Appendix

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12/25/2019

Contents

Search criteria

Search terms

XXXX

Searched databases

XXXX To Catarina: name and URL of database searched

Summary total results

XXXX To Catarina: put here results per database, cross-matching, anything else

Exclusion criteria

Exclusion title and abstract XXXX To Catarina: what criteria for first round exclusions?

Exclusion reading XXXX To Catarina: criteria second round exclusions

Exclusion analysis For the articles that passed the first two filters, we looked into the tables and the reported coefficients. We kept articles in this step based on two criteria:

1. Matched treatment variable:

- N: Number Legislators Lower House
- logN: Log Number Legislators Lower House
- K: Number Legislators Upper House

2. Matched outcome variable:

- ExpPC: Expenditure Per Capita
- logExpPC: Log Expenditure Per Capita
- PCTGDP: Percent GDP Public Expenditure

PRISM

- Number of articles matching the search criteria: XXXX
- Number of articles excluded after title and abstract: XXXX
- Number of articles excluded after reading: XXXX
- Number of articles excluded before analysis: 3
- Number of articles excluded during the analysis: 0

We have 26 articles in the meta-analysis.

Meta-analysis dataset

The meta-analytic data is comprised of two datasets. The first dataset has the main coefficients that were reported in the paper. XXXX (Copiar da parte de métodos).

Adding articles

Descriptive statistics

Study Year

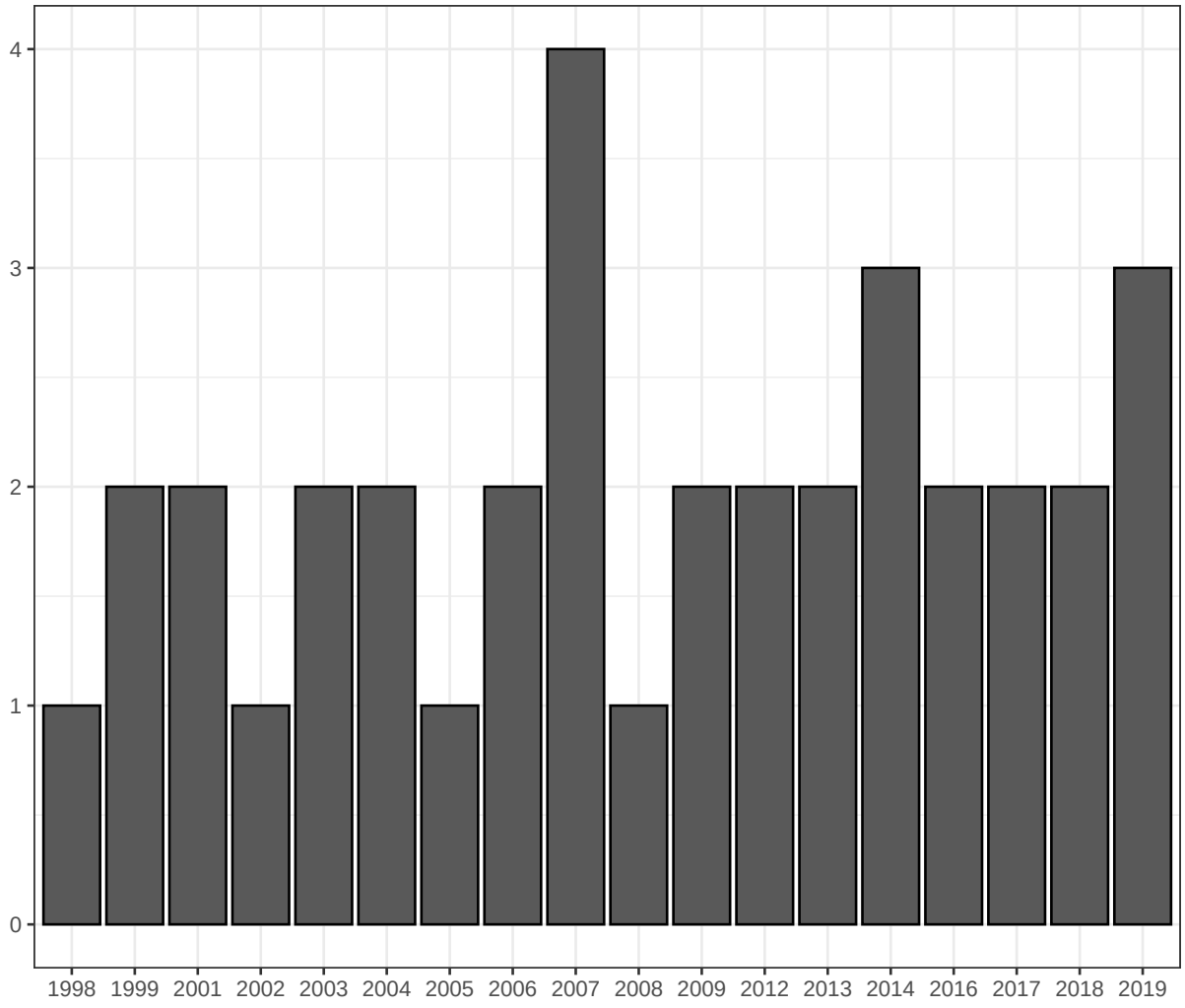


Figure 1: Study Year Frequencies

Published?

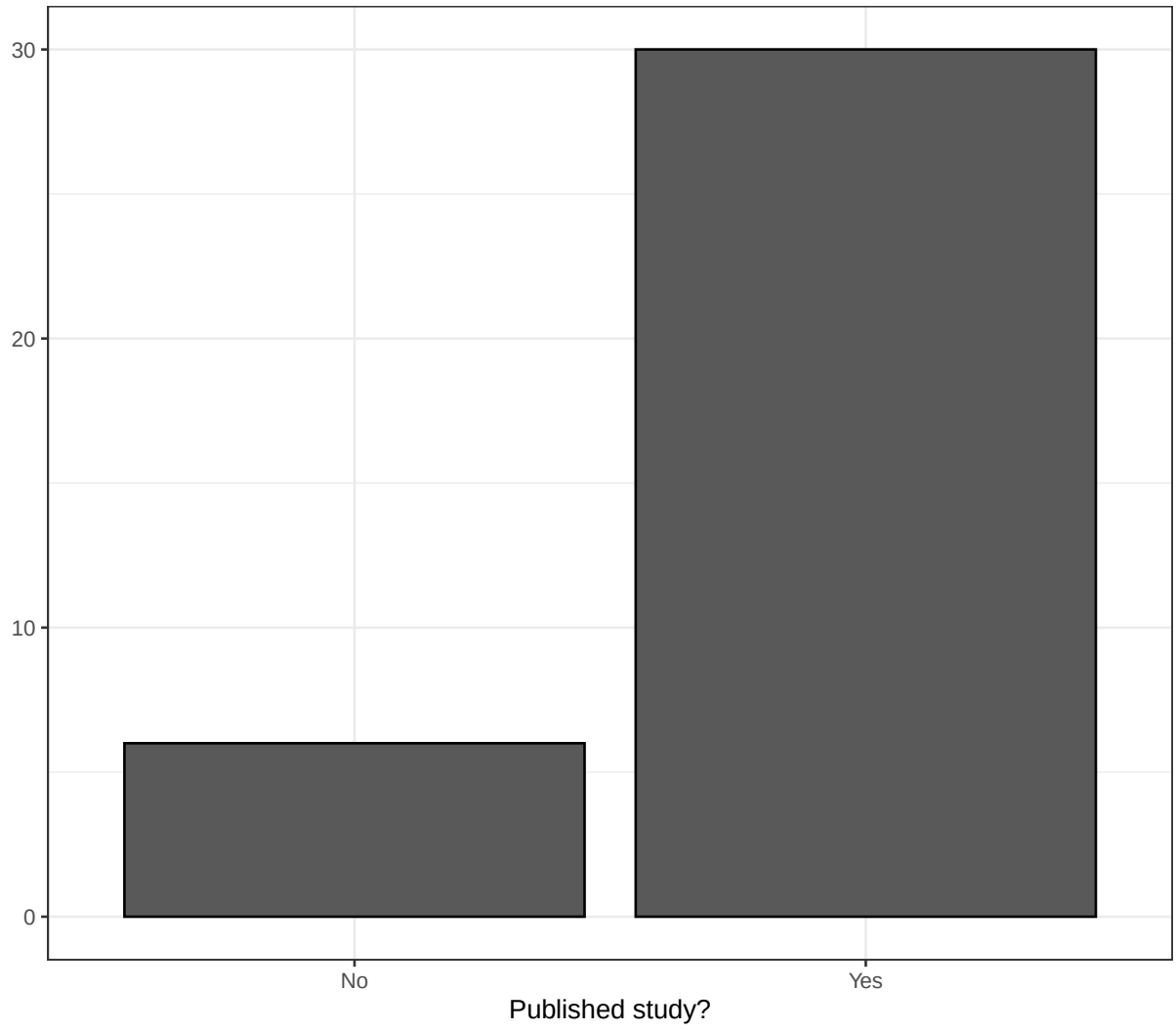


Figure 2: Was the study published?

