Teachers or Roads:
How Fluctuations in Public Finances Erode Public Infrastructure

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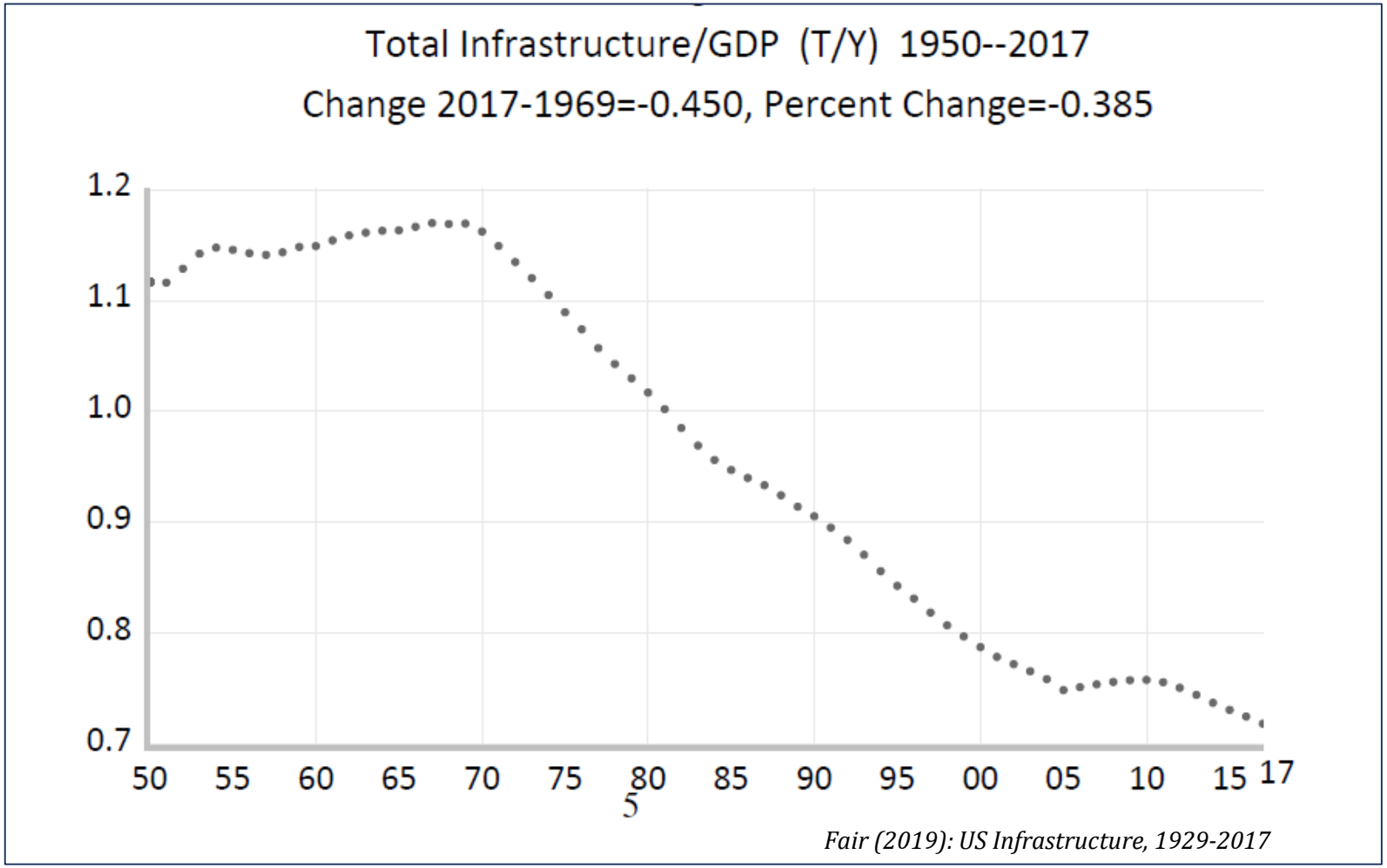
LONG TERM DISINVESTMENT IN INFRASTRUCTURE

Infrastructure spending matters
- Direct consumption welfare
- Costly disrepair feedback cycles

Key contributing factors?
- Public choice (policymakers)
- Committed costs
- Concern for votes

<u>This paper</u>:
Study how volatility in public budgets can exacerbate disinvestment

Implications for public expenditures:
- Hedging/smoothing
- Balanced budget requirements



Fair (2019): US Infrastructure, 1929-2017

EMPIRICAL METHODOLOGY (1)

Almost Ideal Demand System, Deaton and Muellbauer (1980) in 1st differences:

$$\Delta w_{ig} = \beta_i \Delta \log\left(\frac{X_g}{P}\right) + \sum_j \gamma_{ij} \Delta \log(p_{jg})$$

Variables

- Δw_{ig}: government g's budget share for good i
- X_g/P: g's real expenditure on good i
- p_{jg}: prices of the J goods available to g.

(Each good i's demand is a function of all prices.)

EMPIRICAL METHODOLOGY (2)

Almost Ideal Demand System, Deaton and Muellbauer (1980) in 1st differences:

$$\Delta w_{ig} = \boldsymbol{\beta_i} \Delta \log\left(\frac{X_g}{P}\right) + \sum_j \gamma_{ij} \Delta \log(p_{jg})$$

Features

1. β_i is the sensitivity of budget share to a changes in real expenditures
2. Sum of all goods elasticities, β_i, equals zero in first differences.
3. The null, $\beta_i = 0$, is proportional changes in expenditures with changes in budget
4. $\beta_i < 0$ means that an income reduction leads to an **increase** in relative budget share for good *i* (less than one–for–one cuts)…. **a "necessity" good.**
5. $\beta_i > 0$ means that an income reduction leads to a **decrease** in relative budget share for good *I (*more than one-for-one cuts) …. **a "luxury" good.**

