

Linking Regional Income Inequality to Government Spending: A Spatial Concept of Redistributive Government Spending

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RESEARCH QUESTIONS

Democracies, where the majority of influential voting power is theoretically held by the poor, rarely engage in large-scaled redistribution.

- Why do the poor oppose expansionary government spending when it would be in their interest to support fiscal expansion?**
- What difference does it make that poor live in a poor region, compared to the poor living in a rich region?**
- How does institutional structure affect the individual redistributive motives shaped by geographic aggregation of interests?**

ARGUMENT

- Inequality in regional wealth constrains government distribution because
 - Region trumps individual redistributive motives.
 - Rich regions opposes redistribution that go to poor regions.
 - Decentralization amplifies policy gridlock on redistributive spending.

ROADMAP

- ❑ **Conceptual challenges in understanding income inequality**
- ❑ **EITM as a frame work (Micro-level)**
 - ❑ **STEP1: Developing a theoretical concept -- how regions affect individual redistributive motives (decision making)? And a statistical concept -- do individuals support redistributive policy or not (nominal choice)?**
 - ❑ **STEP2: Developing an individual utility model for redistribution and statistical analogues (binary choice – Support or not).**
 - ❑ **STEP3: Unifying this behavioral model with statistical analogues in the multilevel survey data analysis of spatial effects on the probability of public support for redistribution.**
- ❑ **Institutional Implication on Redistribution (Macro-level)**
- ❑ **Conclusion**

GOVERNMENTS CARE ABOUT THE RISE OF INCOME INEQUALITY BECAUSE ...

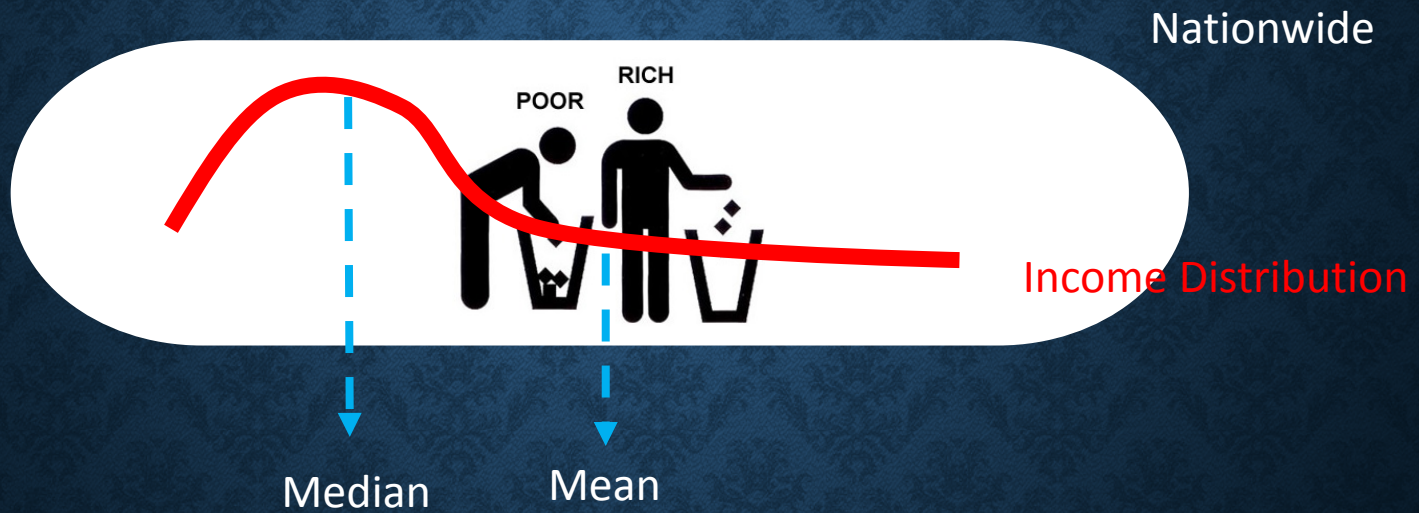


Social backlash against government policies

Political instability

Discouragement to economic investment

INEQUALITY IN NATIONALLY AGGREGATED INDIVIDUAL INCOME DISTRIBUTION



(RMR) THEORY OF INTER-PERSONAL INEQUALITY

- ❑ The main theory in the literature expects that higher inter-personal inequality should lead to more redistribution because the median income voters, earning much lower than the average, become highly motivated to press policy demands to correct such disparity (Romer 1975; Meltzer and Richard 1981).
- ❑ Assumptions for the Romer-Meltzer-Richard (RMR) modelers: policies determined by median voters under majoritarian voting rules in a single polity.

THEORY OF INTER-PERSONAL INEQUALITY

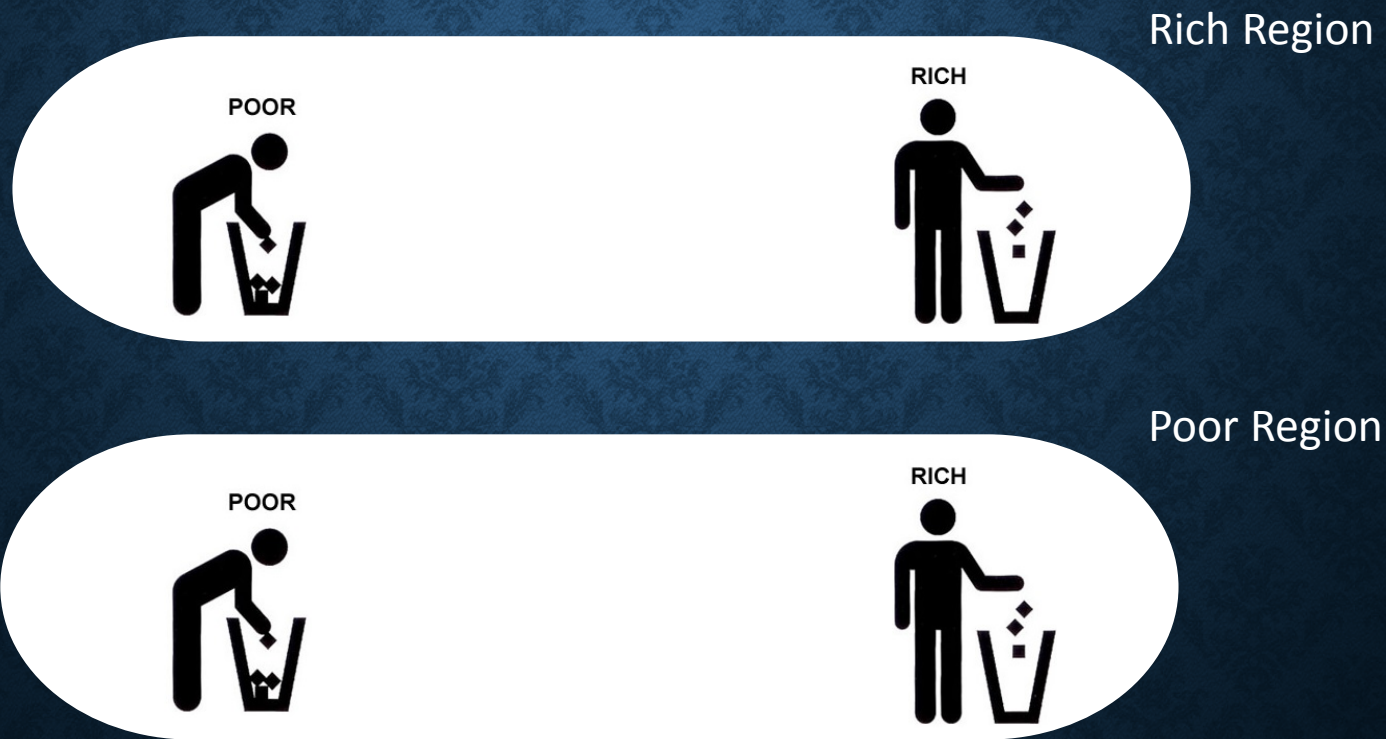
Both existing theory and empirical measurement of inter-personal inequality, however, have provided only an incomplete picture of redistributive politics.

- This theory underestimates the bargaining power of groups to oppose expansion of redistribution as inequality grows more disparate (Giuranno 2009; Beramendi 2012). This important omission may result in misrepresenting the politics of inequality in any nation.

THEORY OF INTER-PERSONAL INEQUALITY (CONT'D)

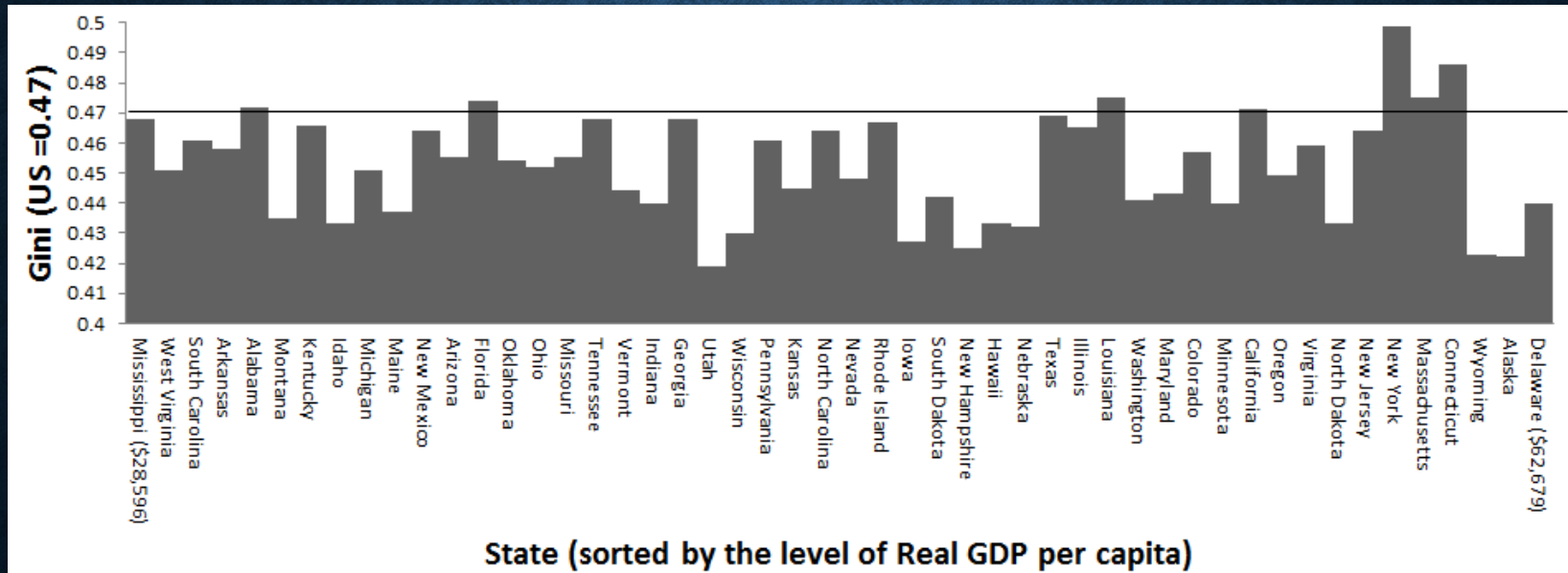
- ❑ Current empirical measures of inter-personal inequality are also inadequate because they capture inter-personal inequality only by aggregation at the national level. Critiques of these measures typically focus on the calculation of a formula appropriate to measure inequality and how adequately that represents political reality or not (Piketty & Saez 2006; Lupe & Pontusson 2011).
- ❑ Analyses of income inequality have mainly focused on interpersonal factor neglecting the spatial dynamics of income spreads. Policy is, however, influenced by more than the individual, given that political institutions cause various configurations of collective identity driving distributive concerns, including political geography.

