

# FINANCIAL TRANSFERS BETWEEN PROVINCES: CAUSES AND CONSEQUENCES

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MEMORIAL UNIVERSITY – NOV 17



# Transfers are an Important Policy Issue

- “Equalization is **broken**” – Brian Jean (Former AB Opposition Leader)
- “Canada’s unfair equalization formula ... **punishes** Alberta for being rich in non-renewable resources” – Jason Kenney (Current AB Opposition Leader)
- “We’ve been **shafted** again and again” – Danny Williams (Former NL Premier)
- “Quebecers are getting **swindled**” – Jean-Yves Laforest (former BQ MP)

# What We Know, What We Don't

- **Financial transfers between states/provinces are ubiquitous**
  - **Direct Transfers:** *Australia, Belgium, Canada, China, France, India, Germany, South Africa, Switzerland, the United Kingdom, and others.*
  - **Indirect transfers:** *Federal spending and revenue responds to a region's average income (income taxes, employment insurance, Medicaid (US), etc...*
- **Natural Consequence of a Federal Government**
  - *Uniform tax rates, similar benefit programs, etc*
  - *Rich households pay more income tax and GST*
  - *Elderly households collect pension and old-age security*
  - *Unemployed individuals collect EI*
- **Provinces Differ**

# What We Know, What We Don't

- **Large research literature on Fiscal Federalism**
  - *Assignment problem (who should spend what, where)*
  - *Transfers (determinants, political interactions, efficiency consequences, tax interactions, ...)*
  - *Factor mobility (labour, capital, ...)*
- **Less research on interaction between internal transfers and trade**
  - *Absent trade, transfers have no effect*
  - *Higher incomes → higher living standards*
  - *Higher prices → lower living standards*
  - *How prices and incomes respond depends on trade openness*
- **Quantifying the effect of transfers requires Model + Data**
  - *Tombe and Winter (2017)*

# The Takeaway

- **Over 70% of inter-provincial transfers are “automatic”**
  - *Equalization only about one-fifth*
- **Trade flows, and trade costs, matter**
  - *Recipient provinces run trade deficits; contributors, a surplus*
  - *PEI roughly 33% higher welfare (real income); Alberta, 9% lower*
  - *Lower trade costs, bigger effect of transfers*
- **Equalization program can be improved**
  - *Currently features many undesirable, ad-hoc components*
  - *Dramatic simplification possible (a GDP-based formula)*

# Outline of the Talk

## 1) **Data on Fiscal Transfers**

- *Latest from Statistics Canada for 2016 (from Nov 8<sup>th</sup>)*

## 2) **Quantify the effect on GDP, productivity, income, etc...**

- *Model-based estimates – simplified version*

## 3) **Equalization Formula**

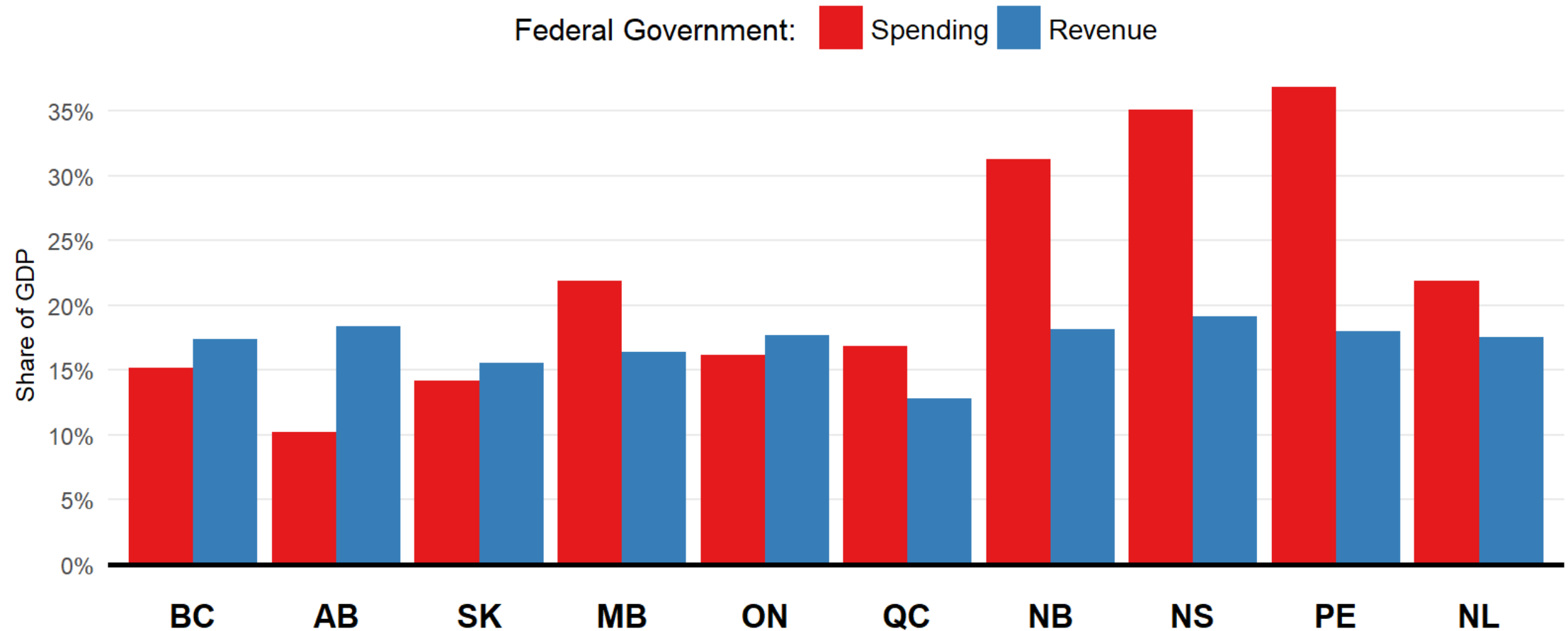
- *How it works, how it doesn't*
- *Problems; some serious, some not*
- *Potential solutions*
- *My own proposal (not yet written up)*

# Fiscal Integration in Canada

Measuring the magnitude (and causes of) fiscal transfers between regions

# Fiscal Integration in Canada (2016)

Source: CANSIM 384-0047 and 384-0037

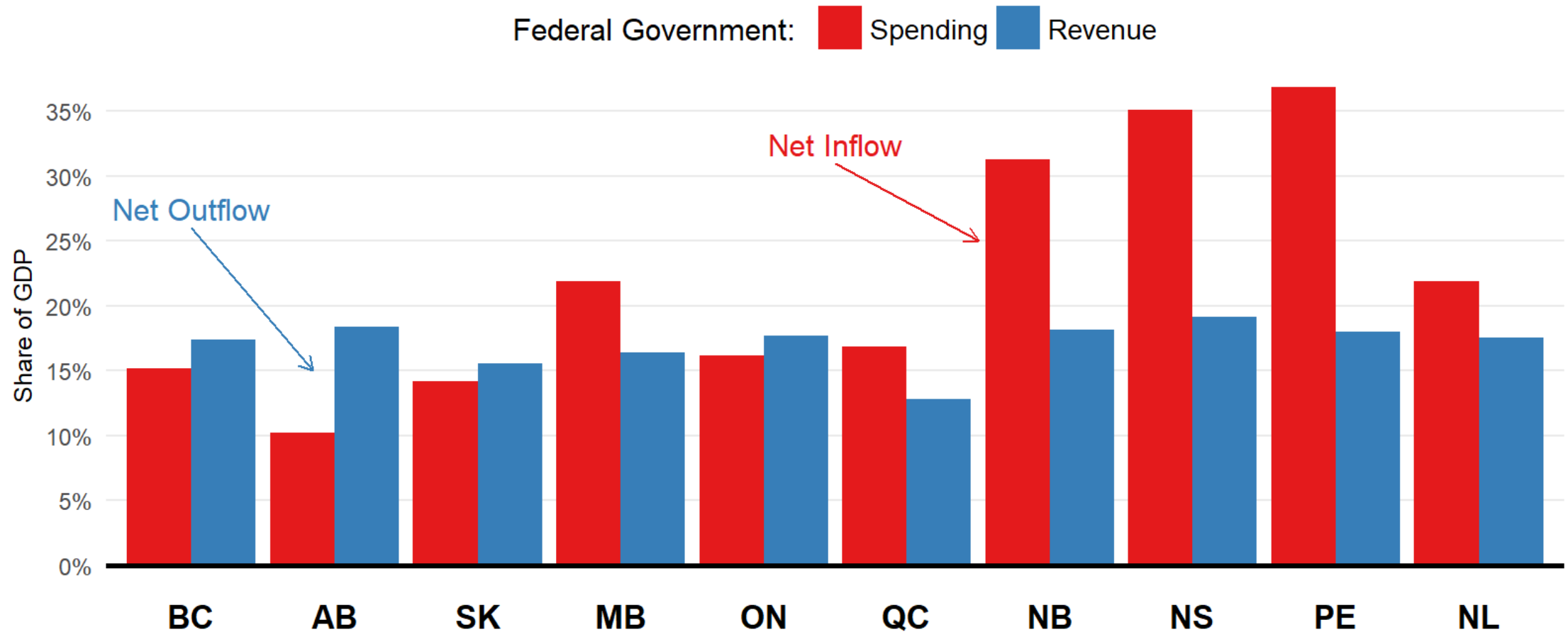


Note: Includes CPP/QPP payments and all Federal government revenue and expenditures.  
Graph by @trevortombe



# Fiscal Integration in Canada (2016)

Source: CANSIM 384-0047 and 384-0037



Note: Includes CPP/QPP payments and all Federal government revenue and expenditures.  
Graph by @trevortombe

# How to Measure Transfers

## What's the best benchmark?

- *Equal per-capita flows*

**Net implicit transfers:** higher per-person federal spending to a province than elsewhere; lower per-person revenue

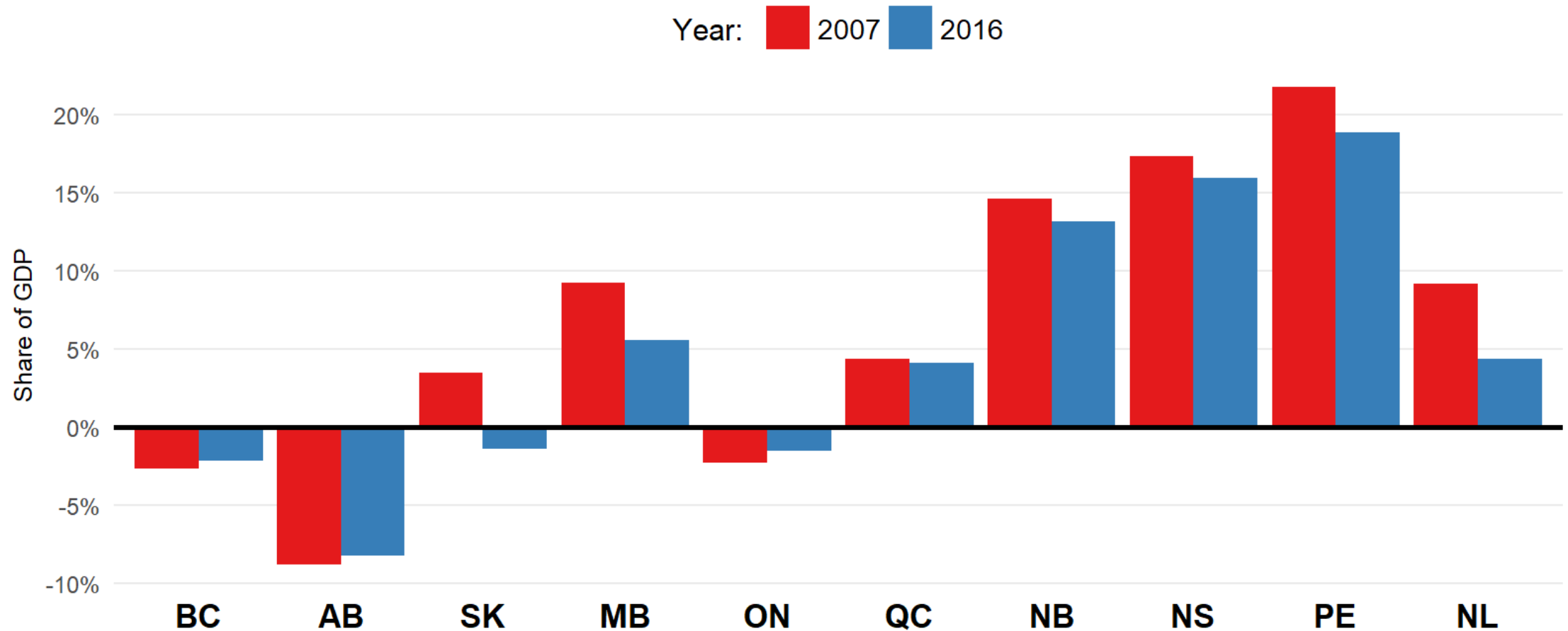
$$\text{Per Person: } t_n = (s_n - \bar{s}) - (r_n - \bar{r})$$

$$\text{Total: } T_n = \text{Population}_n \times t_n$$

Can disaggregate this across all spending/revenue categories

# Implicit Transfers, as % of Provincial GDP

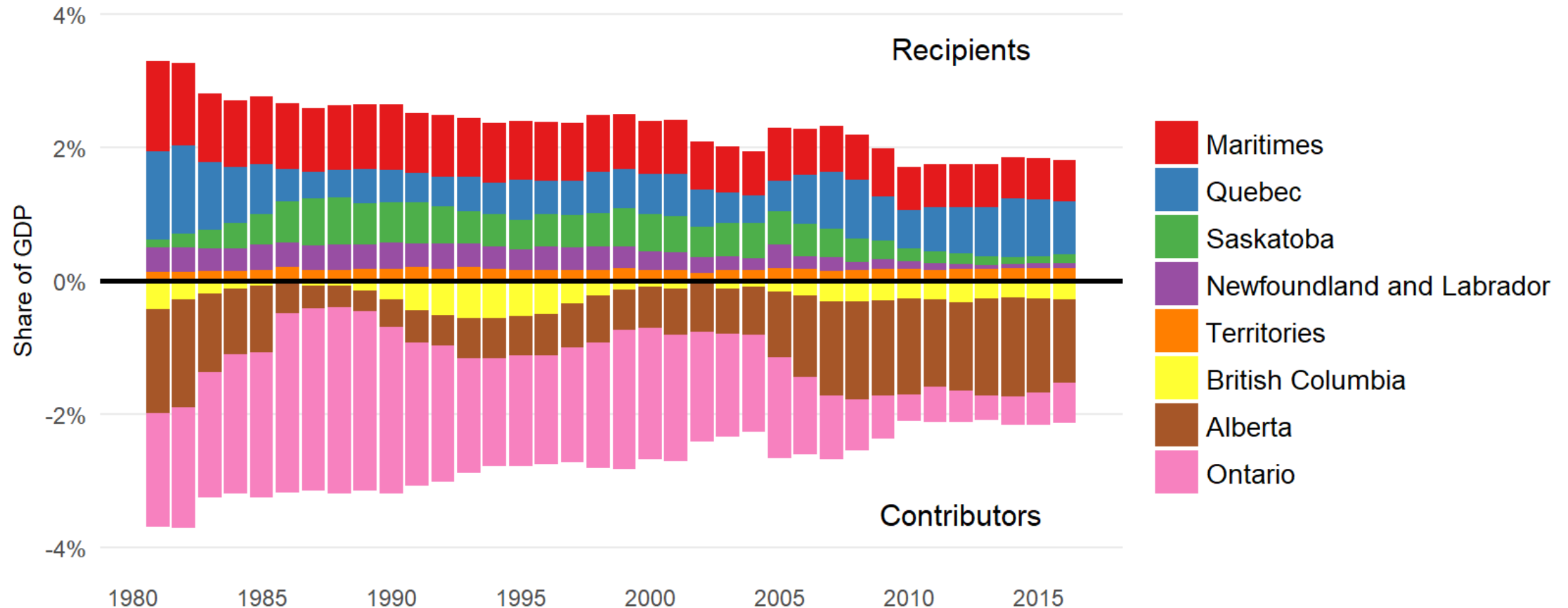
Source: CANSIM 384-0047 and 384-0037



Note: Aggregate imbalances are distributed equal per capita across provinces.  
Graph by @trevortombe

# Fiscal Transfers by Source and Destination, as % of Canada's GDP

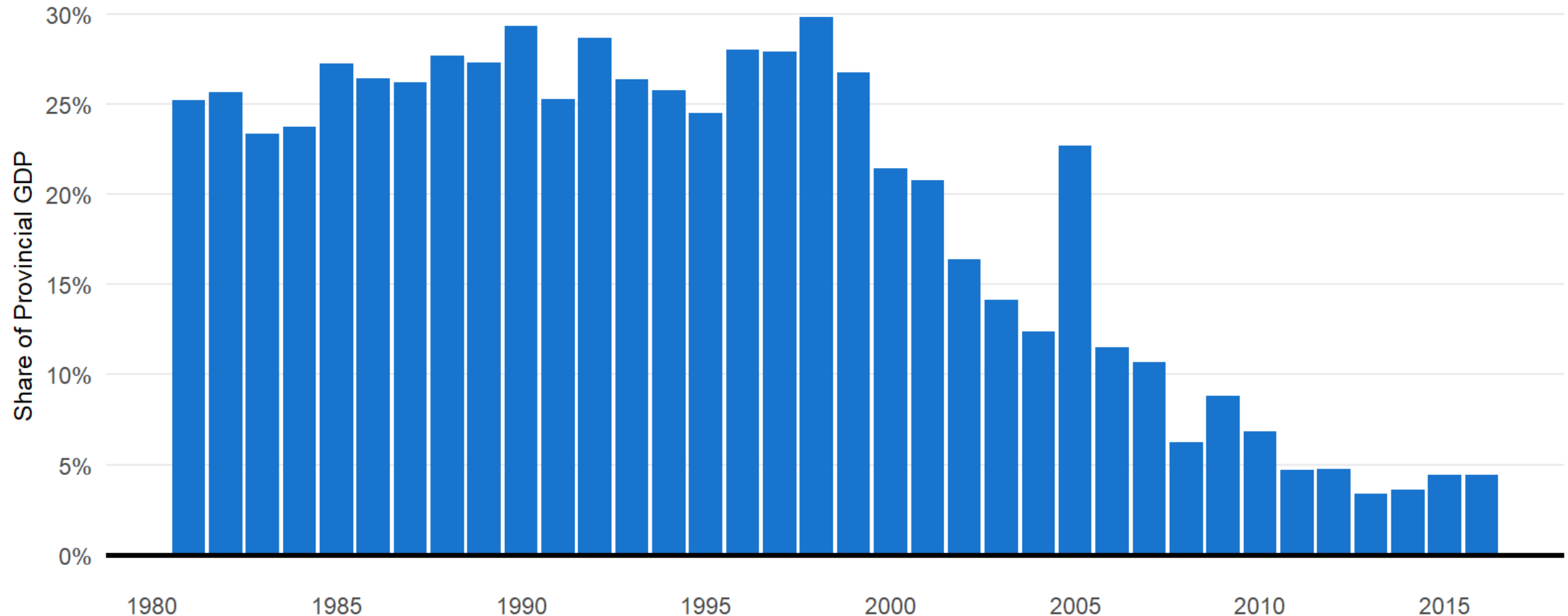
Source: CANSIM 384-0004, 384-0005, 384-0047 and 384-0037