Dependent variables

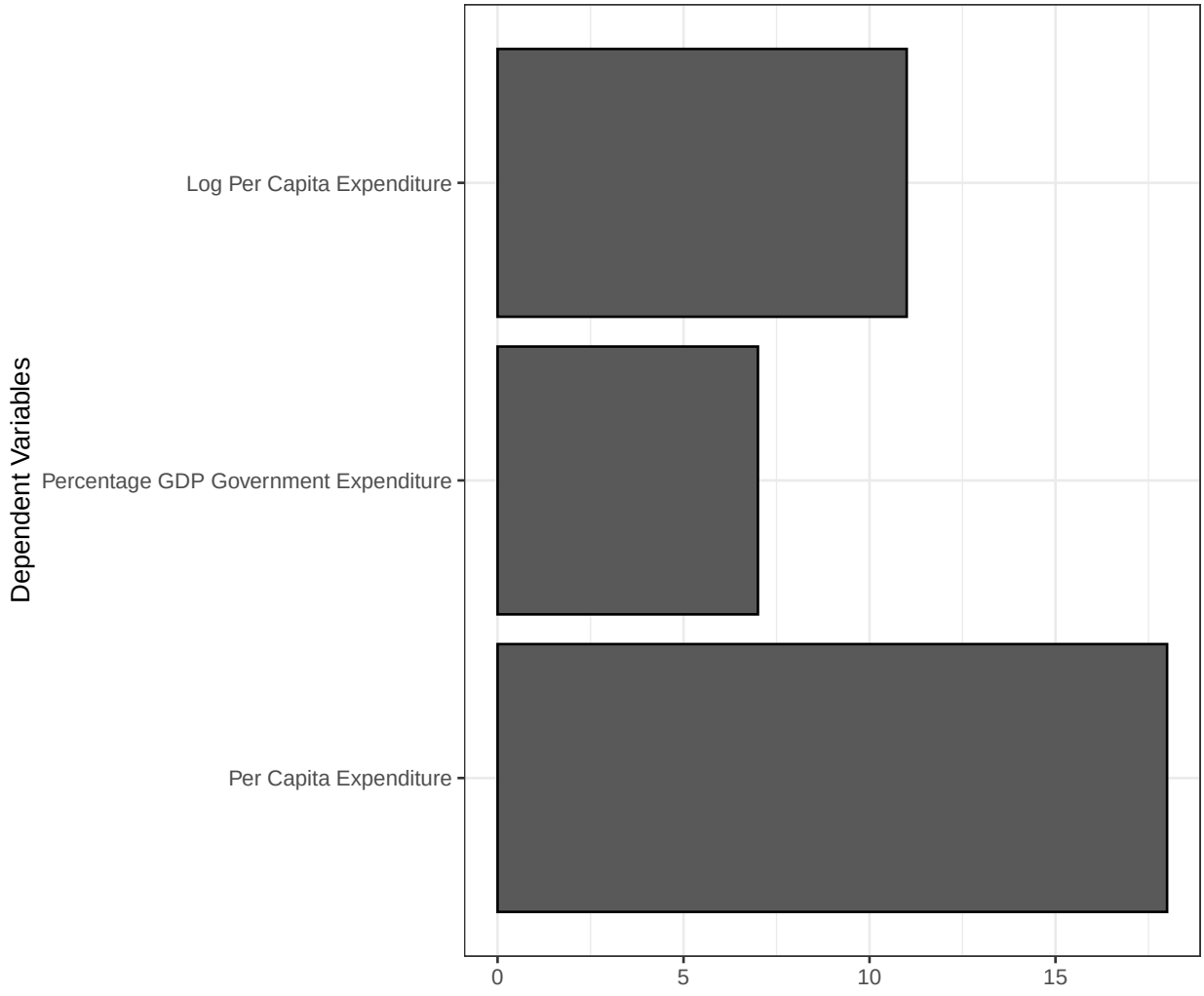


Figure 3: Dependent variables across the law of 1/n studies

Independent variables

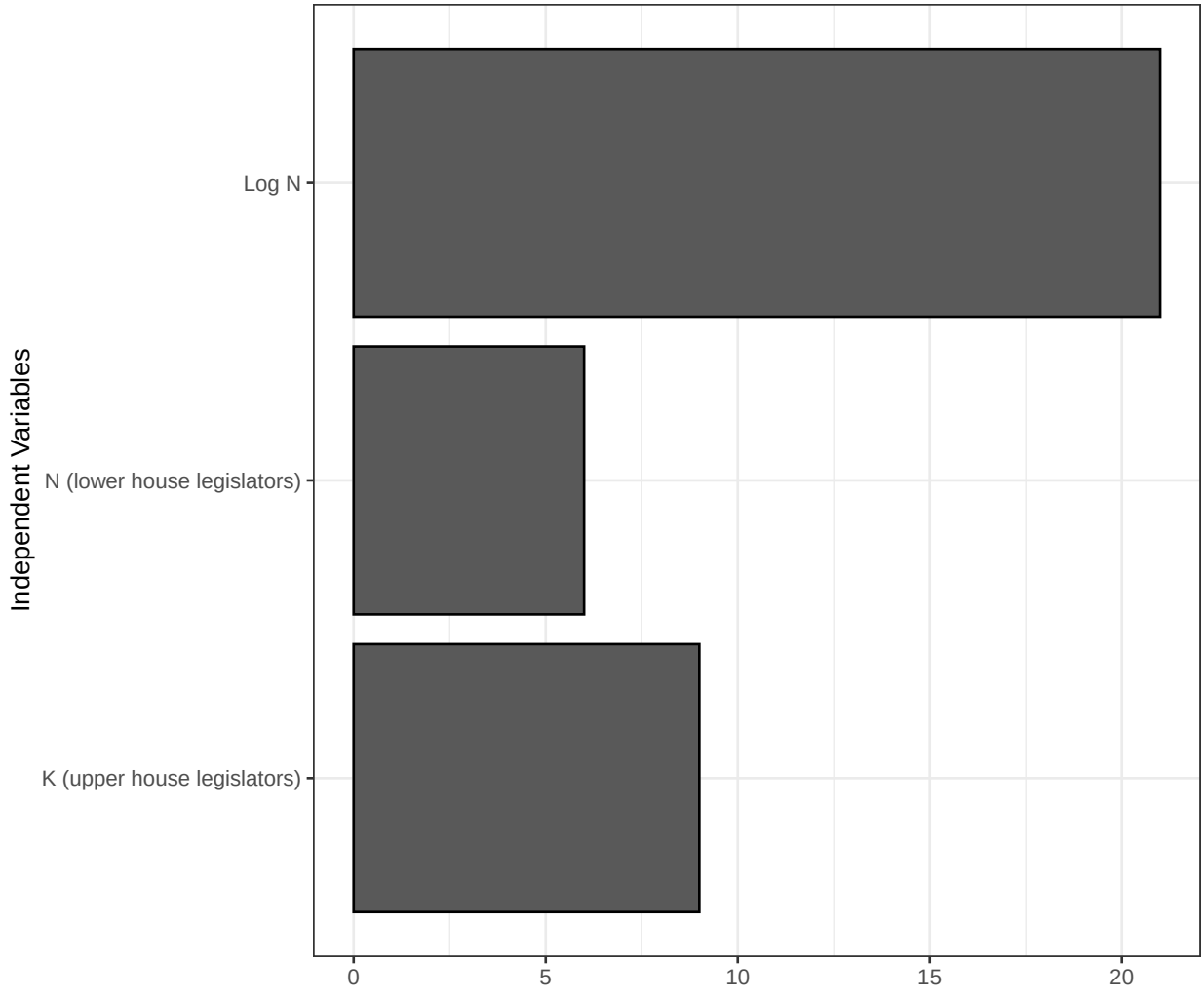


Figure 4: Independent variables across the law of 1/n studies

Histogram Coefficients

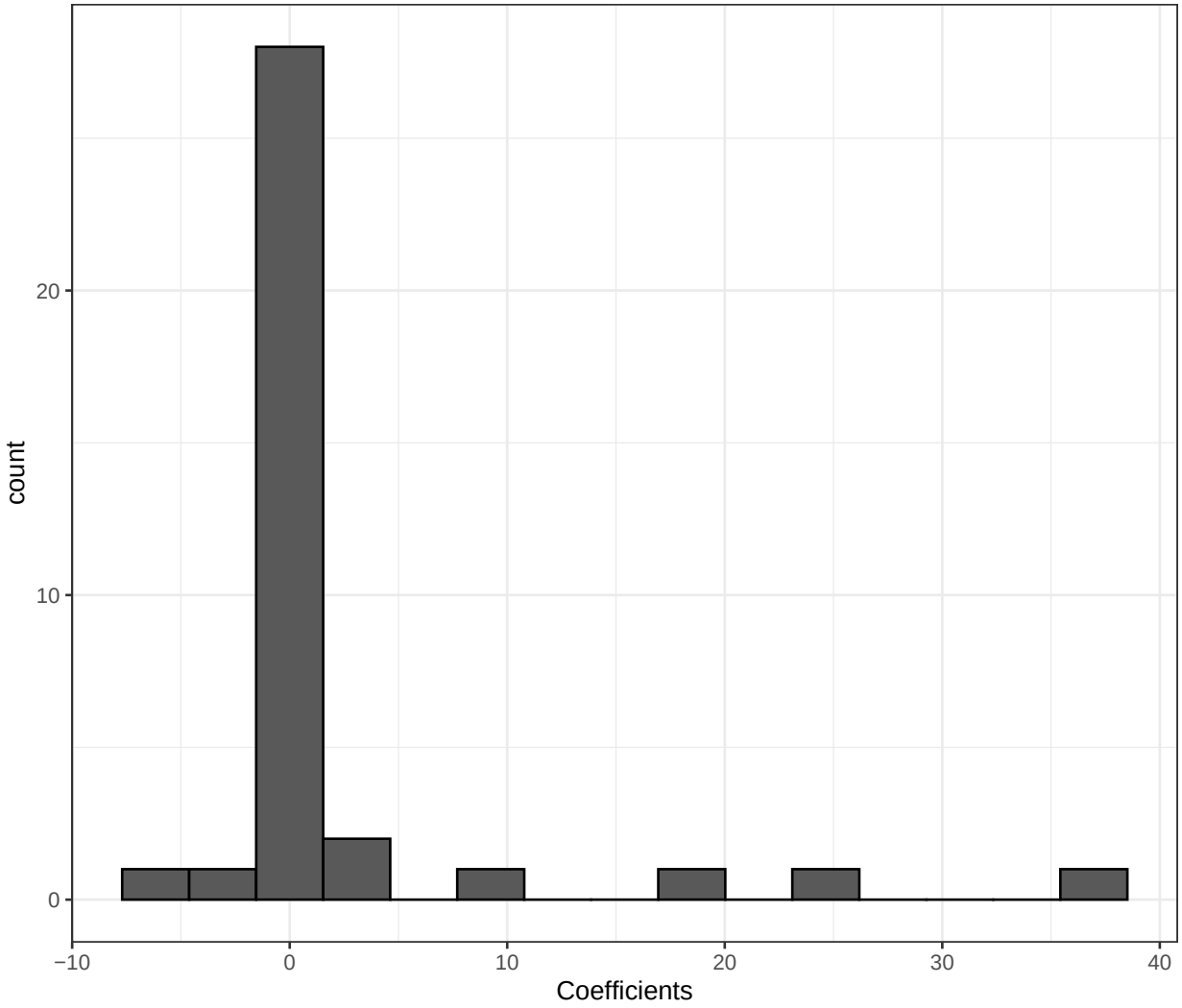


Figure 5: Histogram Coefficients

Histogram Standard Errors

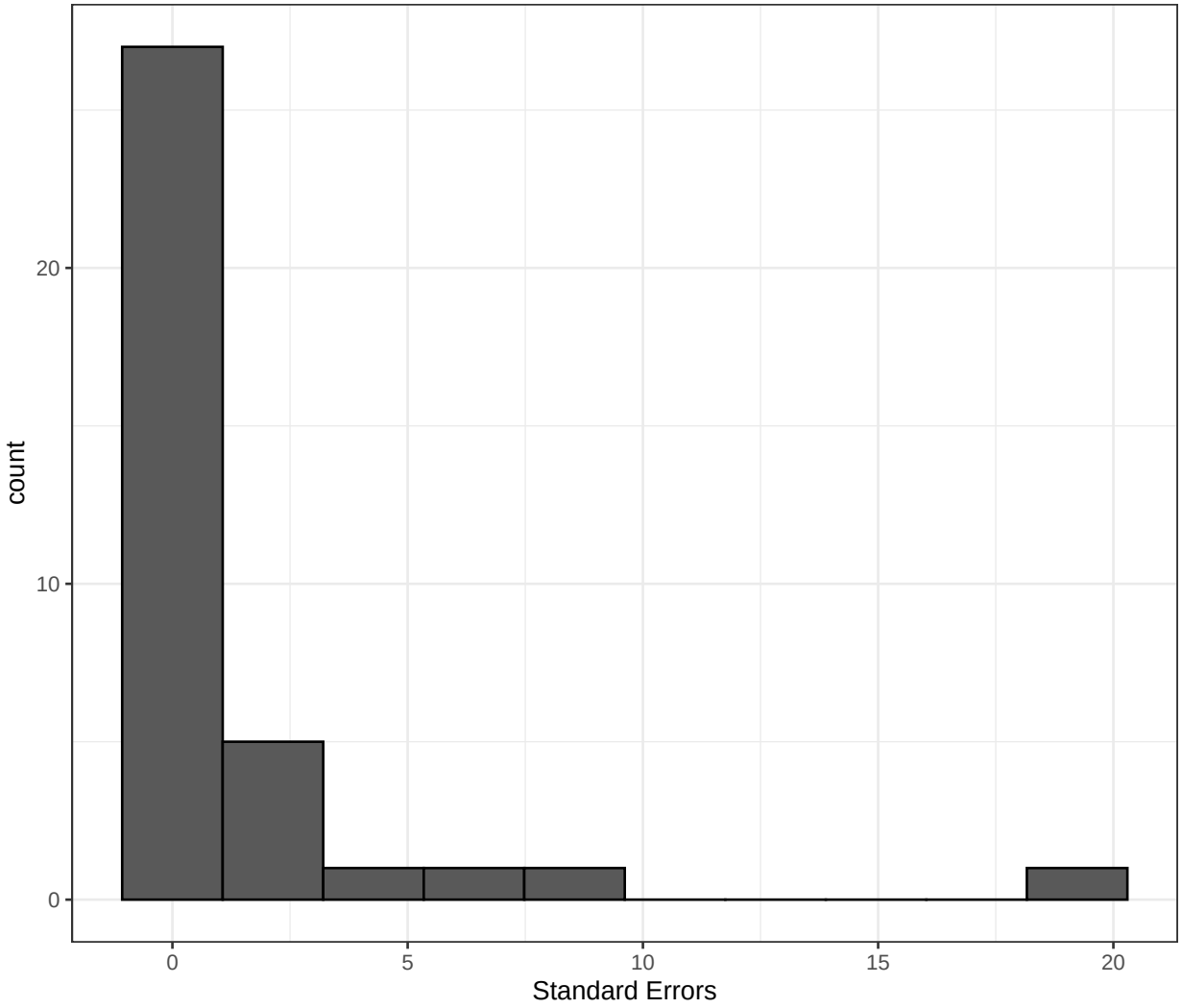


Figure 6: Histogram Standard Errors

Sign Coefficients

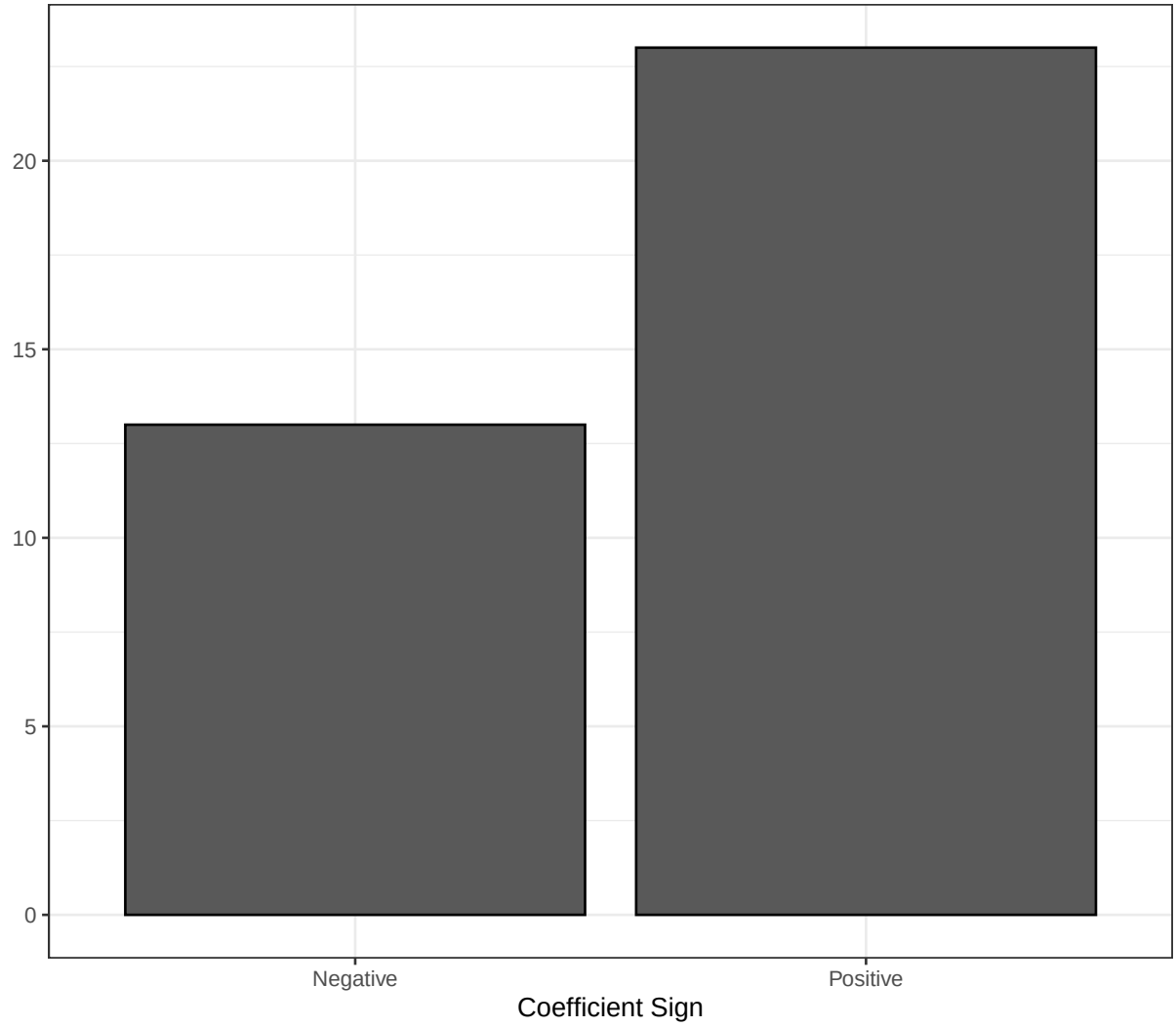


Figure 7: Coefficient Sign?

A general test of the theory would be to study whether the coefficients are positive or negative. Note that the law of 1/n would pose that we should have a positive influence of legislature size on expenditure. To test this theory, we run a Binomial One-Proportion Z-test. For the number of legislators in the lower house (N), the results follow below.

```
##
##  Exact binomial test
##
## data:  table(aux$scoef)[1] and sum(table(aux$scoef))
## number of successes = 11, number of trials = 21, p-value = 1
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.2978068 0.7428694
## sample estimates:
## probability of success
```

```
##              0.5238095
```

Therefore, the most elementary test we could run, a sign direction test, tells us that the law of 1/n does not hold for our sample. For the number of legislators in the upper house (K), the results follow below.

```
##
##  Exact binomial test
##
## data:  table(aux$scoef)[1] and sum(table(aux$scoef))
## number of successes = 1, number of trials = 9, p-value = 0.03906
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.002809137 0.482496515
## sample estimates:
## probability of success
##              0.1111111
```

Here, the law of 1/n holds. However, the effect goes in a direction different from the predicted in the law of k/n paper.

Electoral system

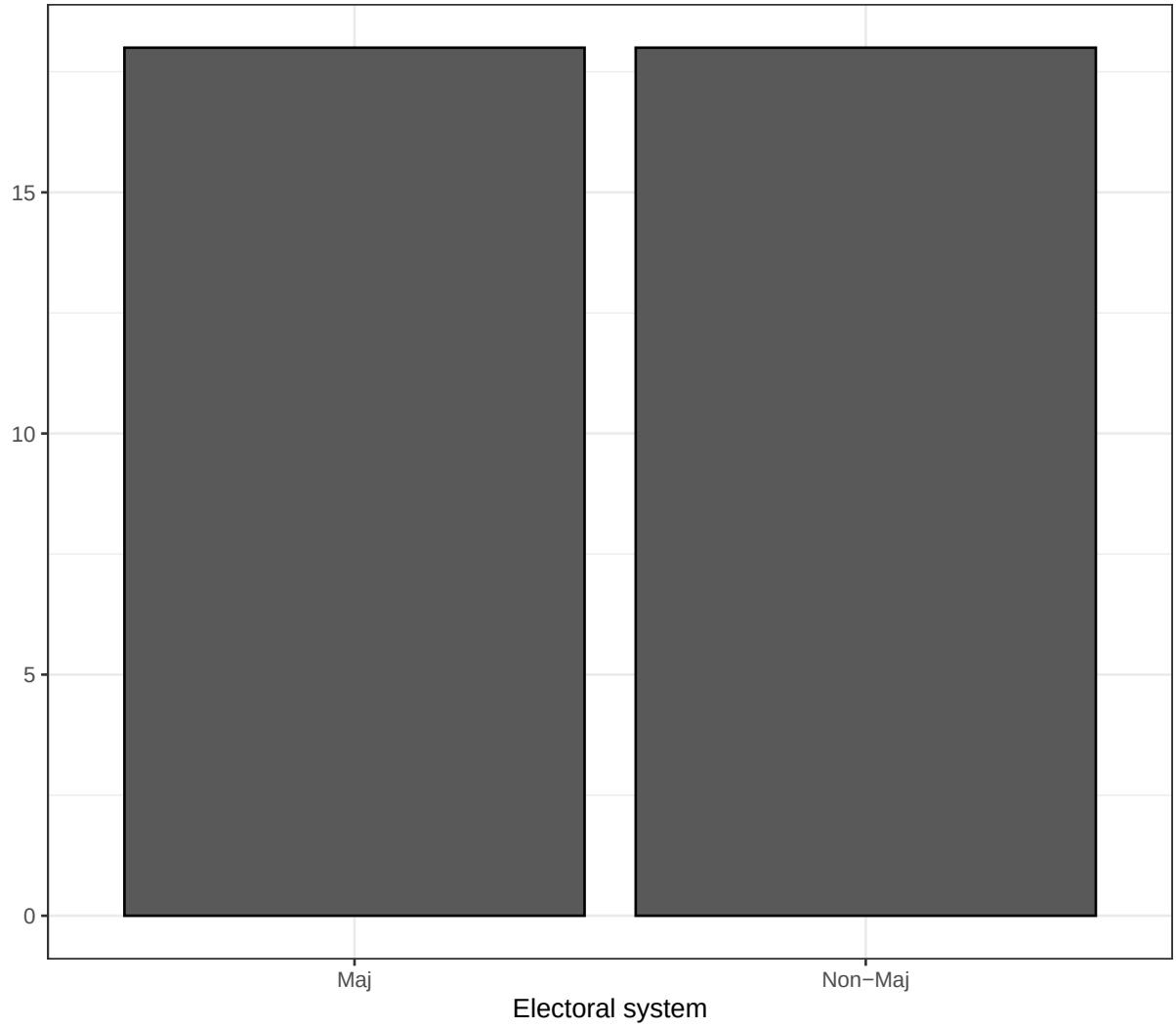


Figure 8: Electoral system

Electoral system x Sign Coefficient

```
##
##            Maj Non-Maj
##   Negative   5       8
##   Positive  13      10
```

```
##
##  Pearson's Chi-squared test with simulated p-value (based on 2000
##  replicates)
##
## data:  table(dat$scoef, dat$elecsys2)
## X-squared = 1.0836, df = NA, p-value = 0.4883
```

Independent Variable x Sign Coefficient

```
##
##             K logN  N
##   Negative  1    1 11
##   Positive  8    5 10
```

```
##
##  Pearson's Chi-squared test with simulated p-value (based on 2000
##  replicates)
##
## data:  table(dat$scoef, dat$indepvar2)
## X-squared = 5.8309, df = NA, p-value = 0.05797
```

Dependent variables x Independent variables

```
##
##            ExpPC logExpPC PCTGDP
##   Negative     6        3      4
##   Positive    12        4      7
```

```
##
##  Pearson's Chi-squared test with simulated p-value (based on 2000
##  replicates)
##
## data:  table(dat$scoef, dat$depvar2)
## X-squared = 0.19858, df = NA, p-value = 1
```

Descriptive Stats of Moderators

Moderator	Freq	Pct
Depvar: ExpPC	18	50%
Depvar: logExpPC	7	19.44%
Depvar: PCTGDP	11	30.56%
Indepvar: K	9	25%
Indepvar: logN	6	16.67%
Indepvar: N	21	58.33%
Published: No	6	16.67%
Published: Yes	30	83.33%
Electoral System: Maj	18	50%
Electoral System: Non-Maj	18	50%
Method: OLS	13	36.11%
Method: PANEL	17	47.22%
Method: IV	3	8.33%
Method: RDD	3	8.33%
Aggregate Level: Local	7	19.44%
Aggregate Level: States	21	58.33%
Aggregate Level: Countries	8	22.22%
Location: Country	29	80.56%
Location: World	7	19.44%
Year	2009.33 (Mean)	2008.5 (Median)

Meta-analysis

We combined the three independent variables (N, logN, and K) with the levels of the three dependent variables (ExpPC, logExpPC, PCTGDP). This formed a 3x3 possibility for our analysis.