INEQUALITY IN INTER-REGIONAL INCOME DISTRIBUTION



The region has less inequality than the country-wide.

US STATES BY GINI COEFFICIENT OF INDIVIDUAL INCOME INEQUALITY (2010)



Data Source: the American Community Survey conducted by the US census Bureau, 2010.

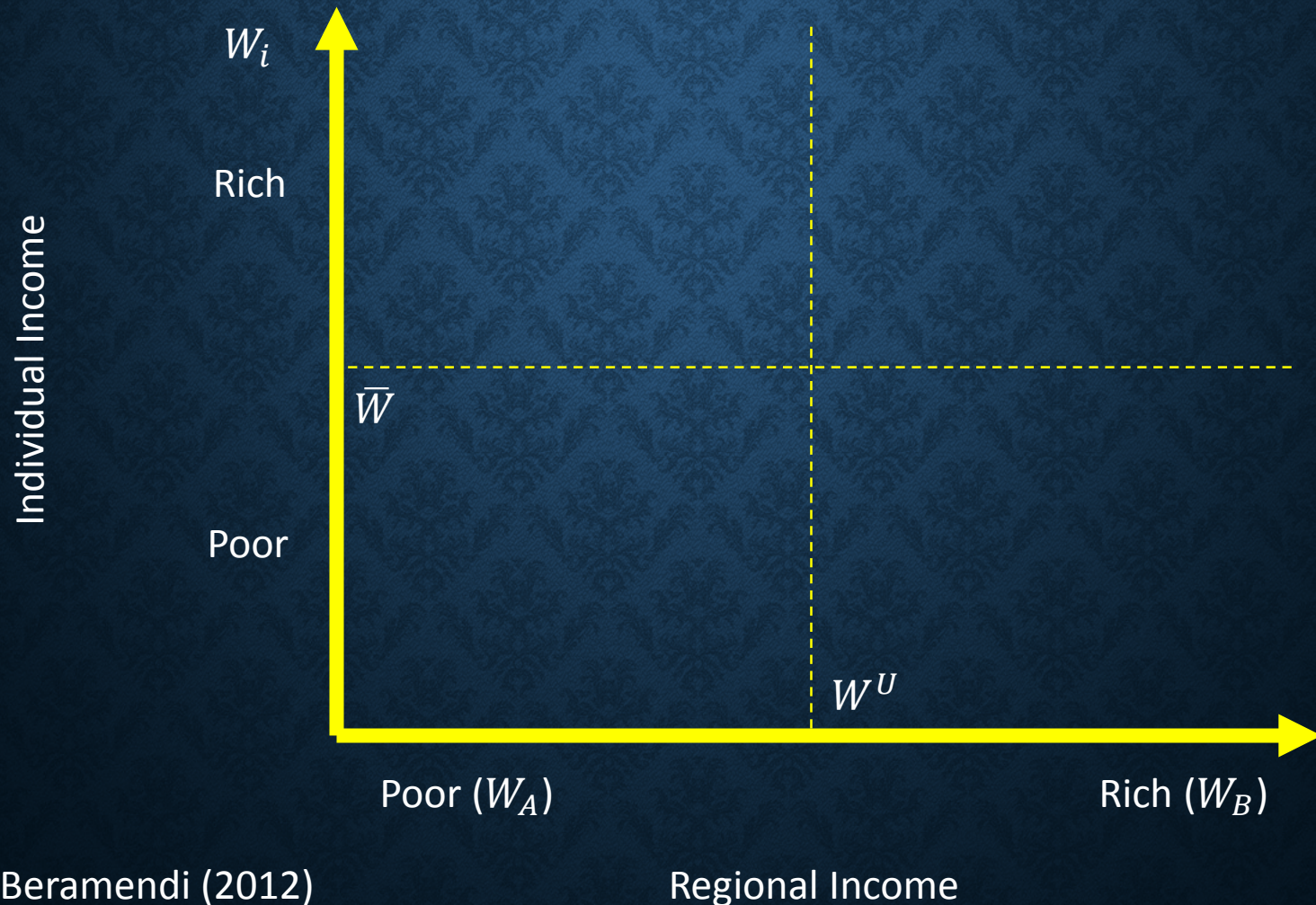
THEORY OF INTER-REGIONAL INEQUALITY

- ❑ The political economy research emphasizes the political interests of regional economic transfers, with specific comparison to inter-personal inequality (Bolton & Roland 1997; Beramendi 2007).
- ❑ Policy studies of inter-regional inequality attempt to explain the economic and political sources of its divergence, not the reverse: Inter-regional inequality's effects on politics (c.f. Lessmman 2009; Rodriguez-pose & Ezcurra 2010).
- ❑ Scholars in geography and regional studies have measured income inequality by geographic region, but have not applied these measures to concept of government spending for the nation as a whole.

RESEARCH EXTENSION I

- ❑ Develop a theoretical model for the individual redistributive motives shaped by geographic aggregation of interests (c.f. Beramendi 2012). This model assumes that every individual desires to maximize benefits from redistribution, but also to minimize her share of the costs attended to the redistribution (extracted from taxation).
- ❑ Argument: policies preferred by both rich and poor individuals tend to be collectively formed by levels of wealth pertinent to the region where they reside.

INCOME DISPARITY AND POLICY PREFERENCE



Source: Beramendi (2012)

Regional Income

UTILITY MODEL (IN A SINGLE POLITY)

$$U_i = \alpha[W_i(1 - t_i)] + (1 - \alpha)b - (\beta/2)t_i^2$$

Individual consumption

W_i individual income

i individual person

t level of inter-personal redistribution.

α probability that individuals might be employed at any given time.

b the benefits individuals received while unemployed.

$(\beta/2)t^2$ inefficiency cost of taxation (due to reduction in the supply of labor)

UTILITY MODEL (IN A SINGLE POLITY)

$$U_i = \alpha [W_i(1 - t)] + (1 - \alpha)b - (\beta/2)t^2$$
$$= \alpha [W_i(1 - t)] + \alpha W^U t - (\beta/2)t^2$$

F.O.C w.r.t the level of inter-personal redistribution (t)

$$\partial U_i / \partial t = -\alpha W_i + \alpha W^U - \beta t$$
$$= \alpha(W^U - W_i) - \beta t$$
$$t^* = \alpha/\beta (W^U - W_i)$$

- ❑ Citizens with income above W^U will want to have zero t.*
- ❑ Citizens with income at or below \bar{w}_i will want to $t^* = 1$
- ❑ The more citizens below W^U , the greater the demand for redistribution ($\alpha/\beta > 0$).

UTILITY MODEL (IN DISPARATE REGIONS)

$$U_{ir} = \alpha [W_{ir}(1 - t_i)] + \alpha W^U t_i - (\beta/2)t_i^2 - \sum t_i(W_r - W^U) - (\gamma/2)\sum t_i^2$$

α probability that individuals might be employed at any given time.

$\sum t_i$ level of inter-regional redistribution

W^U average income of regions within a country

W_{ir} Individual income within a region

W_r average income of a region

$(1-\alpha)b = \alpha W^U t$ budget constraint for an individual received from a country

$(\gamma/2) \sum t_i^2$ inefficiency cost of inter-regional transfers

UTILITY MODEL (IN DISPARATE REGIONS)

$$U_{ir} = \alpha[W_{ir}(1-t_i)] + \alpha W^U t_i - (\beta/2)t_i^2 - \sum t_i(W_r - W^U) - (\gamma/2)\sum t_i^2$$

F.O.C w.r.t the level of inter-personal redistribution (t_1)

$$\partial U_{1r} / \partial t_1 = -\alpha W_{1r} + \alpha W^U - \beta t_1 - (W_r - W^U) - \gamma t_1$$

$$0 = \alpha(W^U - W_{1r}) + (W^U - W_r) - t_1(\beta + \gamma)$$

$$t_1(\beta + \gamma) = \alpha(W^U - W_{1r}) + (W^U - W_r)$$

$$t_1^* = \frac{\alpha}{\beta + \gamma} (W^U - W_{1r}) + \frac{1}{\beta + \gamma} (W^U - W_r)$$

$$1 \geq t_1^* = \frac{\alpha}{\beta + \gamma} (W^U - W_{1r}) + \frac{1}{\beta + \gamma} (W^U - W_r) \geq 0 \quad (\text{where } \alpha, \beta, \gamma > 0)$$

For $t_1^* > 0$ (higher income tax rate) \rightarrow They become beneficiaries of interpersonal redistribution.

$W^U > W_{1r}$ and $W^U - W_r \rightarrow W^U > W_{1r} > W_r$ (Rich people in poor region)

$W^U > W_r > W_{1r}$ (Poor people in poor region)

If $W_r > W_{1r} > W^U$ (poor people in rich regions) or $W_{1r} > W_r > W^U$ (rich people in rich region) will want as close as $t_1^* = 0$, which is their ideal point.