HISTORICAL DATA ON EXPENDITURES: US CENSUS OF GOVERNMENTS

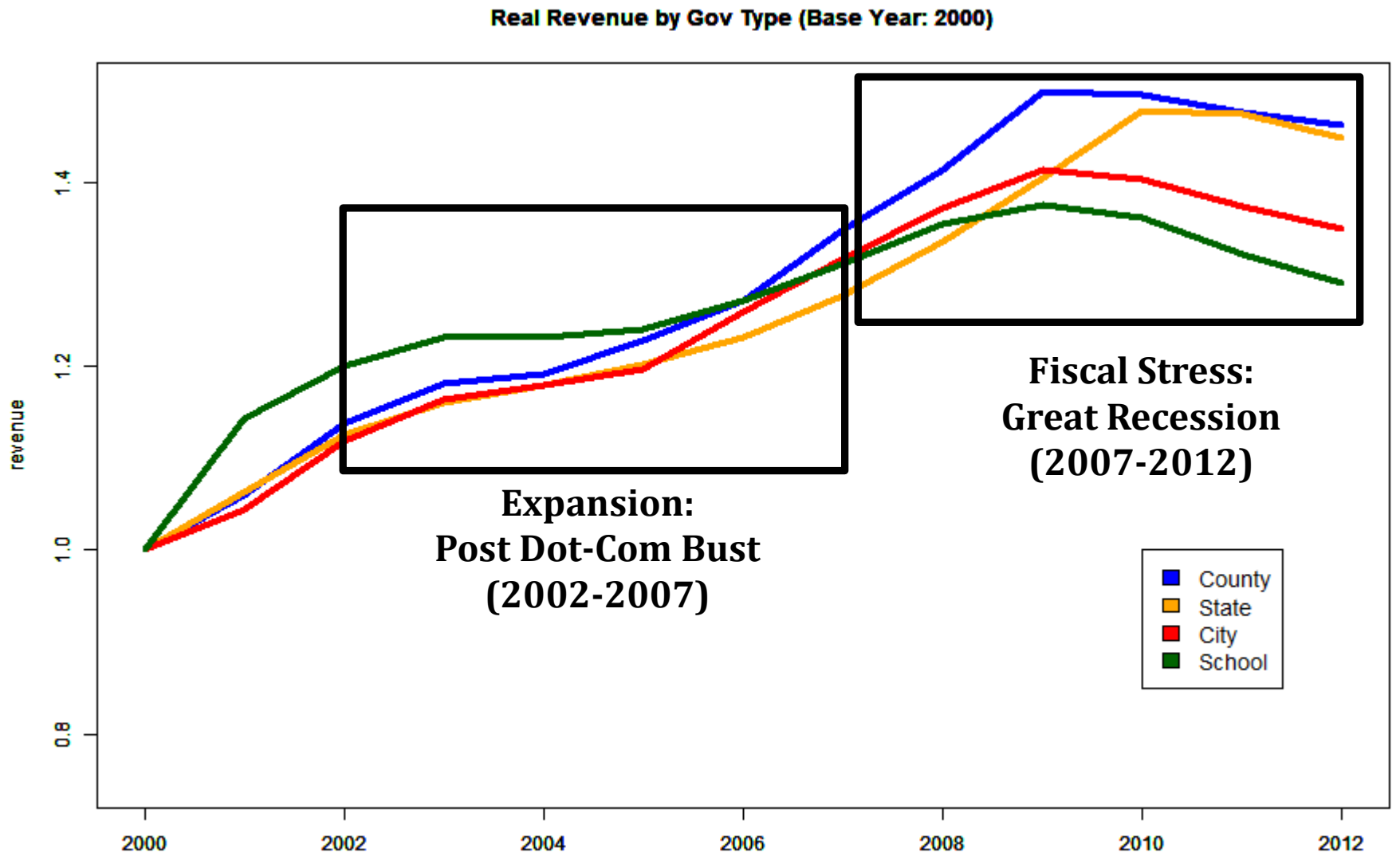
Near-universe of public entities: **86,608 governments**, including

- **50 states**
- **3,021 counties**
- **35,241 cities and towns**
- **13,430 independent school districts**
- **34,866 special government districts**

All governments surveyed every five years (…2002, 2007, 2012…)

$3 trillion portfolio of public goods and services

ESTIMATING SAMPLES



STATS: SUMMATION OF EXPENDITURES ACROSS GOVERNMENTS *(EXCLUDES ALL IGA TRANSFERS)*

Sums (combined cap & current)	2007 -$B	2012 - $B	2007 - %	2012 - %
• Civil Administration	$252	$263	10.7%	9.8%
• Education – Elementary	$535	$562	22.7%	20.9%
• Education – Higher	$239	$304	10.2%	11.3%
• Public Safety	$227	$255	9.7%	9.5%
• Health	$194	$238	8.2%	8.9%
• Transport	$193	$220	8.2%	8.2%
• Parks Recreation	$77	$77	3.3%	2.9%
• Utilities	$191	$204	8.1%	7.6%
• Welfare	$145	$151	6.1%	5.6%
• Debt (current only)	$106	$125	4.5%	4.6%
• Retirement (current only)	$167	$193	7.1%	7.1%
• Unemployment (current only)	$29	$96	1.2%	3.6%
Total	$2,356	$2,688		