Note: Aggregate imbalances are distributed equal per capita across provinces.  
The old data (0004/0005) are average with the new (0047) for the years 2007-2009. Graph by @trevortombe

# Fiscal Transfers to Newfoundland and Labrador, as % of GDP

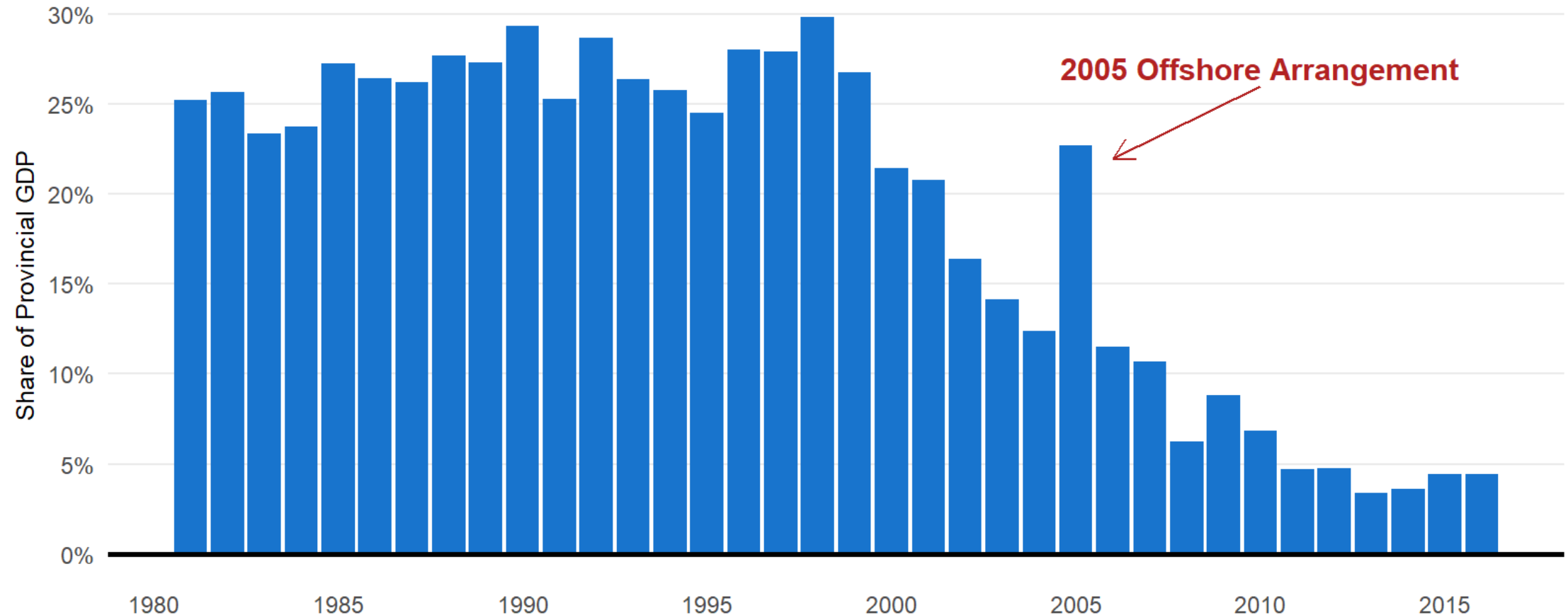
Source: CANSIM 384-0004, 384-0005, 384-0047 and 384-0037



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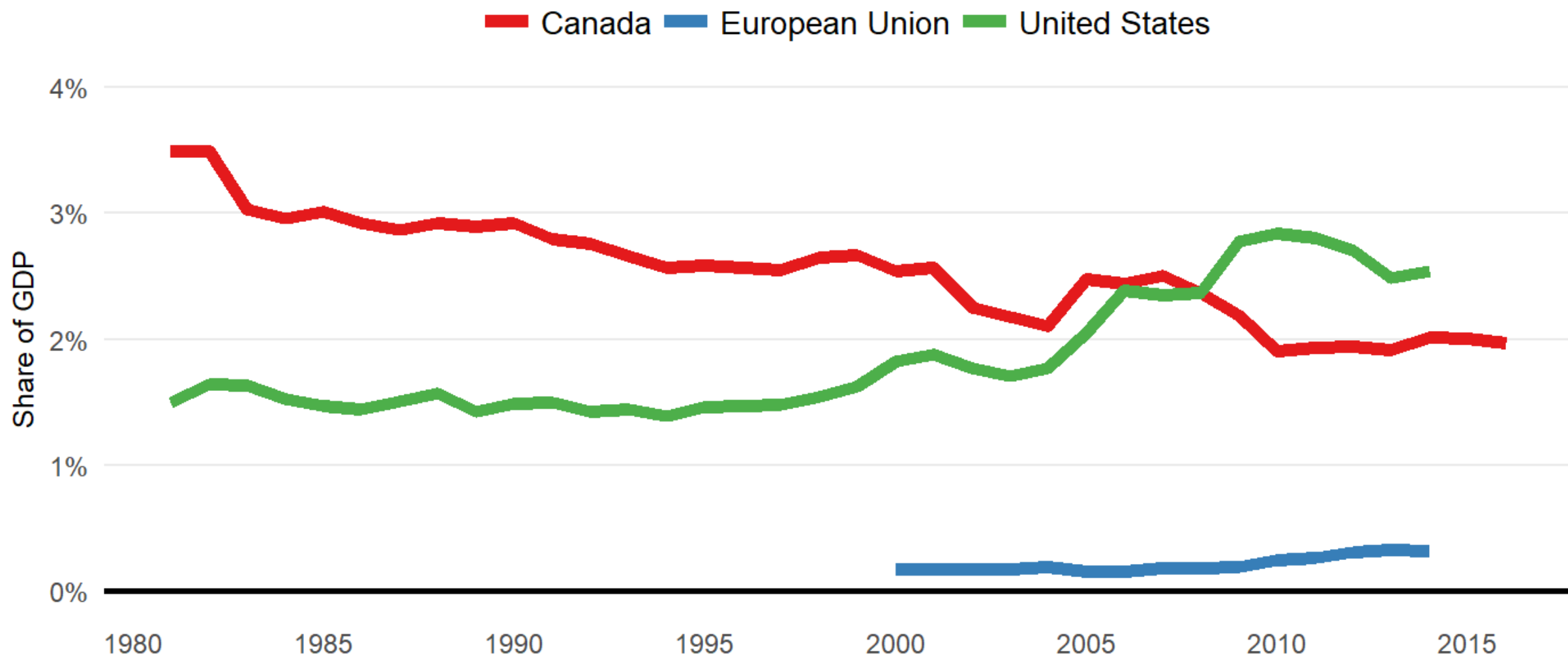
Source: CANSIM 384-0004, 384-0005, 384-0047 and 384-0037



Note: Aggregate imbalances are distributed equal per capita across provinces.  
The old data (0004/0005) are average with the new (0047) for the years 2007-2009. Graph by @trevortombe

# Comparing Interregional Fiscal Transfers, as % of GDP

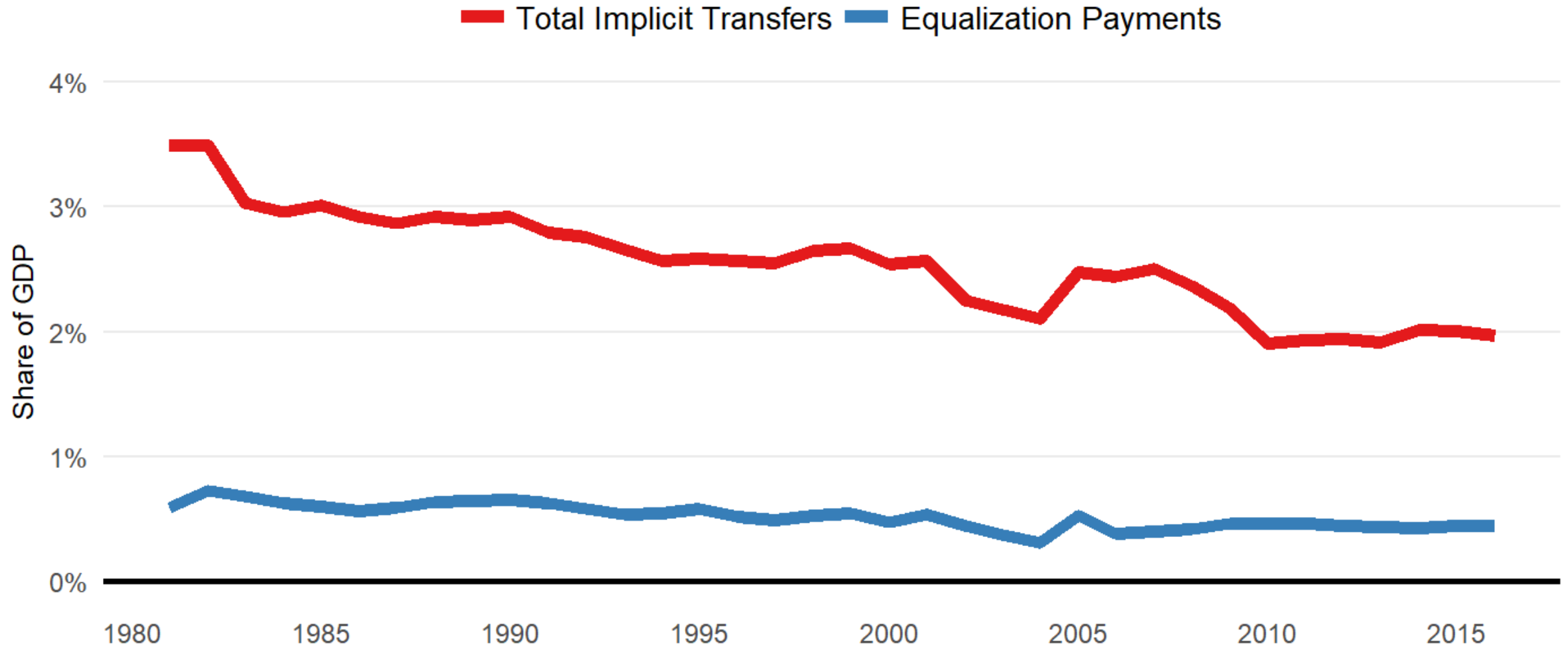
Source: CANSIM 384-0004, 384-0005, 384-0047 and 384-0037. And various sources for USA/EU.



Note: Aggregate imbalances are distributed equal per capita across provinces.  
The old data (0004/0005) are average with the new (0047) for the years 2007-2009. Graph by @trevortombe

# Equalization Is Only a Small Share of Interregional Transfers

Source: CANSIM 384-0004, 384-0005, 384-0047 and 384-0037.

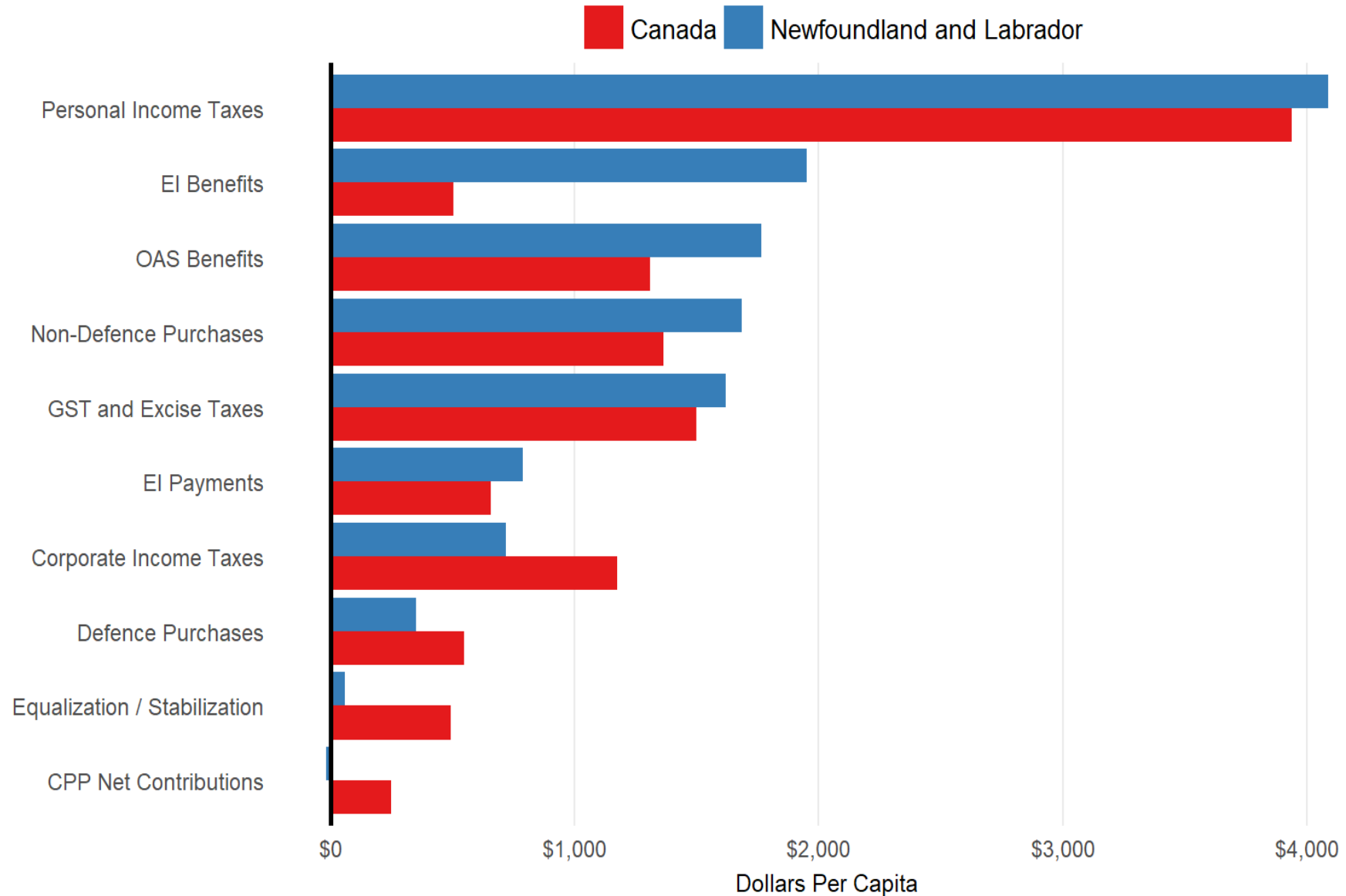


Note: Aggregate imbalances are distributed equal per capita across provinces.  
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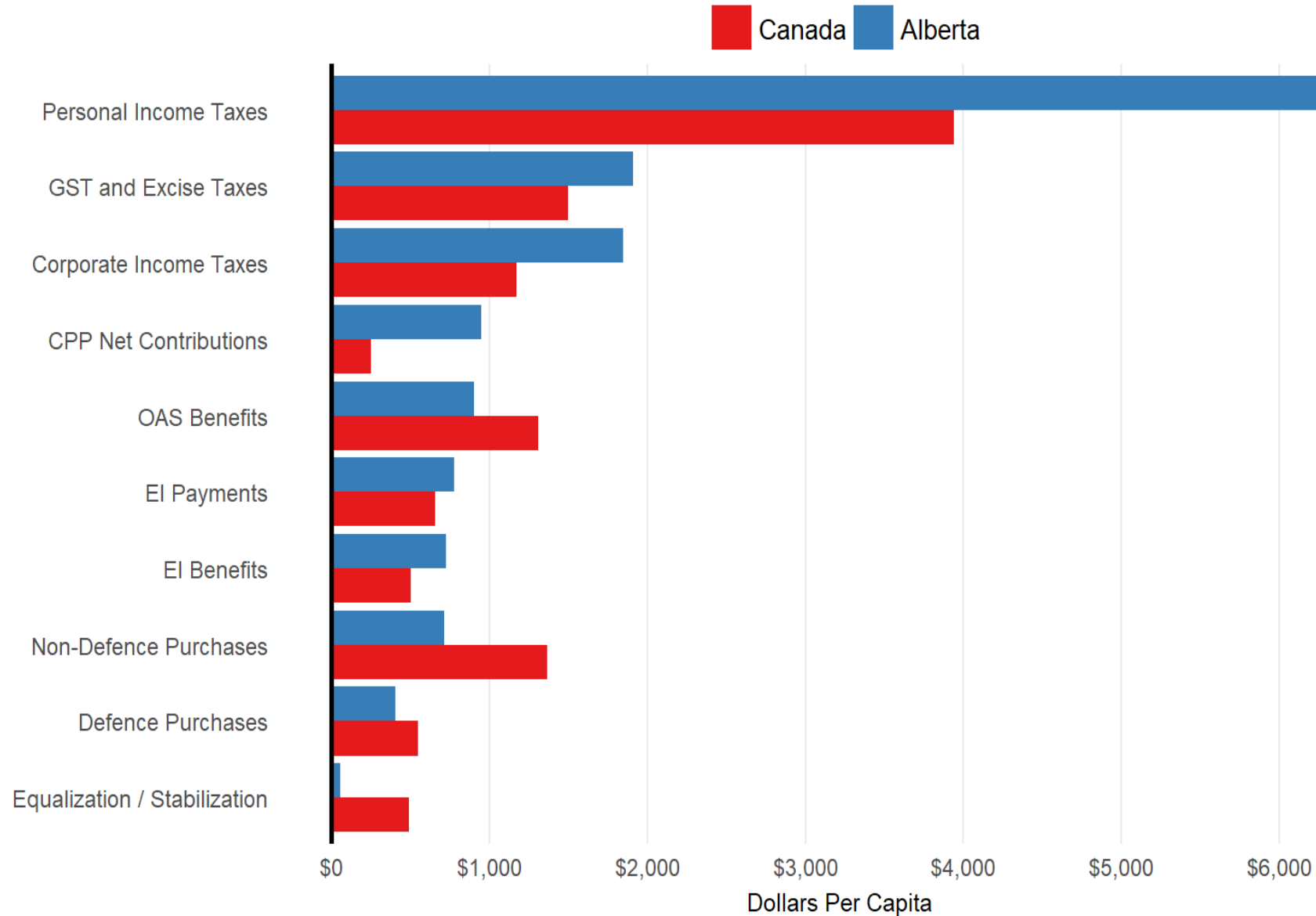
# Federal Revenue and Spending per Capita in NL (2016)