WORKING CASES 5 & 6

$$t_1^* = \frac{\alpha}{\beta + \gamma} (W^U - W_{1r}) + \frac{1}{\beta + \gamma} (W^U - W_r) \quad (\text{where } \alpha, \beta, \gamma > 0)$$

Cases	Types of People	t1*	$(W^U - W_{1r}) = \Delta W_{1r}$	$(W^U - W_r)$
5	$W_{1r} > W^U > W_r$ rich people in poor regions	?	(-)	(+)
6	$W_r > W^U > W_{1r}$ poor people in rich regions	?	(+)	(-)

$$t_1^* = \frac{\alpha}{\beta + \gamma} \Delta W_{1r} + \frac{1}{\beta + \gamma} \Delta W_r > 0$$

$$\frac{\alpha}{\beta + \gamma} \Delta W_{1r} + \frac{1}{\beta + \gamma} \Delta W_r > 0$$

$$\alpha \Delta W_{1r} > - \Delta W_r$$

$$\alpha > \frac{- \Delta W_r}{\Delta W_{1r}}$$

α is the probability that individuals are employed at any given time.

CASES 5 & 6

$t1^* = \alpha > \frac{-\Delta W_r}{\Delta W_{1r}}$ so the sign on the left side is always positive. (where $1 > \alpha > 0$)

□ $|\Delta W_r| > |\Delta W_{1r}|$ (given $W_{1r} > W^U > W_r$)

→ $\frac{-\Delta W_r}{\Delta W_{1r}}$ can be bigger than 1 (employed) → $t1^* < 0$, this **cannot be acceptable** to rich people in very poor regions.

□ $|\Delta W_r| > |\Delta W_{1r}|$ (given $W_r > W^U > W_{1r}$)

→ $\frac{-\Delta W_r}{\Delta W_{1r}}$ can be bigger than 1 → $t1^* < 0$, this **cannot be acceptable** to poor people in very rich regions.

□ $|\Delta W_r| < |\Delta W_{1r}|$ (given $W_{1r} > W^U > W_r$)

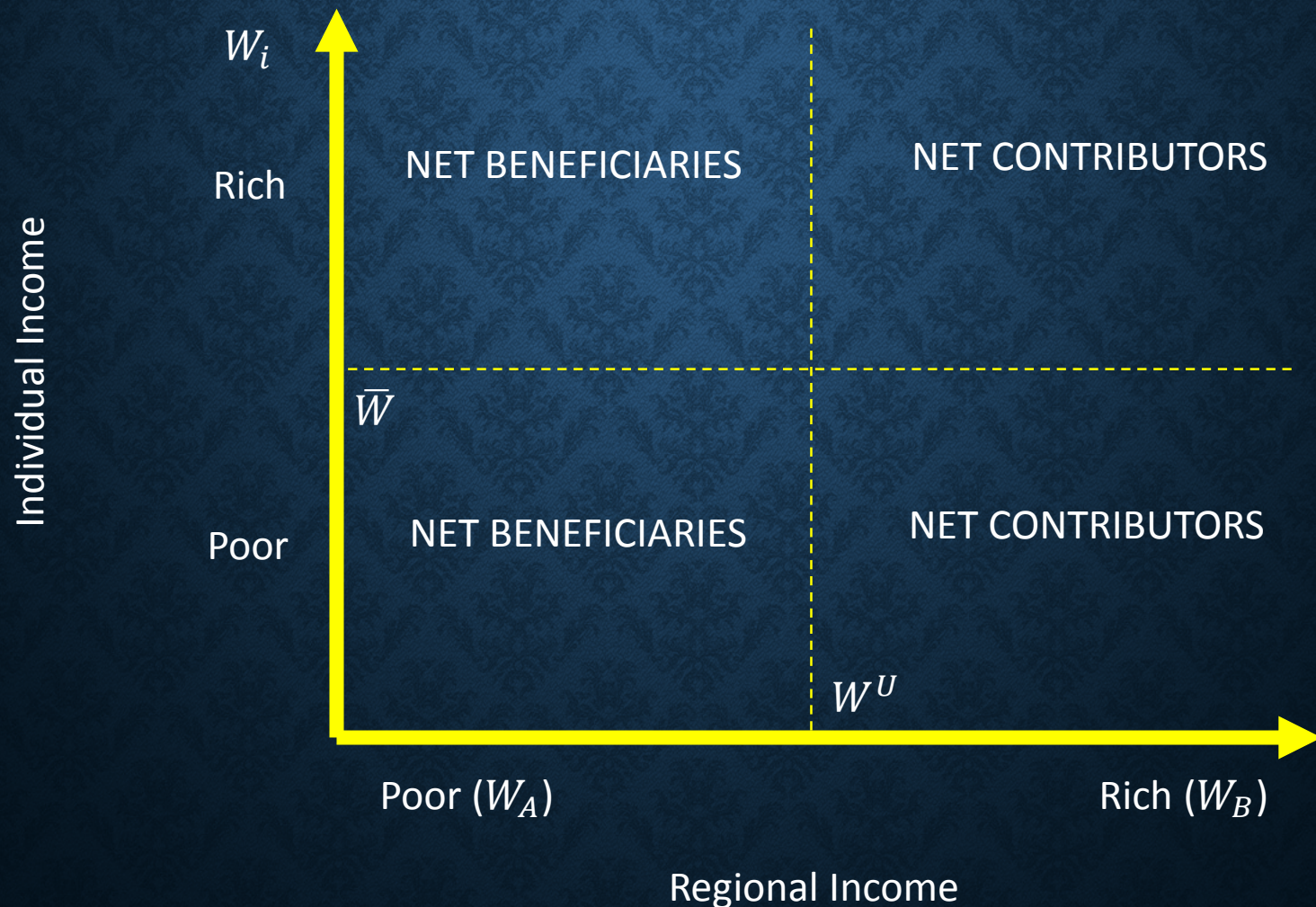
→ $\frac{-\Delta W_r}{\Delta W_{1r}}$ can be smaller than 1 → $t1^* > 0$, this can be acceptable to very rich people in poor regions.

□ $|\Delta W_r| < |\Delta W_{1r}|$ (given $W_r > W^U > W_{1r}$)

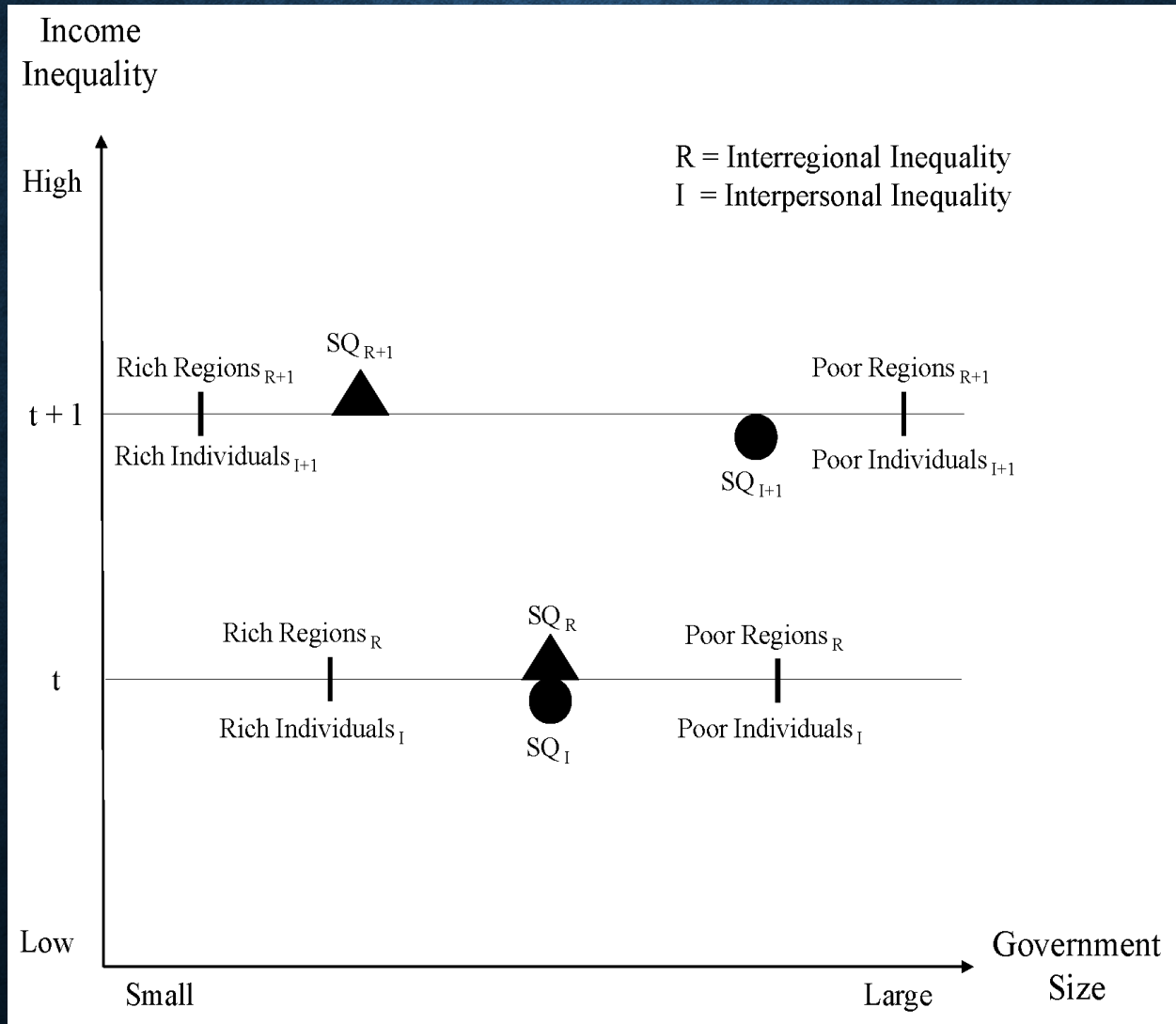
→ $\frac{-\Delta W_r}{\Delta W_{1r}}$ can be smaller than 1 → $t1^* > 0$, this can be acceptable to very poor people in rich regions.