ExpPC x N

```
##                                SMD             95%-CI %W(random)
## Crowley (2019)              -0.3510 [-1.8112;  1.1092]        5.3
## Lee and Park (2018)         -0.8510 [-3.5851;  1.8831]        2.1
## Lee (2016)                   0.0164 [-2.5570;  2.5898]        2.4
## Kessler (2014)               0.1740 [ 0.0074;  0.3406]       13.1
## Bjedov et al. (2014)        -0.0030 [-0.0226;  0.0166]       13.4
## Baskaran (2013)              0.9740 [-0.1212;  2.0692]        7.3
## Erler (2007)                 3.9300 [ 1.6172;  6.2428]        2.8
## Chen and Malhotra (2007)    -2.0400 [-4.6468;  0.5668]        2.3
## Fiorino and Ricciuti (2007)  0.2130 [ 0.1777;  0.2483]       13.4
## Primo (2006)                -0.8200 [-1.1924; -0.4476]       12.2
## Matsusaka (2005)            -0.9600 [-1.3128; -0.6072]       12.3
## Schaltegger and Feld (2009)  0.0010 [-0.0010;  0.0030]       13.4
##
## Number of studies combined: k = 12
##
##                          SMD            95%-CI     t p-value
## Random effects model -0.0699 [-0.6712; 0.5314] -0.26  0.8028
## Prediction interval          [-1.5540; 1.4142]
##
## Quantifying heterogeneity:
##  tau^2 = 0.3690 [0.1794; 4.7570]; tau = 0.6075 [0.4236; 2.1810];
##  I^2 = 94.7% [92.3%; 96.3%]; H = 4.34 [3.61; 5.21]
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  206.92   11 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 94.68.
2. The Random effects modem SMD estimated is $g = $ -0.07 ($SE = 0.273$).
3. The prediction interval ranges from -1.55 to 1.41. Therefore, it emcompasses zero.

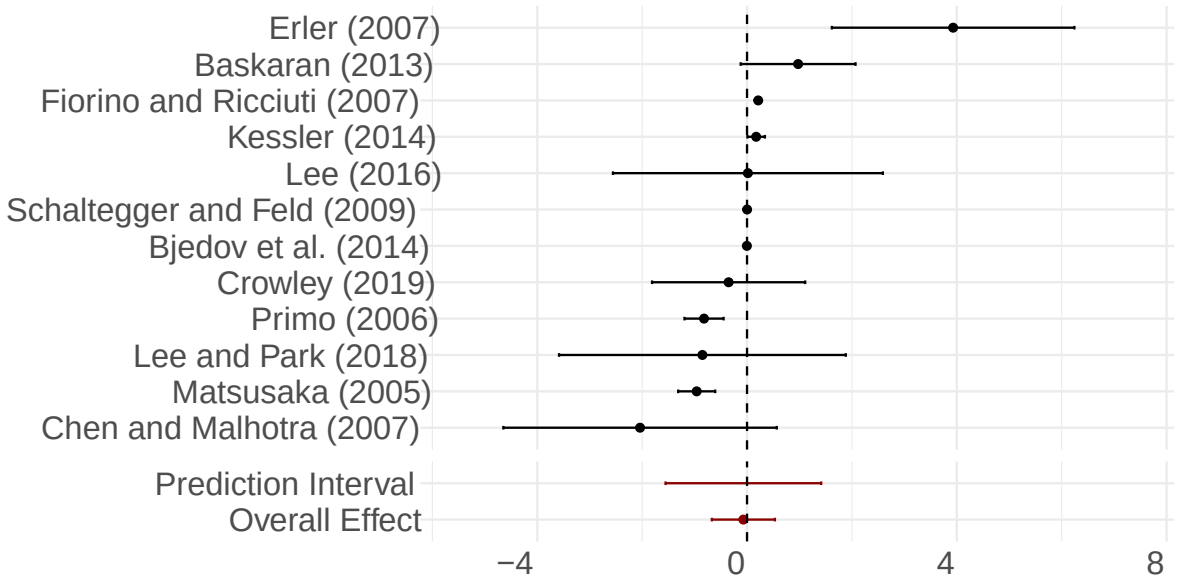


Figure 9: Effect of lower houses size (N) on Per Capita Expenditure (ExpPC)

Electoral system subgroup analysis The law of 1/n was created for majoritarian systems. In the theoretical section below, we explain why the argument have potential issues when applied to non-majoritarian electoral systems. We estimated a subgroup analysis using a binary electoral system.

Therefore, we can see that the hypothesis that majoritarian systems produce systematic positive effects was disproved. 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 non-significant, but they reassure us that the absense of effect is not caused by pooling multiple types of electoral systems.

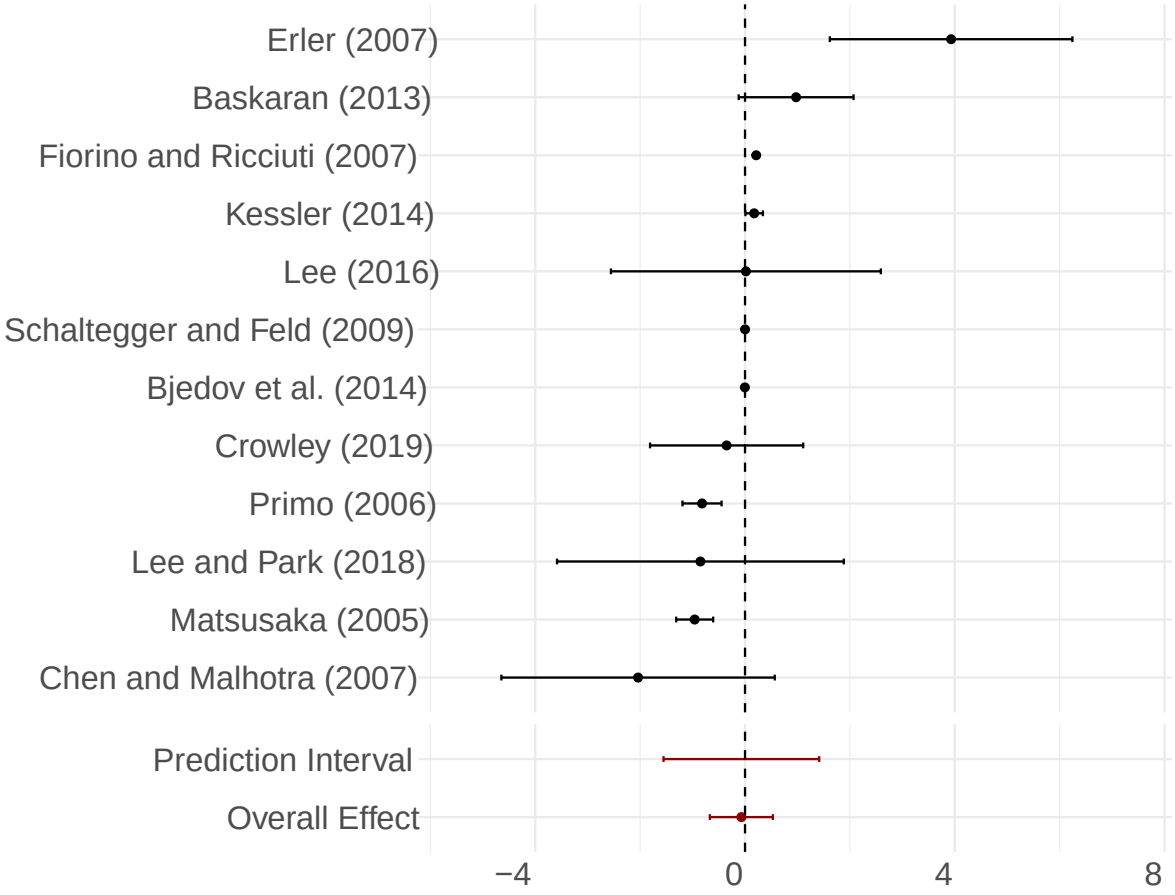


Figure 10: Subgroup Analysis of (N) x (ExpPC), controlling by electoral system

ExpPC x logN

There were no studies that had per capita expenditure in the dependent variable and log of lower house size in the treatment variable.

ExpPC x K

Now we are investigating the upper house size (K). In this model, we investigate the effect of upper house size on expenditure per capita (ExpPC).

```
# Pooling effects analysis -- ExpPC x K
aux <- dat %>%
  filter(indepvar2 == 'K',
         depvar2 == 'ExpPC')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                                    SMD             95%-CI %W(random)
## Crowley (2019)                  8.2100 [ 0.2702; 16.1498]       20.0
## Lee and Park (2018)            19.7400 [ 3.2645; 36.2155]       13.8
## Lee (2016)                     38.4400 [ 0.7499; 76.1301]        5.1
## Bradbury and Stephenson (2009)  0.6240 [ 0.2295;  1.0185]       23.1
## Chen and Malhotra (2007)       26.0900 [11.4883; 40.6917]       15.1
## Primo (2006)                    0.9700 [-0.4804;  2.4204]       23.0
##
## Number of studies combined: k = 6
##
##                           SMD               95%-CI    t p-value
## Random effects model 10.6134 [ -2.6210; 23.8479] 2.06  0.0943
## Prediction interval          [-21.1303; 42.3571]
##
## Quantifying heterogeneity:
##  tau^2 = 104.2124 [20.3551; >1042.1236]; tau = 10.2084 [4.5117; >32.2819];
##  I^2 = 79.4% [55.1%; 90.6%]; H = 2.20 [1.49; 3.26]
##
## Test of heterogeneity:
##      Q d.f. p-value
##  24.31    5  0.0002
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 79.43.
2. The Random effects modem SMD estimated is $g = $ 10.61 ($SE = 5.148$).
3. The prediction interval ranges from -21.13 to 42.36. Therefore, it emcompasses zero.

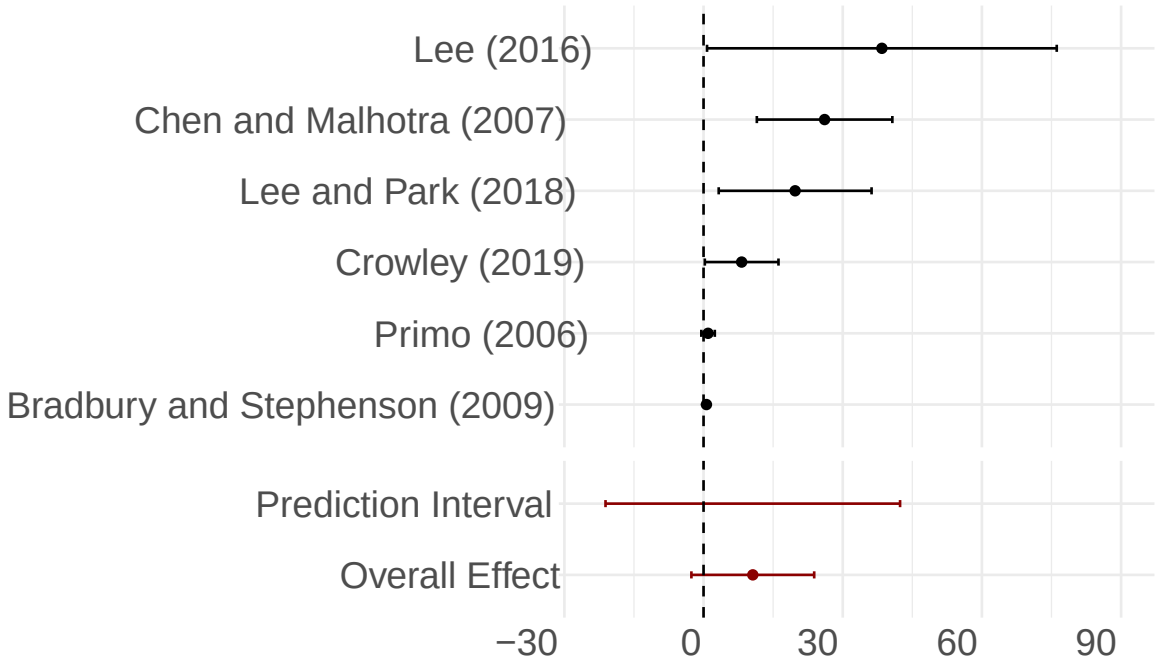


Figure 11: Effect of upper house size (K) on the per capita government expenditure (ExpPC)

logExpPC x N

This model estimates the Log of Per Capita Expenditure as the dependent variable, and the number of lower house legislators as the treatment variable.

```
# Pooling effects analysis -- logExpPC x N
aux <- dat %>%
  filter(indepvar2 == 'N',
         depvar2 == 'logExpPC')

mod <- metagen(
  coef, SE, data=aux,
  studlab=paste(authoryear),
  comb.fixed = FALSE,
  comb.random = TRUE,
  method.tau = "REML",
  hakn = TRUE,
  prediction = TRUE,
  sm="SMD"
  )

mod
```

```
##                              SMD             95%-CI %W(random)
## Lewis (2019)             -0.1740 [-0.2450; -0.1030]       24.3
## Höhmann (2017)           -0.0300 [-0.0496; -0.0104]       26.6
## Drew and Dollery (2017)   0.0770 [ 0.0221;  0.1319]       25.3
## Pettersson-Lidbom (2012) -0.1590 [-0.2394; -0.0786]       23.7
```

```
##
## Number of studies combined: k = 4
##
##                           SMD            95%-CI     t p-value
## Random effects model -0.0686 [-0.2560; 0.1188] -1.17  0.3282
## Prediction interval          [-0.6179; 0.4807]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0128 [0.0034; 0.1933]; tau = 0.1133 [0.0584; 0.4396];
##  I^2 = 92.5% [84.1%; 96.5%]; H = 3.66 [2.51; 5.34]
##
## Test of heterogeneity:
##      Q d.f.  p-value
##  40.11    3 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

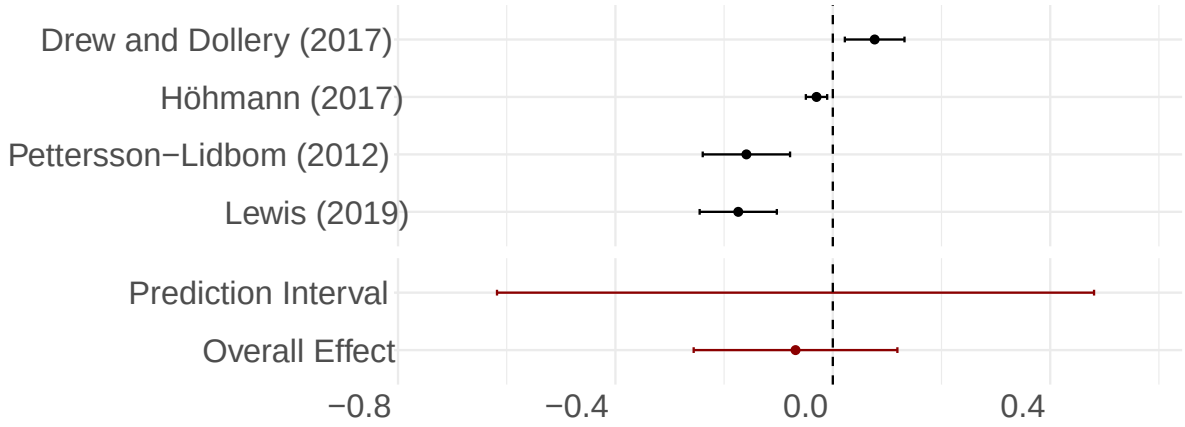


Figure 12: Effect of lower houses size (N) on log of per capita expenditure (logExpPC)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 92.52.
2. The Random effects modem SMD estimated is $g = $ -0.07 ($SE = 0.059$).
3. The prediction interval ranges from -0.62 to 0.48. Therefore, it emcompasses zero.

logExpPC x logN

In this specification, we study the log of per capita expenditure (logExpPC) as a function of the log of lower house size (logN).

```
# Pooling effects analysis -- logExpPC x logN
aux <- dat %>%
  filter(indepvar2 == 'logN',
         depvar2 == 'logExpPC')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                      SMD           95%-CI %W(random)
## MacDonald (2008) 0.1360 [0.0447; 0.2273]       31.9
## Baqir (2002)     0.1127 [0.0396; 0.1858]       34.2
## Baqir (1999)     0.3020 [0.2269; 0.3771]       33.9
##
## Number of studies combined: k = 3
##
##                          SMD            95%-CI    t p-value
## Random effects model 0.1844 [-0.0738; 0.4425] 3.07  0.0916
## Prediction interval         [-1.2580; 1.6267]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0093 [0.0014; 0.4193]; tau = 0.0964 [0.0372; 0.6476];
##  I^2 = 85.9% [59.0%; 95.2%]; H = 2.66 [1.56; 4.54]
##
## Test of heterogeneity:
##      Q d.f. p-value
##  14.18    2  0.0008
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 85.9.
2. The Random effects modem SMD estimated is $g = $ 0.18 ($SE = 0.06$). **This model is significant at the 10% confidence level.**
3. The prediction interval ranges from -1.26 to 1.63. Therefore, it emcompasses zero.

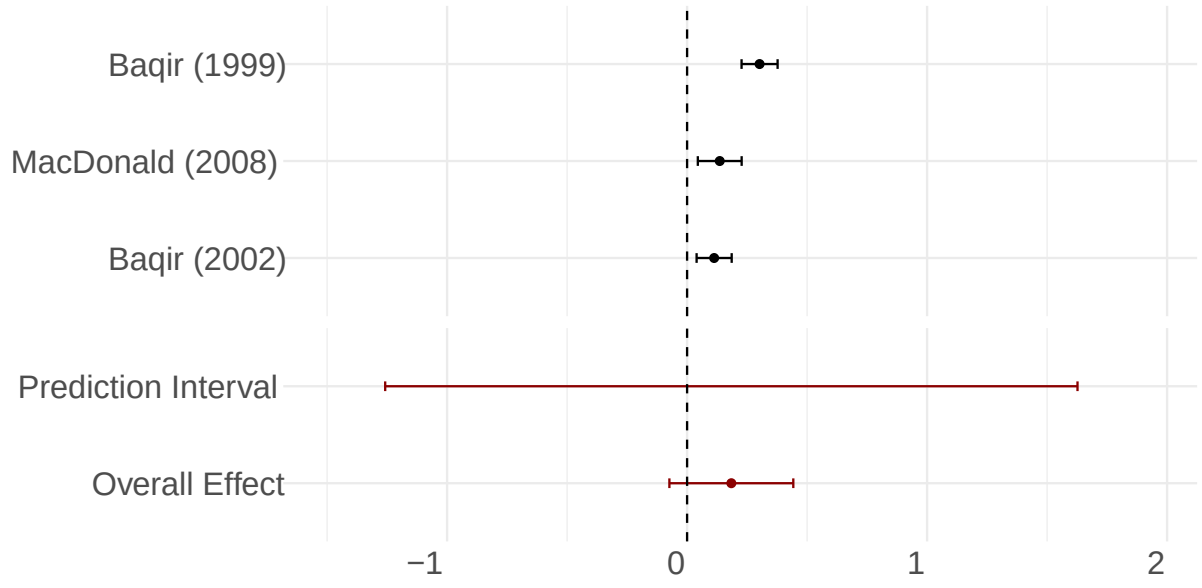


Figure 13: Effect of log lower houses size (logN) on the log of per capita government expenditure (logExpPC)

logExpPC x K

No studies related the log of per capita expenditure with the size of upper house (K).

PCTGDP x N

This model fits the random effects for the percentage of GDP as public expenditure as the main outcome, and the size of lower house as the main treatment variable.

```
# Pooling effects analysis -- PCTGDP x N
aux <- dat %>%
  filter(indepvar2 == 'N',
         depvar2 == 'PCTGDP')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                               SMD             95%-CI %W(random)
## Bjedov et al. (2014)      -0.0040 [-0.0432;  0.0352]       15.1
## Maldonado (2013)          -0.0609 [-0.0838; -0.0380]       19.5
## Mukherjee (2003)           0.0030 [ 0.0010;  0.0050]       23.0
## Bradbury and Crain (2001)  0.0036 [ 0.0008;  0.0065]       23.0
## Ricciuti (2004)            0.0140 [-0.0095;  0.0375]       19.4
##
```

```
## Number of studies combined: k = 5
##
##                          SMD            95%-CI     t p-value
## Random effects model -0.0083 [-0.0450; 0.0285] -0.62  0.5667
## Prediction interval          [-0.1054; 0.0889]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0008 [0.0002; 0.0072]; tau = 0.0275 [0.0129; 0.0849];
##  I^2 = 87.1% [72.2%; 94.0%]; H = 2.78 [1.90; 4.08]
##
## Test of heterogeneity:
##      Q d.f.  p-value
##  30.97    4 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

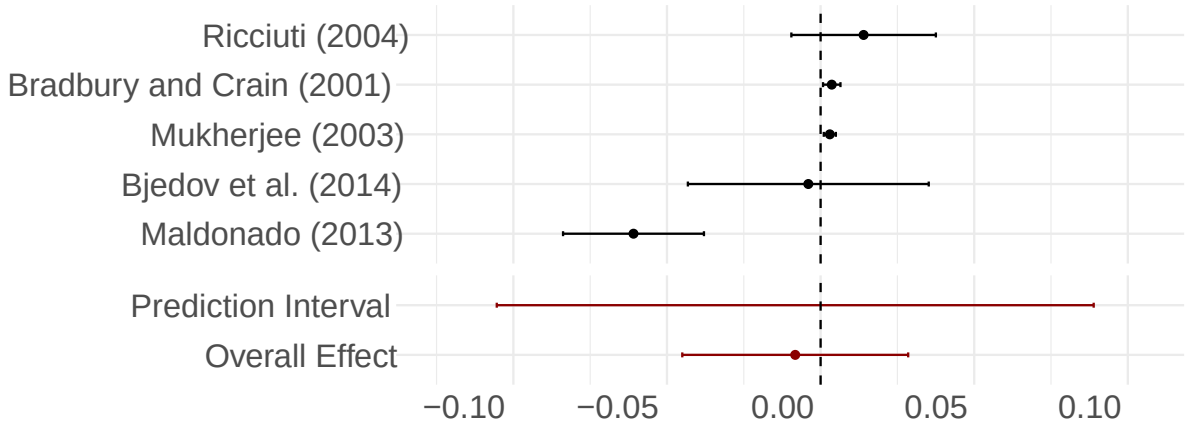


Figure 14: Effect of lower houses size (N) on percentage of public expenditure GDP (PCTGDP)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 87.08.
2. The Random effects modem SMD estimated is $g = $ -0.01 ($SE = 0.013$).
3. The prediction interval ranges from -0.11 to 0.09. Therefore, it emcompasses zero.

PCTGDP x logN

This meta-regression investigates the percentage of GDP as public expenditure as the dependent variable and the log lower house size (logN) as the treatment variable.