Source: CANSIM 384-0047 and 051-0001



# Federal Revenue and Spending per Capita in Alberta (2016)

Source: CANSIM 384-0047 and 051-0001



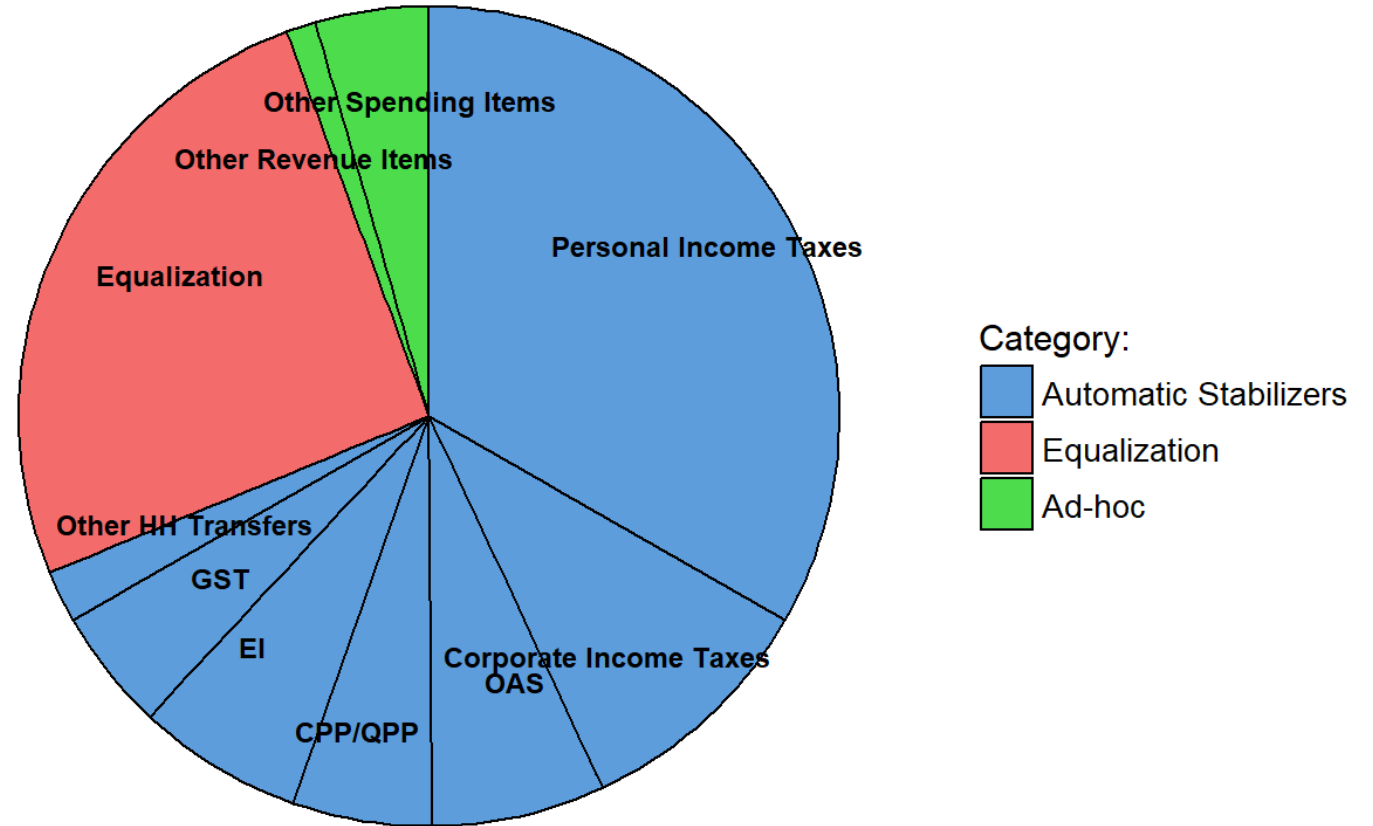
# Decomposing the Source of Inter-Provincial Transfers in Canada

**Net implicit transfers** to province  $i$  due to tax/spending item  $j$

$$T_n^j = L_n \sum_{j=1}^J \left( s_n^j - \bar{s}^j \right) - \left( r_n^j - \bar{r}^j \right)$$

**Nationally:**

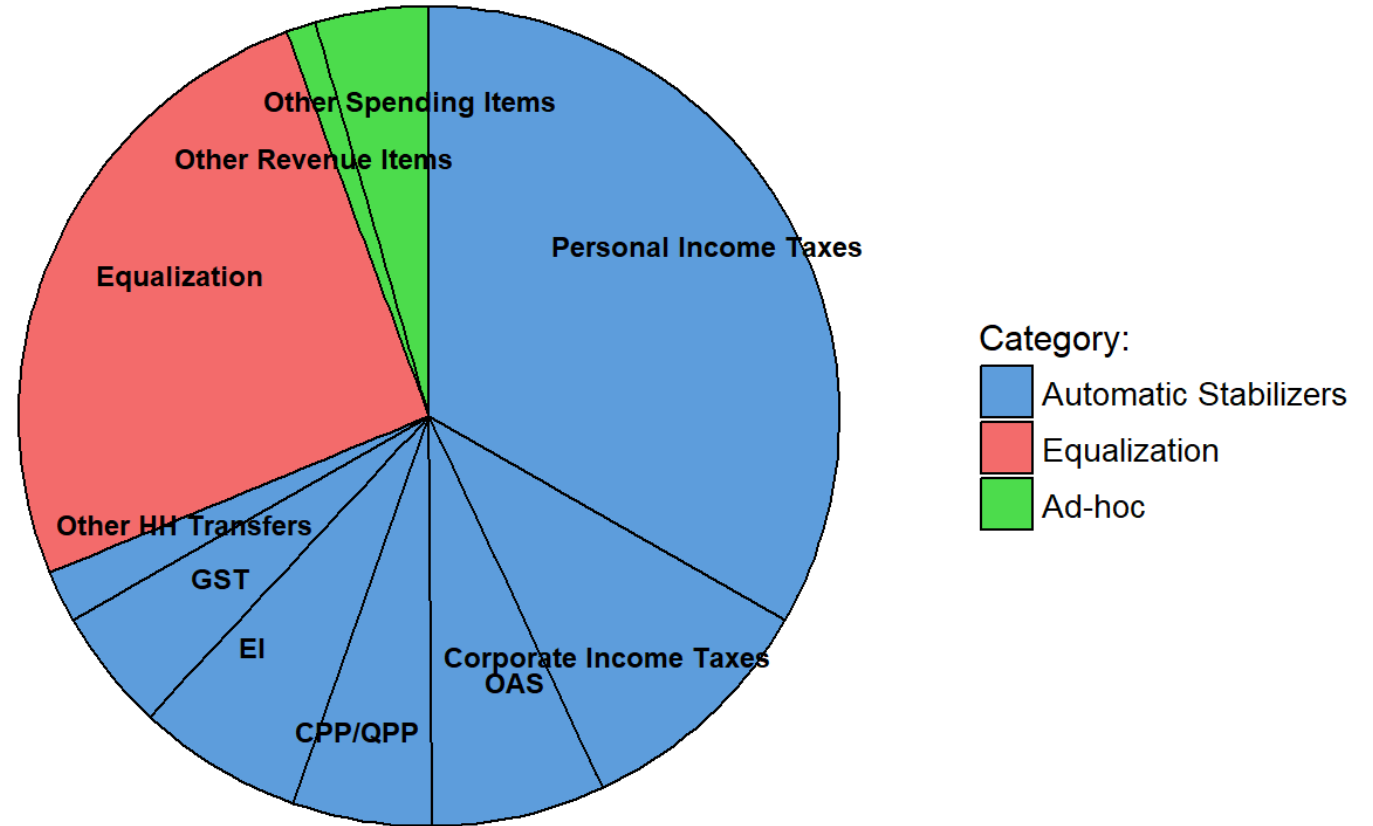
$$T^j = \frac{1}{2} \sum_{n=1}^N |T_n^j|$$



# Decomposing the Source of Inter-Provincial Transfers in Canada

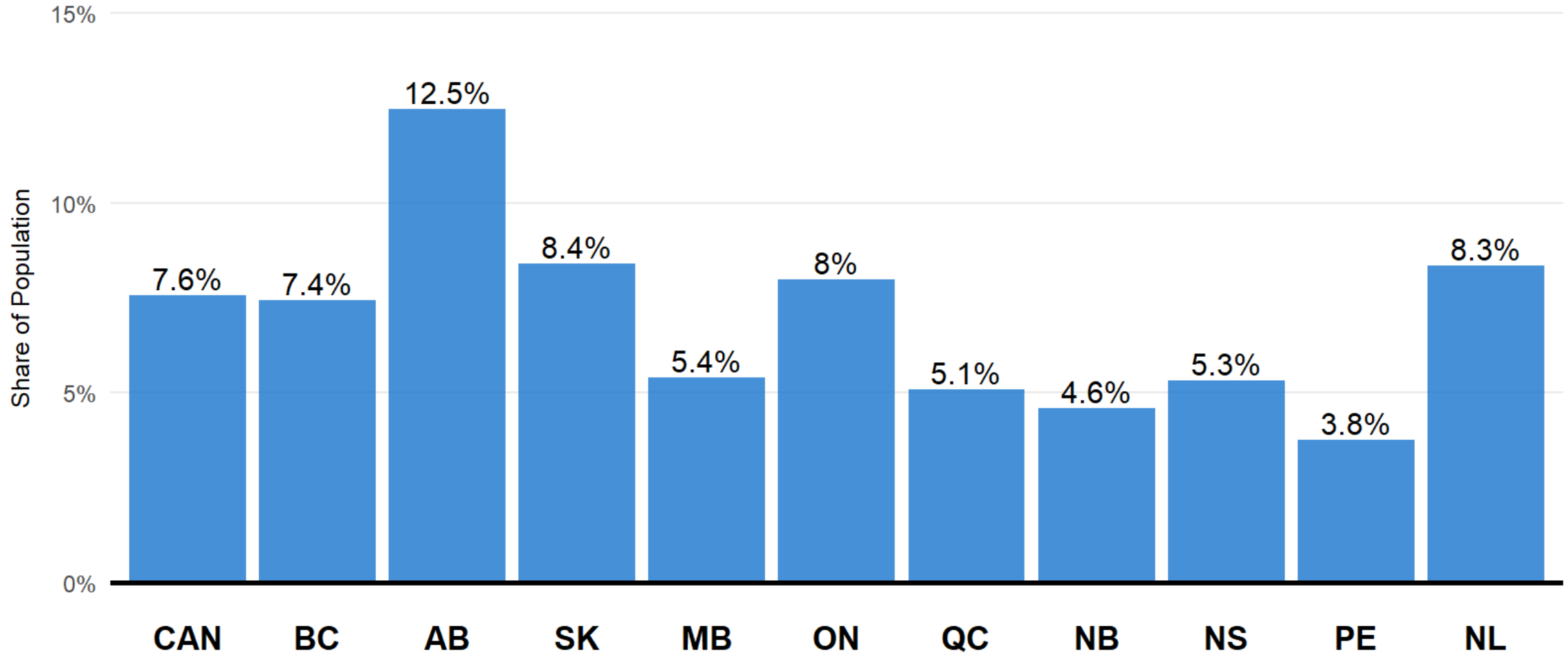
## Correlation to GDP/Capita:

- Income Taxes: 0.86
- Corp Taxes: 0.95
- CPP/QPP Net Payments: 0.74
- GST: 0.75
- OAS: -0.63
- Equalization: -0.37



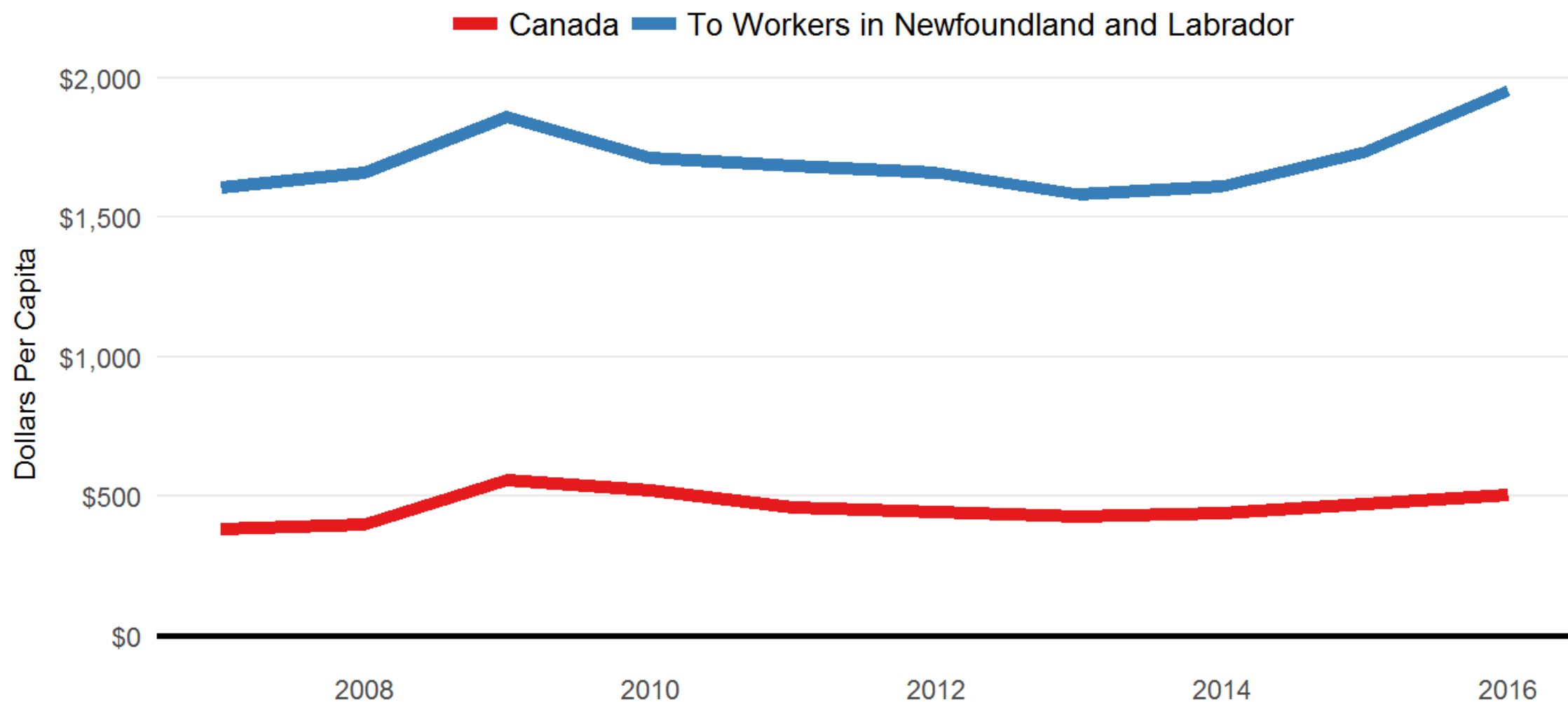
# Top-Decile Tax Filers, as % of Population (2015)