Cases	Types of People	$t1^*$	$(W^U - W_{1r}) = \Delta W_{1r}$	$(W^U - W_r) = \Delta W_r$
5	$W_{1r} > W^U > W_r$?	(-)	(+)
6	$W_r > W^U > W_{1r}$?	(+)	(-)

REDISTRIBUTIVE POLICY PREFERENCE (WITH HIGH INTER-REGIONAL INEQUALITY)



DIVERGENCE HYPOTHESIS (NATIONAL GOVERNMENT WITH STRONG CENTRALIZATION)



DATA AND ANALYTICS (SURVEY DATA ANALYSIS)

- DV: The government should spend less on benefits for the poor (ISSP 2009 - Social inequality IV).
 - Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
- (Alternative) DV: Please show where you would like to see more or less government spending in each area -- Environment, Health, Police and law enforcement, education, military & defense, old age pensions, unemployment benefits, culture and the arts (ISSP 2006 – Role of Government 2006).
 - Spend much more
 - Spend more
 - Spending the same as now
 - Spend less
 - Spend much less

MULTI-LEVEL DATA ANALYSIS

- ❑ Challenge: The individual level data have variances among individual response with characteristics that are homogenous to their own respective regions of residency. The upper (region) level data, on the other hand, have variances across different regions. By using the regional mean of individual variables for regression estimates in individual-level analysis, one can neglect endogenously correlated variances across these two levels and wrongly assume that individual characteristics vary across different regional means.
- ❑ There are several methodological advantages to multilevel modeling.
 - ❑ First, it enables us to specify predictors at each level and combine multiple levels of analysis in a single comprehensive model. This allows us to examine cross-level effects with better precision (Bryk and Raudenbush 1992).
 - ❑ Second, compared to single level models, multilevel approaches are less prone to model misspecification problems because unexplained variances are actually incorporated into estimation instead of becoming part of error terms (Steenburgen and Johnson 2002).
 - ❑ Third, multilevel models help us explore “causal heterogeneity” (Western 1998). Causal heterogeneity occurs when the causal effects of lower-level predictors are conditioned by higher-level predictors. This local condition significantly alters the causal story from one group to another.

WORKING MODEL FOR TWO-LEVEL SPECIFICATION FOR A SINGLE COUNTRY

Pr (Not supporting redistribution $_i = 1$)

$$= \text{logit}^{-1} (\alpha_{j[i]}^{\text{region}} + b_{1j[i]} \textit{Employed}_i + \sum b_k \textit{controls}_i)$$

where

$$\alpha_j^{\text{region}} \sim \text{N} (r_{00} + r_{01} \textit{regional GDP pc}_j, \sigma_{u0}^2)$$

$$b_{1j} \sim \text{N} (r_{10} + r_{11} \textit{regional GDP pc}_j, \sigma_{u1}^2)$$

Identify $b_{1j[i]} \textit{Employed}$ as a way of capturing the interaction between individual-level and country-level variables. r_{11} corresponds to the interaction between individual residency and regional GDP pc. I am expected to find $r_{11} < 0$ and statistically significant through multilevel model analysis. For the effect of interpersonal income inequality, I am expecting to find $b_1 > 0$ and statistically significant.

JUMP TO CROSS-NATIONAL ANALYSIS.

- Currently working in progress on the individual-level empirical analysis.
- Institutions (decentralization) matter.

RESEARCH EXTENSION 2

(CONDITIONAL ON DECENTRALIZATION)

- ❑ I test the micro-level model against a cross-sectional study examining interregional inequality's effects on redistributive policies.
- ❑ Particularly, I examine the variability of redistribution in federal countries relative to non-federal. I find that federalism is a relevant variable bearing on the policy outcomes of inequality because it diffuses policy making authority across subnational governments (Tiebout 1956; Riker 1964; Oates 1972), but that the heterogeneity of regions' parochial interests also creates policy constraints (Giuranno 2009; Beramendi 2012).
- ❑ Based on this finding, I argue that high inter-regional inequality for a country institutionalizing regional autonomy exacerbates policy gridlock (Tsebelis 2002; Tsebelis & Chang 2004). Inter-regional inequality of a federal system, compared to a unitary, should lead to less of a change in spending on collective goods, such as general public education spending.

CHARACTERISTICS OF FEDERALISM

- ❑ “Power Diffusion”: Federalism allows local constituencies to have more access to the policy process through multiple levels of government.
- ❑ “Policy Constraint”: The heterogeneity of political regions under federalism also increases constraints on policy agreement among regions at the national level. (each region is considered a veto player)
- ❑ [In empirical grounds], cross-national comparative studies show *no clear relationship* in redistributive policy outcomes
 - ❑ Pro: strengthening fiscal decentralization capacities to compensate for inequality (Rodriguez-pose & Ezucurra 2010; Lessman 2009)
 - ❑ Con: weakening the power of the central government to play an equalizing role (Prud’homme 1995; Cheshire and Gordon 1998).

CONNECTING FEDERALISM TO INEQUALITY OF TWO TYPES:

Interpersonal Inequality, Fractionalization Effects of Federalism on the Size of Government

- ❑ Assumption for inter-personal inequality: Multiple (but homogenous) RMR states in wealth distribution under federalism.
- ❑ Poor individuals have more policy access to multiple regional governments.
- ❑ The incentive to emerge in logrolling is exacerbated where their benefits (from a region's parochial interests) exceed their proportional share of the cost attached to maintaining a common pool. This is clearly understood by scholars who study budget deficits (Weingast et al. 1981; Alesina & Drazen 1991).
- ❑ More institutional diffusion leads to a higher capacity for changing the status quo in an expansionary direction (Crepaz and Mozar 2004).

CONNECTING FEDERALISM TO INEQUALITY OF TWO TYPES:

Interregional Inequality, Polarization Effects of Federalism on the Variability of Government Spending

- ❑ Assumption for inter-regional inequality: Multiple (but heterogeneous) states in wealth distribution under federalism.
- ❑ The locking-in-argument of Tsebelis (1999) and Treisman (2000) depending on the previous policy pattern: whatever that pattern happens to be.
- ❑ Vetoes make it more difficult to change the status-quo policies (Tsebelis 2002; Crepaz and Mozar 2004; Cox and McCubbins 2001).

DECENTRALIZATION EFFECTS

Table 1. Effects of Inequality and Decentralization on Broad Redistributive Spending

	Inter-personal Inequality	Inter-regional Inequality
Unitary	Increase or Decrease (A)	Change (C)
Federalism	Greater Increase (B)	Less Change (D)*

* Tsebelis (1995: 293): The potential policy change decreases ...

1. With the number of veto players,
2. With the lack of congruence (dissimilarity of policy positions among veto players),
3. With the cohesion (similarity of policy positions among the constituent units of each veto player) of these veto players.

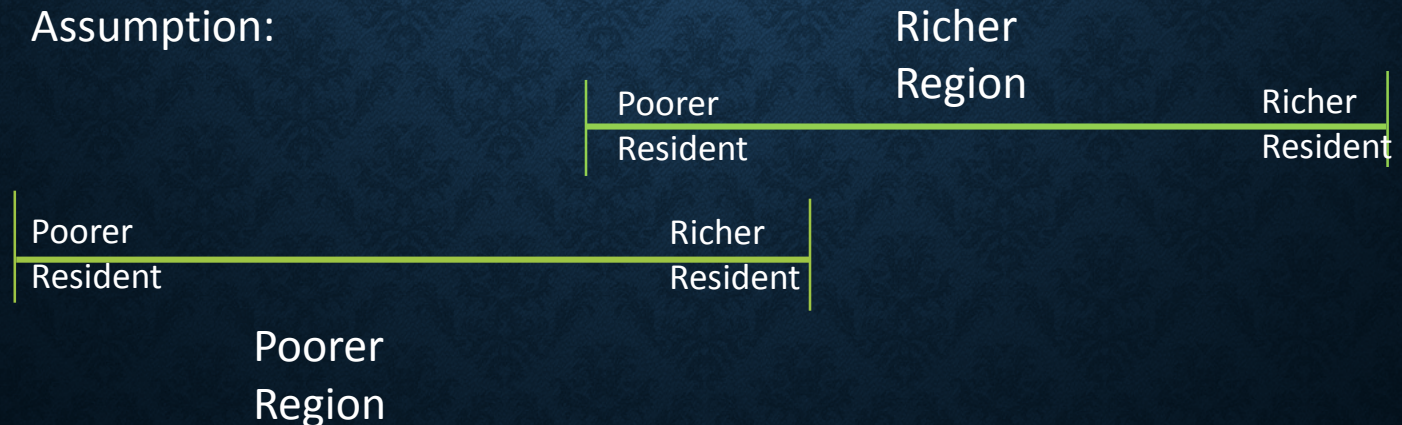
DECENTRALIZATION EFFECTS: FEDERALISM * INTER-REGIONAL INEQUALITY

Table 2. Individual Redistributive Motives under Federalism

	Poorer Regions	Richer Regions
Poorer Residents	Support	Don't Support*
Richer Residents	Support*	Don't Support

Note: * Regions trump individual redistributive motives

Assumption:



HYPOTHESES

□ Fractionalization Effects:

Federalism for inter-personal inequality **increases** the level of broad redistributive spending more than a unitary system of government would.

□ Polarization Effects:

Federalism for inter-regional inequality leads to **less change** (either increase or decrease) in broad redistributive spending than a unitary system of government would.