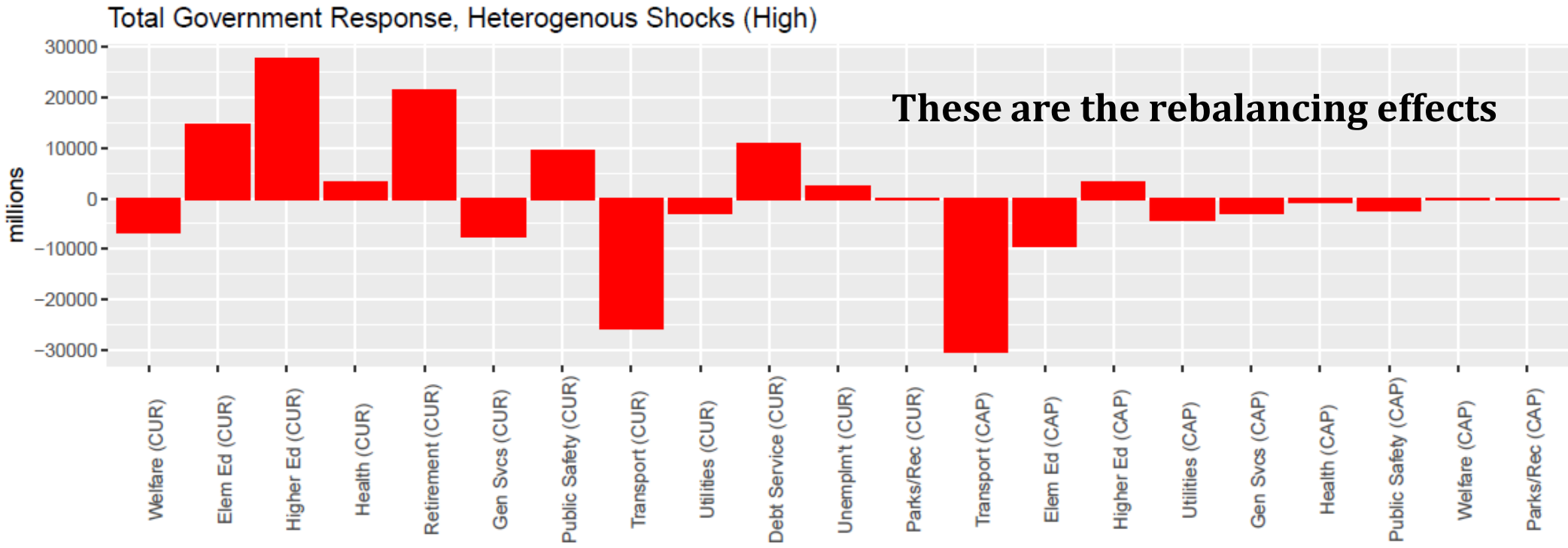
RESULTS – PART 1: PROJECT TOTAL PORTFOLIO REBALANCING

Compute total allocation changes:

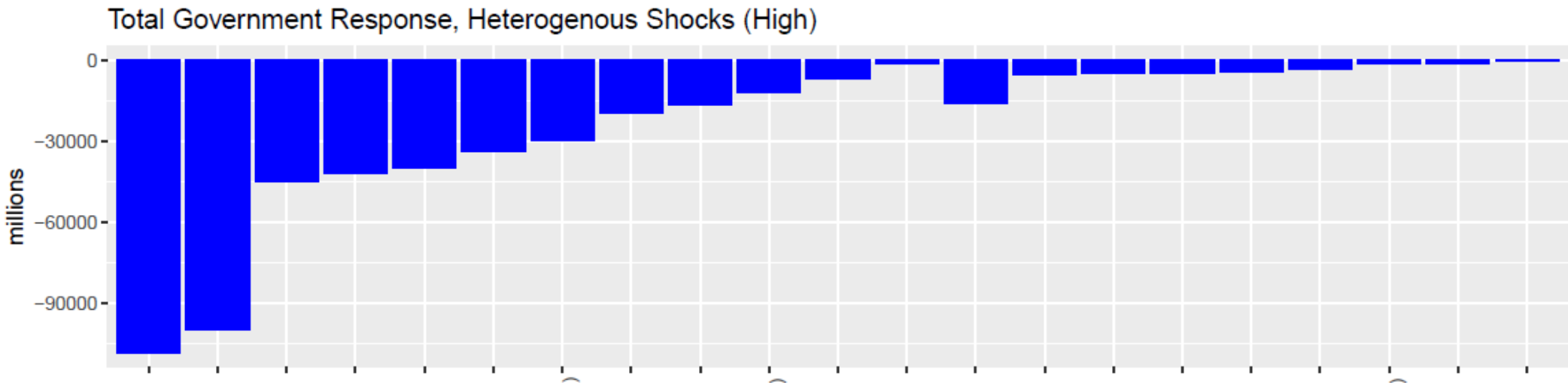
1. Estimate elasticities, $\{\boldsymbol{\beta_i}\}_{\boldsymbol{i=1}}^{\boldsymbol{21}}$:
   - By **expenditure category** (education, health, etc.) and by **jurisdiction type** (state, county, etc.)
   - Our best specification: Allow β_i for sub-state entities to vary within state *(heterogeneity in regional preferences)*

2. Calibrate negative shock
   - Realistic and flexible model for impact of **severe macroeconomic downturn**
     - Whittaker (2020) state-level estimates of reduction in revenues arising from COVID 19
   - **General magnitude:** ~9% decline in state revenues; and ~5% decline in local revenues

