  0.0327  -2.2500
##                    pval    ci.lb    ci.ub
## intrcpt          0.0247   2.8374  24.4056
## indepvar2logN    0.1686  -0.1250   0.0308
## indepvar2N       0.1642  -0.0245   0.0059
## year             0.0246  -0.0121  -0.0014
## elecsys2Non-Maj  0.1943  -0.0336   0.1196
## methodPANEL      0.3481  -0.0652   0.0291
## instdesignMixed  0.0876  -0.1645   0.0172
##
## intrcpt          *
## indepvar2logN
## indepvar2N
## year             *
## elecsys2Non-Maj
## methodPANEL
## instdesignMixed  .
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

We find that:

1. Recent papers report smaller effect sizes than older studies.
2. Papers whose models include unicameral legislatures report slightly higher coefficients.

Below, we show the results for our meta-regression when we use our full study sample. The results follow below:

```
##
## Multivariate Meta-Analysis Model (k = 43; method: REML)
##
```

```
##    logLik   Deviance        AIC
##   91.5028  -183.0057  -165.0057
##       BIC       AICc
## -150.7540  -158.0826
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
## sigma^2.1  0.0001  0.0110      8     no
## sigma^2.2  0.0001  0.0102     43     no
##                        factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 36) = 1314.1472, p-val < .0001
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 36) = 3.1348, p-val = 0.0141
##
## Model Results:
##
##                  estimate      se     tval
## intrcpt           12.4965  3.3964   3.6794
## indepvar2logN     -0.0327  0.0237  -1.3790
## indepvar2N         0.0024  0.0050   0.4923
## year              -0.0062  0.0017  -3.6838
## elecsys2Non-Maj    0.0385  0.0198   1.9481
## methodPANEL       -0.0103  0.0132  -0.7798
## instdesignMixed   -0.0580  0.0154  -3.7582
##                    pval    ci.lb    ci.ub
## intrcpt          0.0008   5.6083  19.3847
## indepvar2logN    0.1764  -0.0808   0.0154
## indepvar2N       0.6255  -0.0076   0.0125
## year             0.0008  -0.0096  -0.0028
## elecsys2Non-Maj  0.0592  -0.0016   0.0786
## methodPANEL      0.4406  -0.0371   0.0165
## instdesignMixed  0.0006  -0.0893  -0.0267
##
## intrcpt          ***
## indepvar2logN
```

```
## indepvar2N
## year             ***
## elecsys2Non-Maj    .
## methodPANEL
## instdesignMixed  ***
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The model indicates that:

1. Papers from more recent years find smaller effect sizes than older studies.
2. Studies using non-majoritarian systems find more positive effects between variables.
3. Papers whose models included unicameral legislatures report significantly higher coefficients.

J.4 Meta-Regressions (All Coefficients)

Here we aggregate all the papers in our sample and run a multivariate meta-regression, controlling for:

1. The type of the dependent variable in the study (expenditure per capita, log expenditure per capita, and expenditure as percentage of GDP).
2. The type of the independent variable in the study (lower chamber size, upper chamber size, or log of lower chamber size).
3. The electoral system (Majoritarian versus Non-Majoritarian).
4. The year when the study was published.
5. Whether the study is a working paper or published work.
6. The institutional design: whether the legislature in the analysis is unicameral, bicameral, or mixed.
7. The estimation method used in the paper (OLS, PANEL, IV, or RDD).

The results follow below, and show null effects for all variables except for unicameral institutional designs.

```
##
## Multivariate Meta-Analysis Model (k = 45; method: REML)
##
##   logLik  Deviance       AIC       BIC
## -53.0989  106.1978  136.1978  158.1838
```

```
##     AICc
## 166.1978
##
## Variance Components:
##
##              estim    sqrt  nlvls  fixed
## sigma^2.1  0.0059  0.0771     20     no
## sigma^2.2  0.0114  0.1070     45     no
##                         factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 32) = 177.8278, p-val < .0001
##
## Test of Moderators (coefficients 2:13):
## F(df1 = 12, df2 = 32) = 1.3602, p-val = 0.2353
##
## Model Results:
##
##                         estimate       se
## intrcpt                  26.0315  18.8118
## depvar2logExpPC           0.0500   0.1274
## depvar2PCTGDP             0.0747   0.0738
## indepvar2logN            -0.2221   0.1439
## indepvar2N               -0.0548   0.0668
## year                     -0.0130   0.0094
## publishedYes             -0.0845   0.0928
## elecsys2Non-Maj          -0.0815   0.1425
## methodPANEL              -0.0267   0.1137
## methodIV                 -0.1595   0.1899
## methodRDD                -0.1684   0.1469
## instdesignMixed           0.1227   0.1962
## instdesignUnicameral      0.3965   0.1619
##                           tval    pval
## intrcpt                 1.3838  0.1760
## depvar2logExpPC         0.3923  0.6975
## depvar2PCTGDP           1.0123  0.3190
## indepvar2logN          -1.5434  0.1326
## indepvar2N             -0.8195  0.4185
## year                   -1.3830  0.1763
```