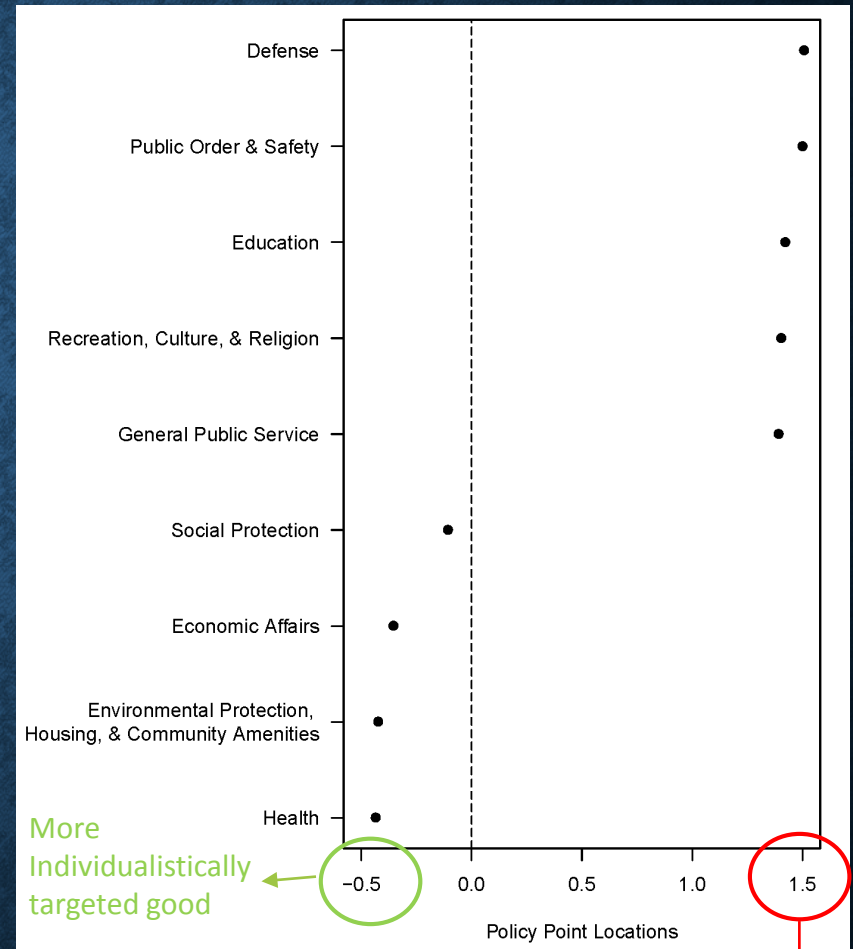
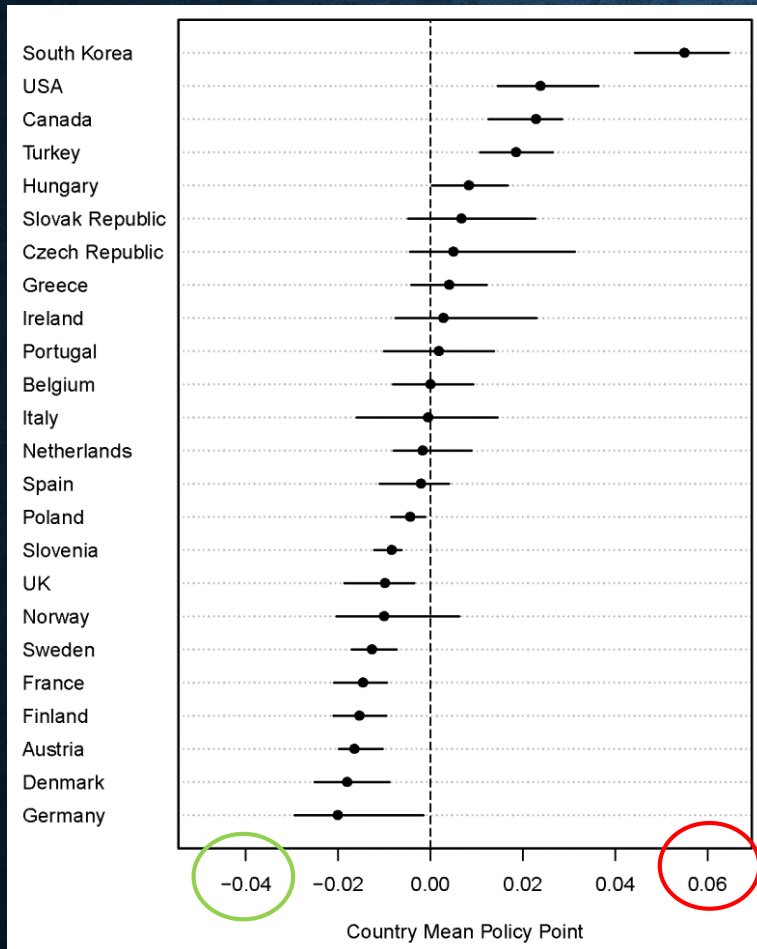
DATA AND VARIABLES

- ❑ Samples for DV: General public education spending as share of GDP for 18 advanced economies from 1980 to 2010.
 - ❑ Level of spending
 - ❑ Volatility of spending

Education spending is one form of government transfer to help human capital accumulation.

Public education spending at the general government level include all levels of governments, and thus captures aggregated amount of broad redistribution in the human capital investment. The general government's public education spending can also be applied to both a unitary system of government and federalism. This data series is available from the World Development Indicators (WDI) database provided by the World Bank group. I used public education spending observations for 18 OECD countries from 1980 and 2010.

24 OECD GENERAL GOVERNMENT SPENDING DATA REPLICATION OF JACOBY AND SCHNEIDER (2009)



Notes: Dots on the right panel indicate point coordinates of policy priorities over different spending programs, obtained from unfolding analysis of 24 OECD countries 1990-2010. Dots on the left panel are the mean points of spending policy priorities for each country. Horizontal bars show the minimum-maximum range of point coordinates of policy priorities for each country during the time period.

More
Collective
Goods

DATA AND VARIABLES

- ❑ Measures for inter-personal inequality: the ratio of individual earning in the upper 90th percentile to earnings in the bottom 10th percentile (P90/10)
- ❑ Measure of inter-regional inequality: allowing the “intra-country” variance information to be translated into the numerically continuous index (0-1) of “inter-country” variance

Key information to create a new dataset:

1) Regional GDP per capita, 2) the country's average GDP per capita, 3) the share of the country's total population in a region.

INTER-REGIONAL INEQUALITY CALCULATION (MEASURE OF DISPERSION)

$$COV = \frac{1}{\bar{y}} \sqrt{\frac{1}{n} \sum_{i=1}^n (\bar{y} - y_i)^2}$$

Coefficient of
Variance

The country's
average GDP
per capita

The number of
regions

The GDP per
capita for region i

INTER-REGIONAL INEQUALITY CALCULATION (MEASURE OF DISPERSION – POPULATION WEIGHTED)

$$COVW = \frac{1}{\bar{y}} \sqrt{\sum_{i=1}^n p_i (\bar{y} - y_i)^2}$$

The diagram illustrates the components of the COVW formula:

- COVW**: The population weighted coefficient of variance
- $\frac{1}{\bar{y}}$: The country's average GDP per capita
- $\sum_{i=1}^n$: The number of regions
- p_i : The share of country's total population in region i
- $(\bar{y} - y_i)^2$: The GDP per capita for region i

INTER-REGIONAL INEQUALITY CALCULATION (MEASURES OF DEPRIVATION)

$$ADGINI = \frac{2 \sum_{i=1}^n i y_i}{n \sum_{i=1}^n y_i} - \frac{n+1}{n}$$

The region-
adjusted Gini
coefficient

The number of
regions

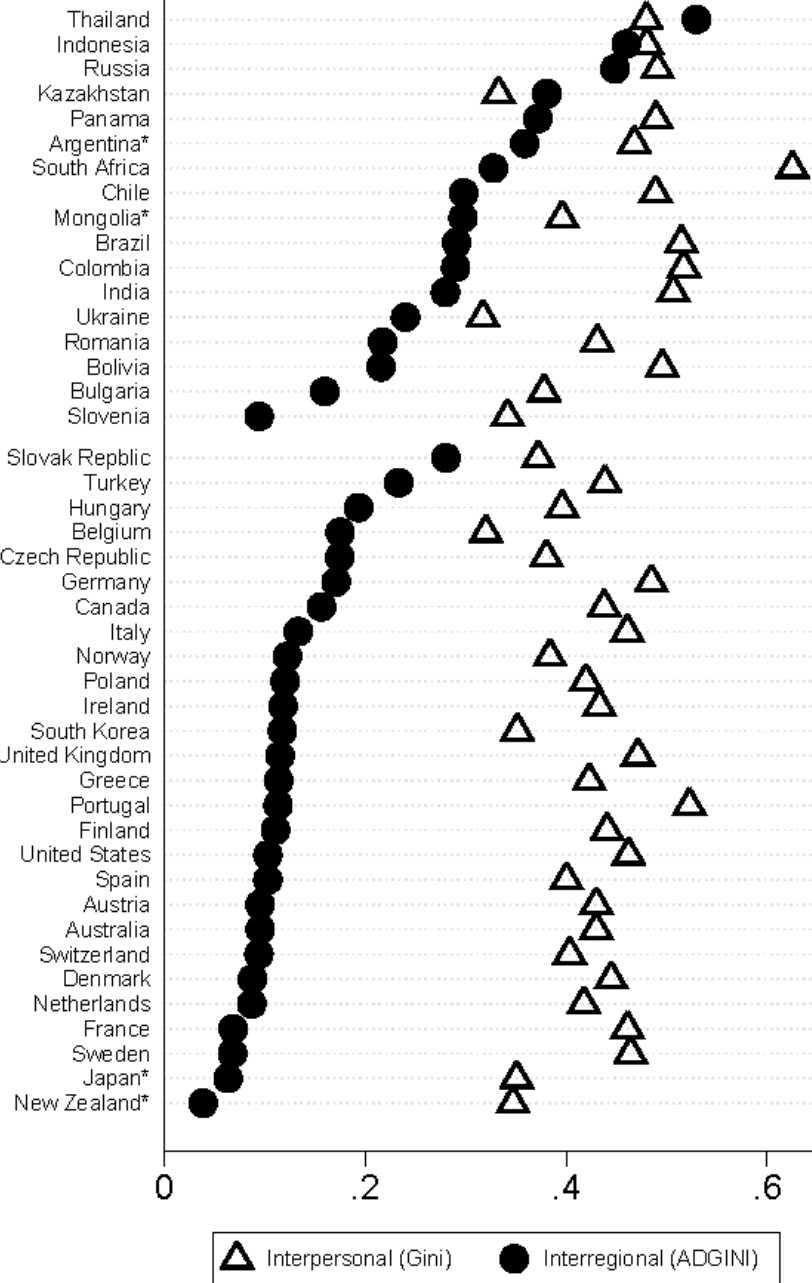
The GDP per
capita for region i

ADGINI captures degree of deprivation by giving additional weight to regional incomes as they veer farther from the mean of the regional income distribution.