3. Elasticities drive government-level response to shock; aggregate across all governments

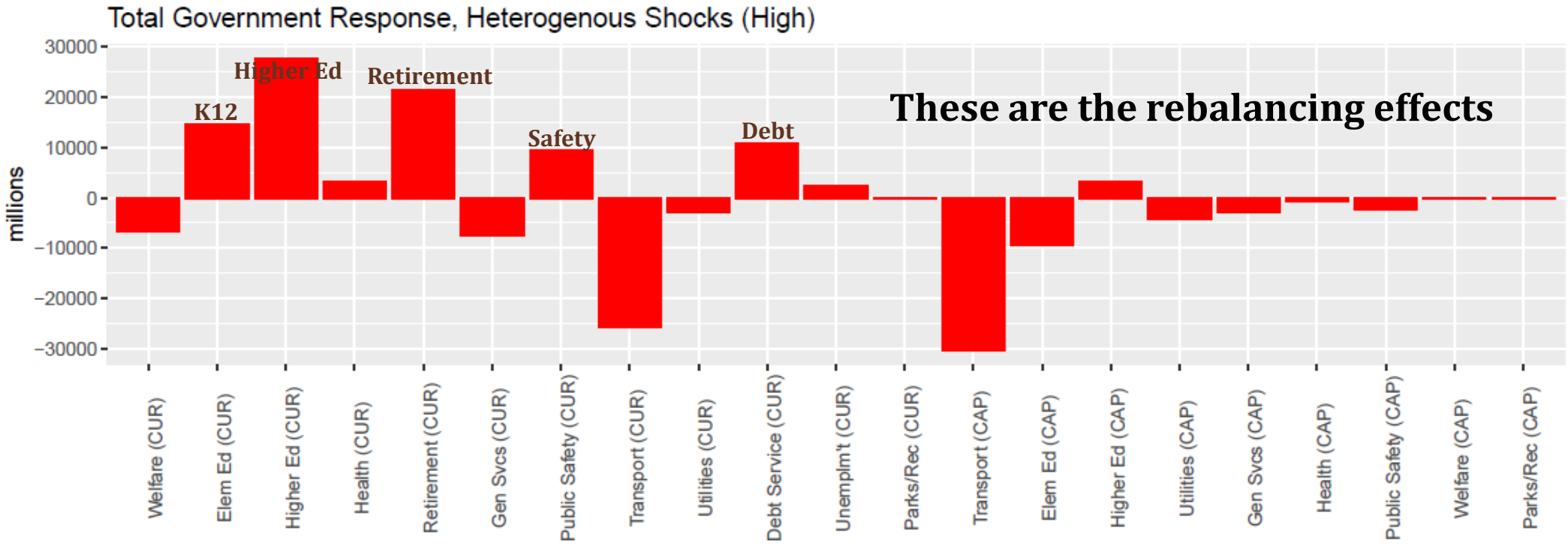


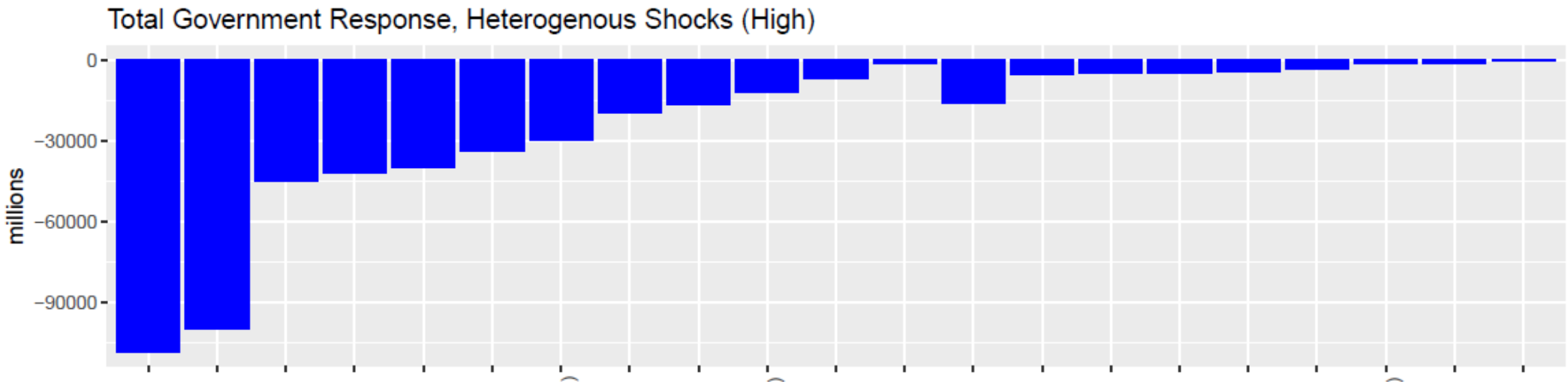
These are the rebalancing effects



Necessities:

- K-12 Educ.
- Higher Ed
- Retirement
- Safety
- Debt



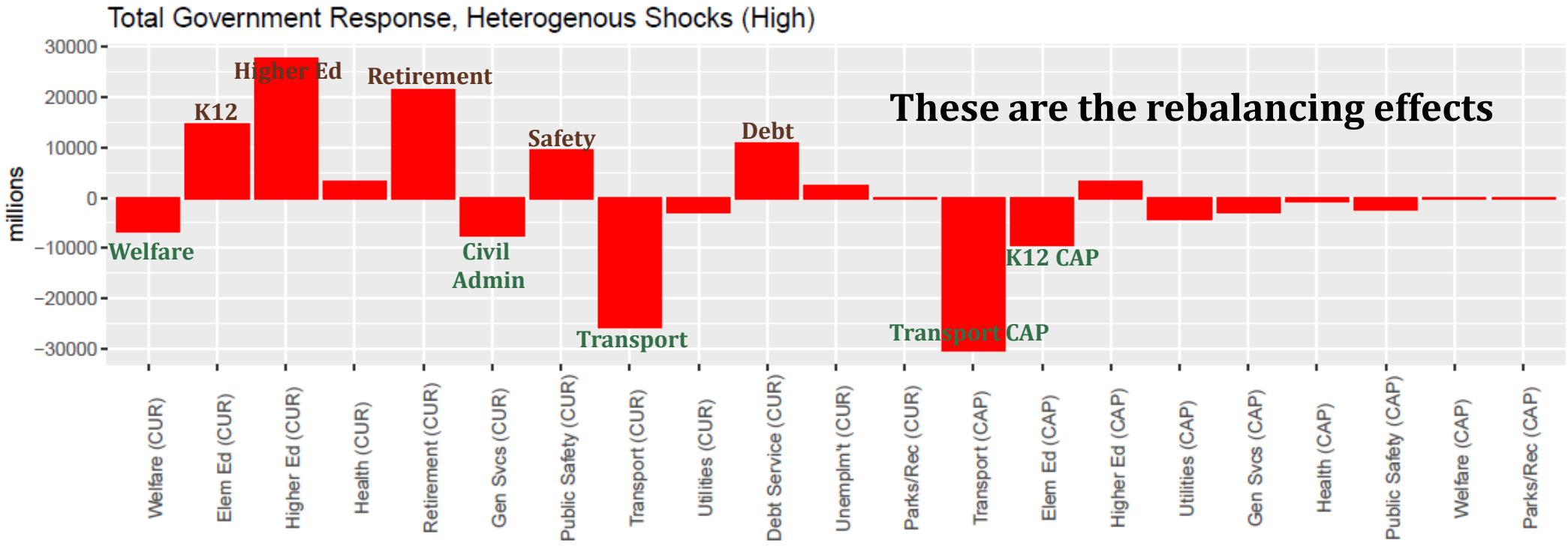


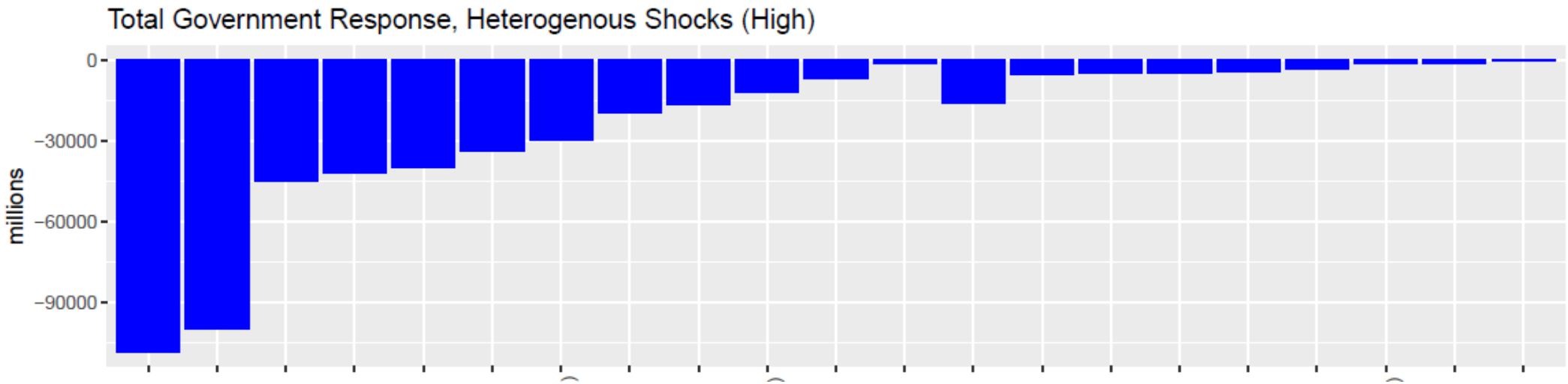
Necessities:

- K-12 Educ.
- Higher Ed
- Retirement
- Safety
- Debt

Luxuries:

- Welfare
- Civil Admin
- Transport
  - Current
  - Capital
- K-12 Ed Capital





TOTAL FLOWS DUE TO PORTFOLIO REBALANCING

Contraction-Implied Rebalancing:

- -23.5B from transportation (capital)
- -20B from transportation (current)
- -7B from K-12 (capital)
- -5.2B from other capital expenditures

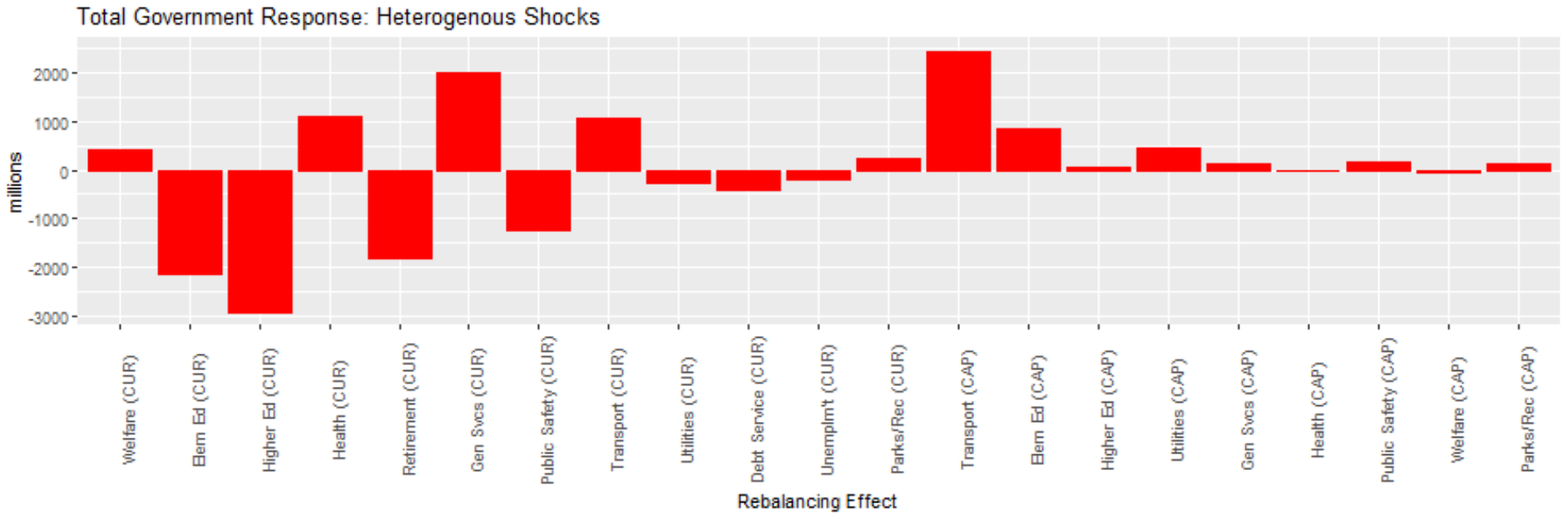
- -6.1B from civil administration
- -5.1B from welfare services

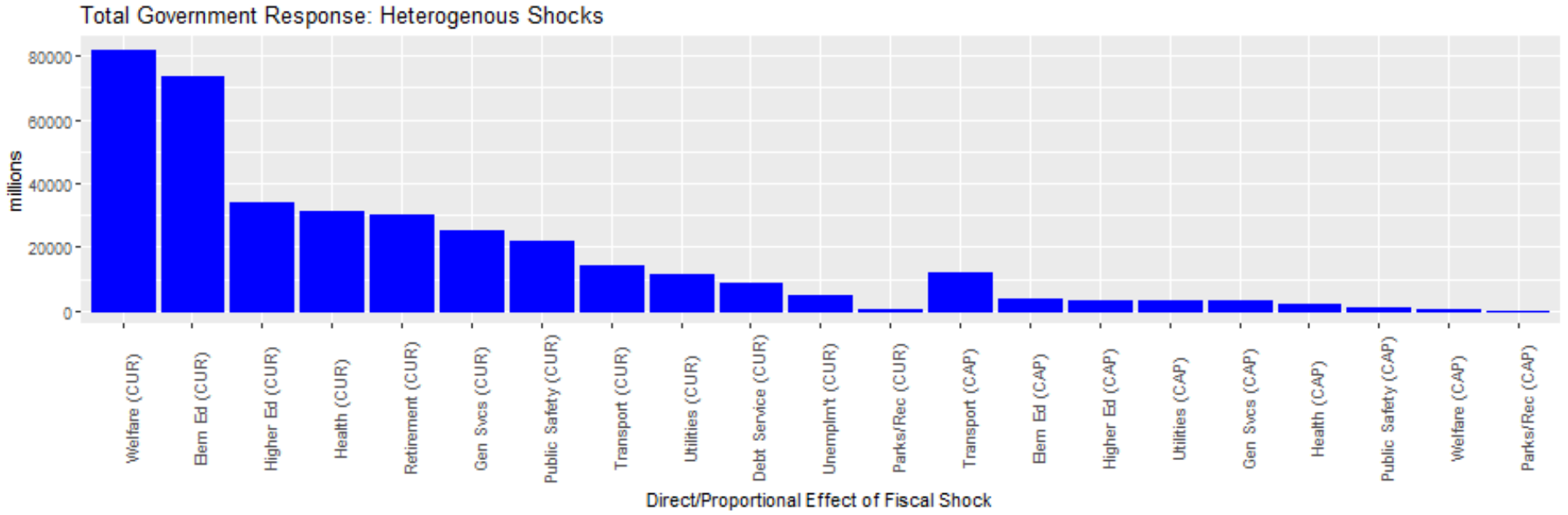
Total of **$67B** additional cuts; **$56B infrastructure**