```
# Pooling effects analysis -- PCTGDP x logN
aux <- dat %>%
  filter(indepvar2 == 'logN',
         depvar2 == 'PCTGDP')

mod <- metagen(
  coef, SE, data=aux,
  studlab=paste(authoryear),
  comb.fixed = FALSE,
  comb.random = TRUE,
  method.tau = "REML",
  hakn = TRUE,
  prediction=TRUE,
  sm="SMD"
  )

mod
```

```
##                           SMD            95%-CI %W(random)
## Baqir (1999)           2.0660 [ 1.4887; 2.6433]       40.8
## Lledo (2003)          -4.6900 [-9.9427; 0.5627]       17.7
## Stein et al. (1998)    0.0109 [-0.0171; 0.0389]       41.5
##
## Number of studies combined: k = 3
##
##                           SMD              95%-CI    t p-value
## Random effects model 0.0203 [ -7.1961;  7.2367] 0.01  0.9914
## Prediction interval         [-36.2058; 36.2465]
##
## Quantifying heterogeneity:
##  tau^2 = 5.3156 [0.5756; >100.0000]; tau = 2.3056 [0.7587; >10.0000];
##  I^2 = 96.1% [91.8%; 98.2%]; H = 5.08 [3.48; 7.42]
##
## Test of heterogeneity:
##      Q d.f.  p-value
##  51.65    2 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 96.13.
2. The Random effects modem SMD estimated is $g = $ 0.02 ($SE = 1.677$).
3. The prediction interval ranges from -36.21 to 36.25. Therefore, it emcompasses zero.

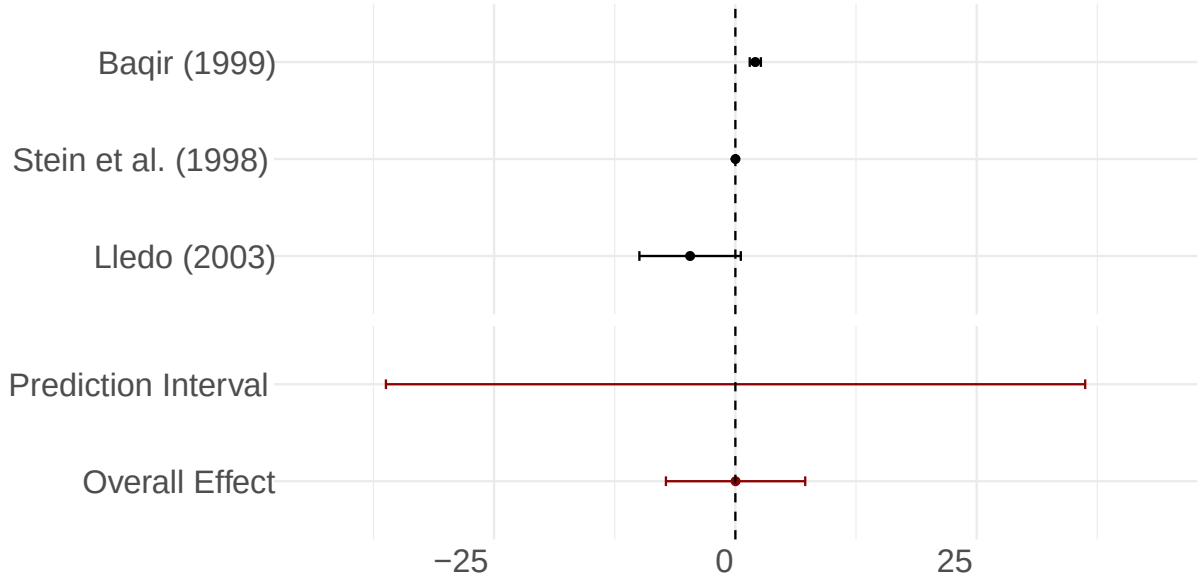


Figure 15: Effect of log lower houses size (logN) on the GDP share of public expenditure (PCTGDP)

PCTGDP x K

This model looks into the effect of upper house size (K) on the public expenditure share of the GDP (PCTGDP).

```
# Pooling effects analysis -- PCTGDP x K
aux <- dat %>%
  filter(indepvar2 == 'K',
         depvar2 == 'PCTGDP')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                                SMD             95%-CI %W(random)
## Maldonado (2012)           -0.0400 [-0.0659; -0.0141]       31.3
## Bradbury and Crain (2001)   0.0126 [ 0.0010;  0.0243]       36.4
## Ricciuti (2004)             0.0160 [-0.0075;  0.0395]       32.3
##
## Number of studies combined: k = 3
##
##                          SMD            95%-CI     t p-value
## Random effects model -0.0027 [-0.0793; 0.0738] -0.15  0.8915
## Prediction interval          [-0.4284; 0.4229]
##
```

```
## Quantifying heterogeneity:
##  tau^2 = 0.0008 [0.0001; 0.0388]; tau = 0.0284 [0.0101; 0.1970];
##  I^2 = 85.8% [58.6%; 95.1%]; H = 2.65 [1.55; 4.53]
##
## Test of heterogeneity:
##      Q d.f. p-value
##  14.07    2  0.0009
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

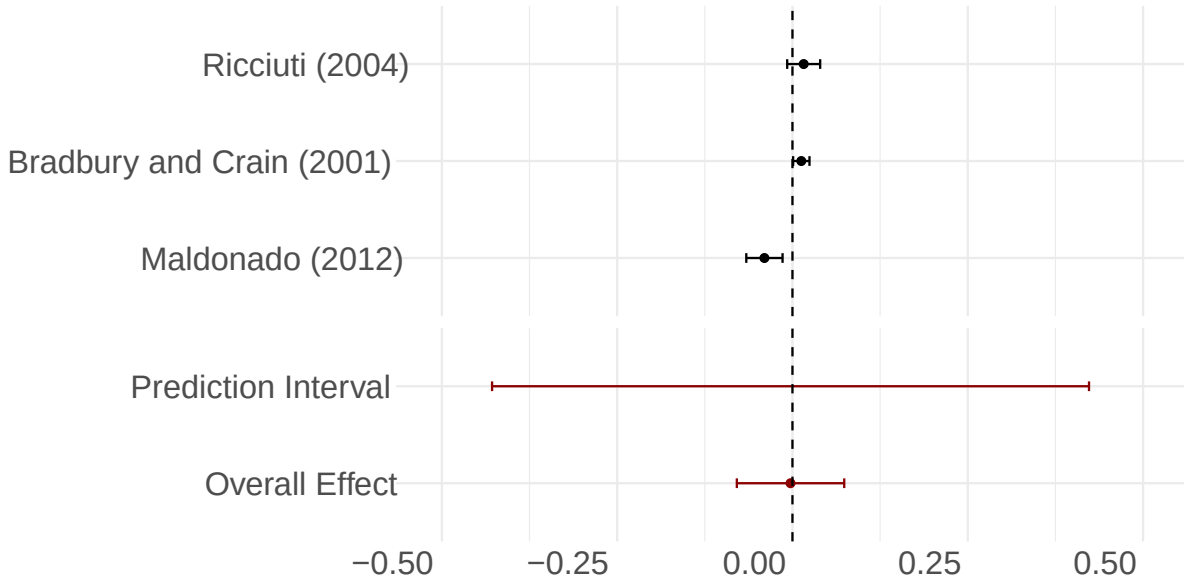
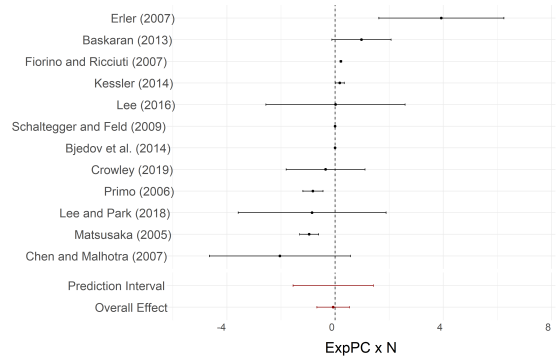
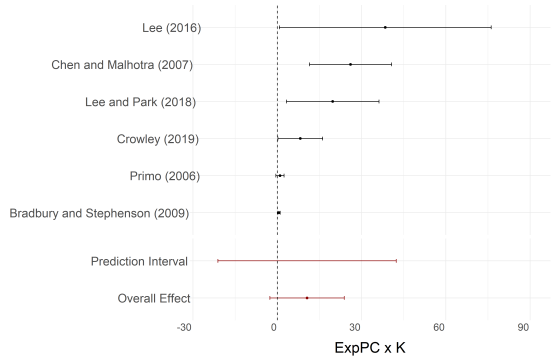


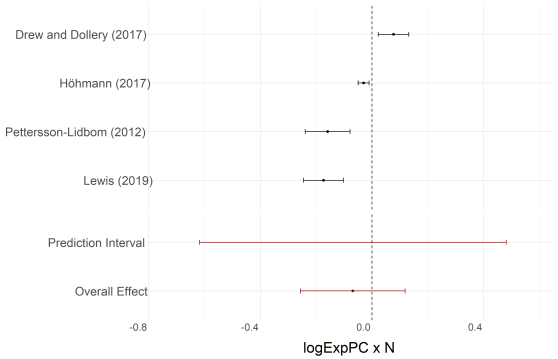
Figure 16: Effect of upper house size (K) on the public expenditure share of the GDP (PCTGDP)

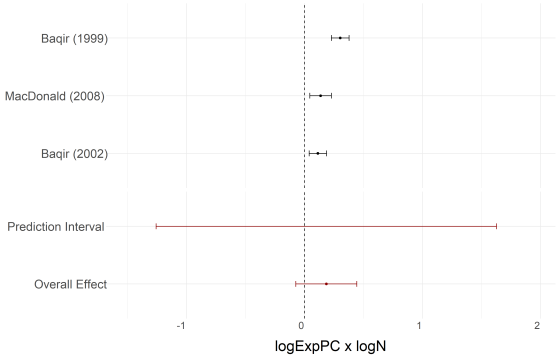
Highlights:

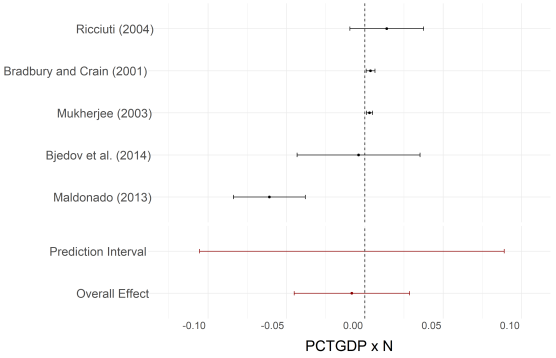
1. The results are highly heterogeneous: $I^2 = $ 85.79.
2. The Random effects modem SMD estimated is $g = $ 0 ($SE = 0.018$).
3. The prediction interval ranges from -0.43 to 0.42. Therefore, it emcompasses zero.

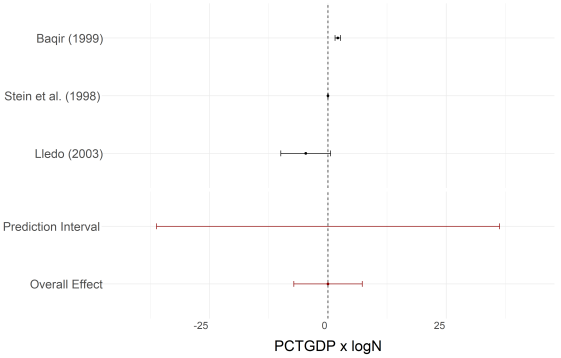

Erler (2007)
Baskaran (2013)
Fiorino and Ricciuti (2007)
Kessler (2014)
Lee (2016)
Schaltegger and Feld (2009)
Bjedov et al. (2014)
Crowley (2019)
Primo (2006)
Lee and Park (2018)
Matsusaka (2005)
Chen and Malhotra (2007)
Prediction Interval
Overall Effect
-4
0
4
8
ExpPC x N

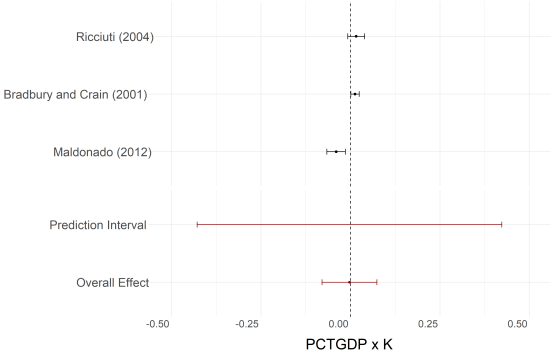

Lee (2016)
Chen and Malhotra (2007)
Lee and Park (2018)
Crowley (2019)
Primo (2006)
Bradbury and Stephenson (2009)
Prediction Interval
Overall Effect
-30
0
30
60
90
ExpPC x K


Drew and Dollery (2017)
Höhmann (2017)
Pettersson-Lidbom (2012)
Lewis (2019)
Prediction Interval
Overall Effect
-0.8
-0.4
0.0
0.4
logExpPC x N


Baqir (1999)
MacDonald (2008)
Baqir (2002)
Prediction Interval
Overall Effect
-1
0
1
2
logExpPC x logN


Ricciuti (2004)
Bradbury and Crain (2001)
Mukherjee (2003)
Bjedov et al. (2014)
Maldonado (2013)
Prediction Interval
Overall Effect
-0.10
-0.05
0.00
0.05
0.10
PCTGDP x N


Baqir (1999)
Stein et al. (1998)
Lledo (2003)
Prediction Interval
Overall Effect
-25
0
25
PCTGDP x logN


Ricciuti (2004)
Bradbury and Crain (2001)
Maldonado (2012)
Prediction Interval
Overall Effect
-0.50
-0.25
0.00
0.25
0.50
PCTGDP x K

Meta-Analysis (all coefficients)

ExpPC x N

```
## Warning in rma.uni(yi = TE[sel], sei = seTE[sel], method = method.tau, control
## = control): Ratio of largest to smallest sampling variance extremely large. May
## not be able to obtain stable results.
```

```
##                                  SMD             95%-CI %W(random)
## Crowley (2019)              -0.3510 [-1.8112;  1.1092]        2.0
## Crowley (2019)               5.9750 [ 0.7889; 11.1611]        0.3
## Crowley (2019)               7.6580 [-0.0290; 15.3450]        0.2
## Lee and Park (2018)         -0.8510 [-3.5851;  1.8831]        0.9
## Lee and Park (2018)         -1.6890 [-3.0551; -0.3229]        2.1
## Lee and Park (2018)          7.6320 [ 3.1064; 12.1576]        0.4
## Lee (2016)                   0.0164 [-2.5570;  2.5898]        1.0
## Kessler (2014)               0.1740 [ 0.0074;  0.3406]        3.6
## Kessler (2014)               0.2230 [ 0.1211;  0.3249]        3.6
## Kessler (2014)               0.2150 [ 0.0954;  0.3346]        3.6
## Kessler (2014)               0.1580 [ 0.0522;  0.2638]        3.6
## Bjedov et al. (2014)        -0.0030 [-0.0226;  0.0166]        3.6
## Bjedov et al. (2014)        -0.0060 [-0.0256;  0.0136]        3.6
## Baskaran (2013)              0.9740 [-0.1212;  2.0692]        2.5
## Erler (2007)                 3.9300 [ 1.6172;  6.2428]        1.2
## Chen and Malhotra (2007)    -2.0400 [-4.6468;  0.5668]        1.0
## Chen and Malhotra (2007)    -1.4000 [-2.6544; -0.1456]        2.3
## Fiorino and Ricciuti (2007)  0.2130 [ 0.1777;  0.2483]        3.6
## Fiorino and Ricciuti (2007)  0.2290 [ 0.1565;  0.3015]        3.6
## Fiorino and Ricciuti (2007)  0.4550 [ 0.3805;  0.5295]        3.6
## Fiorino and Ricciuti (2007)  0.4110 [ 0.3150;  0.5070]        3.6
## Fiorino and Ricciuti (2007)  0.2260 [ 0.1221;  0.3299]        3.6
## Fiorino and Ricciuti (2007)  0.2130 [-0.4083;  0.8343]        3.1
## Fiorino and Ricciuti (2007)  0.1850 [-0.4128;  0.7828]        3.2
## Fiorino and Ricciuti (2007)  0.2350 [-0.4235;  0.8935]        3.1
## Fiorino and Ricciuti (2007)  0.3740 [ 0.2486;  0.4994]        3.6
## Fiorino and Ricciuti (2007)  0.8110 [ 0.4562;  1.1658]        3.4
## Fiorino and Ricciuti (2007)  0.7950 [ 0.4500;  1.1400]        3.5
## Fiorino and Ricciuti (2007)  0.8490 [ 0.3825;  1.3155]        3.3
## Primo (2006)                -0.8200 [-1.1924; -0.4476]        3.4
## Primo (2006)                -1.7000 [-2.3076; -1.0924]        3.2
## Primo (2006)                -2.3700 [-3.0952; -1.6448]        3.0
## Primo (2006)                -2.0300 [-2.7552; -1.3048]        3.0
## Matsusaka (2005)            -0.9600 [-1.3128; -0.6072]        3.4
## Schaltegger and Feld (2009)  0.0010 [-0.0010;  0.0030]        3.6
## Schaltegger and Feld (2009) -0.0010 [-0.0030;  0.0010]        3.6
##
## Number of studies combined: k = 36
##
##                           SMD            95%-CI     t p-value
## Random effects model -0.0169 [-0.4166; 0.3829] -0.09  0.9322
## Prediction interval          [-1.7588; 1.7250]
##
## Quantifying heterogeneity:
##  tau^2 = 0.6959 [0.7202; 4.3553]; tau = 0.8342 [0.8486; 2.0869];
##  I^2 = 95.3% [94.2%; 96.1%]; H = 4.60 [4.16; 5.08]
```

```
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  739.53   35 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

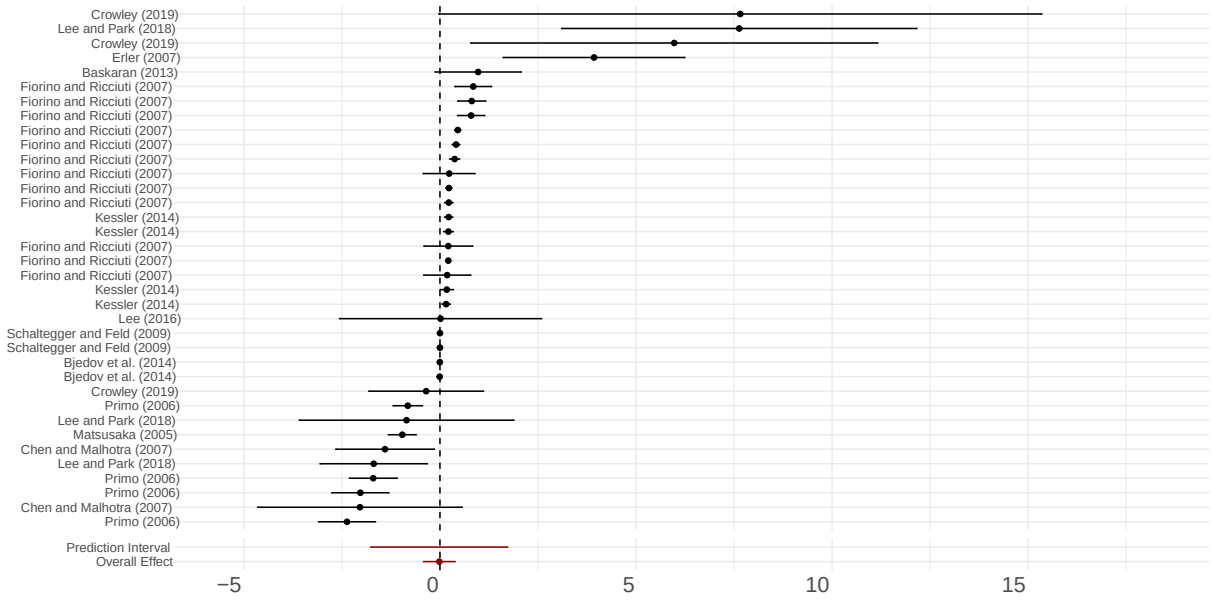


Figure 17: Effect of lower houses size (N) on Per Capita Expenditure (ExpPC)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 95.27.
2. The Random effects modem SMD estimated is $g = $ -0.02 ($SE = 0.197$).
3. The prediction interval ranges from -1.76 to 1.73. Therefore, it emcompasses zero.