AVERAGED INCOME INEQUALITY COMPARED (2006-2010).

NonOECD

OECD



△ Interpersonal (Gini) ● Interregional (ADGINI)

DATA (CONT'D)

□ Measure of Federalism (Type 1)

- Electoral Federalism
 - Federalism captures the political dynamics (local input in policy-making) that produces divergence across regions.
 - I am interested in capturing the level of the closeness between local politicians and their local constituencies.
- Coding (Database of Political Institutions)
 - Unitary (no local election) = 0
 - The legislature is locally elected but the executive is appointed = 1
 - Both the legislature and the executive are locally elected = 2 (e.g., Austria, Spain, Canada, USA)

DATA (ROBUSTNESS)

□ Measure of Federalism (Type 2)

- Fiscal Federalism

Fiscal authority is important to the functioning of federalism. Without money and the ability to spend it, federalism may have little policy effect. I take a veto player approach by using a discrete index of approximate the strength of regional governments' power over the distribution of tax revenue.

- Coding

The degree in which regional governments or their representatives in the legislature exercise over the distribution of the central government's tax revenues (Hooghe et al. 2008, Regional Authority Dataset)

- Unitary = 0 (No Consultation power)
- Weak = 1 (Negotiation, but not veto power)
- Strong = 2 (Veto power - local governments can dictate spending, e.g., Belgium, Germany, Netherlands)

INTERACTION MODELS

- **Collective Veto Points Hypothesis**

$$\begin{aligned} \text{Public Education Spending}_{it} = & \beta_1 \text{Inter-personal Inequality}_{it} \\ & + \beta_2 \text{Inter-regional Inequality}_{it} \\ & + \beta_3 \text{federalism}_{it} \\ & + \beta_4 \text{Inter-personal Inequality} * \text{federalism}_{it} \\ & + \sum \beta_j \text{Controls}_{it} + \sum \beta_k \text{Country}_{ki} + \epsilon_{it} \end{aligned}$$

- **Competitive Veto Points Hypothesis**

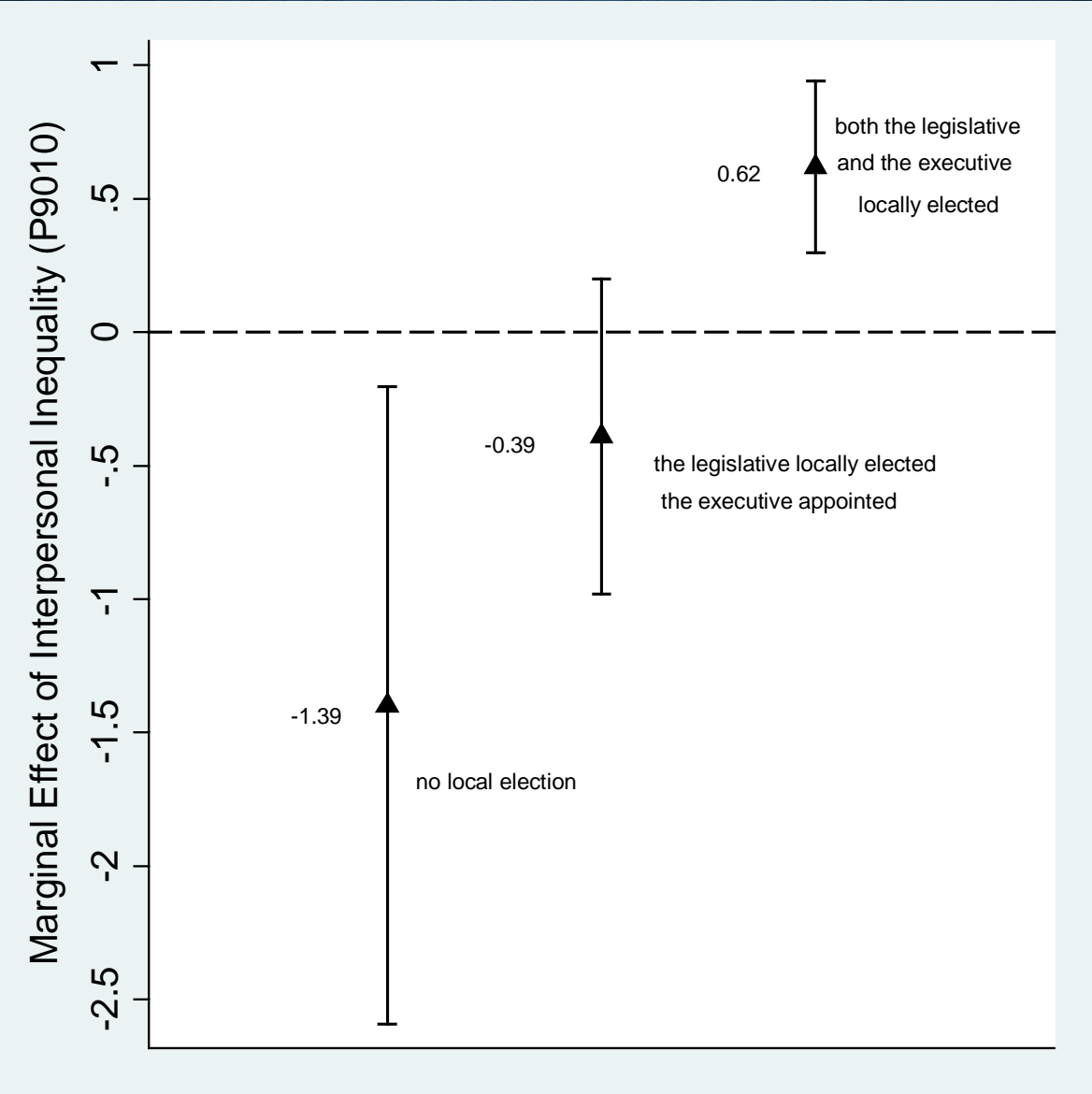
$$\begin{aligned} \dagger \text{Public Education Spending}_{it} = & \beta_1 \text{Inter-personal Inequality}_{it} \\ & + \beta_2 \text{Inter-regional Inequality}_{it} \\ & + \beta_3 \text{federalism}_{it} \\ & + \beta_4 \text{Inter-regional Inequality} * \text{federalism}_{it} \\ & + \sum \beta_j \text{Controls}_{it} + \sum \beta_k \text{Country}_{ki} + \epsilon_{it} \end{aligned}$$

Effects of Inter-personal Inequality & Federalism on Public Education Spending

Variables	Model 1 PCSE + AR(1)	Mode 2 PCSE + AR(1)	Model 3 PCSE + AR(1)
P9010 (Inter-personal Inequality)	0.400 (0.264)	-1.489** (0.657)	-1.399** (0.609)
Electoral federalism	-0.056 (0.127)	-2.677*** (0.924)	-1.832** (0.802)
P9010 × Electoral federalism		1.024*** (0.347)	1.009*** (0.329)
COV (Inter-regional Inequality)	-0.103 (0.089)	-0.129 (0.083)	0.177 (0.199)
COV × Electoral Federalism			-0.276* (0.164)
Trade openness (trade % of GDP)	0.007 (0.005)	0.007 (0.005)	0.008* (0.005)
Capital openness (Chin-Ito Index)	0.491*** (0.074)	0.449*** (0.073)	0.469*** (0.070)
Government expenditure (as % of GDP)	0.289*** (0.334)	0.266*** (0.034)	0.258*** (0.034)
Left party legislative seats (as % total)	0.008* (0.004)	0.005 (0.004)	0.007 (0.004)
GDP per capita (Logged)	1.334*** (0.383)	1.508*** (0.379)	1.334*** (0.359)
Growth of real GDP (Annual %)	0.026 (0.017)	0.026 (0.017)	0.027* (0.016)
Population ages 0-14 (% of population)	0.334*** (0.053)	0.341*** (0.051)	0.340*** (0.050)
Number of observations	245	245	245
Countries	18	18	18
Country Fixed Effect	Yes	Yes	Yes
R square	0.992	0.992	0.993