Allocated to: education (33B), safety (7B), financial flows (27B)

POSITIVE SHOCK

- Elasticities estimated from expansionary period after dot-com bust (2002-2007)
- Similar split into luxuries and necessities
- Rebalancing effect is order of magnitude smaller





TOTAL FLOWS DUE TO PORTFOLIO REBALANCING

Contraction-Implied Rebalancing:

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- -20B from transportation (current)
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- -5.2B from other capital expenditures

- -6.1B from civil administration
- -5.1B from welfare services

Total of **$67B** additional cuts; **$56B infrastructure**

Allocated to: education (33B), safety (7B), financial flows (27B)

Expansion-Implied Rebalancing:

- +2.4B from transportation (capital)
- +1.1B from transportation (current)
- +.8B from K-12 (capital)
- +.8B from other capital expenditures

- +2B from civil administration
- +.4B from welfare services

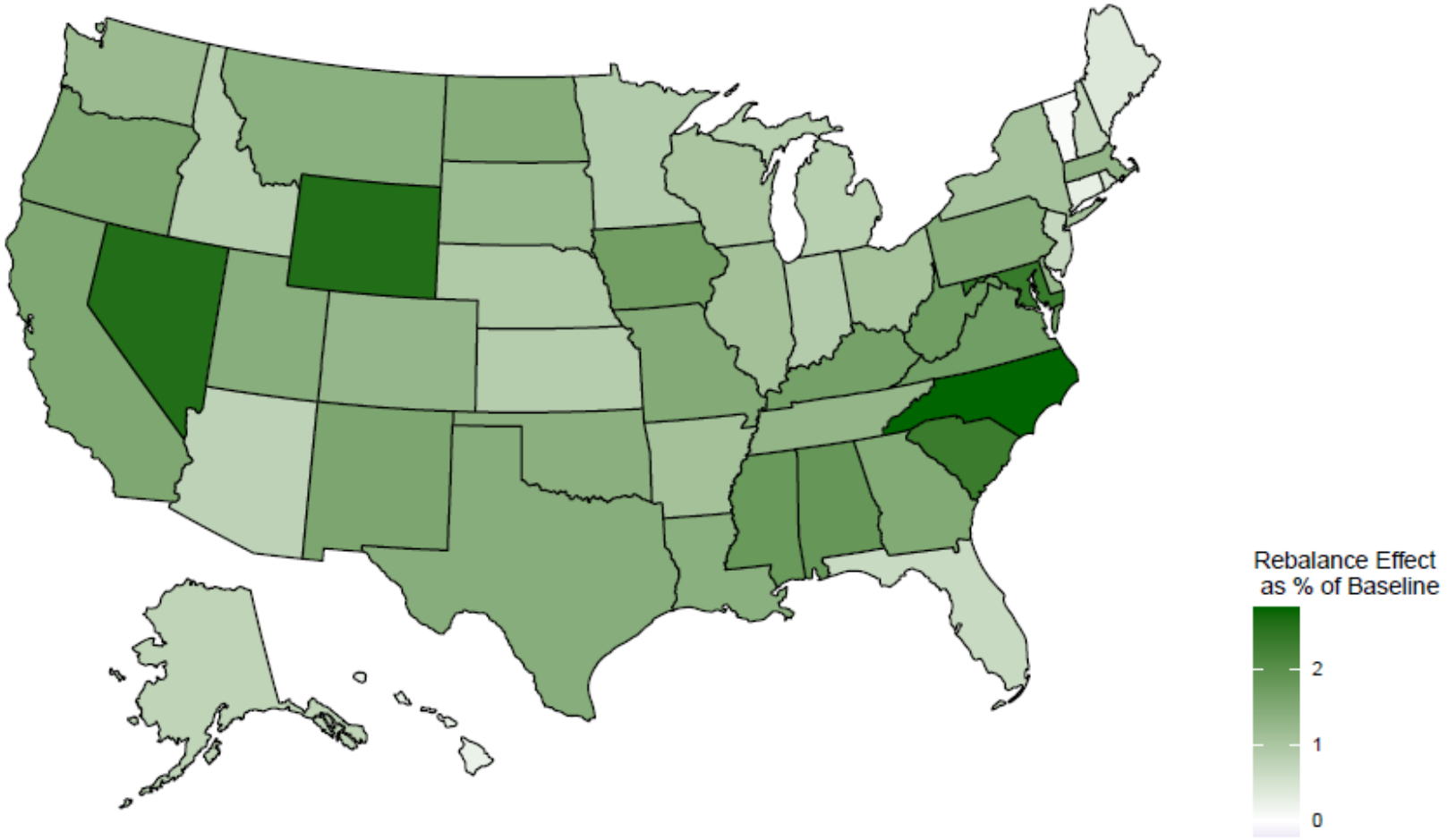
$7.5B in additional allocations; **$5.1B infrastructure**

Sources: education (5B), safety (1B), financial flows (2B)