Source: CANSIM 204-0001 and 051-0001



# Federal EI Payments per Capita (2016)

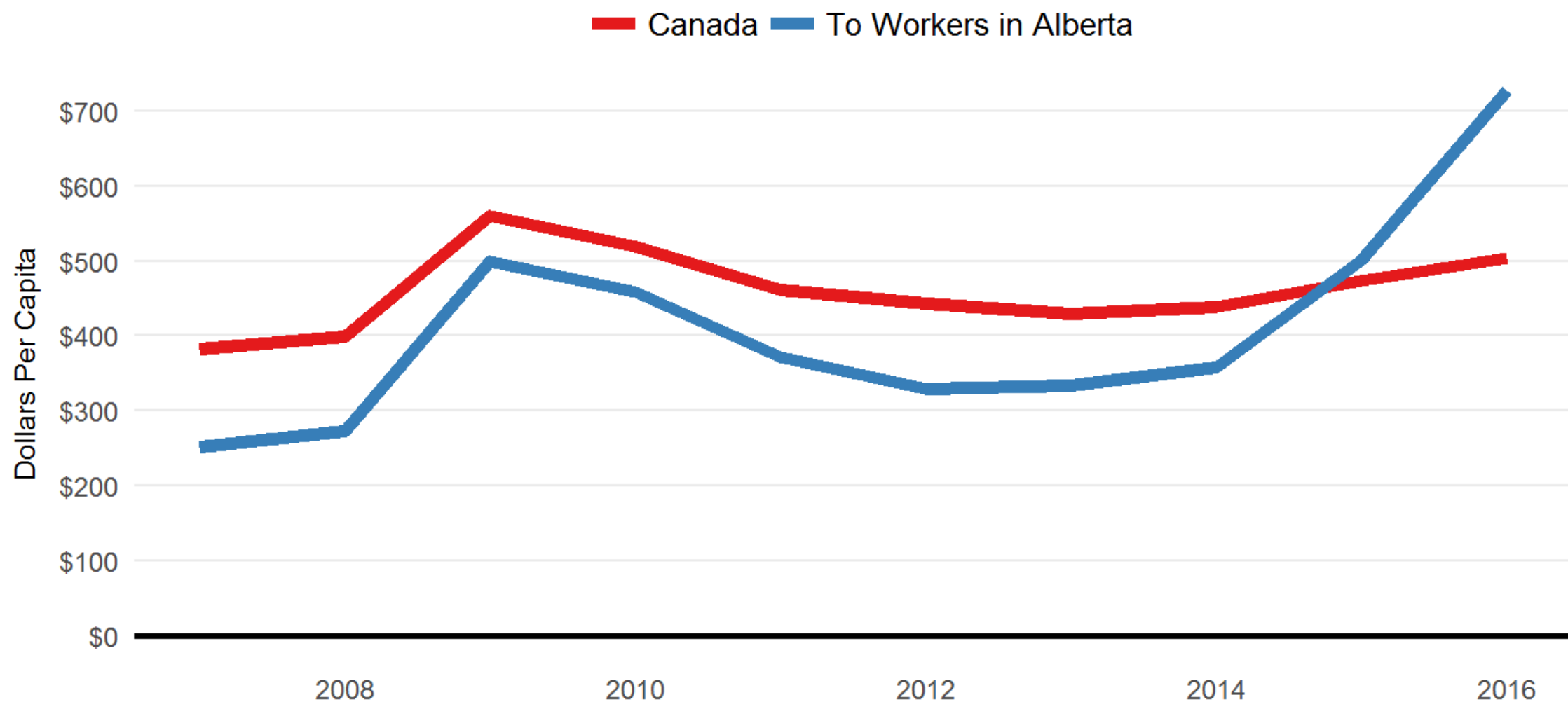
Source: CANSIM 384-0047 and 051-0001



Graph by @trevortombe

# Federal EI Payments per Capita (2016)

Source: CANSIM 384-0047 and 051-0001



Graph by @trevortombe

# Strength of Fiscal Integration in Canada

**A Useful Measure:** Sensitivity of post-transfer income ( $I_n$ ) to pre-transfer GDP/Capita ( $w_n$ )? That is, an elasticity:

$$I_n \propto w_n^{1+\gamma} \Rightarrow \frac{\% \Delta I_n}{\% \Delta w_n} = \gamma$$

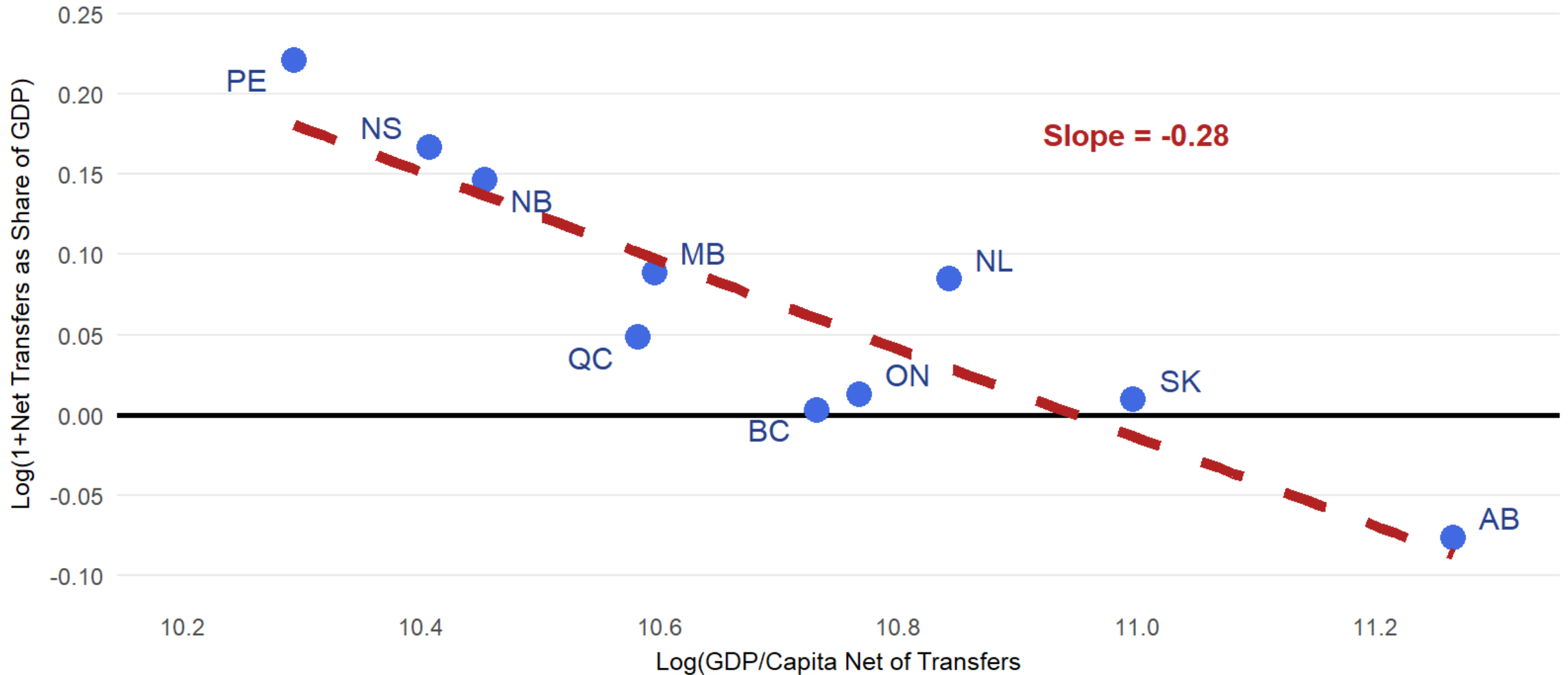
Our results:

- We find  $\gamma \approx -0.3$
- A 10% increase in GDP yields a 7% increase in after-transfer income
- Regional income inequality is roughly **half** what it would be without transfers



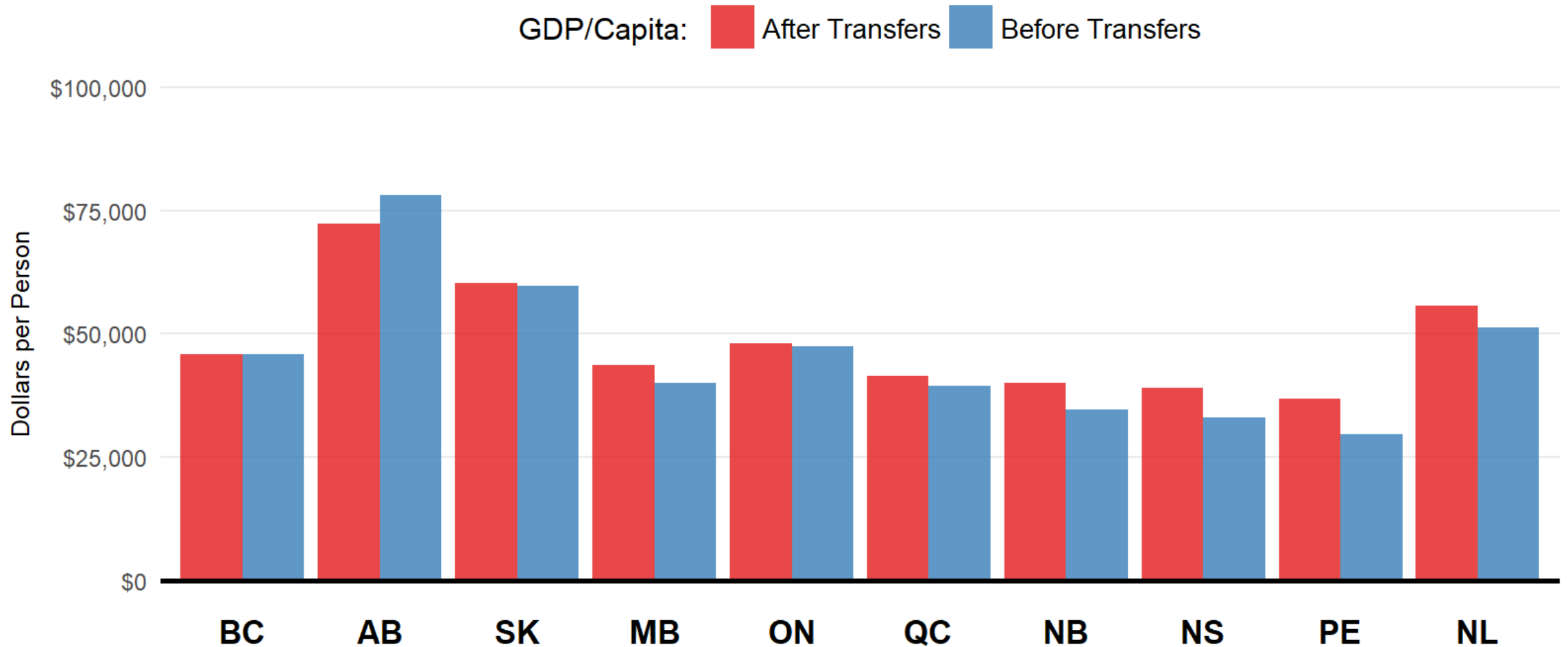
# Strength of Fiscal Integration in Canada

Source: Tombe and Winter (2017). Displays the strength of fiscal equalization.



# Strength of Fiscal Integration in Canada

Source: Tombe and Winter (2017). Displays pre- and post-transfer GDP per capita.



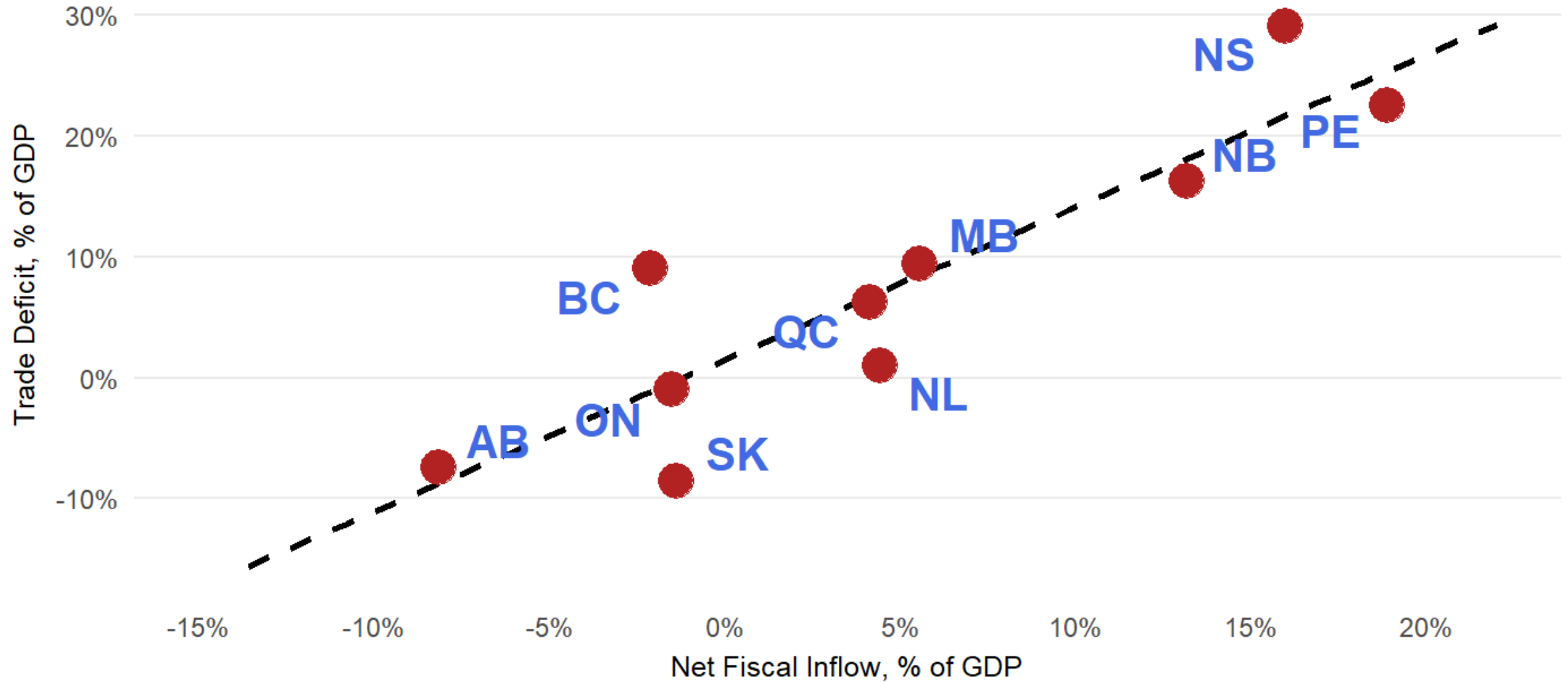
# A Model of Trade and Transfers

Tombe and Winter (2017)

A variation on a rich Eaton-Kortum model of trade, with full input-output links

# Financial Inflows and Trade Deficits, % of GDP (2013)

Own calculations from CANSIM 384-0047, 384-0038, 386-0003



# How Transfers Affect Provincial Economies

- **Income Effect:**

- *Trade dampens price responses*
- *Freer trade amplifies the benefits of financial transfers*

- **Productivity Effect:**

- *Higher income → higher wages → higher production costs*
- *Imports rise, shutting down lower productivity firms*

- **Differences across sectors**

# Core Components

**Consumer Problem:** Maximize utility by consuming a continuum of products across  $J$  sectors

$$U_n = \prod_{j=1}^J \left( C_n^j \right)^{\beta^j}$$

subject to a budget constraint, and where  $C_n^j$  is a **composite good**

$$C_n^j = \left( \int_0^1 y_n^j(\omega)^{\frac{\sigma^j-1}{\sigma^j}} d\omega \right)^{\frac{\sigma^j}{\sigma^j-1}}$$

# Core Components

**Production Costs:** Individual products produced using labour and a full set of intermediate inputs from (potentially) all other sectors

$$c_n^j \propto w_n^{\phi^j} \left[ \prod_{k=1}^J (P_n^k)^{\gamma^{jk}} \right]^{(1-\phi^j)}$$

**Trade Costs:** Consumer prices exceed production costs

$$p_n^j \propto \tau_{ni}^j c_n^j$$

# Important Results of the Model

Productivity across producers varies. Choose lowest cost supplier.

**Trade Shares:** Share of region  $n$  spending on goods from region  $i$ :

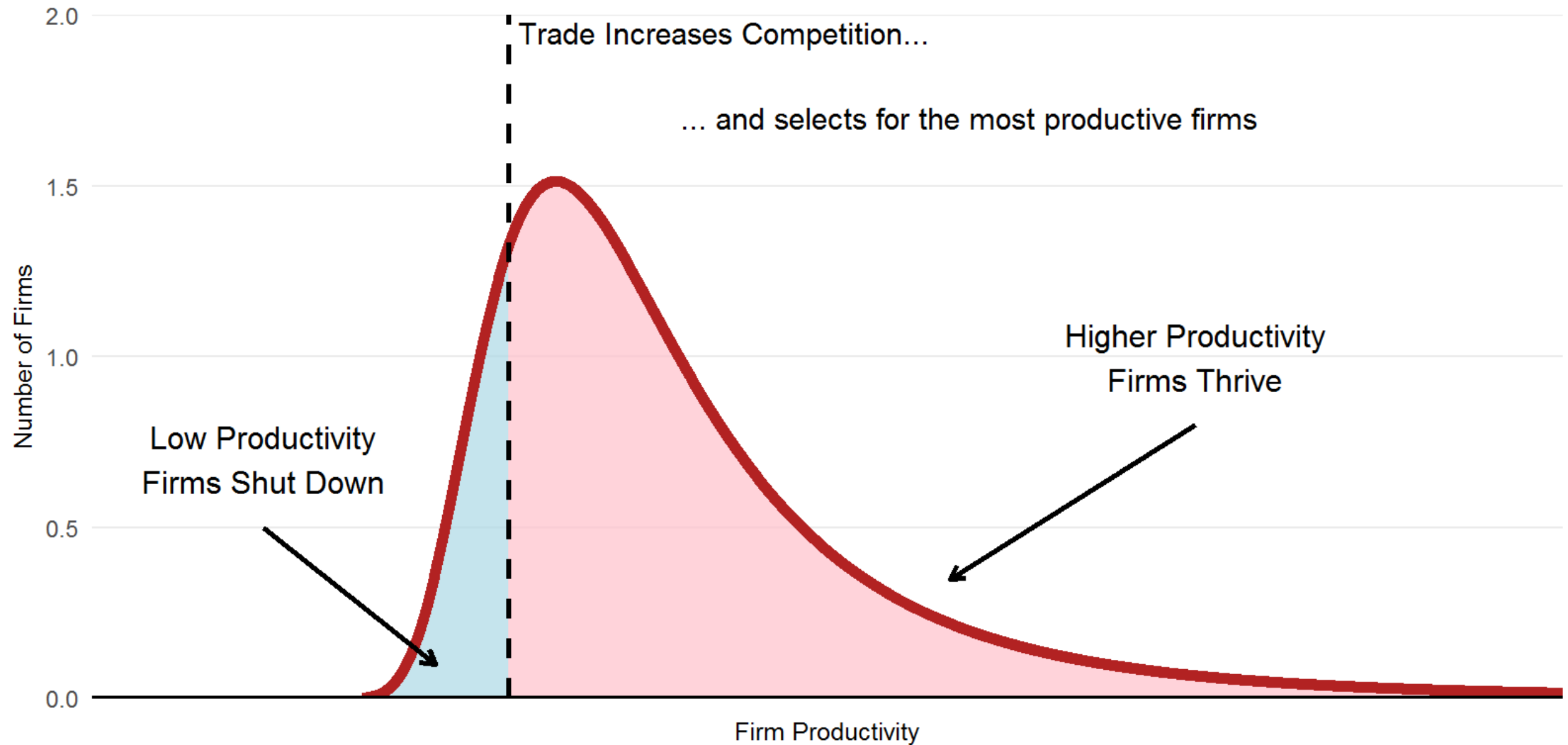
$$\pi_{ni}^j \propto \left( \frac{\tau_{ni}^j c_i^j}{A_i^j P_n^j} \right)^{-\theta^j}$$