note: Two tailed tests for significant at *** p<0.01, ** p<0.05, * p<0.1

MARGINAL EFFECT OF INTER-PERSONAL INEQUALITY (P90/10) ON PUBLIC EDUCATION SPENDING, CONDITIONAL ON ELECTORAL FEDERALISM

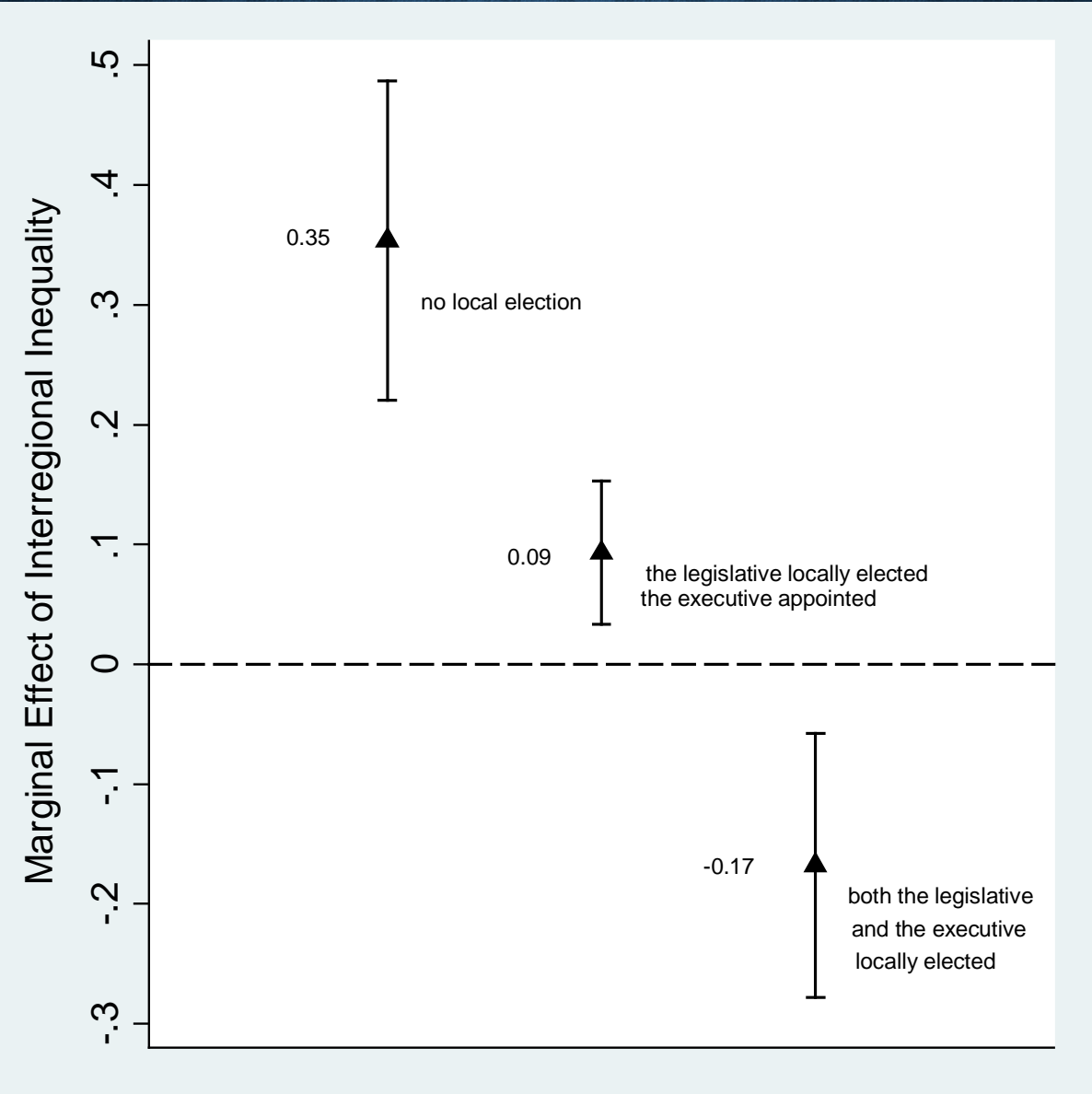


Effects of Economic Inequality & Federalism on Volatility of Public Education Spending

Variables	Model 1 PCSE + AR(1)	Model 2 PCSE + AR(1)	Model 3 PCSE + AR(1)
COV (Inter-regional Inequality)	0.084 *** (0.029)	0.354*** (0.068)	0.358*** (0.069)
Electoral federalism	-0.276** (0.110)	0.434** (0.180)	0.766 (0.472)
COV * Electoral federalism		-0.261*** (0.054)	-0.262*** (0.054)
P9010 (Inter-personal Inequality)	0.178** (0.089)	0.258*** (0.068)	0.497 (0.355)
P9010 * Electoral federalism			-0.135 (0.174)
Trade openness (trade % of GDP)	-0.002 (0.003)	-0.001 (0.002)	-0.001 (0.002)
Capital Openness (Chin-Ito Index)	-0.050* (0.028)	-0.006 (0.028)	0.001 (0.027)
Government expenditure (as % of GDP)	0.045** (0.028)	0.033** (0.016)	0.037** (0.016)
Left party legislative seats (as % total)	0.001 (0.002)	0.004* (0.002)	0.005* (0.002)
GDP per capita (Logged)	-0.013 (0.014)	-0.250 (0.176)	-0.269 (0.181)
Grwoth of real GDP (Annuual %)	-0.013 (0.014)	-0.022* (0.012)	-0.022* (0.012)
Population ages 0-14 (% of population)	-0.044** (0.019)	-0.042** (0.018)	-0.042** (0.019)
Number of observations	92	92	92
Countries	18	18	18
Country Fixed Effect	Yes	Yes	Yes
R2	0.782	0.840	0.841

note: Two tailed test for significant at *** p<0.01, ** p<0.05, * p<0.1

MARGINAL EFFECT OF INTER-REGIONAL INEQUALITY (COV) ON VOLATILITY OF PUBLIC EDUCATION SPENDING, CONDITIONAL ON ELECTORAL FEDERALISM



MORE TESTS FOR ROBUSTNESS CHECK

- ❑ Controlling for the level of interregional transfers
- ❑ Endogeneity (regional disparity \leftrightarrow redistribution)
 - ❑ Instrumental Variable Approach.

CONCLUSIONS

- ❑ Separate inter-regional inequality from inter-personal inequality. Inter-regional inequality is as important as inter-personal inequality since political decision-making is based on geography.
- ❑ Improvement over earlier studies: political institutions matter in the process of converting private desires into public policies.
- ❑ Show differences in policy effect between inequality of two types, conditional on the constitutional structures of the countries.

IMPLICATIONS

- ❑ The spatial concept of inequality explains the policy behavior of certain individuals, not fully explored by the existing models in the literature.
- ❑ The theoretical and empirical distinctions regarding inequality will entirely depend on the level of analysis as well as institutional structures in a country (e.g., federalism, voting districts, and district-oriented voting behavior). My work, for example, distinguishes itself by identifying political decentralization as a relevant institutional factor to amplify influences of interregional inequality on preferences for government redistribution.
- ❑ For policymakers, when choosing more appropriate indicators of inequality, it is critical to match inequality indicators with the relevant political / demographic conditions of a country.

FURTHER RESEARCH PLAN

- Work progress on the survey data analysis to test micro-level models.
- The further step aims to show that not all redistributive policies lead necessarily to policy impasses. Countries may be able to target redistributive spending in some policy areas more effectively. I posit that redistributive goods specific to local constituencies on their needs basis will make regions' political bargaining relatively easier than spending on collective goods. I predict more of a change in spending in the case of particularized benefits to sub-populations, such as social welfare spending (c.f., Volen & Wizeman 2007; Jacoby & Schneider 2009).

THANK YOU

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APPNEDIX A. Robustness Tests: Impacts of Inequality on Levels of Public Education Spending

Variables	(1) coef/pcse	(2) coef/pcse	(3) coef/pcse
Inter-regional Inequality			
COV	-0.1910 (0.0717)***		
COVW		-0.2417 (0.1032)**	
ADGINI			-0.4748 (0.1796)***
Inter-personal Inequality			
P9010	0.5567(0.1817)***	0.5105 (0.1840)***	0.5876 (0.1791)***
SKEW	1.5970 (0.7703)**	1.5912 (0.7700)**	1.6710 (0.7794)**
Controls			
TRADE	0.0091(0.0043)**	0.0092 (0.0043)**	0.0085 (0.0044)*
KAOPEN	0.4702 (0.0698)***	0.4796 (0.0700)***	0.4706 (0.0700)***
GOVTEXP	0.3182 (0.0302)***	0.3120 (0.0301)***	0.3180 (0.0301)***
LEFT	0.0077 (0.0038)**	0.0076 (0.0038)**	0.0079 (0.0039)**
GDPPC (LOG)	1.4688 (0.5077)***	1.5517 (0.5093)***	1.4846 (0.5067)***
GDPPC (GROWTH)	0.0256 (0.0168)	0.0271 (0.0168)	0.0262 (0.0167)
POP14	0.3647 (0.0537)***	0.3675 (0.0532)***	0.3734 (0.0545)***
FISCAL FEDERALISM	-9.1473 (1.1985)***	-9.1608 (1.1717)***	-8.0811 (1.0296)***
ELECTORAL FEDERALISM	-0.3188 (0.2766)	-0.3471 (0.2673)	-0.2766 (0.2739)
Number of observations	245	245	245
Countries	18	18	18
R square	0.9943	0.9944	0.9944
Note: Two tailed tests for significant at *** p<0.01, ** p<0.05, * p<0.1. All models account for country fixed effects. Errors are corrected for panel specific AR1. The constant is suppressed.			

APPENDIX B: Effects of Inter-personal Inequality & Federalism on Levels of Public Education Spending

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	coef/pcse	coef/pcse	coef/pcse	coef/pcse	coef/pcse	coef/pcse
Inter-personal Inequality						
P9010	0.8586***	0.8474***	0.8667***	-0.9256	-0.8423	-0.9562
	(0.2372)	(0.2366)	(0.2367)	(0.5906)	(0.5769)	(0.5872)
SKEW	1.5611*	1.5828*	1.5370*	0.8046	0.5259	1.0401
	(0.8256)	(0.8296)	(0.8235)	(1.9598)	(1.9032)	(2.0153)
Testing Collective Action Problem Constraints						
P9010 * Fiscal Federalism	-0.3967	-0.4438	-0.3563			
	(0.3499)	(0.3545)	(0.3525)			
SKEW * Fiscal Federalism	-0.2386	-0.2927	-0.0689			
	(1.6675)	(1.6911)	(1.6649)			
P9010 * Electoral Federalism				0.8593***	0.7942***	0.8943***
				(0.3061)	(0.2997)	(0.3041)
SKEW * Electoral Federalism				0.6448	0.7802	0.5658
				(1.0611)	(1.0382)	(1.0894)
Inter-regional Inequality						
COV	-0.1777**			-0.1903***		
	(0.0711)			(0.0716)		
COVW		-0.2235**			-0.2278**	
		(0.0994)			(0.1028)	
ADGINI			-0.4318**			-0.4872***
			(0.1758)			(0.1808)
Controls						
FISCAL FEDERALISM	-6.5107**	-7.0712**	-6.8371**	-6.5497***	-5.9886***	-5.6495***
	(2.7181)	(2.8542)	(2.7234)	(1.6212)	(1.5753)	(1.5405)
ELECTORAL FEDERALISM	-0.3045	-0.3327	-0.2686	-3.0879**	-3.1126**	-3.0353*
	(0.2752)	(0.2638)	(0.2758)	(1.5688)	(1.5364)	(1.5883)
Number of observations	245	245	245	245	245	245
Countries	18	18	18	18	18	18
R square	0.995	0.995	0.995	0.994	0.994	0.994

Note: Two tailed tests for significant at *** p<0.01, ** p<0.05, * p<0.1. Estimates are panel corrected error adjusted with AR(1). Country fixed effects are controlled. The constants are suppressed. Controls are included, not reported due to the space limit.