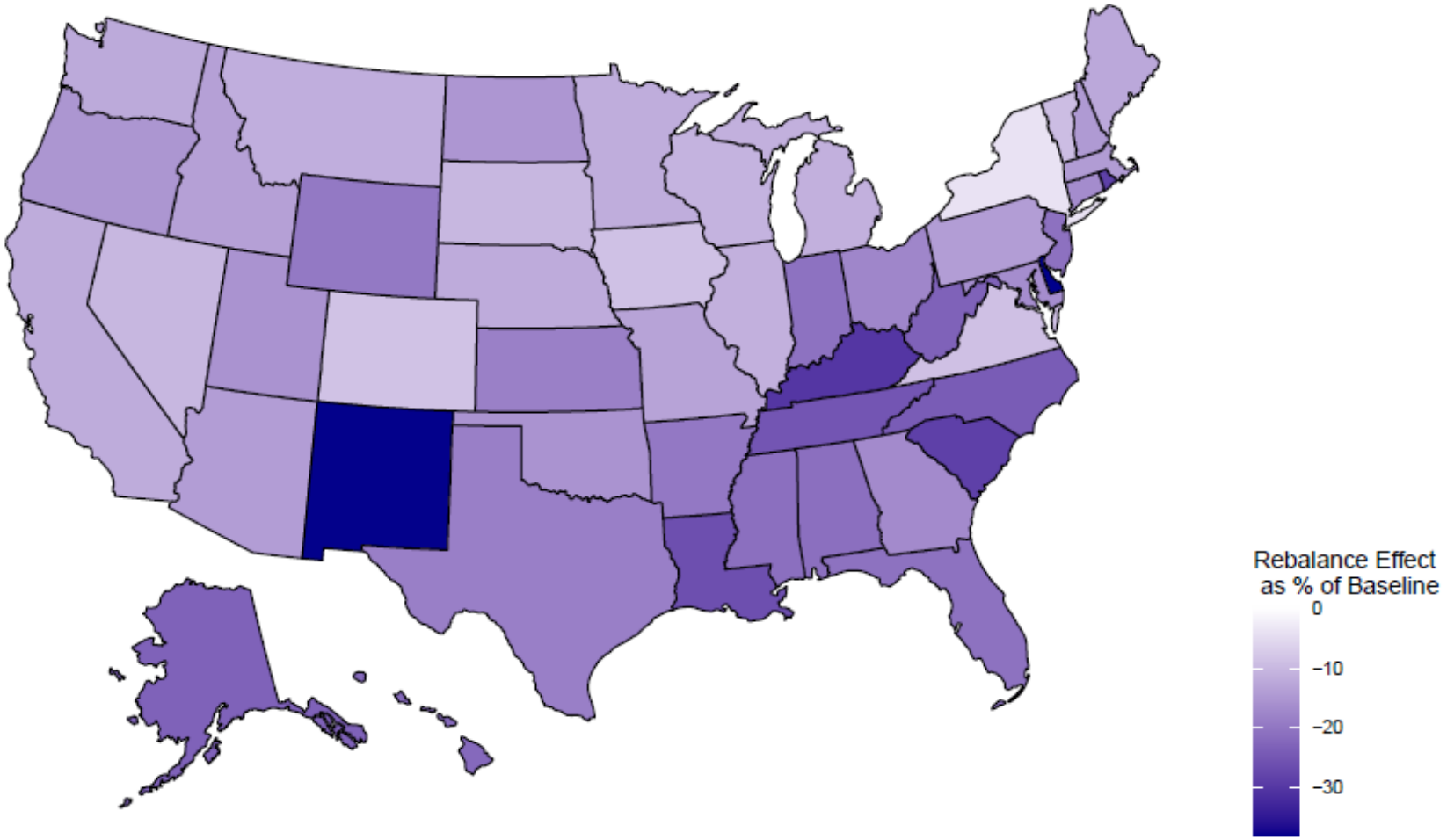
RESULTS – PART 2: HETEROGENEITIES BY STATE

MAP WHAT MATTERS MORE / LESS ACROSS STATES

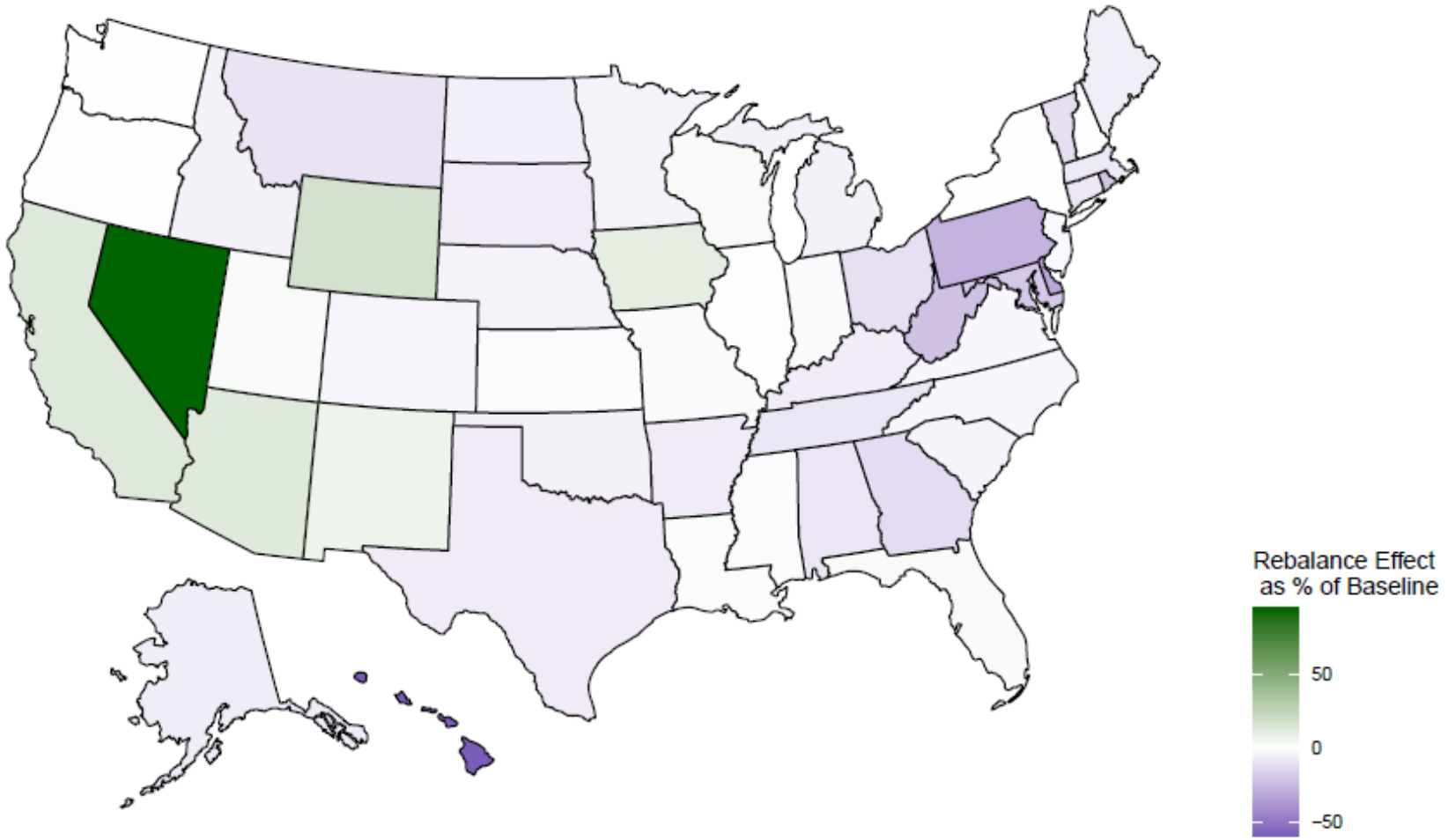
Reduction due to Rebalancing, 2nd Wave Scenario: Elem Ed (CUR)