Electoral system subgroup analysis The law of 1/n was created for majoritarian systems. In the theoretical section below, we explain why the argument have potential issues when applied to non-majoritarian electoral systems. We estimated a subgroup analysis using a binary electoral system.

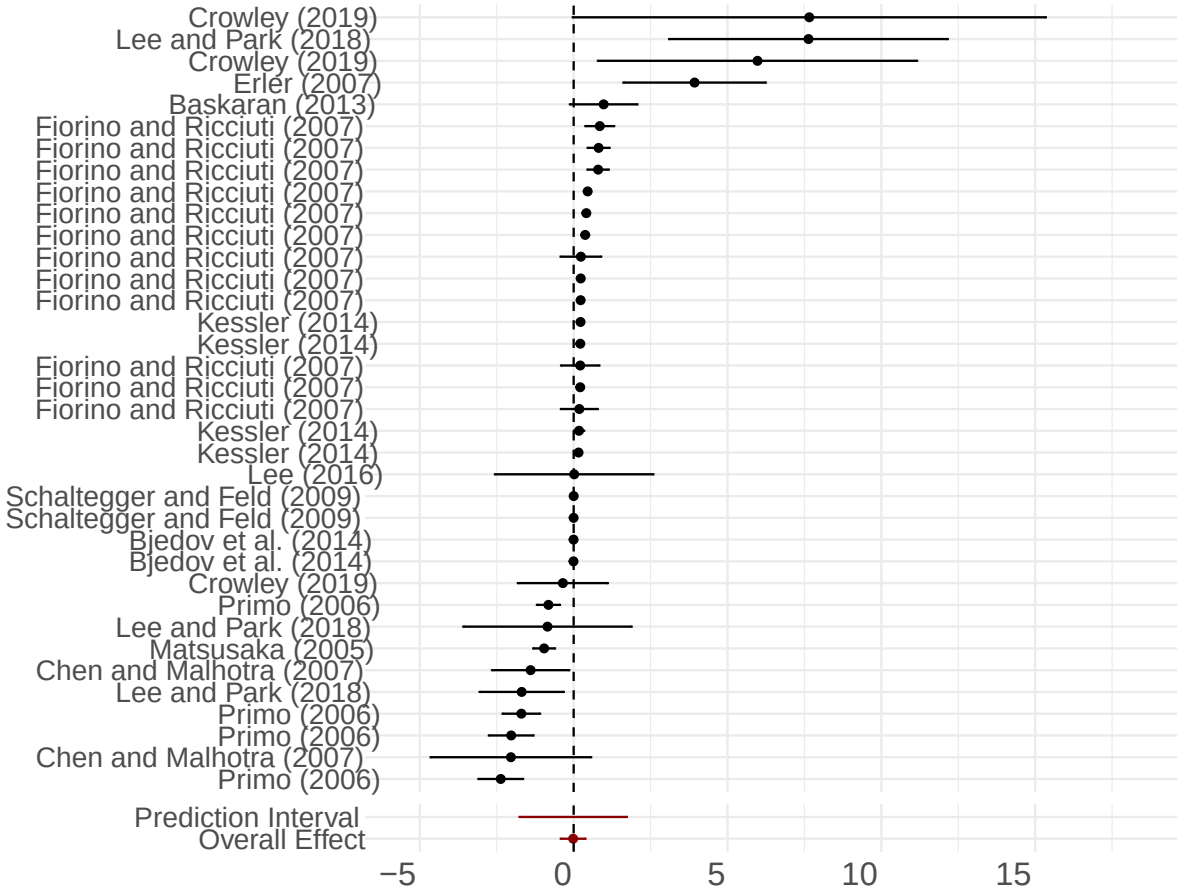


Figure 18: Subgroup Analysis of (N) x (ExpPC), controlling by electoral system

Therefore, we can see that the hypothesis that majoritarian systems produce systematic positive effects was disproved. 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 non-significant, but they reassure us that the absense of effect is not caused by pooling multiple types of electoral systems.

ExpPC x logN

There were no studies that had per capita expenditure in the dependent variable and log of lower house size in the treatment variable.

ExpPC x K

Now we are investigating the upper house size (K). In this model, we investigate the effect of upper house size on expenditure per capita (ExpPC).

```
# Pooling effects analysis -- ExpPC x K
aux <- fulldat %>%
  filter(indepvar2 == 'K',
         depvar2 == 'ExpPC')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                                    SMD              95%-CI %W(random)
## Crowley (2019)                  8.2100 [  0.2702; 16.1498]        4.8
## Crowley (2019)                  8.4230 [-27.1895; 44.0355]        0.4
## Crowley (2019)                  9.5940 [  2.1383; 17.0497]        5.1
## Lee and Park (2018)            19.7400 [  3.2645; 36.2155]        1.7
## Lee and Park (2018)            10.0600 [  2.2887; 17.8313]        4.9
## Lee and Park (2018)             9.0620 [-30.8821; 49.0061]        0.3
## Lee (2016)                     38.4400 [  0.7499; 76.1301]        0.4
## Lee (2016)                     37.8500 [  3.0214; 72.6786]        0.4
## Lee (2016)                     25.6100 [ -0.8103; 52.0303]        0.8
## Lee (2016)                      5.9960 [-19.6011; 31.5931]        0.8
## Lee (2016)                     25.5600 [ -0.8799; 51.9999]        0.8
## Lee (2016)                      4.6930 [-19.5126; 28.8986]        0.9
## Bradbury and Stephenson (2009)  0.6240 [  0.2295;  1.0185]       10.0
## Chen and Malhotra (2007)       26.0900 [ 11.4883; 40.6917]        2.1
## Chen and Malhotra (2007)        8.3000 [  3.6941; 12.9059]        7.3
## Chen and Malhotra (2007)        5.1400 [  0.1813; 10.0987]        7.0
## Chen and Malhotra (2007)        4.7800 [ -0.9039; 10.4639]        6.4
## Chen and Malhotra (2007)       20.3800 [  7.6990; 33.0610]        2.6
## Chen and Malhotra (2007)        4.8700 [  1.2833;  8.4567]        8.2
## Chen and Malhotra (2007)       26.7500 [  0.8589; 52.6411]        0.8
## Primo (2006)                    0.9700 [ -0.4804;  2.4204]        9.7
## Primo (2006)                    5.9000 [  2.6857;  9.1143]        8.5
## Primo (2006)                    5.7500 [  2.3593;  9.1407]        8.4
## Primo (2006)                    6.9600 [  2.6089; 11.3111]        7.6
##
## Number of studies combined: k = 24
##
##                          SMD             95%-CI    t  p-value
## Random effects model 7.2162 [ 4.4400;  9.9925] 5.38 < 0.0001
## Prediction interval         [-1.2217; 15.6542]
##
## Quantifying heterogeneity:
##  tau^2 = 14.7532 [5.4141; 111.2304]; tau = 3.8410 [2.3268; 10.5466];
##  I^2 = 77.7% [67.3%; 84.8%]; H = 2.12 [1.75; 2.57]
```

```
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  103.34   23 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

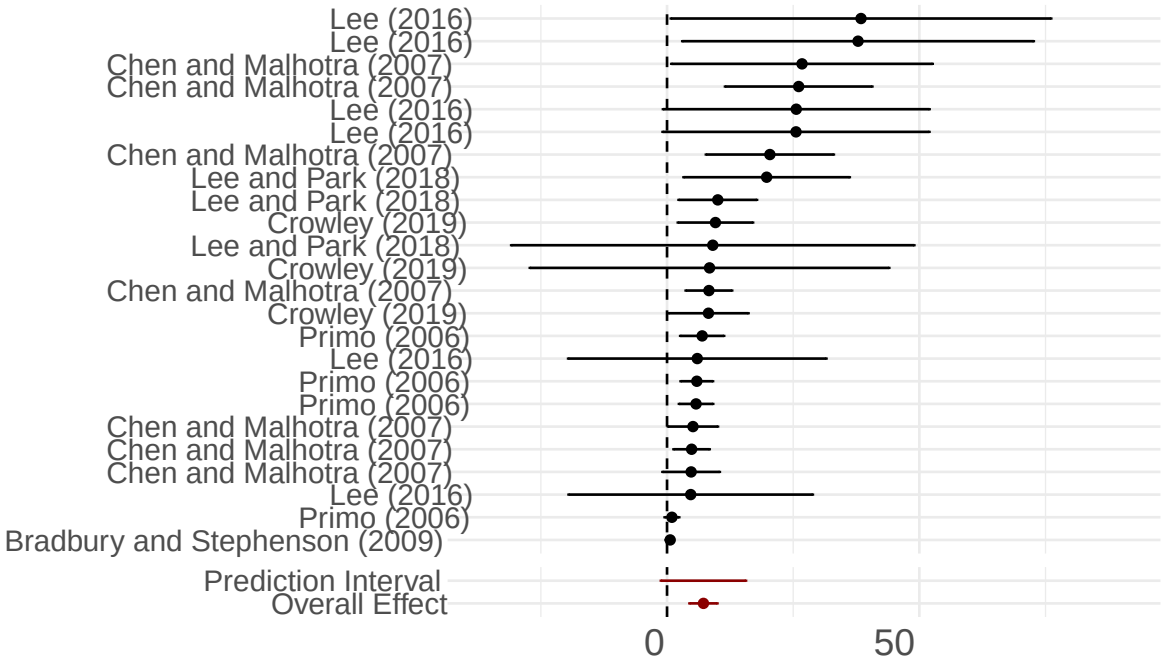


Figure 19: Effect of upper house size (K) on the per capita government expenditure (ExpPC)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 77.74.
2. The Random effects modem SMD estimated is $g = $ 7.22 ($SE = 1.342$).
3. The prediction interval ranges from -1.22 to 15.65. Therefore, it emcompasses zero.

logExpPC x N

This model estimates the Log of Per Capita Expenditure as the dependent variable, and the number of lower house legislators as the treatment variable.

```
# Pooling effects analysis -- logExpPC x N
aux <- fulldat %>%
  filter(indepvar2 == 'N',
         depvar2 == 'logExpPC')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                              SMD             95%-CI %W(random)
## Lewis (2019)             -0.1740 [-0.2450; -0.1030]        6.6
## Höhmann (2017)           -0.0300 [-0.0496; -0.0104]        7.1
## Höhmann (2017)           -0.0300 [-0.0496; -0.0104]        7.1
## Höhmann (2017)           -0.0400 [-0.0792; -0.0008]        7.0
## Drew and Dollery (2017)   0.0770 [ 0.0221;  0.1319]        6.8
## Drew and Dollery (2017)   0.0310 [-0.0121;  0.0741]        6.9
## Pettersson-Lidbom (2012) -0.1590 [-0.2394; -0.0786]        6.4
## Pettersson-Lidbom (2012) -0.1470 [-0.2274; -0.0666]        6.4
## Pettersson-Lidbom (2012) -0.0900 [-0.1645; -0.0155]        6.5
## Pettersson-Lidbom (2012) -0.0810 [-0.1574; -0.0046]        6.5
## Pettersson-Lidbom (2012) -0.0880 [-0.1625; -0.0135]        6.5
## Pettersson-Lidbom (2012)  0.2100 [ 0.1649;  0.2551]        6.9
## Pettersson-Lidbom (2012)  0.1570 [ 0.0845;  0.2295]        6.5
## Pettersson-Lidbom (2012) -0.1990 [-0.2774; -0.1206]        6.4
## Pettersson-Lidbom (2012) -0.1690 [-0.2494; -0.0886]        6.4
##
## Number of studies combined: k = 15
##
##                          SMD            95%-CI     t p-value
## Random effects model -0.0463 [-0.1142; 0.0216] -1.46  0.1655
## Prediction interval          [-0.3105; 0.2178]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0139 [0.0070; 0.0364]; tau = 0.1181 [0.0836; 0.1908];
##  I^2 = 93.8% [91.2%; 95.6%]; H = 4.00 [3.38; 4.75]
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  224.56   14 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
```

```
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

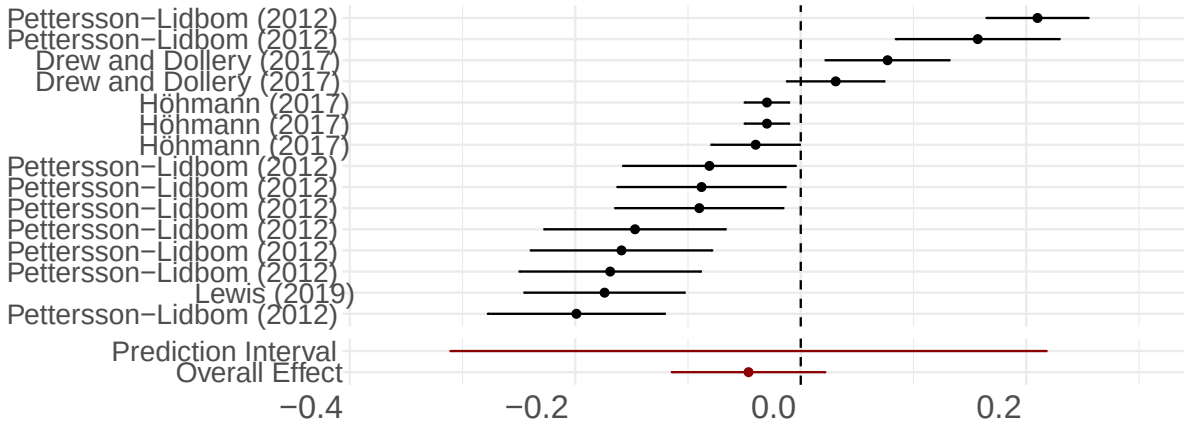


Figure 20: Effect of lower houses size (N) on log of per capita expenditure (logExpPC)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 93.77.
2. The Random effects modem SMD estimated is $g = $ -0.05 ($SE = 0.032$).
3. The prediction interval ranges from -0.31 to 0.22. Therefore, it emcompasses zero.

logExpPC x logN

In this specification, we study the log of per capita expenditure (logExpPC) as a function of the log of lower house size (logN).

```
# Pooling effects analysis -- logExpPC x logN
aux <- fulldat %>%
  filter(indepvar2 == 'logN',
         depvar2 == 'logExpPC')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                      SMD           95%-CI %W(random)
## MacDonald (2008) 0.1360 [0.0447; 0.2273]        7.9
## MacDonald (2008) 0.2319 [0.1322; 0.3316]        7.4
## MacDonald (2008) 0.1443 [0.0471; 0.2415]        7.6
## MacDonald (2008) 0.1594 [0.0667; 0.2521]        7.8
## MacDonald (2008) 0.2259 [0.1163; 0.3355]        6.9
## Baqir (2002)     0.1127 [0.0396; 0.1858]        9.1
## Baqir (2002)     0.2760 [0.2007; 0.3513]        8.9
## Baqir (2002)     0.3021 [0.2270; 0.3772]        8.9
## Baqir (2002)     0.3203 [0.2450; 0.3956]        8.9
## Baqir (1999)     0.3020 [0.2269; 0.3771]        8.9
## Baqir (1999)     0.2760 [0.2007; 0.3513]        8.9
## Baqir (1999)     0.2950 [0.2165; 0.3735]        8.7
##
## Number of studies combined: k = 12
##
##                         SMD           95%-CI     t  p-value
## Random effects model 0.2346 [0.1864; 0.2828] 10.71 < 0.0001
## Prediction interval         [0.0848; 0.3844]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0040 [0.0011; 0.0145]; tau = 0.0636 [0.0335; 0.1203];
##  I^2 = 70.0% [45.6%; 83.4%]; H = 1.82 [1.36; 2.45]
##
## Test of heterogeneity:
##      Q d.f. p-value
##  36.62   11  0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

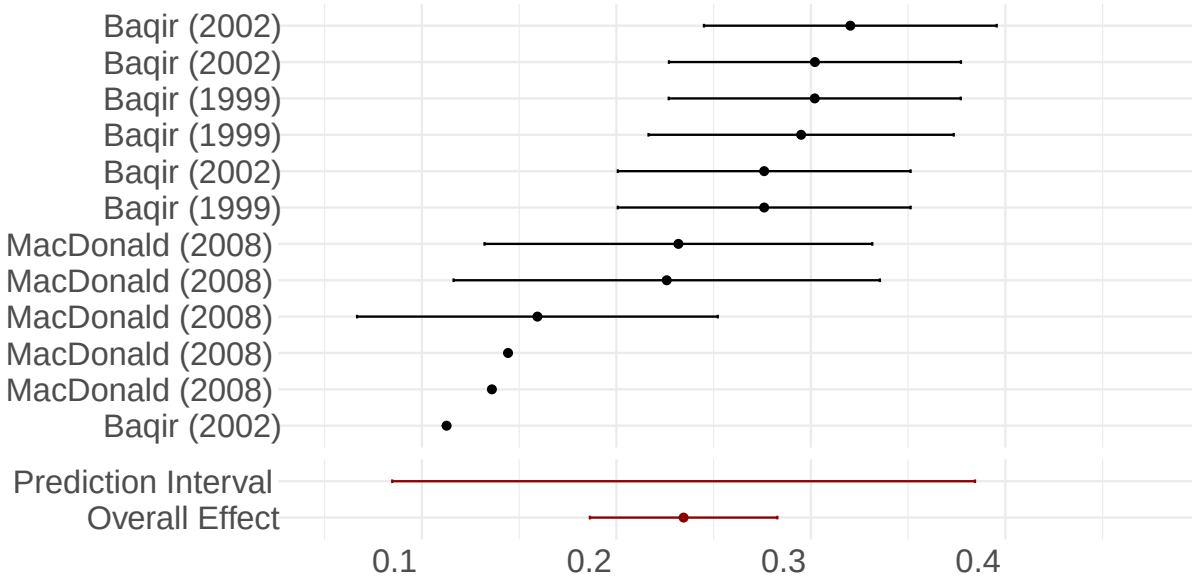


Figure 21: Effect of log lower houses size (logN) on the log of per capita government expenditure (logExpPC)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 69.96.
2. The Random effects modem SMD estimated is $g = $ 0.23 ($SE = 0.022$). **This model is significant at the 10% confidence level.**
3. The prediction interval ranges from 0.08 to 0.38. Therefore, it does not emcompasses zero.

logExpPC x K

No studies related the log of per capita expenditure with the size of upper house (K).

PCTGDP x N

This model fits the random effects for the percentage of GDP as public expenditure as the main outcome, and the size of lower house as the main treatment variable.