APPENDIX D: Effects of Economic Inequality & Federalism on Volatility of Public Education Spending†

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	coef/pcse	coef/pcse	coef/pcse	coef/pcse	coef/pcse	coef/pcse
Inter-regional Inequality						
COV	0.0790			0.3094***		
	(0.0603)			(0.0707)		
COVW		0.0365			0.3874***	
		(0.0811)			(0.0664)	
ADGINI			0.1749			0.6878***
			(0.1369)			(0.1771)
Testing Veto Player Constraints						
COV * Fiscal Federalism	-0.0178					
	(0.0411)					
COVW * Fiscal Federalism		0.0111				
		(0.0645)				
ADGINI * Fiscal Federalism			-0.1110			
			(0.1245)			
COV * Electoral Federalism				-0.2366***		
				(0.0566)		
COVW * Electoral Federalism					-0.2788***	
					(0.0448)	
ADGINI * Electoral Federalism						-0.5064***
						(0.1212)
Inter-personal Inequality						
P9010	0.3050***	0.3027***	0.3009***	0.3535***	0.3017***	0.3656***
	(0.1007)	(0.1005)	(0.0993)	(0.0931)	(0.0754)	(0.0965)
SKEW	1.0357***	1.0511***	1.0490***	1.0269***	1.0513***	1.1220***
	(0.3205)	(0.3428)	(0.3187)	(0.3309)	(0.2700)	(0.3178)
FISCAL FEDERALISM††	-0.4793	-0.5674	-0.4648	-0.4823	-0.5840	-0.8037*
	(0.4307)	(0.4436)	(0.4494)	(0.4021)	(0.3848)	(0.4384)
ELECTORAL FEDERALISM††	-0.0494	-0.0504	-0.0511	0.4482**	0.4117***	0.4898**
	(0.1115)	(0.1135)	(0.1132)	(0.1793)	(0.1493)	(0.2005)
Number of observations	91	91	91	91	91	91
Countries	18	18	18	18	18	18
R square	0.861	0.857	0.859	0.887	0.891	0.881

Note: Two tailed tests for significant at *** p<0.01, ** p<0.05, * p<0.1. Estimates are panel corrected error adjusted based on lagged dependent variable models. Country fixed effects are controlled. †Volatility is the standard deviation of government expenditure on public education over 3 years non-overlapping periods between 1980 and 2010. †† Values are taken for the maximum score during 3 years; all other independent variables take the average value of 3 years.

Table 1. Determinants of Central Government Spending

Testing on the Level of Spending

	Baseline Models			Full Models		Robustness Models	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
COVW	-0.030*** (0.008)			-0.032*** (0.007)		-0.030*** (0.008)	
ADGINI		-0.071*** (0.017)			-0.091*** (0.013)		-0.089*** (0.012)
Gini Coefficient			0.008 (0.029)	0.066*** (0.023)	0.070*** (0.021)	0.065*** (0.024)	0.070*** (0.020)
Parliamentary System	1.444*** (0.325)	1.165*** (0.403)	1.293*** (0.454)	1.631*** (0.376)	1.356*** (0.348)	1.679*** (0.398)	1.502*** (0.401)
Federal System	-2.771*** (0.443)	-2.335*** (0.453)	-2.677*** (0.406)	-2.551*** (0.389)	-2.855*** (0.355)	-2.620*** (0.416)	-3.053*** (0.426)
Territorial Bicameralism						0.284 (0.400)	0.414 (0.488)
Intergovernmental Transfers	-0.488*** (0.093)	-0.429*** (0.084)	-0.442*** (0.119)	-0.524*** (0.083)	-0.432*** (0.063)	-0.539*** (0.094)	-0.453*** (0.054)
Population (Logged)	0.082 (0.107)	0.025 (0.148)	-0.125 (0.188)	0.113 (0.136)	0.068 (0.117)	0.044 (0.172)	0.078 (0.103)
GDP per capita (Logged)	0.048 (0.133)	0.035 (0.135)	0.377*** (0.134)	-0.009 (0.132)	0.020 (0.100)	0.012 (0.138)	0.038 (0.098)
Trade (% of GDP)	0.002 (0.003)	0.002 (0.003)	-0.006** (0.004)	0.004 (0.003)	0.005*** (0.002)	0.003 (0.003)	0.006** (0.002)
% Population > 65	0.008 (0.038)	-0.014 (0.033)	0.043 (0.057)	0.109** (0.049)	0.055 (0.034)	0.103** (0.049)	0.052 (0.034)
Lagged Dependent Variable	0.817*** (0.015)	0.819*** (0.013)	0.826*** (0.016)	0.811*** (0.015)	0.798*** (0.012)	0.813*** (0.015)	0.803*** (0.010)
Constant	6.291*** (1.096)	7.144*** (1.402)	2.489 (1.856)	2.749** (1.085)	4.062*** (1.039)	2.577** (1.260)	3.340*** (1.076)
Number of Observations	128	128	132	128	128	128	128
Countries	39	39	39	39	39	39	39
χ^2	12,790***	11,584***	17,248***	10,486***	32,412***	9,678***	53,631***

Notes: Significant at ***p<0.01, **p<0.05, *p<0.1. All independent variables are calculated as 5 year average values. All models are Feasible Generalized Least Squares regressions, corrected for heteroskedastic and first-order panel-specific error structures.

Table 3. Instrumental Variable Analysis of Central Government Spending

Testing on the Level of Spending

	Baseline Models		Full Models		Robustness Models	
	[15]	[16]	[17]	[18]	[19]	[20]
COVW	-0.307** (0.122)		-0.315*** (0.100)		-0.286*** (0.088)	
ADGINI		-0.547** (0.233)		-0.567*** (0.205)		-0.516*** (0.194)
Gini Coefficient			0.440* (0.240)	0.406* (0.221)	0.404* (0.228)	0.375* (0.213)
Parliamentary System	-2.072 (3.524)	-1.510 (3.172)	-1.551 (3.251)	-1.106 (2.947)	-0.712 (3.013)	-0.400 (2.871)
Federalism	-3.310 (4.359)	-3.203 (3.994)	-1.745 (4.393)	-1.757 (3.981)	-0.923 (4.387)	-1.105 (4.011)
Territorial Bicameralism					-2.292 (1.901)	-1.909 (1.953)
Intergovernmental Transfers	1.069*** (0.336)	1.137*** (0.362)	1.436*** (0.389)	1.475*** (0.419)	1.406*** (0.397)	1.451*** (0.423)
Population (Logged)	0.465 (1.606)	0.603 (1.569)	-0.067 (1.487)	0.102 (1.494)	0.418 (1.556)	0.493 (1.548)
GDP per capita (Logged)	-2.417 (1.797)	-1.572 (1.399)	-3.404*** (1.726)	-2.511* (1.435)	-3.117** (1.550)	-2.294* (1.333)
Trade (% of GDP)	0.077** (0.038)	0.073** (0.037)	0.094*** (0.038)	0.089* (0.038)	0.090** (0.036)	0.086** (0.037)
% Population > 65	1.454*** (0.475)	1.208*** (0.436)	1.275*** (0.460)	1.045** (0.427)	1.213*** (0.440)	1.013** (0.410)
Constant	39.457** (19.409)	33.221** (16.920)	32.911*** (15.430)	27.503* (14.187)	30.920** (14.310)	25.828* (13.561)
Number of Observations	122	122	122	122	122	122
Countries	33	33	33	33	33	33
R-squared	0.960	0.966	0.962	0.967	0.964	0.969
† Hansen J-statistics, χ^2 [p-value]	1.107[0.293]	0.943[0.332]	0.794 [0.373]	0.621 [0.431]	0.787[0.3749]	0.636[0.425]

Notes: Second-stage regressions. Significant at ***p<0.01, **p<0.05, *p<0.1. All independent variables are calculated as 5-year average values. Instrument variables regressions run for all models; adjusted for two-step efficient GMM estimator, arbitrary heteroskedasticity, and within-group correlation.

√ Instrumented with the country's dispersion in soccer league points and an indicator of the 2nd and 3rd method of moment of regional inequality.

† The over-identification test statistics fail to reject the null that instruments are valid.

Table 9. Robust to General Government Spending.

Testing on the Level of Spending

	Feasible General Linear Regression		Prais-winsten Regression with PCSEs	
	[37]	[38]	[39]	[40]
COVW	-0.052*** (0.007)		-0.071*** (0.017)	
ADGINI		-0.099*** (0.018)		-0.164*** (0.036)
Gini Coefficient	-0.006 (0.014)	-0.008 (0.016)	0.000 (0.029)	-0.000 (0.029)
Intergovernmental Transfers	0.364*** (0.069)	0.377*** (0.072)	0.288*** (0.123)	0.255* (0.131)
Population (Logged)	-0.043 (0.175)	-0.185 (0.170)	0.500 (0.358)	0.390 (0.335)
GDP per capita (Logged)	-0.056 (0.258)	-0.155 (0.257)	0.735* (0.405)	0.412 (0.417)
Trade (% of GDP)	0.011*** (0.004)	0.011*** (0.004)	0.022*** (0.008)	0.023*** (0.007)
% Population > 65	0.630*** (0.062)	0.587*** (0.067)	0.338*** (0.114)	0.277*** (0.118)
Parliamentary System	0.718*** (0.344)	0.185 (0.336)	1.779** (0.708)	1.563** (0.694)
Federal System	0.609 (0.452)	1.298*** (0.422)	-0.383 (0.642)	0.063 (0.584)
Constant	11.019*** (2.358)	13.077*** (2.393)	4.867 (4.429)	9.570** (4.753)
Number of Observations	557	557	557	557
Countries	38	38	38	38
R-squared	--	--	0.932	0.928
χ^2	990***	643***	216***	211***

Notes: Significant at ***p<0.01, **p<0.05, *p<0.1 (two-tailed tests). All independent variables are calculations of 5 year moving average. Errors are adjusted for panel-heteroskedasticity and a panel-specific AR(1) process.

FURTHER RESEARCH: REGIONAL CONFLICTS IN THE SIZE OF NATIONAL GOVERNMENT

[Labor Mobility is Not Allowed]

Rich people ■■■ rich regions (-)

Poor people



Rich People ■■■ poor regions (+)

Poor people



[Labor Mobility is Allowed]

much richer regions

relatively poorer regions

relatively richer regions

much poorer regions



Prevalence of Policy Gridlocks:

- Much poorer regions + much richer regions: Decrease (Higher regional disparity)**
- Relatively poorer regions + relative richer regions: Increase (Lower regional disparity)
- Much richer regions + relative richer regions: Status Quo
- Relatively poorer regions + much poorer regions: Status Quo