**Productivity:** More imports  $\rightarrow$  higher domestic productivity:

*Productivity Growth  $\approx -\theta^j \times (\text{Change in Import Share})$*



# How Trade Can Increase Productivity



# Effect of Transfers (in brief)

## A fiscal inflow:

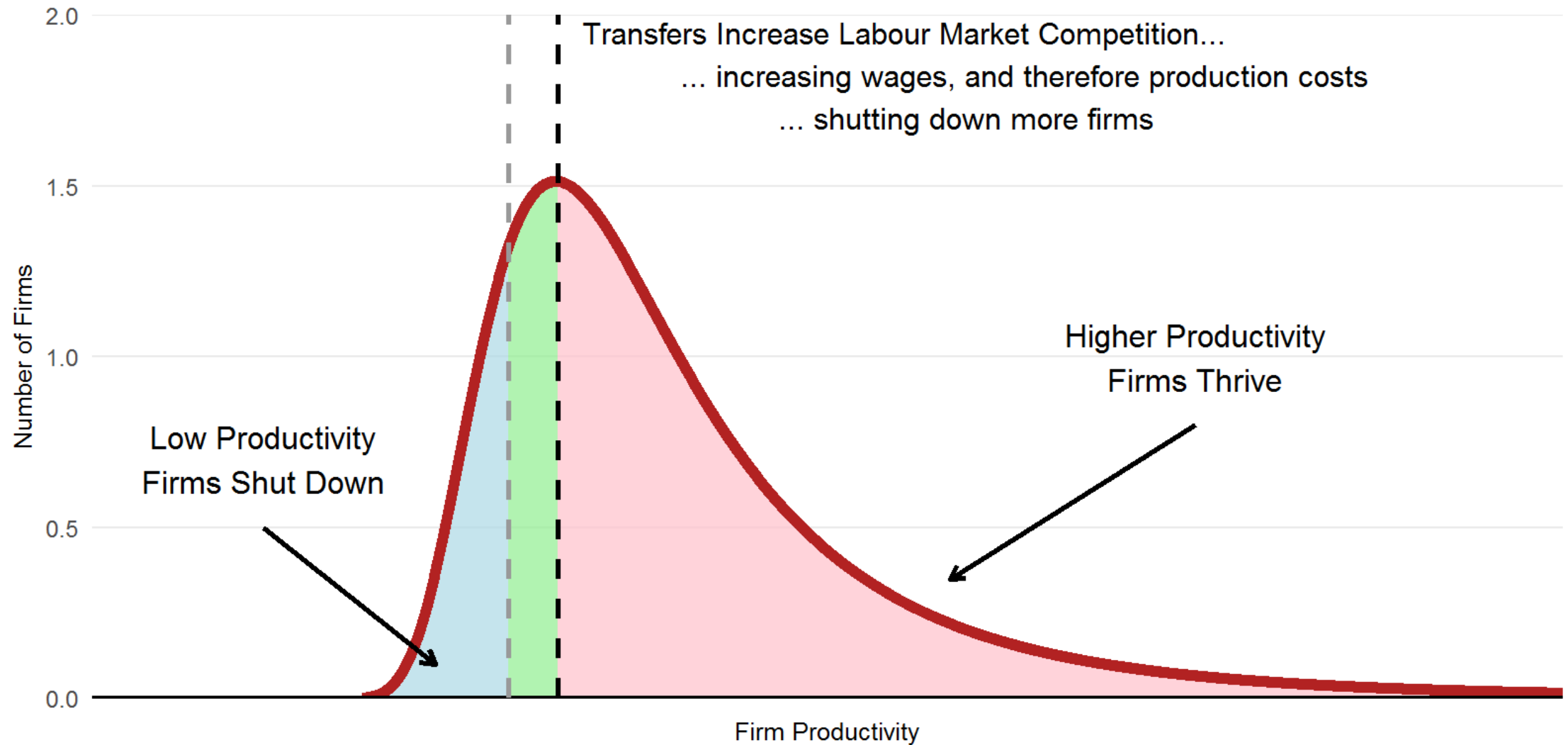
- *Increases income directly*
- *Increases wages and prices indirectly*

Higher Prices  $\rightarrow$  higher import shares  $\rightarrow$  **productivity gains**

Aggregate **welfare gains** in a given region (let  $\hat{x} \equiv x'/x$ )

$$\hat{U}_n = \underbrace{\left( \hat{w}_n / \hat{P}_n \right)}_{\substack{\text{Real Income} \\ \text{or Productivity} \\ \text{Gains}}} \times \underbrace{\left( \hat{t}_n \right)}_{\substack{\text{Income Gains} \\ \text{due to the} \\ \text{Transfers}}}$$

# How Transfers Affect Provincial Economies



# The Importance of Trade

- **No Trade**

- *Transfers increase income*
- *Prices rise by same proportion*
- *No change in real income or living standards*
- *“Helicopter Money”*

- **Completely Free Trade**

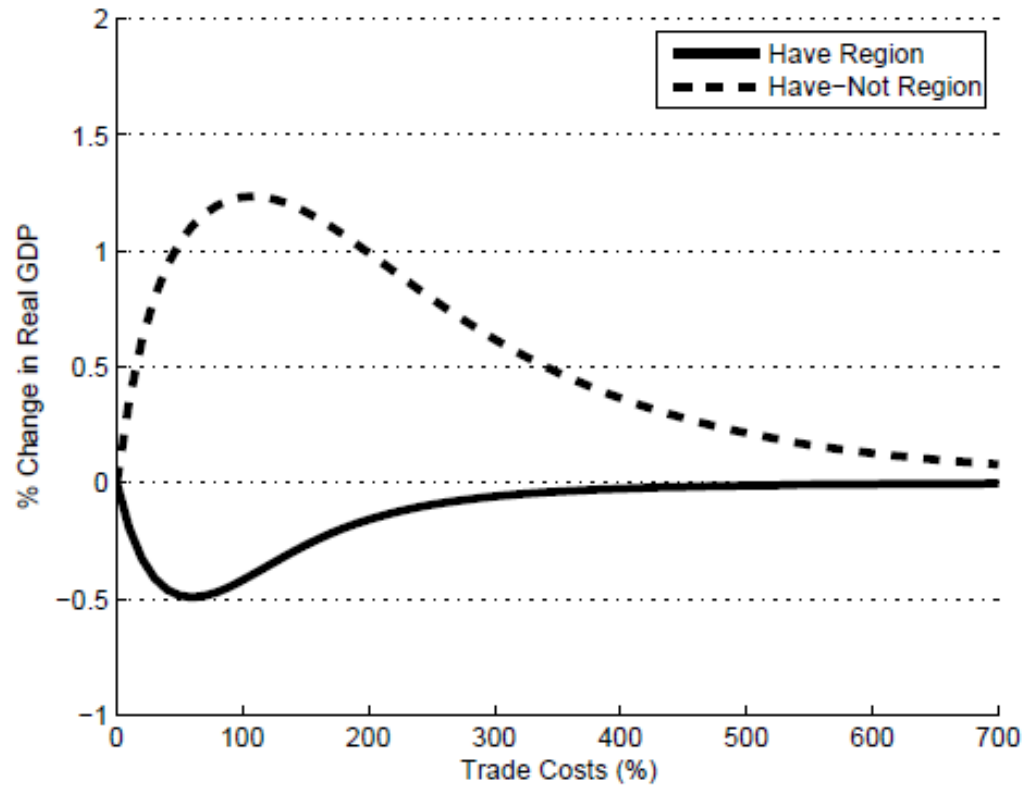
- *Prices equalize everywhere, so transfers matter more*

- **Trade Costs Matter (!)**

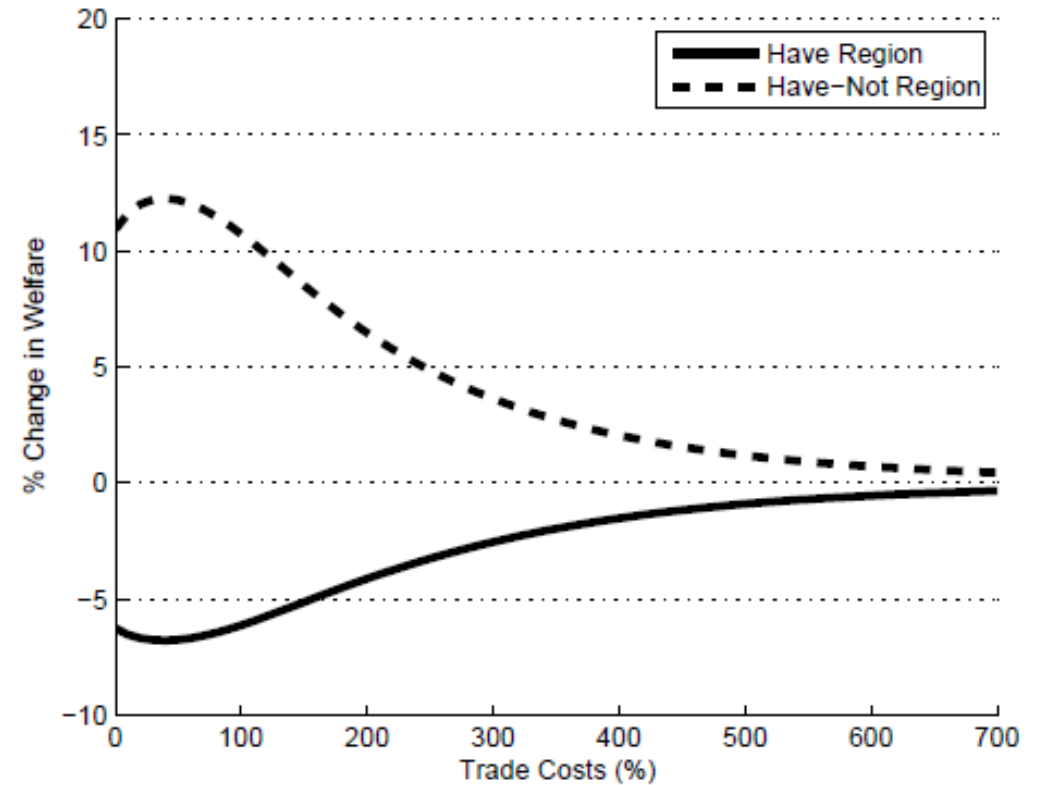
- *Illustrate with simple model*

# The Effect of Fiscal Transfers (Simple Model)

(a) Real Wages



(b) Real Incomes (Welfare)



# Quantifying the Effect of Transfers in Canada

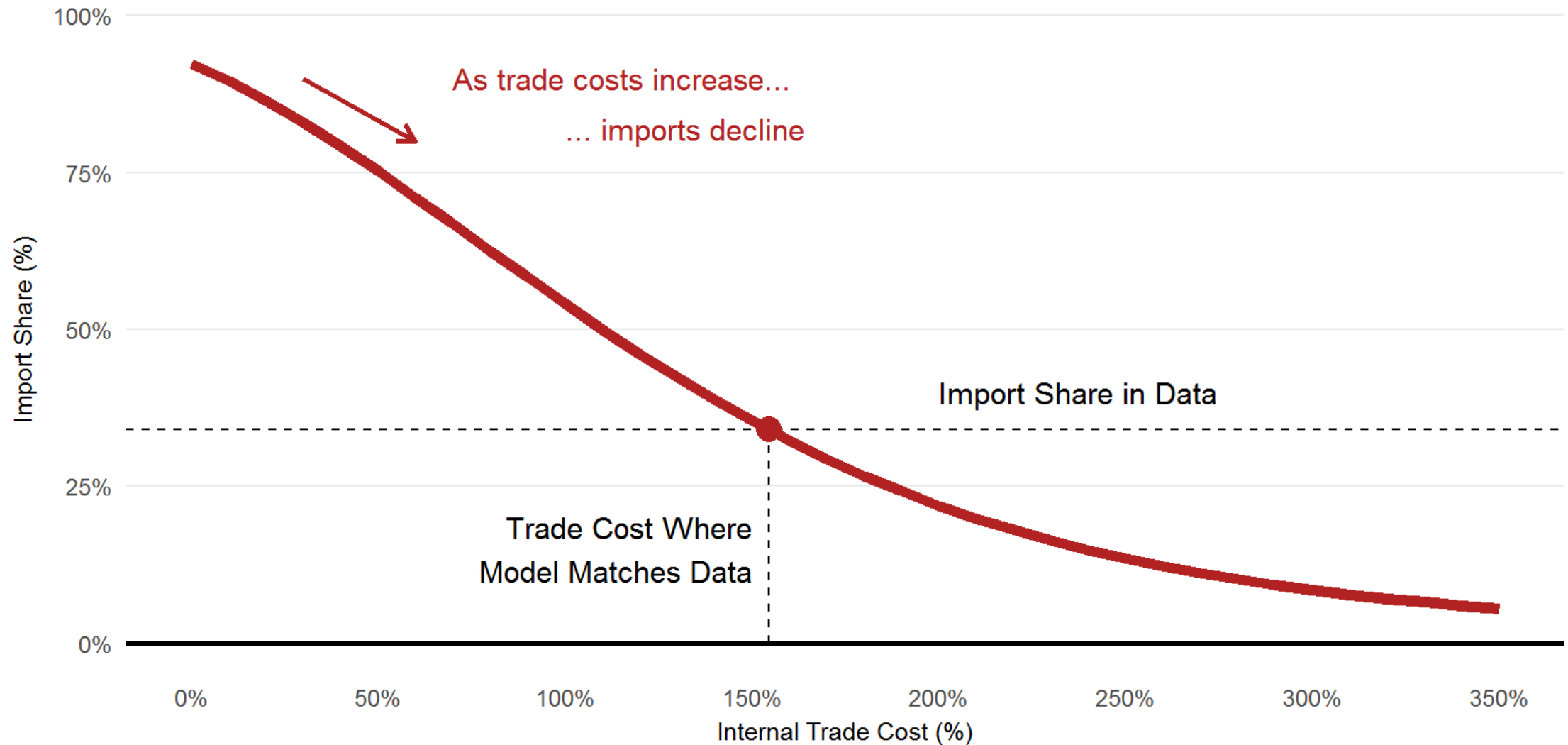
- **Set up the model**

- *Calibrate to match (perfectly) observed trade and transfers*
- *Especially important to estimate trade costs*

- **Simulate various counterfactuals**

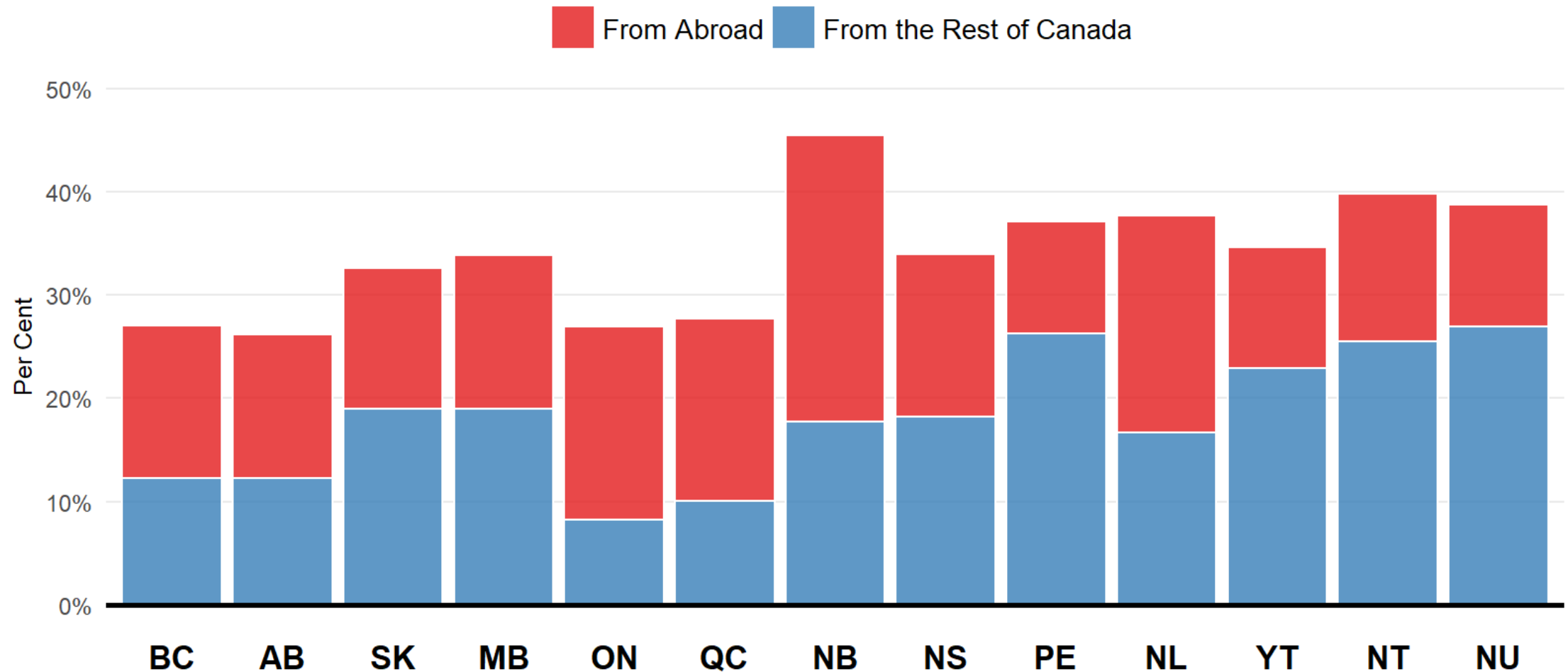
- *Sets all transfers to zero*
- *Changes in welfare, productivity, etc, capture the effect of transfers*
- *More analysis in the paper*