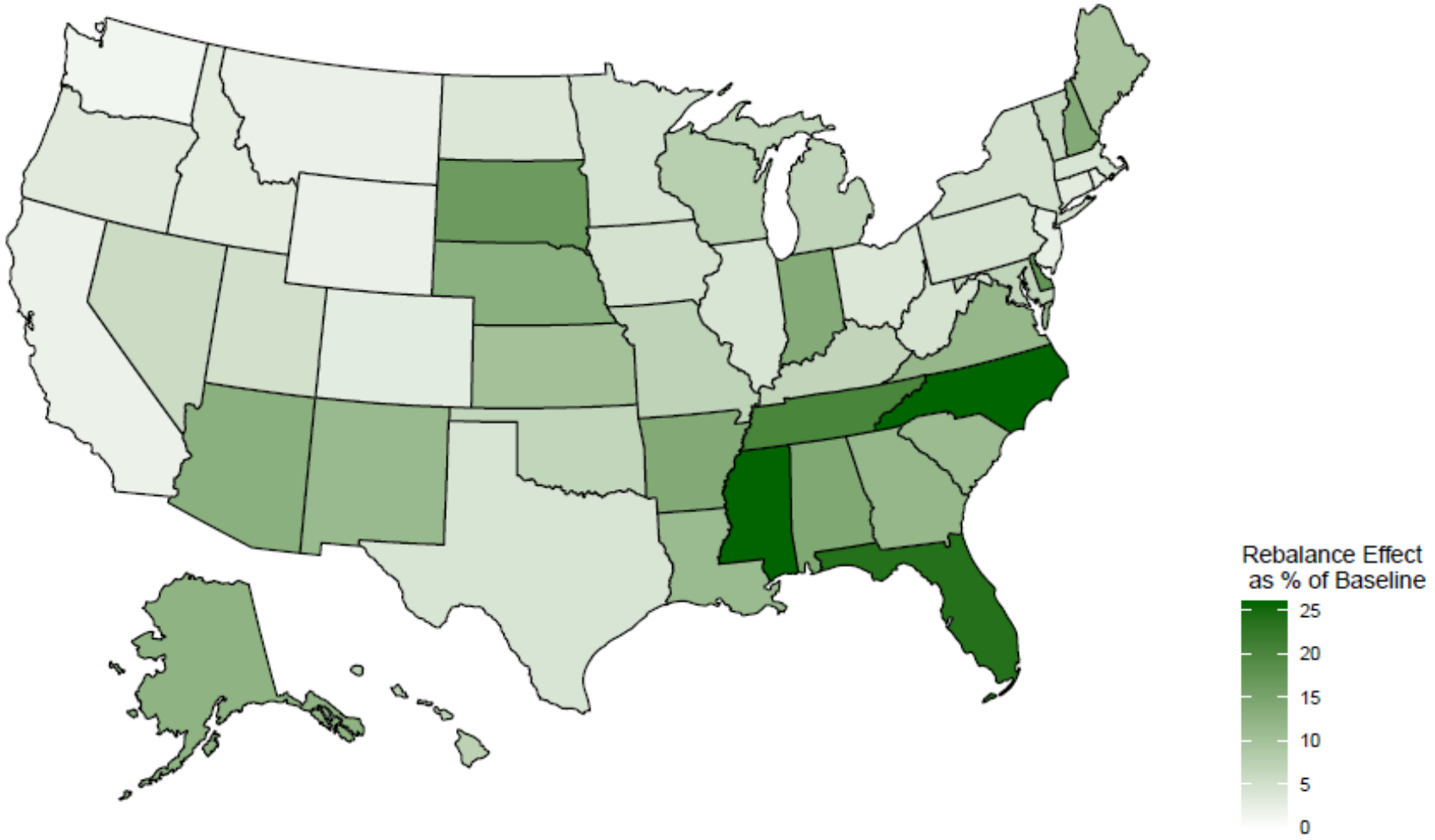
Reduction due to Rebalancing, 2nd Wave Scenario: Transport (CUR)



Reduction due to Rebalancing, 2nd Wave Scenario: Parks/Rec (CUR)



Reduction due to Rebalancing, 2nd Wave Scenario: Unemplm't (CUR)



TAKEAWAYS

1. In contractions:
   - Infrastructure acts like a luxury
   - Allows for governments to treat education like a necessity

2. Yet in fiscal expansion:
   - Infrastructure loses its luxury-like properties
   - Additional allocations across goods more or less in proportion

3. Implications
   - Massive decline in infrastructure over time
   - Single expansion/contraction cycle ⇒ ↓ $\$50\text{B}$ infrastructure allocation

4. Policy
   - Smoothing (i.e., relaxing balanced budget requirements; increased hedging) might have welfare benefits … need future research