```
# Pooling effects analysis -- PCTGDP x N
aux <- fulldat %>%
  filter(indepvar2 == 'N',
         depvar2 == 'PCTGDP')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                               SMD             95%-CI %W(random)
## Bjedov et al. (2014)      -0.0040 [-0.0432;  0.0352]        2.1
## Bjedov et al. (2014)      -0.0080 [-0.0472;  0.0312]        2.1
## Maldonado (2013)          -0.0609 [-0.0838; -0.0380]        3.6
## Mukherjee (2003)           0.0030 [ 0.0010;  0.0050]        5.6
## Mukherjee (2003)           0.0090 [ 0.0051;  0.0129]        5.5
## Mukherjee (2003)           0.0110 [ 0.0051;  0.0169]        5.4
## Mukherjee (2003)           0.0050 [-0.0009;  0.0109]        5.4
## Mukherjee (2003)           0.0400 [ 0.0380;  0.0420]        5.6
## Mukherjee (2003)           0.0300 [ 0.0280;  0.0320]        5.6
## Mukherjee (2003)           0.0100 [ 0.0061;  0.0139]        5.5
## Mukherjee (2003)           0.0200 [ 0.0122;  0.0278]        5.3
## Bradbury and Crain (2001)  0.0036 [ 0.0008;  0.0065]        5.6
## Bradbury and Crain (2001)  0.0005 [-0.0016;  0.0027]        5.6
## Bradbury and Crain (2001)  0.0169 [ 0.0131;  0.0208]        5.6
## Bradbury and Crain (2001)  0.0123 [ 0.0087;  0.0160]        5.6
## Ricciuti (2004)            0.0140 [-0.0095;  0.0375]        3.5
## Ricciuti (2004)           -0.0110 [-0.0286;  0.0066]        4.2
## Ricciuti (2004)            0.0070 [-0.0067;  0.0207]        4.7
## Ricciuti (2004)            0.0050 [-0.0126;  0.0226]        4.2
## Ricciuti (2004)            0.0050 [-0.0126;  0.0226]        4.2
## Ricciuti (2004)            0.0120 [-0.0017;  0.0257]        4.7
##
## Number of studies combined: k = 21
##
##                          SMD            95%-CI    t p-value
## Random effects model 0.0078 [-0.0003; 0.0160] 2.01  0.0579
## Prediction interval         [-0.0259; 0.0416]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0002 [0.0002; 0.0007]; tau = 0.0156 [0.0136; 0.0261];
##  I^2 = 98.5% [98.2%; 98.7%]; H = 8.11 [7.40; 8.88]
##
## Test of heterogeneity:
##        Q d.f.  p-value
```

```
##  1314.54   20 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

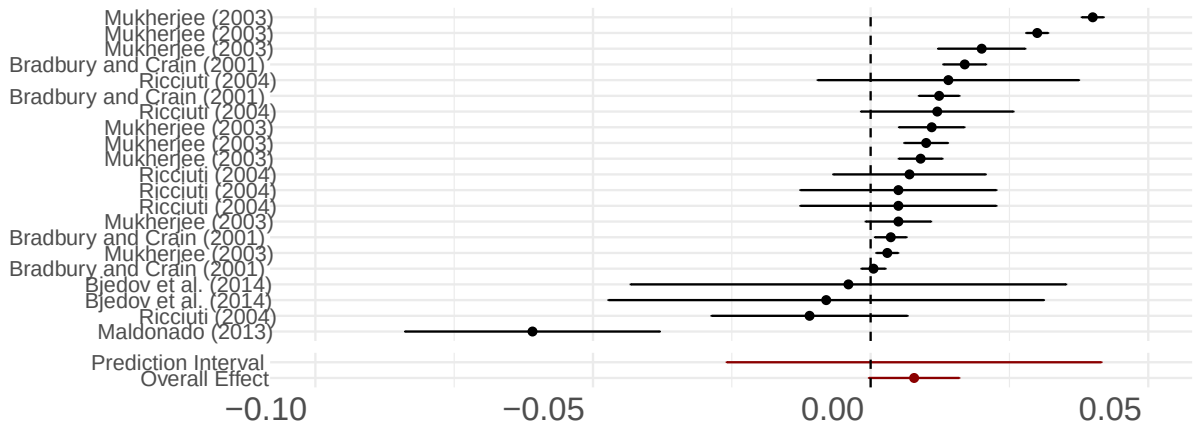


Figure 22: Effect of lower houses size (N) on percentage of public expenditure GDP (PCTGDP)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 98.48.
2. The Random effects modem SMD estimated is $g = $ 0.01 ($SE = 0.004$).
3. The prediction interval ranges from -0.03 to 0.04. Therefore, it emcompasses zero.

PCTGDP x logN

This meta-regression investigates the percentage of GDP as public expenditure as the dependent variable and the log lower house size (logN) as the treatment variable.

```
# Pooling effects analysis -- PCTGDP x logN
aux <- fulldat %>%
  filter(indepvar2 == 'logN',
         depvar2 == 'PCTGDP')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                          SMD            95%-CI %W(random)
## Baqir (1999)          2.0660 [ 1.4887; 2.6433]       18.9
```

```
## Baqir (1999)         2.0120 [ 1.4235; 2.6005]       18.8
## Baqir (1999)         2.4680 [ 1.8817; 3.0543]       18.8
## Lledo (2003)        -4.6900 [-9.9427; 0.5627]        3.8
## Stein et al. (1998)  0.0109 [-0.0171; 0.0389]       19.8
## Stein et al. (1998)  0.0135 [-0.0102; 0.0372]       19.8
##
## Number of studies combined: k = 6
##
##                         SMD            95%-CI    t p-value
## Random effects model 1.0619 [-0.7256; 2.8493] 1.53  0.1873
## Prediction interval         [-3.0267; 5.1504]
##
## Quantifying heterogeneity:
##  tau^2 = 1.6850 [0.6497; 38.1618]; tau = 1.2981 [0.8060; 6.1775];
##  I^2 = 96.9% [95.2%; 98.1%]; H = 5.71 [4.55; 7.16]
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  163.00    5 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

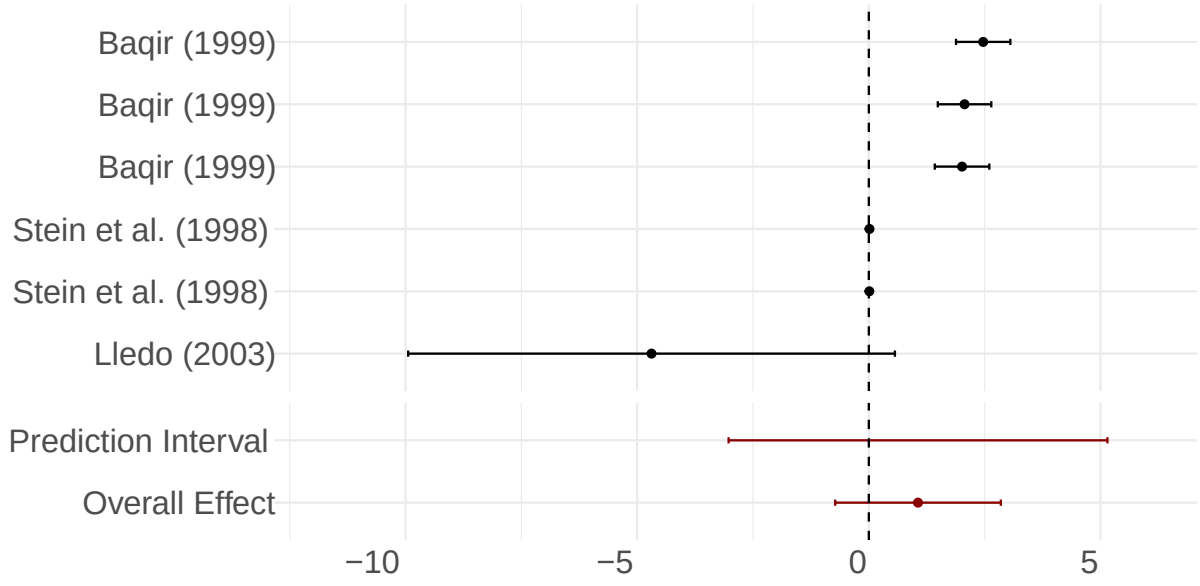


Figure 23: Effect of log lower houses size (logN) on the GDP share of public expenditure (PCTGDP)

Highlights:

1. The results are highly heterogeneous: $I^2 = $ 96.93.
2. The Random effects modem SMD estimated is $g = $ 1.06 ($SE = 0.695$).

3. The prediction interval ranges from -3.03 to 5.15. Therefore, it emcompasses zero.

PCTGDP x K

This model looks into the effect of upper house size (K) on the public expenditure share of the GDP (PCTGDP).

```
# Pooling effects analysis -- PCTGDP x K
aux <- fulldat %>%
  filter(indepvar2 == 'K',
         depvar2 == 'PCTGDP')

mod <- metagen(coef, SE, data=aux,
          studlab=paste(authoryear),
          comb.fixed = FALSE,
          comb.random = TRUE,
          method.tau = "REML",
          hakn = TRUE,
          prediction=TRUE,
          sm="SMD")
mod
```

```
##                                SMD             95%-CI %W(random)
## Maldonado (2012)           -0.0400 [-0.0659; -0.0141]        5.7
## Bradbury and Crain (2001)   0.0126 [ 0.0010;  0.0243]        9.8
## Bradbury and Crain (2001)   0.0050 [ 0.0016;  0.0083]       11.8
## Bradbury and Crain (2001) -0.0113 [-0.0163; -0.0064]       11.5
## Bradbury and Crain (2001) -0.0056 [-0.0102; -0.0010]       11.6
## Ricciuti (2004)            0.0160 [-0.0075;  0.0395]        6.2
## Ricciuti (2004)            0.0210 [-0.0006;  0.0426]        6.7
## Ricciuti (2004)            0.0140 [-0.0036;  0.0316]        7.9
## Ricciuti (2004)            0.0030 [-0.0088;  0.0148]        9.7
## Ricciuti (2004)            0.0300 [-0.0210;  0.0810]        2.2
## Ricciuti (2004)            0.0300 [-0.0210;  0.0810]        2.2
## Ricciuti (2004)            0.0390 [-0.0022;  0.0802]        3.1
## Ricciuti (2004)            0.0127 [-0.0147;  0.0401]        5.3
## Ricciuti (2004)            0.0160 [-0.0075;  0.0395]        6.2
##
## Number of studies combined: k = 14
##
##                         SMD            95%-CI    t p-value
## Random effects model 0.0056 [-0.0042; 0.0155] 1.24  0.2376
## Prediction interval         [-0.0233; 0.0346]
##
## Quantifying heterogeneity:
##  tau^2 = 0.0002 [0.0001; 0.0008]; tau = 0.0125 [0.0109; 0.0279];
##  I^2 = 80.0% [67.3%; 87.8%]; H = 2.24 [1.75; 2.86]
##
## Test of heterogeneity:
##      Q d.f.  p-value
##  65.02   13 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - Restricted maximum-likelihood estimator for tau^2
```

```
## - Q-profile method for confidence interval of tau^2 and tau
## - Hartung-Knapp adjustment for random effects model
```

And the forest plot:

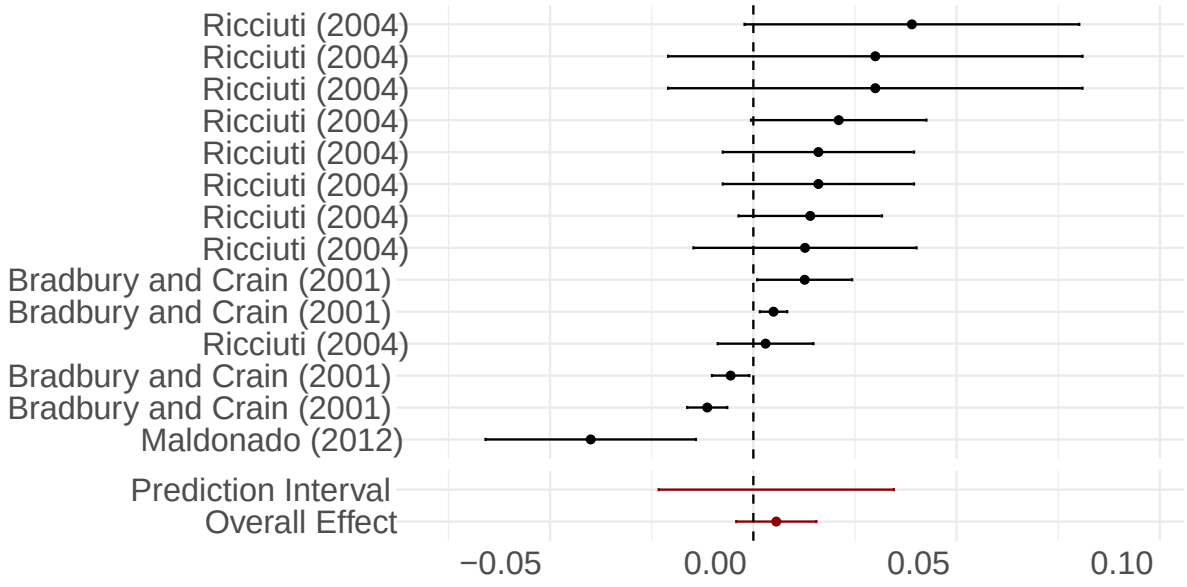
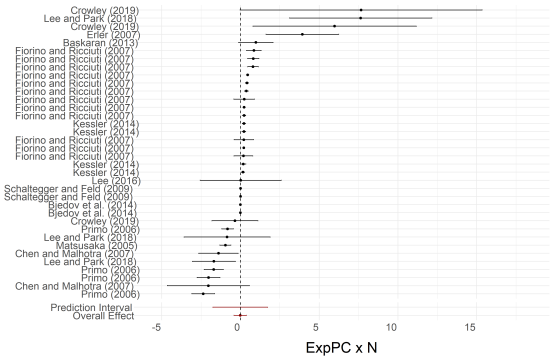
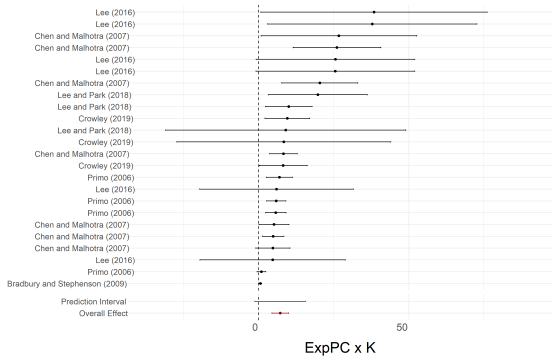


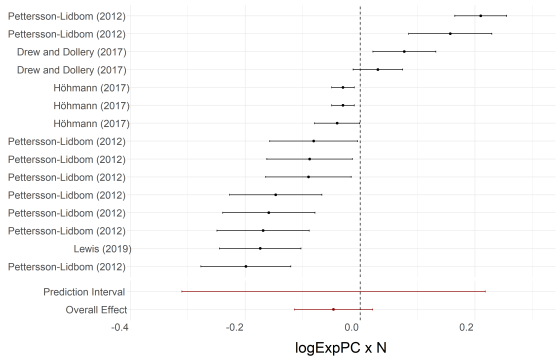
Figure 24: Effect of upper house size (K) on the public expenditure share of the GDP (PCTGDP)

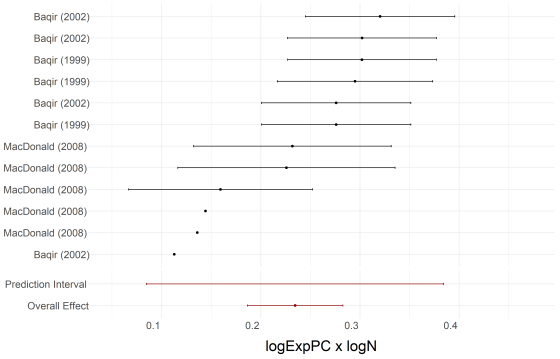
Highlights:

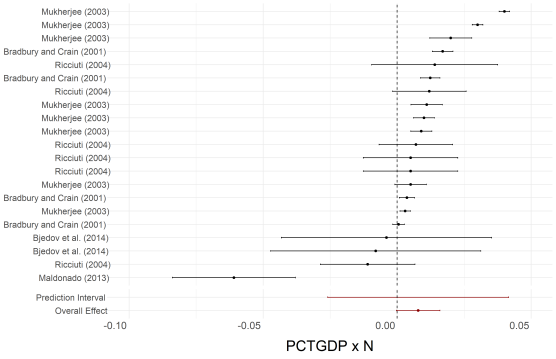
1. The results are highly heterogeneous: $I^2 = $ 80.01.
2. The Random effects modem SMD estimated is $g = $ 0.01 ($SE = 0.005$).
3. The prediction interval ranges from -0.02 to 0.03. Therefore, it emcompasses zero.

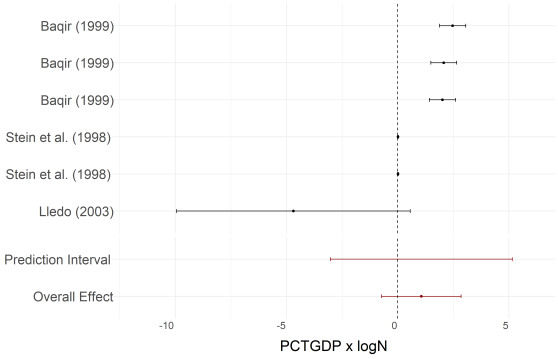

Crowley (2019)
Lee and Park (2018)
Crowley (2019)
Erier (2007)
Baskaran (2013)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Kessler (2014)
Kessler (2014)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Fiorino and Ricciuti (2007)
Kessler (2014)
Kessler (2014)
Lee (2016)
Schaltegger and Feld (2009)
Schaltegger and Feld (2009)
Bjedov et al. (2014)
Bjedov et al. (2014)
Crowley (2019)
Primo (2006)
Lee and Park (2018)
Matsusaka (2005)
Chen and Malhotra (2007)
Lee and Park (2018)
Primo (2006)
Primo (2006)
Chen and Malhotra (2007)
Primo (2006)
Prediction Interval
Overall Effect
-5
0
5
10
15
ExpPC x N

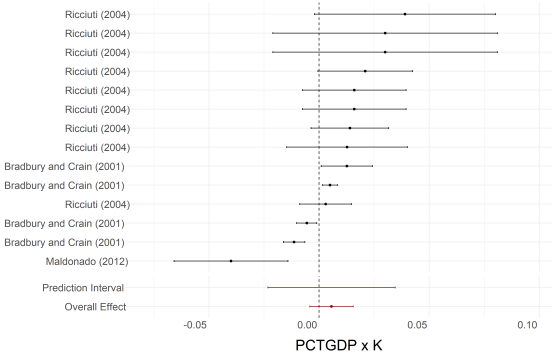

Lee (2016)
Lee (2016)
Chen and Malhotra (2007)
Chen and Malhotra (2007)
Lee (2016)
Lee (2016)
Chen and Malhotra (2007)
Lee and Park (2018)
Lee and Park (2018)
Crowley (2019)
Lee and Park (2018)
Crowley (2019)
Chen and Malhotra (2007)
Crowley (2019)
Primo (2006)
Lee (2016)
Primo (2006)
Primo (2006)
Chen and Malhotra (2007)
Chen and Malhotra (2007)
Chen and Malhotra (2007)
Lee (2016)
Primo (2006)
Bradbury and Stephenson (2009)
Prediction Interval
Overall Effect
0
50
ExpPC x K


Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Drew and Dollery (2017)
Drew and Dollery (2017)
Höhmann (2017)
Höhmann (2017)
Höhmann (2017)
Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Pettersson-Lidbom (2012)
Lewis (2019)
Pettersson-Lidbom (2012)
Prediction Interval
Overall Effect
-0.4
-0.2
0.0
0.2
logExpPC x N


Baqir (2002)
Baqir (2002)
Baqir (1999)
Baqir (1999)
Baqir (2002)
Baqir (1999)
MacDonald (2008)
MacDonald (2008)
MacDonald (2008)
MacDonald (2008)
MacDonald (2008)
Baqir (2002)
Prediction Interval
Overall Effect
0.1
0.2
0.3
0.4
logExpPC x logN


Mukherjee (2003)
Mukherjee (2003)
Mukherjee (2003)
Bradbury and Crain (2001)
Ricciuti (2004)
Bradbury and Crain (2001)
Ricciuti (2004)
Mukherjee (2003)
Mukherjee (2003)
Mukherjee (2003)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Mukherjee (2003)
Bradbury and Crain (2001)
Mukherjee (2003)
Bradbury and Crain (2001)
Bjedov et al. (2014)
Bjedov et al. (2014)
Ricciuti (2004)
Maldonado (2013)
Prediction Interval
Overall Effect
-0.10
-0.05
0.00
0.05
PCTGDP x N


Baqir (1999)
Baqir (1999)
Baqir (1999)
Stein et al. (1998)
Stein et al. (1998)
Lledo (2003)
Prediction Interval
Overall Effect
-10
-5
0
5
PCTGDP x logN


Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Ricciuti (2004)
Bradbury and Crain (2001)
Bradbury and Crain (2001)
Ricciuti (2004)
Bradbury and Crain (2001)
Bradbury and Crain (2001)
Maldonado (2012)
Prediction Interval
Overall Effect
-0.05
0.00
0.05
0.10
PCTGDP x K

Meta-regressions

Meta-regressions for Expenditure measured as

Meta-regressions for Expenditure as a Percentage of the GDP