# Measuring Internal Trade Costs: Method



# Import Share of Spending (2013)

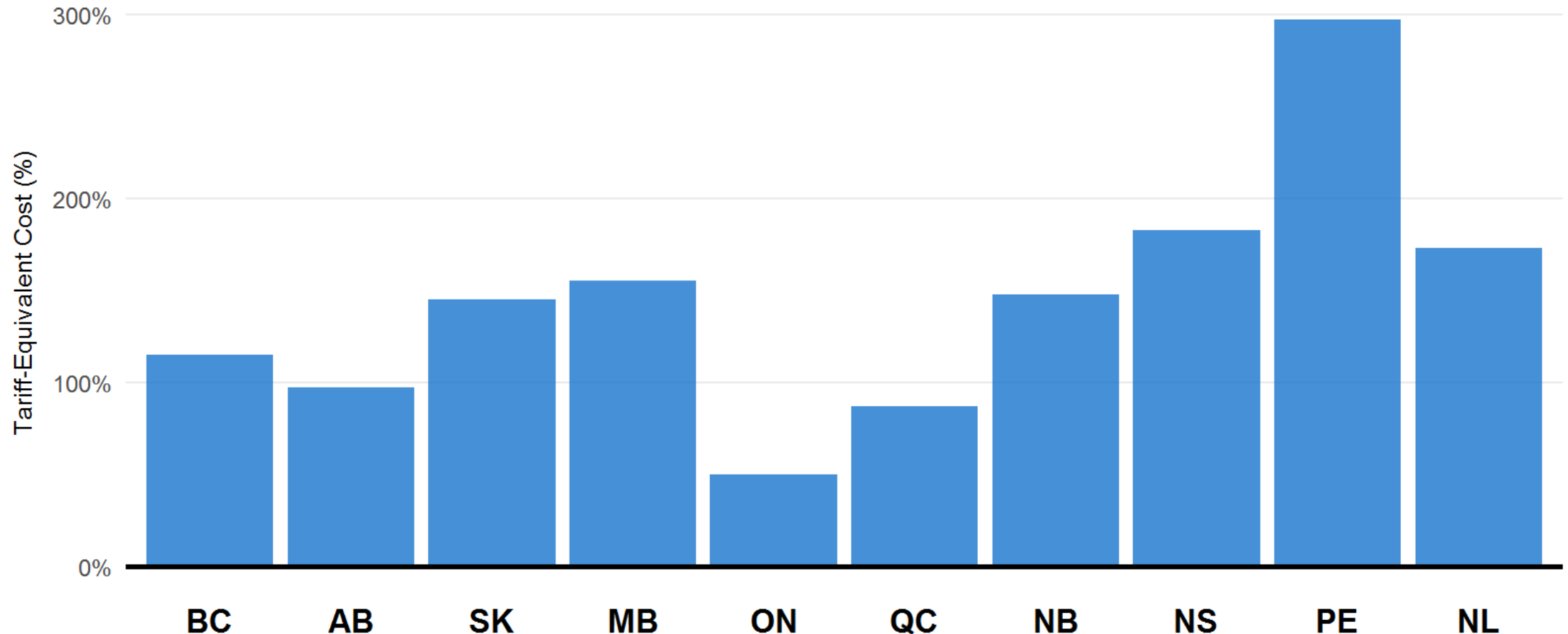
Source: Own calculations from CANSIM 386-0003.





# Measuring Internal Trade Costs: Results

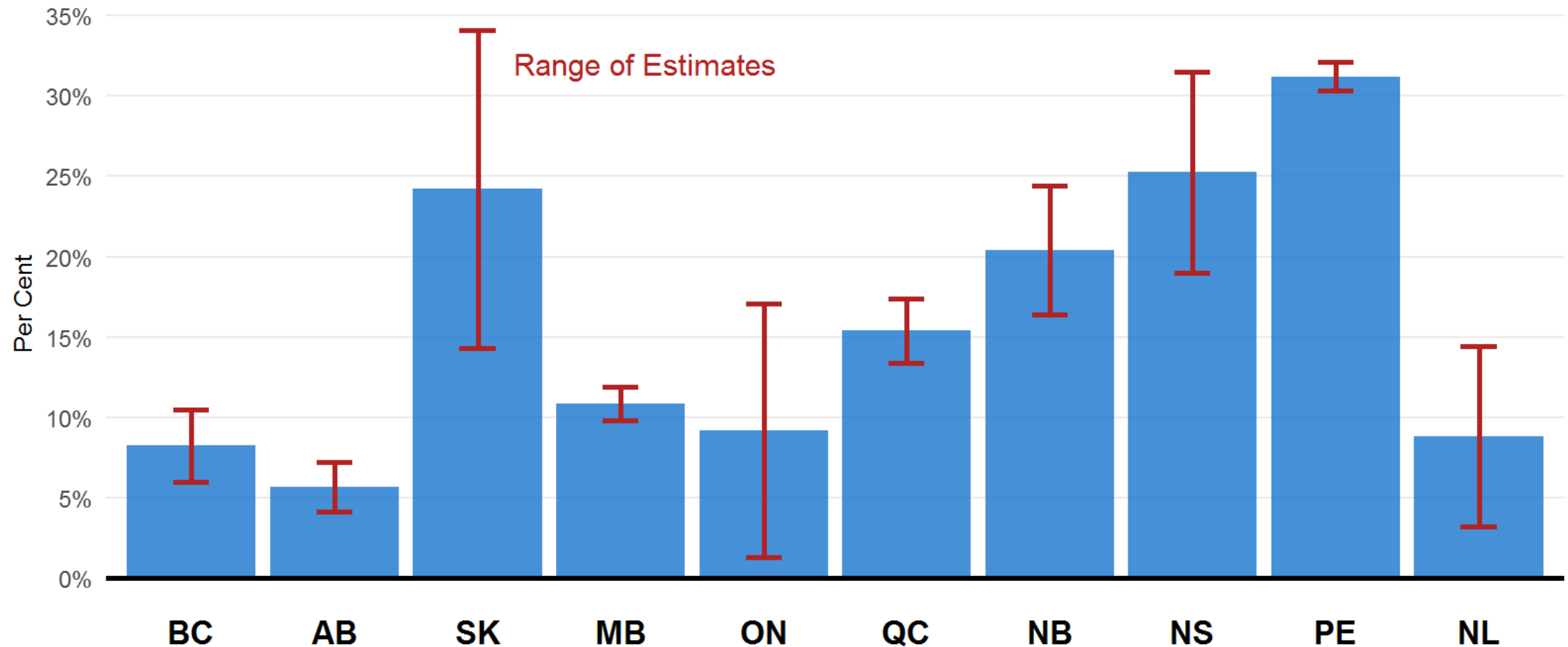
Displays an estimate of the cost of importing from another region, in tariff-equivalent terms.



Source: Own calculations from CANSIM 386-0003, following Ravikumar and Waugh (2016).

# Policy-Relevant Trade Costs

Source: Albrecht and Tombe (2016), 'Internal Trade, Productivity, and Interconnected Industries'

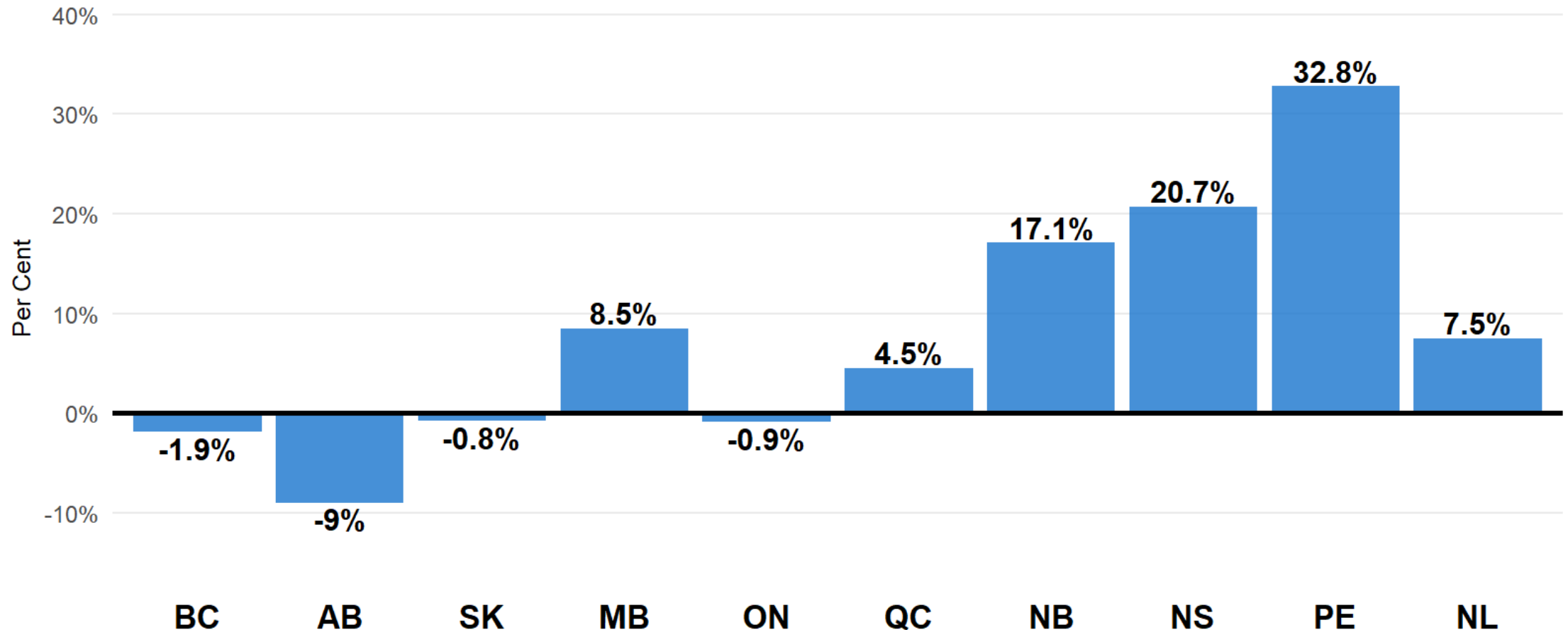


# Quantifying the Effect of Transfers

- **Set up the model**
  - *Calibrate to match (perfectly) observed trade and transfers*
  - *Especially important to estimate trade costs*
- **Simulate various counterfactuals**
  - *Sets all transfers to zero*
  - *Changes in welfare, productivity, etc, capture the effect of transfers*
  - *More analysis in the paper*

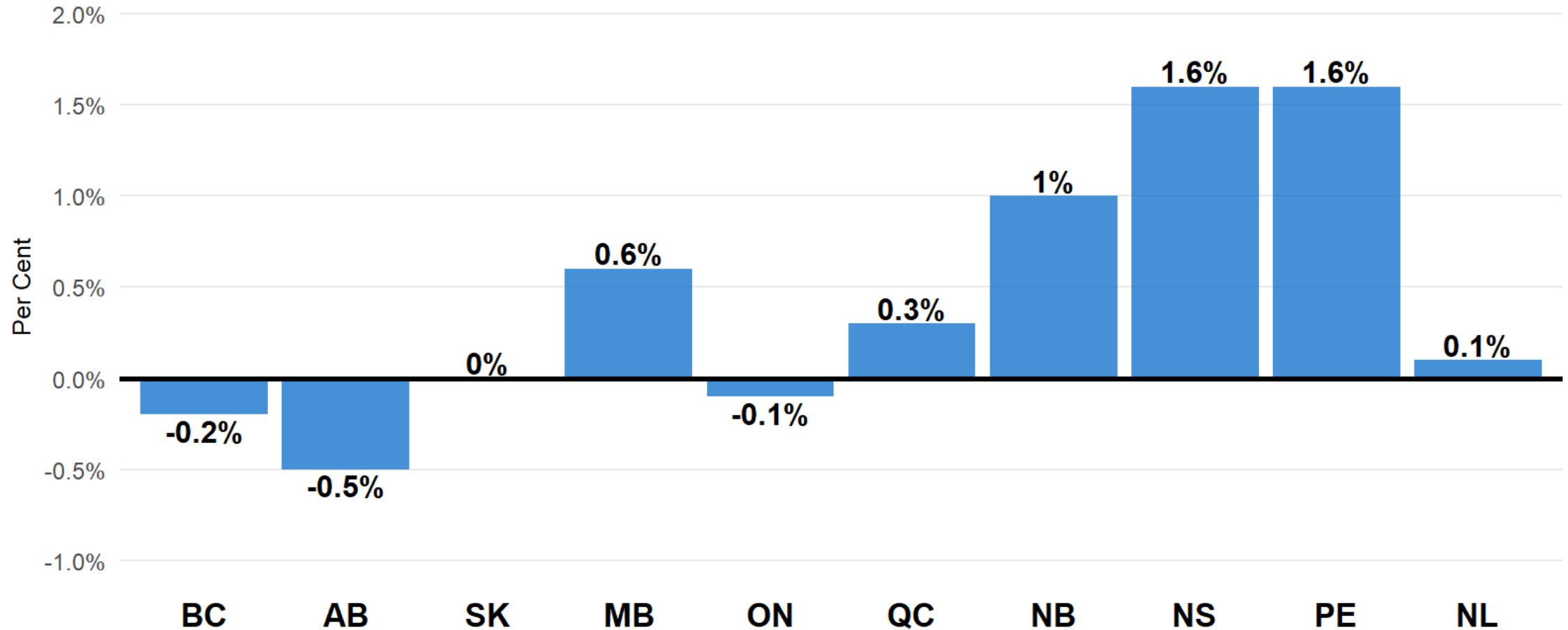
# Effect of Fiscal Transfers: Welfare (Real Income)

Source: Tombe and Winter (2017), 'Fiscal Integration with Internal Trade'



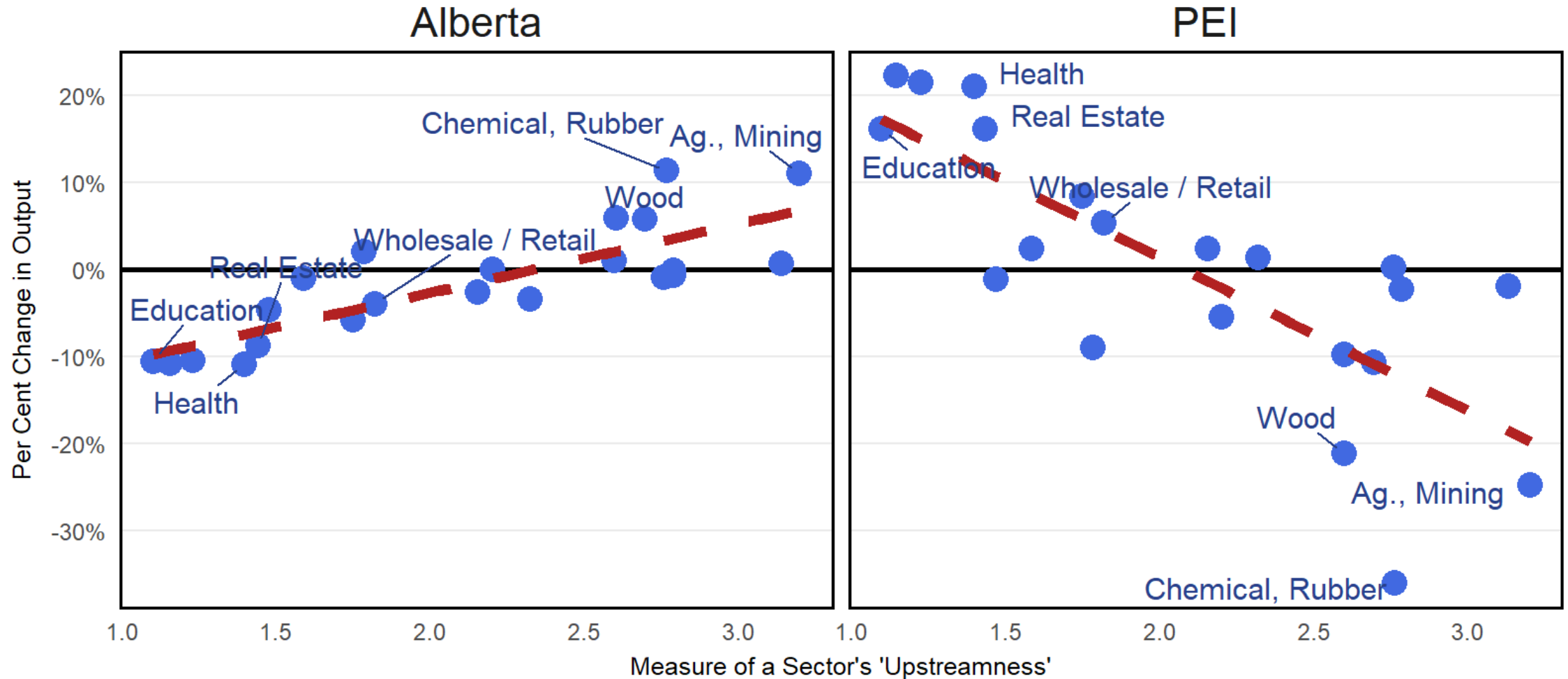
# Effect of Fiscal Transfers: Productivity

Source: Tombe and Winter (2017), 'Fiscal Integration with Internal Trade'



# Winners and Losers Within Provinces

Source: Tombe and Winter (2017). Displays the change in sectoral output due to fiscal transfers.