```
## publishedYes          -0.9105  0.3694
## elecsys2Non-Maj       -0.5719  0.5714
## methodPANEL           -0.2349  0.8158
## methodIV              -0.8399  0.4072
## methodRDD             -1.1466  0.2600
## instdesignMixed        0.6252  0.5363
## instdesignUnicameral   2.4491  0.0200
##                          ci.lb    ci.ub
## intrcpt              -12.2870  64.3499
## depvar2logExpPC        -0.2095   0.3095
## depvar2PCTGDP          -0.0756   0.2250
## indepvar2logN          -0.5151   0.0710
## indepvar2N             -0.1908   0.0813
## year                   -0.0321   0.0061
## publishedYes           -0.2734   0.1045
## elecsys2Non-Maj        -0.3717   0.2087
## methodPANEL            -0.2583   0.2049
## methodIV               -0.5463   0.2273
## methodRDD              -0.4677   0.1308
## instdesignMixed        -0.2770   0.5223
## instdesignUnicameral    0.0667   0.7263  *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

In the restricted sample, which included only the main coefficients in the selected papers, unicameralism has a positive, significant effect. Also, papers that employ regression discontinuity design tend to have a negative effect, significant at the 10% level. We also run the same meta-regression with every coefficient reported in all papers. The results are:

```
##
## Multivariate Meta-Analysis Model (k = 162; method: REML)
##
##    logLik   Deviance        AIC
## -141.3208   282.6417   312.6417
##       BIC       AICc
##  357.7009   316.2507
##
## Variance Components:
##
##             estim    sqrt  nlvls  fixed
```

```
## sigma^2.1  0.0105  0.1024     20     no
## sigma^2.2  0.0014  0.0378    162     no
##                          factor
## sigma^2.1            id_level1
## sigma^2.2  id_level1/id_level2
##
## Test for Residual Heterogeneity:
## QE(df = 149) = 2395.8432, p-val < .0001
##
## Test of Moderators (coefficients 2:13):
## F(df1 = 12, df2 = 149) = 4.3873, p-val < .0001
##
## Model Results:
##
##                        estimate       se
## intrcpt                  2.5051  11.4852
## depvar2logExpPC         -0.0105   0.0725
## depvar2PCTGDP            0.0194   0.0153
## indepvar2logN           -0.1483   0.0897
## indepvar2N              -0.0116   0.0129
## year                    -0.0012   0.0057
## publishedYes            -0.0088   0.0354
## elecsys2Non-Maj         -0.1902   0.0864
## methodPANEL             -0.1373   0.0321
## methodIV                -0.0692   0.0342
## methodRDD               -0.1997   0.0365
## instdesignMixed          0.1915   0.1189
## instdesignUnicameral     0.2767   0.1151
##                           tval    pval
## intrcpt                 0.2181  0.8276
## depvar2logExpPC        -0.1454  0.8846
## depvar2PCTGDP           1.2656  0.2076
## indepvar2logN          -1.6530  0.1004
## indepvar2N             -0.9044  0.3673
## year                   -0.2085  0.8351
## publishedYes           -0.2498  0.8031
## elecsys2Non-Maj        -2.2012  0.0293
## methodPANEL            -4.2730  <.0001
## methodIV               -2.0252  0.0446
## methodRDD              -5.4752  <.0001
## instdesignMixed         1.6105  0.1094
```

```
## instdesignUnicameral   2.4043  0.0174
##                          ci.lb    ci.ub
## intrcpt              -20.1897  25.2000
## depvar2logExpPC        -0.1539   0.1328
## depvar2PCTGDP          -0.0109   0.0496
## indepvar2logN          -0.3255   0.0290
## indepvar2N             -0.0370   0.0138
## year                   -0.0125   0.0101
## publishedYes           -0.0788   0.0611
## elecsys2Non-Maj        -0.3609  -0.0195
## methodPANEL            -0.2008  -0.0738
## methodIV               -0.1368  -0.0017
## methodRDD              -0.2717  -0.1276
## instdesignMixed        -0.0435   0.4265
## instdesignUnicameral    0.0493   0.5041
##
## intrcpt
## depvar2logExpPC
## depvar2PCTGDP
## indepvar2logN
## indepvar2N
## year
## publishedYes
## elecsys2Non-Maj         *
## methodPANEL           ***
## methodIV                *
## methodRDD             ***
## instdesignMixed
## instdesignUnicameral    *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

In the full model, we see that:

1. Compared with papers that employ `OLS`, those that use `PANEL`, `IV` and `RDD` report significantly smaller coefficients.
2. Evidence from unicameral systems presents significantly larger effect sizes.
3. All other moderators are insignificant.

J.5 Comparing Coefficient Sizes and Dependent Variables

Finally, we run a simple linear regression to check whether there are significant differences between effect sizes for our dependent variables. Although the meta-regressions show that the difference is statistically negligible, we can still witness larger or smaller coefficient sizes in different models. The results below show that the differences are indeed mostly negligible.

```
##
## Call:
## lm(formula = coef ~ depvar2, data = aux)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -8.328 -4.403 -0.207  0.431 34.036
##
## Coefficients:
##                 Estimate Std. Error
## (Intercept)      -0.4304     2.3782
## depvar2ExpPC      4.8346     2.8538
## depvar2logExpPC   0.4784     3.5452
##                 t value Pr(>|t|)
## (Intercept)      -0.181   0.8572
## depvar2ExpPC      1.694   0.0977 .
## depvar2logExpPC   0.135   0.8933
## ---
## Signif. codes:
##   0 '***' 0.001 '**' 0.01 '*' 0.05 '.'
##   0.1 ' ' 1
##
## Residual standard error: 7.888 on 42 degrees of freedom
## Multiple R-squared:  0.08355,    Adjusted R-squared:  0.03991
## F-statistic: 1.915 on 2 and 42 DF,  p-value: 0.16
```

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