```r
summary(mod)
```

```
##
## Mixed-Effects Model (k = 11; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##   7.0993  -14.1987    5.8013   -7.2672  225.8013
##
## tau^2 (estimated amount of residual heterogeneity):     0 (SE = 0.0001)
## tau (square root of estimated tau^2 value):             0
## I^2 (residual heterogeneity / unaccounted variability): 0.00%
## H^2 (unaccounted variability / sampling variability):   1.00
## R^2 (amount of heterogeneity accounted for):            100.00%
##
## Test for Residual Heterogeneity:
## QE(df = 2) = 0.5965, p-val = 0.7421
##
## Test of Moderators (coefficients 2:9):
## F(df1 = 8, df2 = 2) = 40.7363, p-val = 0.0242
##
## Model Results:
##
##                   estimate      se      tval    pval     ci.lb    ci.ub
## intrcpt             7.4330  1.7594    4.2248  0.0517   -0.1370  15.0030   .
## indepvar2logN      -4.7067  1.4637   -3.2156  0.0846  -11.0045   1.5912   .
## indepvar2N         -0.0094  0.0030   -3.1174  0.0893   -0.0223   0.0036   .
## year               -0.0003  0.0005   -0.6899  0.5615   -0.0024   0.0017
## publishedYes       -0.0633  0.0078   -8.1139  0.0149   -0.0969  -0.0297   *
## elecsys2Non-Maj    -2.0554  0.1611  -12.7621  0.0061   -2.7484  -1.3625  **
## methodPANEL         0.0556  0.0071    7.7913  0.0161    0.0249   0.0864   *
## agglevelStates     -4.6992  1.4637   -3.2106  0.0848  -10.9969   1.5984   .
## location2World     -4.6959  1.4637   -3.2082  0.0850  -10.9937   1.6019   .
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

As we have considerable heterogeneity in our sample, we run a permutation test to ensure the validity of our estimates. The results follow below.

```
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
```

```
##
## Test of Moderators (coefficients 2:9):
```

```
## F(df1 = 8, df2 = 2) = 40.7363, p-val* = 0.0060
##
## Model Results:
##
##                   estimate      se      tval   pval*     ci.lb    ci.ub
## intrcpt            7.4330  1.7594    4.2248  0.0290   -0.1370  15.0030   *
## indepvar2logN     -4.7067  1.4637   -3.2156  0.1770  -11.0045   1.5912
## indepvar2N        -0.0094  0.0030   -3.1174  0.0160   -0.0223   0.0036   *
## year              -0.0003  0.0005   -0.6899  0.4110   -0.0024   0.0017
## publishedYes      -0.0633  0.0078   -8.1139  0.0110   -0.0969  -0.0297   *
## elecsys2Non-Maj   -2.0554  0.1611  -12.7621  0.0050   -2.7484  -1.3625  **
## methodPANEL        0.0556  0.0071    7.7913  0.0110    0.0249   0.0864   *
## agglevelStates    -4.6992  1.4637   -3.2106  0.1740  -10.9969   1.5984
## location2World    -4.6959  1.4637   -3.2082  0.2240  -10.9937   1.6019
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

We have the following results for the meta-regressions of Expenditure Per Capita:

1. Compared with `K`, models with `N` and `logN` find significantly negative coefficients.
2. Year has null effect.
3. Unpublished papers tend to have higher coefficients than published papers.
4. Passing from `Majoritarian` to `Non-Majoritarian`, decreases significantly the effects found in our models.
5. In terms of the modeling, passing from `OLS` to `PANEL` increases the detected effects.
6. When passing from `Local` to `State` or `World` levels, it decreases the detected effect size.

Below we also run the meta-regressions adding all coefficients in the papers. The results follow below:

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 41; tau^2 estimator: REML)
##
##    logLik   deviance        AIC        BIC       AICc
##   89.1145  -178.2290  -158.2290  -143.5716  -147.7528
##
## tau^2 (estimated amount of residual heterogeneity):     0.0001 (SE = 0.0000)
## tau (square root of estimated tau^2 value):             0.0102
## I^2 (residual heterogeneity / unaccounted variability): 94.05%
## H^2 (unaccounted variability / sampling variability):   16.81
## R^2 (amount of heterogeneity accounted for):            99.92%
##
## Test for Residual Heterogeneity:
## QE(df = 32) = 1001.8067, p-val < .0001
##
## Test of Moderators (coefficients 2:9):
## F(df1 = 8, df2 = 32) = 29.7201, p-val < .0001
##
## Model Results:
##
##                   estimate      se      tval    pval     ci.lb    ci.ub
## intrcpt           -5.2700  5.8694   -0.8979  0.3760  -17.2256   6.6857
## indepvar2logN     -4.6069  2.4363   -1.8909  0.0677   -9.5696   0.3558    .
## indepvar2N        -0.0014  0.0048   -0.2945  0.7703   -0.0112   0.0084
```

```
## year                0.0060  0.0027    2.2730  0.0299    0.0006   0.0114    *
## publishedYes       -0.1130  0.0251   -4.5060  <.0001   -0.1641  -0.0619  ***
## elecsys2Non-Maj    -2.1629  0.1568  -13.7904  <.0001   -2.4823  -1.8434  ***
## methodPANEL         0.1252  0.0304    4.1232  0.0002    0.0633   0.1870  ***
## agglevelStates     -4.7325  2.4361   -1.9426  0.0609   -9.6947   0.2298    .
## location2World     -4.6443  2.4362   -1.9064  0.0656   -9.6067   0.3181    .
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Test of Moderators (coefficients 2:9):
## F(df1 = 8, df2 = 32) = 29.7201, p-val* = 0.0010
##
## Model Results:
##
##                   estimate      se      tval   pval*     ci.lb    ci.ub
## intrcpt           -5.2700  5.8694   -0.8979  0.2670  -17.2256   6.6857
## indepvar2logN     -4.6069  2.4363   -1.8909  0.1010   -9.5696   0.3558
## indepvar2N        -0.0014  0.0048   -0.2945  0.7280   -0.0112   0.0084
## year               0.0060  0.0027    2.2730  0.0030    0.0006   0.0114   **
## publishedYes      -0.1130  0.0251   -4.5060  0.0060   -0.1641  -0.0619   **
## elecsys2Non-Maj   -2.1629  0.1568  -13.7904  0.0010   -2.4823  -1.8434  ***
## methodPANEL        0.1252  0.0304    4.1232  0.0060    0.0633   0.1870   **
## agglevelStates    -4.7325  2.4361   -1.9426  0.0870   -9.6947   0.2298    .
## location2World    -4.6443  2.4362   -1.9064  0.1050   -9.6067   0.3181
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

For all the coefficients, we have the following results:

1. Compared with `K`, models with `N` and `logN` tend to have significantly negative coefficients.
2. Year has a positive effect: the younger the publication, the higher the detected coefficient.
3. Unpublished papers tend to have higher coefficients than published papers.
4. Passing from `Majoritarian` to `Non-Majoritarian`, decreases significantly the effects found in our models.
5. In terms of the modeling, passing from `OLS` to `PANEL` increases the detected effects.
6. When passing from `Local` to `State` or `World` levels, it decreases the detected effect size.

Meta-regressions for Expenditure Per Capita

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 18; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -34.6251   69.2502   85.2502   88.4333  157.2502
##
## tau^2 (estimated amount of residual heterogeneity):     1.8429 (SE = 1.2361)
## tau (square root of estimated tau^2 value):             1.3575
## I^2 (residual heterogeneity / unaccounted variability): 95.05%
## H^2 (unaccounted variability / sampling variability):   20.21
## R^2 (amount of heterogeneity accounted for):            0.00%
```

```
##
## Test for Residual Heterogeneity:
## QE(df = 11) = 45.4940, p-val < .0001
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 11) = 0.3429, p-val = 0.8998
##
## Model Results:
##
##                  estimate        se     tval    pval      ci.lb     ci.ub
## intrcpt         -104.0701  318.9300  -0.3263  0.7503  -806.0302  597.8900
## indepvar2N        -2.9238    2.0932  -1.3968  0.1900    -7.5309    1.6834
## year               0.0525    0.1586   0.3308  0.7470    -0.2967    0.4017
## elecsys2Non-Maj    0.3458    1.5533   0.2226  0.8279    -3.0730    3.7645
## methodPANEL        1.4571    2.2376   0.6512  0.5283    -3.4679    6.3821
## methodIV           1.4936    2.6675   0.5599  0.5868    -4.3776    7.3648
## agglevelStates    -0.0915    2.4255  -0.0377  0.9706    -5.4299    5.2470
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

As we have considerable heterogeneity in our sample, we run a permutation test to ensure the validity of our estimates. The results follow below.

```
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
## Error in rma.uni(x$yi, x$vi, weights = x$weights, mods = cbind(X[sample(x$k),  :
##   Fisher scoring algorithm did not converge. See 'help(rma)' for possible remedies.
```

```
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 11) = 0.3429, p-val* = 0.5750
##
## Model Results:
##
##                  estimate        se     tval   pval*      ci.lb     ci.ub
## intrcpt         -104.0701  318.9300  -0.3263  0.6080  -806.0302  597.8900
## indepvar2N        -2.9238    2.0932  -1.3968  0.0840    -7.5309    1.6834  .
## year               0.0525    0.1586   0.3308  0.5990    -0.2967    0.4017
## elecsys2Non-Maj    0.3458    1.5533   0.2226  0.7430    -3.0730    3.7645
## methodPANEL        1.4571    2.2376   0.6512  0.3410    -3.4679    6.3821
## methodIV           1.4936    2.6675   0.5599  0.4430    -4.3776    7.3648
## agglevelStates    -0.0915    2.4255  -0.0377  0.9500    -5.4299    5.2470
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

We have the following results for the meta-regressions of Expenditure Per Capita:

1. Compared with `K`, models with `N` tend to detect significantly smaller effects.
2. Year has null effect.
3. Passing the electoral rules from `Majoritarian` to `Non-Majoritarian`, increases significantly the per

capita expenditure found in our models.

4. In terms of the modeling, passing from `OLS` to `PANEL` or `IV` increases the detected effects.
5. When passing from `Local` to `State` level, decreases the detected effects.

Below we also run the meta-regressions adding all coefficients in the papers. The results follow below:

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 60; tau^2 estimator: REML)
##
##    logLik   deviance        AIC        BIC       AICc
## -141.1228   282.2456   298.2456   314.0079   301.5183
##
## tau^2 (estimated amount of residual heterogeneity):     1.7264 (SE = 0.4944)
## tau (square root of estimated tau^2 value):             1.3139
## I^2 (residual heterogeneity / unaccounted variability): 99.80%
## H^2 (unaccounted variability / sampling variability):   500.07
## R^2 (amount of heterogeneity accounted for):            39.21%
##
## Test for Residual Heterogeneity:
## QE(df = 53) = 325.8548, p-val < .0001
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 53) = 5.9441, p-val < .0001
##
## Model Results:
##
##                   estimate        se     tval    pval      ci.lb    ci.ub
## intrcpt          -296.9072  166.6870  -1.7812  0.0806  -631.2389  37.4245    .
## indepvar2N         -5.4468    0.9692  -5.6201  <.0001    -7.3907  -3.5029  ***
## year                0.1503    0.0830   1.8117  0.0757    -0.0161   0.3167    .
## elecsys2Non-Maj     1.0236    0.7701   1.3293  0.1894    -0.5209   2.5682
## methodPANEL        -0.1422    0.8136  -0.1747  0.8620    -1.7739   1.4896
## methodIV            0.1907    0.8223   0.2319  0.8175    -1.4587   1.8401
## agglevelStates     -0.2008    1.0049  -0.1998  0.8424    -2.2164   1.8149
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 53) = 5.9441, p-val* = 0.0010
##
## Model Results:
##
##                   estimate        se     tval   pval*      ci.lb    ci.ub
## intrcpt          -296.9072  166.6870  -1.7812  0.0240  -631.2389  37.4245    *
## indepvar2N         -5.4468    0.9692  -5.6201  0.0010    -7.3907  -3.5029  ***
## year                0.1503    0.0830   1.8117  0.0230    -0.0161   0.3167    *
## elecsys2Non-Maj     1.0236    0.7701   1.3293  0.0810    -0.5209   2.5682    .
## methodPANEL        -0.1422    0.8136  -0.1747  0.8180    -1.7739   1.4896
## methodIV            0.1907    0.8223   0.2319  0.7530    -1.4587   1.8401
## agglevelStates     -0.2008    1.0049  -0.1998  0.7610    -2.2164   1.8149
##
## ---
```

```
## 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 `K`, models with `N` tend to detect significantly smaller effects.
2. Year has now a positive effect on coefficient sizes.
3. Passing the electoral rules from `Majoritarian` to `Non-Majoritarian`, increases significantly the effects on per capita expenditure found in our models.
4. In terms of the modeling, passing from `OLS` to `PANEL` decreases the detected effects.
5. All other coeffients were not significant.