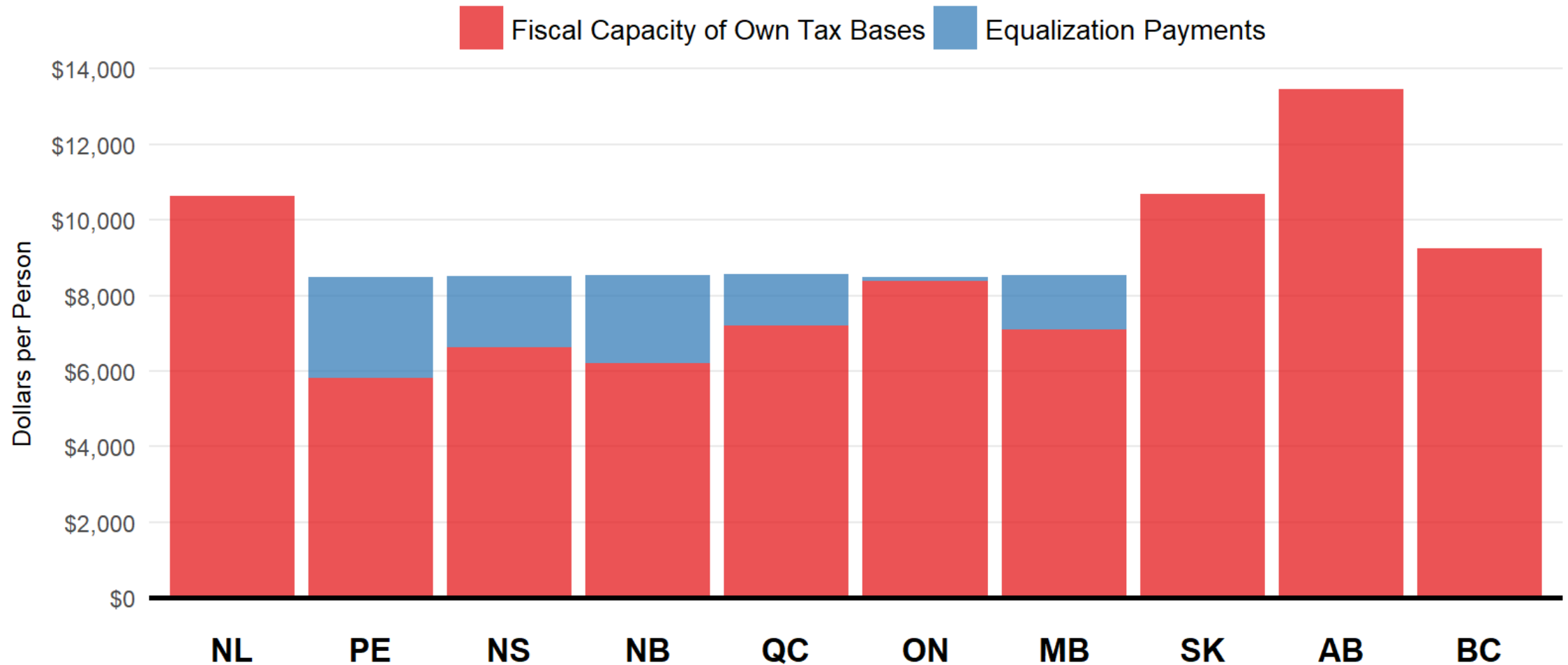


# Equalization: A Primer

How it works. How it doesn't.

# Equalization Tops-Up “Fiscal Capacity”

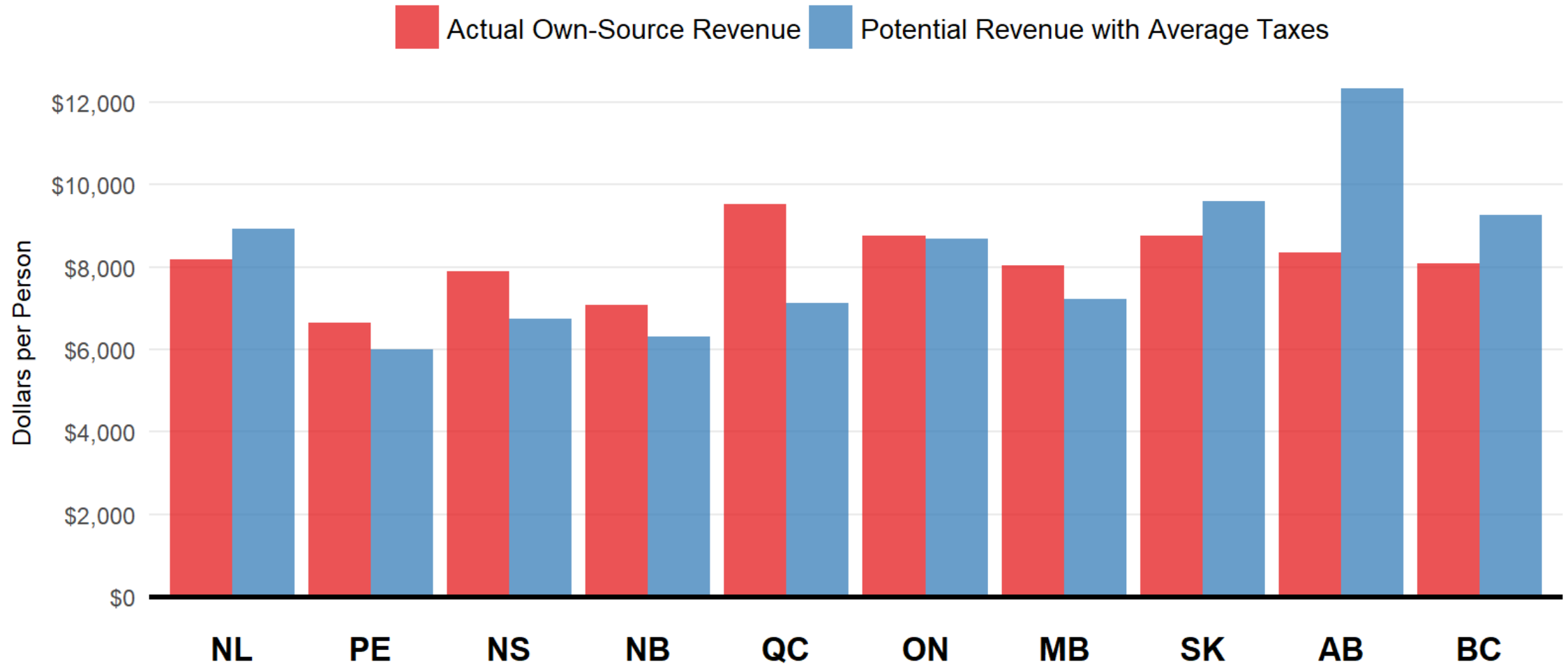
Source: Federal Equalization Workbooks, Table 1.





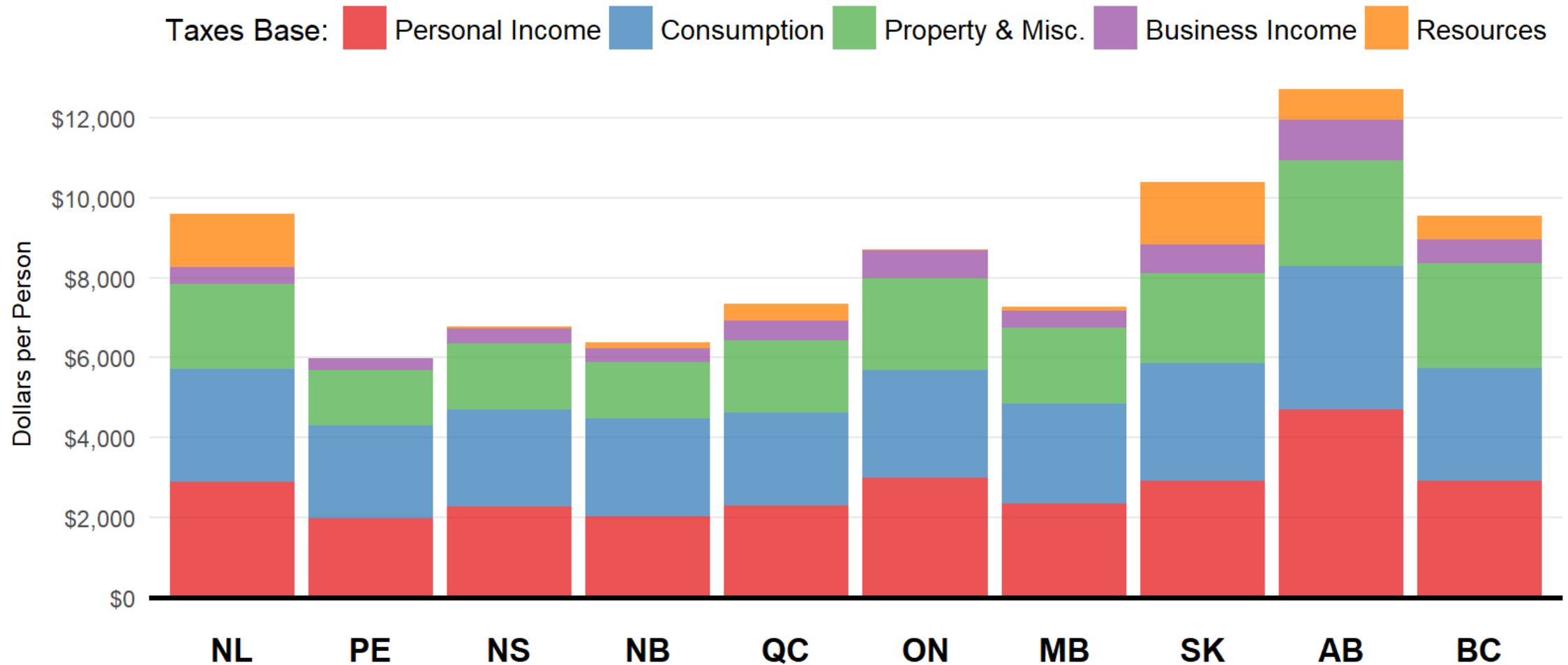
# Actual Revenue \*\*ISN'T\*\* “Fiscal Capacity”

Source: Federal Equalization Workbooks, S-Table 5 and S-Table 8.



# Fiscal Capacity, by Tax Base

Source: Federal Equalization Workbooks, S-Table 6. Includes 100% of resource revenue.



# The (Basic) Equalization Formula

Measure tax bases  $B^j$  and tax rates  $t^j$  nationally, and tax bases  $b_i^j$  in each province across four broad categories

$$e_i = (B^1 - b_i^1)t^1 + (B^2 - b_i^2)t^2 + (B^3 - b_i^3)t^3 + (B^4 - b_i^4)t^4 + \frac{1}{2}(N - n_i)$$

1. Personal Income (**4 items**: PIT, health, payroll, ...)
2. Business Income (**4 items**: CIT, remitted profits (sorta), fines, ...)
3. Consumption (**16 items**: PST/HST, carbon, gas, lotto, ...)
4. Property (**3 items**: property taxes, ...)
5. Resources (**15 items**: forestry, oil, hydro profits, ...)

# ... various complications to equalization

- **0% of 50% Treatment of Resources**

- *Receive the maximum according to a formula with 50% resource treatment and according to a formula with 0% treatment*
- *NL would get \$159M under 0% (simple formula), but \$0 under 50%*

- **Fiscal Capacity Cap**

- *No receiving province can be better than the worst non-receiving province*
- *OR cannot be better than some average of receives*
- *Due to FCC, NL loses the \$159M it would have otherwise received*

- **Growth Cap**

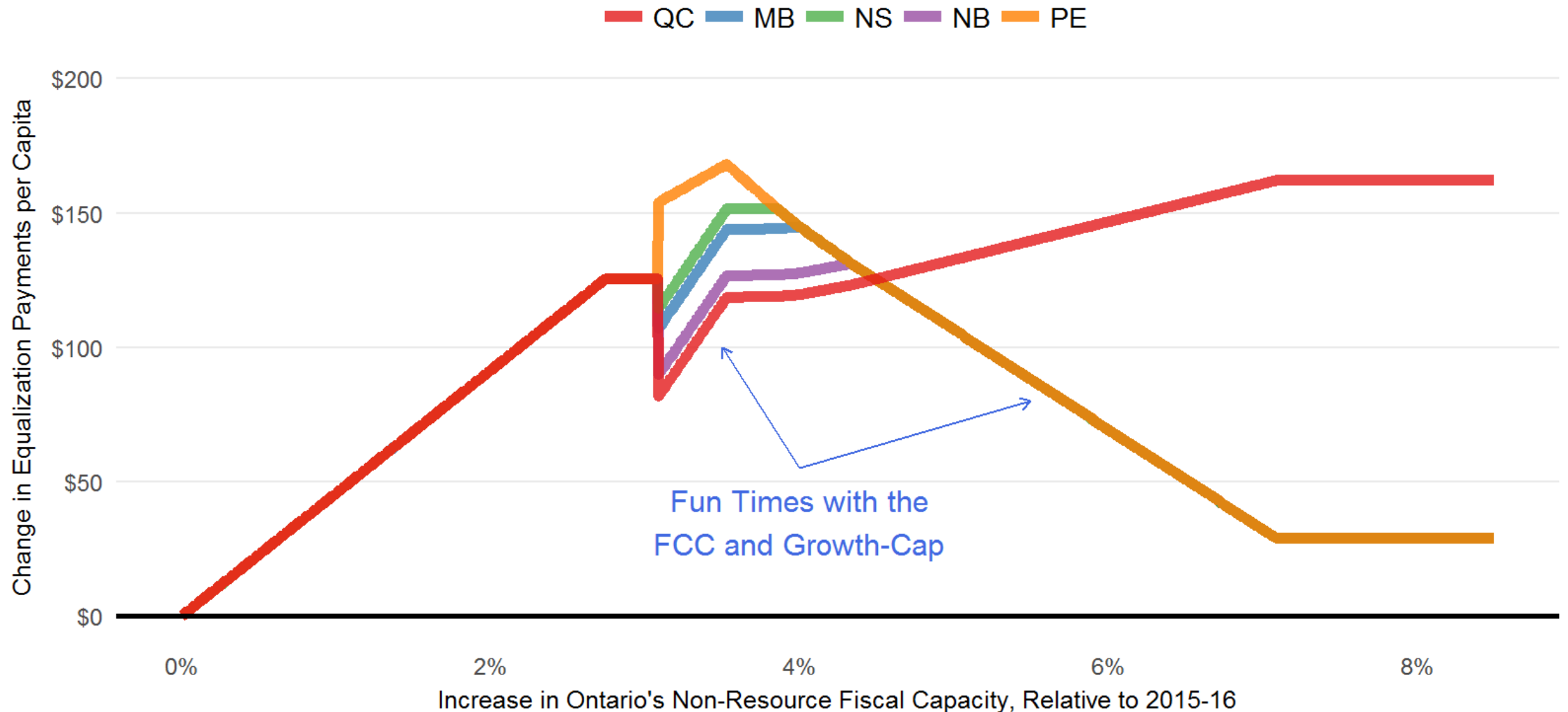
- *Total 2017/18 payments cannot exceed \$18.254B, then adjusted for GDP growth*
- *Can it go below X? Yes. But, Minister has discretion.*

# Deriving Equalization Payments in 2017/18

Province	EQ, 50% Resource Rev.	EQ, 0% Resource Rev.	“Best Of” EQ	Effect of Fiscal Capacity Cap	Effect of Growth Cap	Final Payment
NL	\$0 M	\$159 M	\$159 M	-\$1,073 M	n/a	\$0 M
PE	\$398	\$363	\$398	\$0	-\$8 M	\$390
NS	\$1,830	\$1,629	\$1,830	\$0	-\$51	\$1,779
NB	\$1,801	\$1,675	\$1,801	\$0	-\$41	\$1,760
QC	\$12,619	\$12,408	\$12,619	-\$1,093	-\$445	\$11,081
ON	\$2,166	\$0	\$2,166	\$0	-\$743	\$1,424
MB	\$1,890	\$1,654	\$1,890	\$0	-\$70	\$1,820

# Ontario's Growth Will Affect Recipients in Some Interesting Ways

Note: Own calculations Based on Equalization Data/Worksheets.