Meta-regressions for the Log of Expenditure Per Capita

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 7; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##   0.8657   -1.7315   12.2685   -1.7315  124.2685
##
## tau^2 (estimated amount of residual heterogeneity):     0.0096 (SE = 0.0147)
## tau (square root of estimated tau^2 value):             0.0977
## I^2 (residual heterogeneity / unaccounted variability): 92.15%
## H^2 (unaccounted variability / sampling variability):   12.74
## R^2 (amount of heterogeneity accounted for):            65.22%
##
## Test for Residual Heterogeneity:
## QE(df = 1) = 12.7408, p-val = 0.0004
##
## Test of Moderators (coefficients 2:6):
## F(df1 = 5, df2 = 1) = 2.9742, p-val = 0.4128
##
## Model Results:
##
##                 estimate       se     tval    pval      ci.lb     ci.ub
## intrcpt           8.9590  47.6441   0.1880  0.8817  -596.4166  614.3346
## indepvar2logN     0.1641   0.3258   0.5037  0.7029    -3.9760    4.3043
## year             -0.0044   0.0237  -0.1864  0.8827    -0.3053    0.2965
## publishedYes     -0.1520   0.1902  -0.7993  0.5707    -2.5687    2.2647
## methodPANEL       0.2581   0.1886   1.3680  0.4018    -2.1389    2.6550
## agglevelStates   -0.0875   0.1901  -0.4602  0.7254    -2.5028    2.3278
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

As we have considerable heterogeneity in our sample, we run a permutation test to ensure the validity of our estimates. The results follow below.

```
##
## Test of Moderators (coefficients 2:6):
## F(df1 = 5, df2 = 1) = 2.9742, p-val* = 0.4130
##
## Model Results:
##
##                 estimate       se     tval   pval*      ci.lb     ci.ub
```

```
## intrcpt           8.9590  47.6441   0.1880  0.9190  -596.4166  614.3346
## indepvar2logN     0.1641   0.3258   0.5037  0.7200    -3.9760    4.3043
## year             -0.0044   0.0237  -0.1864  0.9200    -0.3053    0.2965
## publishedYes     -0.1520   0.1902  -0.7993  0.6180    -2.5687    2.2647
## methodPANEL       0.2581   0.1886   1.3680  0.4040    -2.1389    2.6550
## agglevelStates   -0.0875   0.1901  -0.4602  0.7150    -2.5028    2.3278
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

	Estimate	SE	T	P-Value	CI
Intercept	8.959	47.644	0.188	0.919	(-596.4166 ; 614.3346)
Indepvar: N	0.164	0.326	0.504	0.720	(-3.976 ; 4.3043)
Year	-0.004	0.024	-0.186	0.920	(-0.3053 ; 0.2965)
Published: No	-0.152	0.190	-0.799	0.618	(-2.5687 ; 2.2647)
Method: Panel	0.258	0.189	1.368	0.404	(-2.1389 ; 2.655)
AggLevel: States	-0.087	0.190	-0.460	0.715	(-2.5028 ; 2.3278)

We have the following results for the meta-regressions of Log of Expenditure Per Capita:

1. Unpublished papers report a significantly higher coefficient.
2. In terms of the modeling, passing from `OLS` to `PANEL` increases the detected effects.
3. All other coefficients remained insignificant.

Below we also run the meta-regressions adding all coefficients in the papers. The results follow below:

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 27; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##  21.9924  -43.9848  -27.9848  -20.0190  -14.8939
##
## tau^2 (estimated amount of residual heterogeneity):     0.0051 (SE = 0.0021)
## tau (square root of estimated tau^2 value):             0.0716
## I^2 (residual heterogeneity / unaccounted variability): 86.93%
## H^2 (unaccounted variability / sampling variability):   7.65
## R^2 (amount of heterogeneity accounted for):            82.37%
##
## Test for Residual Heterogeneity:
## QE(df = 20) = 98.5701, p-val < .0001
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 20) = 16.9707, p-val < .0001
##
## Model Results:
##
##                 estimate       se     tval    pval     ci.lb    ci.ub
## intrcpt          -1.5738  15.8830  -0.0991  0.9221  -34.7051  31.5574
## indepvar2logN    -0.0088   0.1262  -0.0701  0.9448   -0.2721   0.2544
## year              0.0009   0.0079   0.1187  0.9067   -0.0155   0.0174
## publishedYes     -0.0829   0.0728  -1.1387  0.2683   -0.2347   0.0689
## methodPANEL      -0.2436   0.0705  -3.4537  0.0025   -0.3908  -0.0965   **
```

```
## methodRDD        -0.2978   0.0656  -4.5398  0.0002   -0.4347  -0.1610  ***
## agglevelStates   -0.0438   0.0673  -0.6505  0.5228   -0.1842   0.0966
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Test of Moderators (coefficients 2:7):
## F(df1 = 6, df2 = 20) = 16.9707, p-val* = 0.0010
##
## Model Results:
##
##                 estimate       se     tval   pval*     ci.lb    ci.ub
## intrcpt          -1.5738  15.8830  -0.0991  0.9240  -34.7051  31.5574
## indepvar2logN    -0.0088   0.1262  -0.0701  0.9400   -0.2721   0.2544
## year              0.0009   0.0079   0.1187  0.9090   -0.0155   0.0174
## publishedYes     -0.0829   0.0728  -1.1387  0.2610   -0.2347   0.0689
## methodPANEL      -0.2436   0.0705  -3.4537  0.0030   -0.3908  -0.0965   **
## methodRDD        -0.2978   0.0656  -4.5398  0.0010   -0.4347  -0.1610  ***
## agglevelStates   -0.0438   0.0673  -0.6505  0.5260   -0.1842   0.0966
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

With all coefficients, the results of the effect sizes on the Log of Expenditure Per Capita Regressions are the following:

1. In terms of the modeling, passing from `OLS` to `PANEL` or `RDD` decreases the detected effects.
2. All other coefficients remained insignificant.

Summary of Results

	ExpPC			logExpPC			PCTGDP		
	Estimate	SE	P-Value	Estimate	SE	P-Value	Estimate	SE	P-Value
Base									
Intercept	-104.070	318.930	0.750	8.959	47.644	0.882	7.4330	1.7594	0.0517
Indepvar: N	-2.924	2.093	0.190	0.164	0.326	0.703	-4.7067	1.4637	0.0846
Indepvar: logN	NA	NA	NA	NA	NA	NA	-0.0094	0.0030	0.0893
Year	0.052	0.159	0.747	-0.004	0.024	0.883	-0.0003	0.0005	0.5615
Published: No	NA	NA	NA	-0.152	0.190	0.571	-0.0633	0.0078	0.0149
Elecsys: Non-Majoritarian	0.346	1.553	0.828	NA	NA	NA	-2.0554	0.1611	0.0061
Method: Panel	1.457	2.238	0.528	0.258	0.189	0.402	0.0556	0.0071	0.0161
Method: IV	1.494	2.668	0.587	NA	NA	NA	NA	NA	NA
AggLevel: States	-0.091	2.425	0.971	-0.087	0.190	0.725	-4.6992	1.4637	0.0848
Location: World	NA	NA	NA	NA	NA	NA	-4.6959	1.4637	0.0850
All Coefs									
Intercept	-296.907	166.687	0.081	-1.574	15.883	0.922	-5.2700	5.8690	0.3760
Indepvar: N	-5.447	0.969	0.000	-0.009	0.126	0.945	-4.6070	2.4360	0.0680
Indepvar: logN	NA	NA	NA	NA	NA	NA	-0.0010	0.0050	0.7700
Year	0.150	0.083	0.076	0.001	0.008	0.907	0.0060	0.0030	0.0300
Published: No	NA	NA	NA	-0.083	0.073	0.268	-0.1130	0.0250	0.0000
Elecsys: Non-Majoritarian	1.024	0.770	0.189	NA	NA	NA	-2.1630	0.1570	0.0000
Method: Panel	-0.142	0.814	0.862	-0.244	0.071	0.003	0.1250	0.0300	0.0000
Method: IV	0.191	0.822	0.817	NA	NA	NA	NA	NA	NA
AggLevel: States	-0.201	1.005	0.842	-0.044	0.067	0.523	-4.7320	2.4360	0.0610
Location: World	NA	NA	NA	NA	NA	NA	-4.6440	2.4360	0.0660

Summary of Results (Permutation)

	ExpPC			logExpPC			PCTGDP		
	Estimate	SE	P-Value	Estimate	SE	P-Value	Estimate	SE	P-Value
Base									
Intercept	-104.070	318.930	0.608	8.959	47.644	0.919	7.433	1.759	0.029
Indepvar: N	-2.924	2.093	0.084	0.164	0.326	0.720	-4.707	1.464	0.177
Indepvar: logN	NA	NA	NA	NA	NA	NA	-0.009	0.003	0.016
Year	0.052	0.159	0.599	-0.004	0.024	0.920	0.000	0.000	0.411
Published: No	NA	NA	NA	-0.152	0.190	0.618	-0.063	0.008	0.011
Elecsys: Non-Majoritarian	0.346	1.553	0.743	NA	NA	NA	-2.055	0.161	0.005
Method: Panel	1.457	2.238	0.341	0.258	0.189	0.404	0.056	0.007	0.011
Method: IV	1.494	2.668	0.443	NA	NA	NA	NA	NA	NA
AggLevel: States	-0.091	2.425	0.950	-0.087	0.190	0.715	-4.699	1.464	0.174
Location: World	NA	NA	NA	NA	NA	NA	-4.696	1.464	0.224
All Coefs									
Intercept	-296.907	166.687	0.024	-1.574	15.883	0.924	-5.270	5.869	0.267
Indepvar: N	-5.447	0.969	0.001	-0.009	0.126	0.940	-4.607	2.436	0.101
Indepvar: logN	NA	NA	NA	NA	NA	NA	-0.001	0.005	0.728
Year	0.150	0.083	0.023	0.001	0.008	0.909	0.006	0.003	0.003
Published: No	NA	NA	NA	-0.083	0.073	0.261	-0.113	0.025	0.006
Elecsys: Non-Majoritarian	1.024	0.770	0.081	NA	NA	NA	-2.163	0.157	0.001
Method: Panel	-0.142	0.814	0.818	-0.244	0.071	0.003	0.125	0.030	0.006
Method: IV	0.191	0.822	0.753	NA	NA	NA	NA	NA	NA
AggLevel: States	-0.201	1.005	0.761	-0.044	0.067	0.526	-4.732	2.436	0.087
Location: World	NA	NA	NA	NA	NA	NA	-4.644	2.436	0.105

Theory of Meta Analysis

There are two main estimators for conducting meta analysis: fixed effects and random effects models. The fixed effects model assumes that there is one true effect in reality, and that all estimates are an attempt to uncover this true effect. The random effects model, on the other hand, assumes that there are a distribution of true effects, that vary based on sample and tests characteristics.

In this paper, we use the 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. **Subjects**: Counties, Municipalities, States, Provinces, Countries.
2. **Electoral systems**: Majoritarian, PR, Mixed.
3. **Modeling strategies**: Panel data, Standard OLS, IV, RDD.

These sources of heterogeneity have two implications. First, it makes our estimates very disperse. The heterogeneity tests are all but one significant. When the sample sizes are large enough, we removed more heterogeneous studies, but we still had considerable dispersion in our estimates. Second, the amount of heterogeneity makes fixed effects estimates unrealistic and bised. Thus, we opt for random effects model.

Let each study having an effect of T_i. In a random effects model, we can decompose this effect in two components, the true effect that the study with the same specifications as i come 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.

In all empirical estimates, we use the package `meta`, and the package `dmetar`, described in (Doing Meta-Analysis with R)[https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/random.html]. To empirically implement the random effects model, we need to choose a method to estimate the true effect size variance, τ^2, which in our formulation, represents the variance of ξ_i. We selected the **Restricted Maximum Likelihood Estimator**, as the literature regards it as more precise when we have continuous measures, such as we have on our data (link)[https://www.ncbi.nlm.nih.gov/pubmed/26332144].

Robustness: Full model meta-regressions combined

In this section, we aggregate all the coefficients and run a multivariate meta-regression, controlling by:

1. The type of the dependent variable in the study (expenditure per capita, log of the expenditure per capita, and share of government expenditure in the GDP)
2. The type of the independent variable in the stydy (N, K, log of N);
3. The electoral system (Majoritarian, Proportional Representation, and Mixed).

The results follow below, and show null effect for all variables, including the intercept.

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 36; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
```

```
## -47.9845   95.9689  125.9689  142.3345  205.9689
##
## tau^2 (estimated amount of residual heterogeneity):     0.2315 (SE = 0.1007)
## tau (square root of estimated tau^2 value):             0.4812
## I^2 (residual heterogeneity / unaccounted variability): 99.94%
## H^2 (unaccounted variability / sampling variability):   1599.58
## R^2 (amount of heterogeneity accounted for):            0.00%
##
## Test for Residual Heterogeneity:
## QE(df = 22) = 175.9758, p-val < .0001
##
## Test of Moderators (coefficients 2:14):
## F(df1 = 13, df2 = 22) = 0.3352, p-val = 0.9772
##
## Model Results:
##
##                    estimate        se     tval    pval      ci.lb     ci.ub
## intrcpt            -22.1882  122.5298  -0.1811  0.8580  -276.2994  231.9230
## depvar2logExpPC     -0.5979    0.8526  -0.7012  0.4905    -2.3661    1.1704
## depvar2PCTGDP        0.1796    0.8381   0.2143  0.8323    -1.5585    1.9176
## indepvar2logN        0.4376    1.6148   0.2710  0.7889    -2.9113    3.7865
## indepvar2N          -0.4922    0.5236  -0.9400  0.3574    -1.5780    0.5937
## year                 0.0114    0.0609   0.1875  0.8530    -0.1148    0.1376
## publishedYes        -0.2843    0.6541  -0.4346  0.6681    -1.6408    1.0723
## elecsys2Non-Maj      0.2724    0.6284   0.4335  0.6689    -1.0308    1.5755
## methodPANEL          0.1754    0.7126   0.2461  0.8079    -1.3025    1.6532
## methodIV             0.0336    1.0078   0.0334  0.9737    -2.0565    2.1237
## methodRDD            0.2411    1.2612   0.1912  0.8501    -2.3745    2.8567
## agglevelStates      -0.2400    0.7393  -0.3247  0.7485    -1.7733    1.2932
## agglevelCountries   -1.4929    1.2027  -1.2414  0.2275    -3.9871    1.0013
## location2World       0.7437    1.5559   0.4780  0.6374    -2.4830    3.9704
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

As we have considerable heterogeneity in our sample, we run a permutation test to ensure the validity of our estimates. The results follow below.

```
##
## Test of Moderators (coefficients 2:14):
## F(df1 = 13, df2 = 22) = 0.3352, p-val* = 0.6810
##
## Model Results:
##
##                    estimate        se     tval   pval*      ci.lb     ci.ub
## intrcpt            -22.1882  122.5298  -0.1811  0.8070  -276.2994  231.9230
## depvar2logExpPC     -0.5979    0.8526  -0.7012  0.3270    -2.3661    1.1704
## depvar2PCTGDP        0.1796    0.8381   0.2143  0.7120    -1.5585    1.9176
## indepvar2logN        0.4376    1.6148   0.2710  0.7250    -2.9113    3.7865
## indepvar2N          -0.4922    0.5236  -0.9400  0.1670    -1.5780    0.5937
## year                 0.0114    0.0609   0.1875  0.8070    -0.1148    0.1376
## publishedYes        -0.2843    0.6541  -0.4346  0.5280    -1.6408    1.0723
## elecsys2Non-Maj      0.2724    0.6284   0.4335  0.5160    -1.0308    1.5755
## methodPANEL          0.1754    0.7126   0.2461  0.6910    -1.3025    1.6532
## methodIV             0.0336    1.0078   0.0334  0.9640    -2.0565    2.1237
```

```
## methodRDD            0.2411    1.2612   0.1912  0.7710    -2.3745    2.8567
## agglevelStates      -0.2400    0.7393  -0.3247  0.6070    -1.7733    1.2932
## agglevelCountries   -1.4929    1.2027  -1.2414  0.2370    -3.9871    1.0013
## location2World       0.7437    1.5559   0.4780  0.5810    -2.4830    3.9704
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

In the main text, we selected the coefficients based on the regressions that had most observations and that presented a full model (with fixed effects or intermediate bandwidth in RDD). Below we also run the meta-regressions adding all coefficients in the papers. The results follow below:

```
summary(mod)
```

```
##
## Mixed-Effects Model (k = 128; tau^2 estimator: REML)
##
##    logLik   deviance        AIC        BIC       AICc
## -192.2430   384.4860   414.4860   455.5290   419.3840
##
## tau^2 (estimated amount of residual heterogeneity):     0.0624 (SE = 0.0108)
## tau (square root of estimated tau^2 value):             0.2498
## I^2 (residual heterogeneity / unaccounted variability): 99.96%
## H^2 (unaccounted variability / sampling variability):   2838.73
## R^2 (amount of heterogeneity accounted for):            66.57%
##
## Test for Residual Heterogeneity:
## QE(df = 114) = 2083.6861, p-val < .0001
##
## Test of Moderators (coefficients 2:14):
## F(df1 = 13, df2 = 114) = 2.7571, p-val = 0.0019
##
## Model Results:
##
##                     estimate       se     tval    pval     ci.lb     ci.ub
## intrcpt              38.5165  36.3251   1.0603  0.2912  -33.4434  110.4763
## depvar2logExpPC     -0.3311   0.2342  -1.4139  0.1601   -0.7949    0.1328
## depvar2PCTGDP        0.4967   0.3068   1.6189  0.1082   -0.1111    1.1044
## indepvar2logN        0.1689   0.4677   0.3611  0.7187   -0.7576    1.0954
## indepvar2N          -0.1467   0.1451  -1.0113  0.3140   -0.4342    0.1407
## year                -0.0190   0.0180  -1.0533  0.2944   -0.0547    0.0167
## publishedYes         0.0690   0.1689   0.4088  0.6834   -0.2655    0.4036
## elecsys2Non-Maj      0.6244   0.2274   2.7464  0.0070    0.1740    1.0748   **
## methodPANEL         -0.1833   0.1588  -1.1546  0.2507   -0.4978    0.1312
## methodIV            -0.1452   0.2364  -0.6139  0.5405   -0.6135    0.3232
## methodRDD           -0.2569   0.2618  -0.9812  0.3286   -0.7756    0.2618
## agglevelStates      -0.5263   0.2324  -2.2648  0.0254   -0.9867   -0.0659    *
## agglevelCountries   -1.8292   0.4527  -4.0406  <.0001   -2.7261   -0.9324  ***
## location2World       0.4062   0.4891   0.8305  0.4080   -0.5627    1.3751
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Test of Moderators (coefficients 2:14):
## F(df1 = 13, df2 = 114) = 2.7571, p-val* = 0.0010
```

```
##
## Model Results:
##
##                     estimate       se     tval   pval*     ci.lb     ci.ub
## intrcpt              38.5165  36.3251   1.0603  0.1320  -33.4434  110.4763
## depvar2logExpPC      -0.3311   0.2342  -1.4139  0.0390   -0.7949    0.1328    *
## depvar2PCTGDP         0.4967   0.3068   1.6189  0.0230   -0.1111    1.1044    *
## indepvar2logN         0.1689   0.4677   0.3611  0.5700   -0.7576    1.0954
## indepvar2N           -0.1467   0.1451  -1.0113  0.1340   -0.4342    0.1407
## year                 -0.0190   0.0180  -1.0533  0.1330   -0.0547    0.0167
## publishedYes          0.0690   0.1689   0.4088  0.5460   -0.2655    0.4036
## elecsys2Non-Maj       0.6244   0.2274   2.7464  0.0010    0.1740    1.0748  ***
## methodPANEL          -0.1833   0.1588  -1.1546  0.0980   -0.4978    0.1312    .
## methodIV             -0.1452   0.2364  -0.6139  0.3560   -0.6135    0.3232
## methodRDD            -0.2569   0.2618  -0.9812  0.1370   -0.7756    0.2618
## agglevelStates       -0.5263   0.2324  -2.2648  0.0020   -0.9867   -0.0659   **
## agglevelCountries    -1.8292   0.4527  -4.0406  0.0010   -2.7261   -0.9324  ***
## location2World        0.4062   0.4891   0.8305  0.2210   -0.5627    1.3751
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```