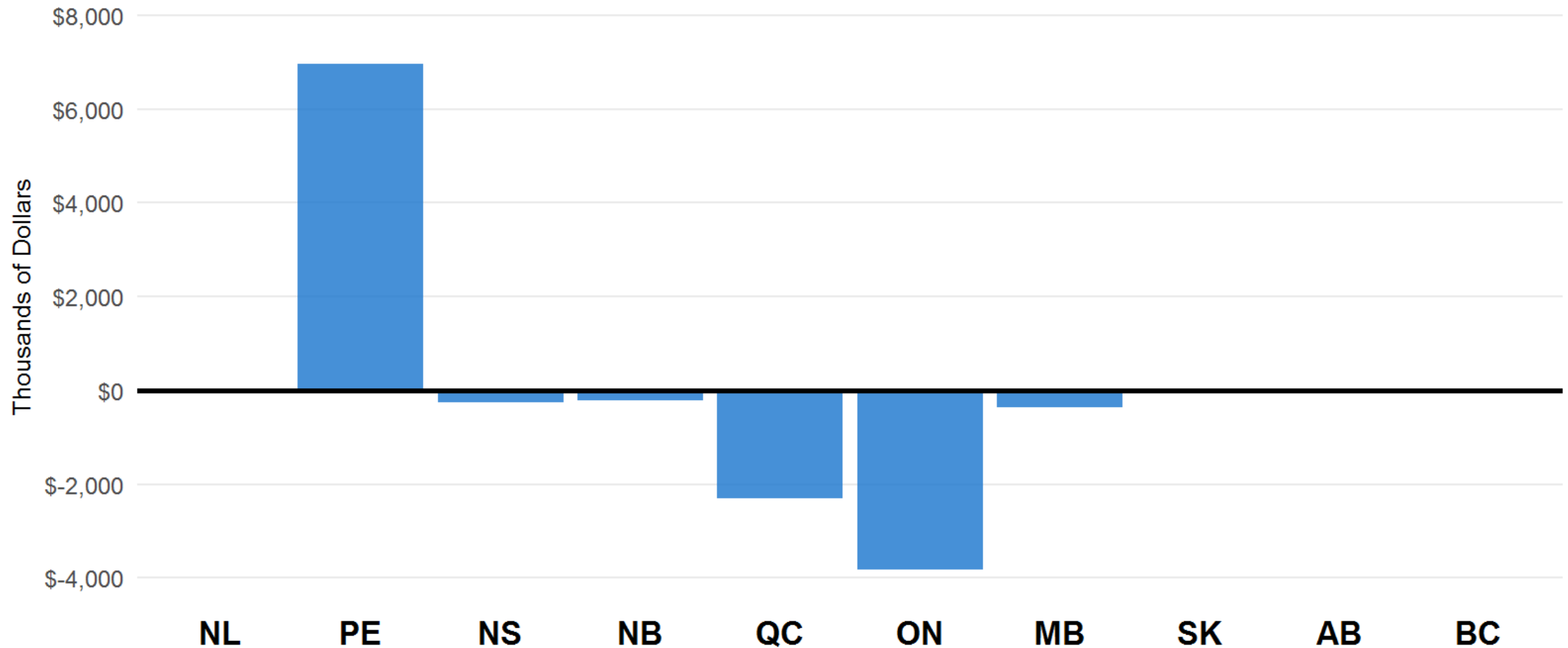


# Beggar-thy-Neighbour Through Equalization

- The FCC and Growth caps
- Policy decisions unrelated to fiscal capacity can affect equalization
- **Example of Quebec's Gentilly-2 Closure in 2012**
  - *A nuclear power plant refurbished*
  - *Lowered Hydro-Quebec's profits \$1.88 billion that year*
  - *Lowered Quebec's resources fiscal capacity, and national standard*
  - *Quebec's higher entitlement also tightened the growth cap*
  - *PBO estimates this cost Ontario \$298 million*

# If PEI Increases Its Corporate Tax Rate by 1%: Its Equalization Will Rise, Others Will Fall

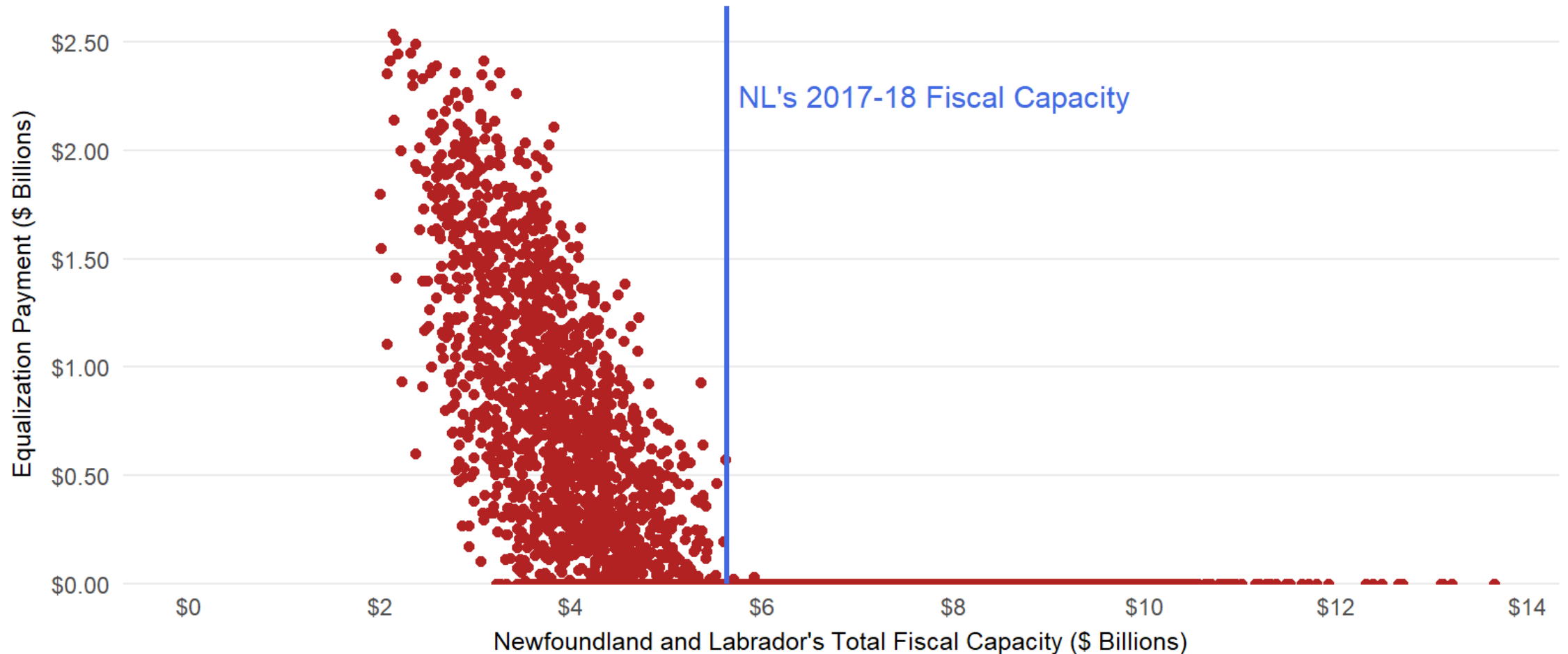
Own calculations from Equalization Worksheets and a corporate tax semi-elasticity of -0.16.





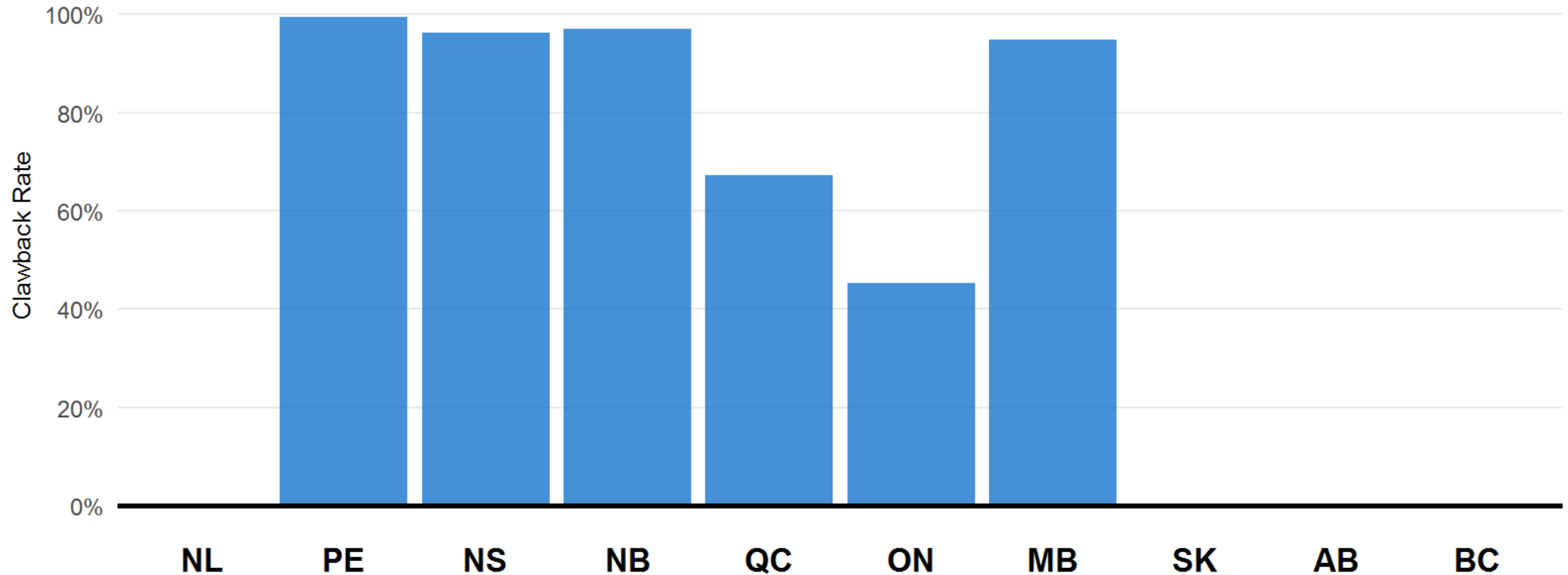
# Newfoundland Unlikely to be Have-Not

Explores the equalization payments within a range of 0.5-2x of current fiscal capacities in every province, holding the national per capita fiscal capacity unchanged (by type: resource, non-resource). Using 5,000 simulations.



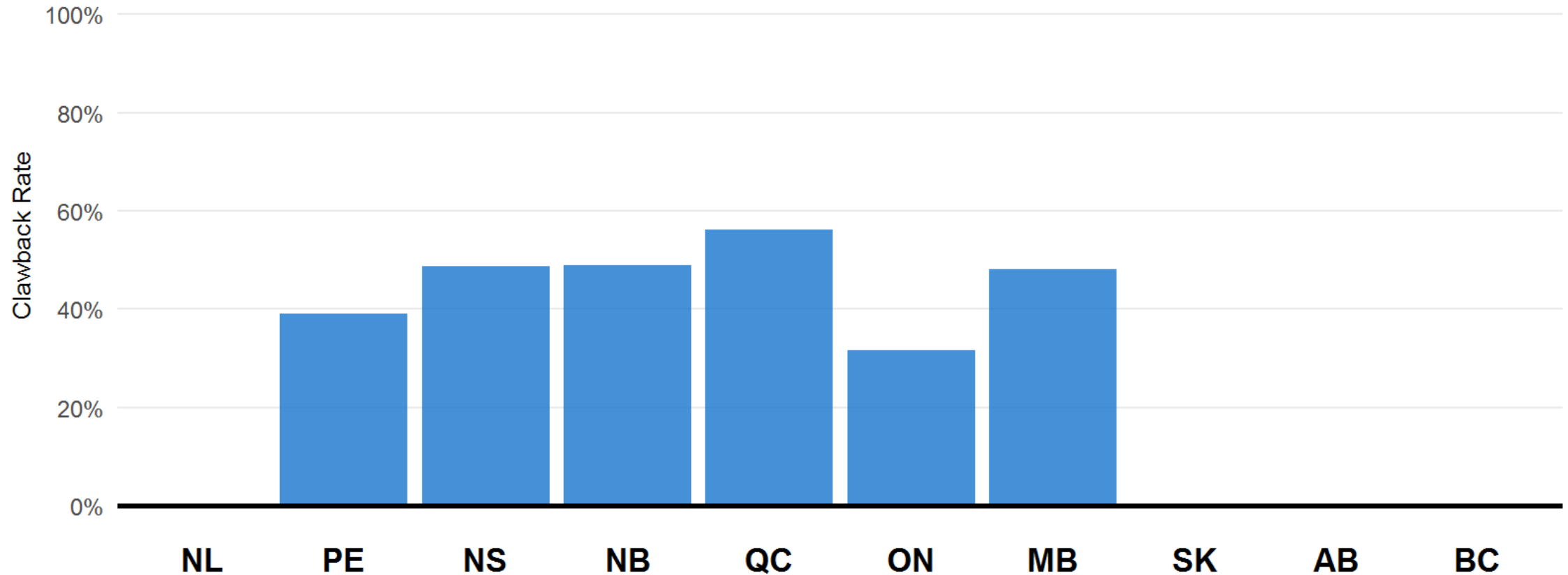
# Lower Incentive to Improve Fiscal Capacity

Own calculations from Equalization Worksheets, based on a simulated 1% change in each province's non-resource fiscal capacity. Displays the reduction of equalization payments as a share of the increased fiscal capacity.



# Lower Incentive to Develop Resources

Own calculations from Equalization Worksheets, based on a simulated 1% change in each province's resource fiscal capacity. Displays the reduction of equalization payments as a share of the increased fiscal capacity.

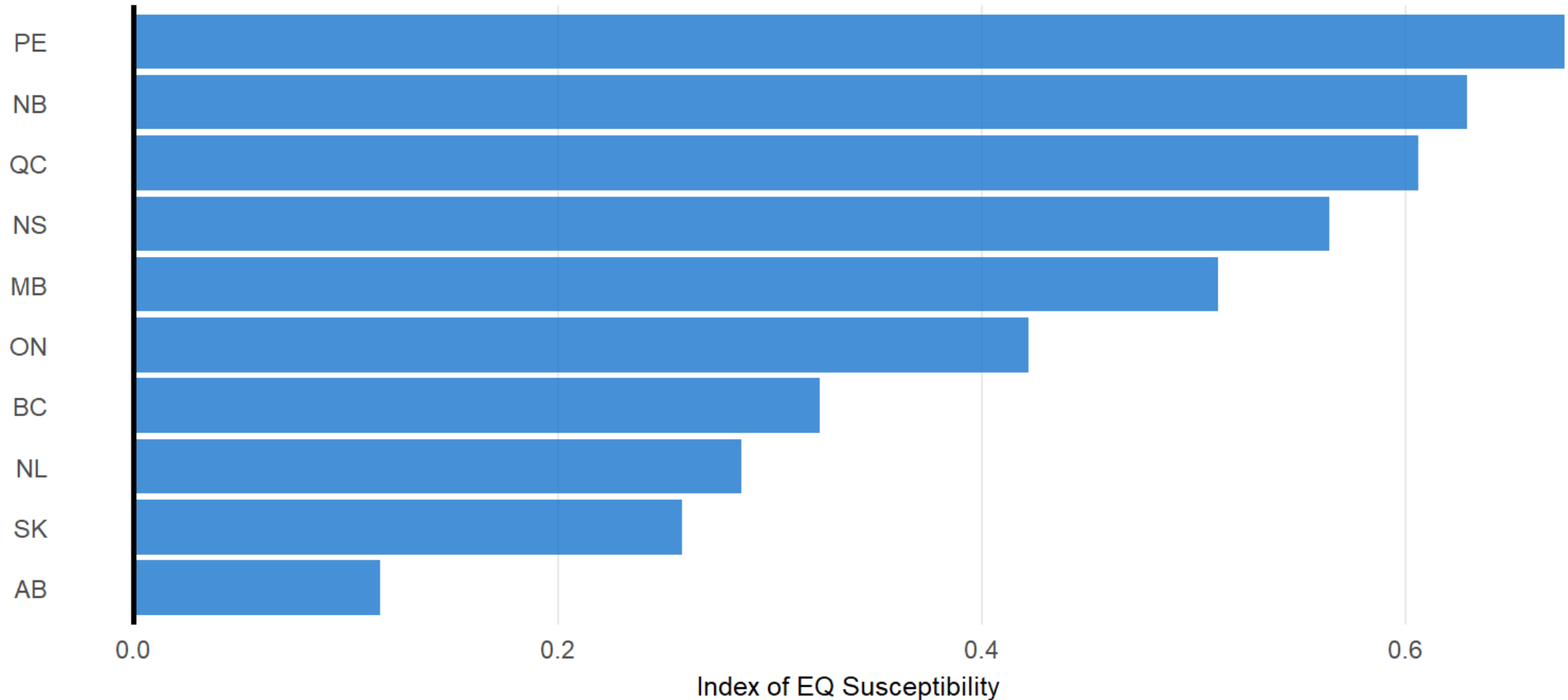


# Can Equalization Be Improved?

A modest proposal for a simple, independent, and robust formula

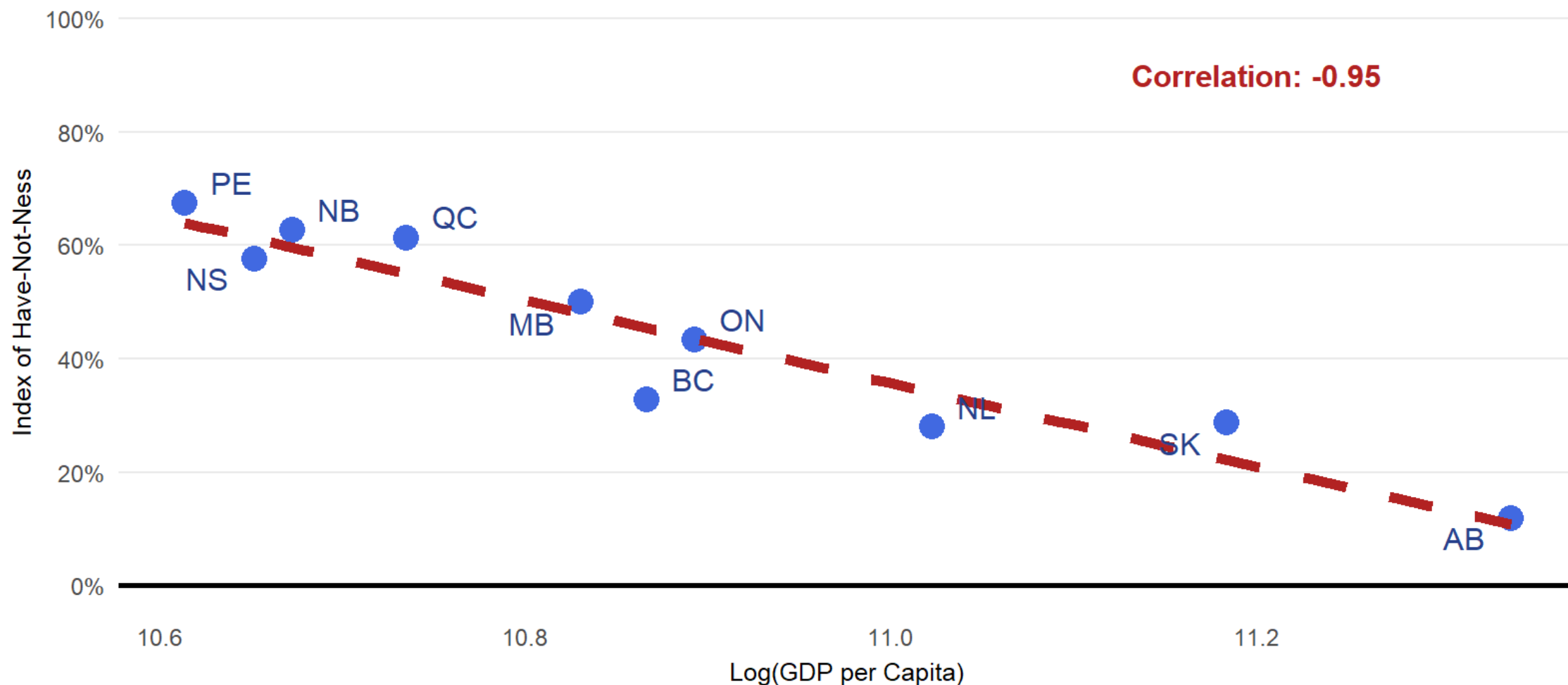
# An Index of Have-Not-Ness

Displays frequency of receiving equalization, by province, within a range of 0.5-2x of current fiscal capacities in every province, holding the national per capita fiscal capacity unchanged (by type: resource, non-resource).



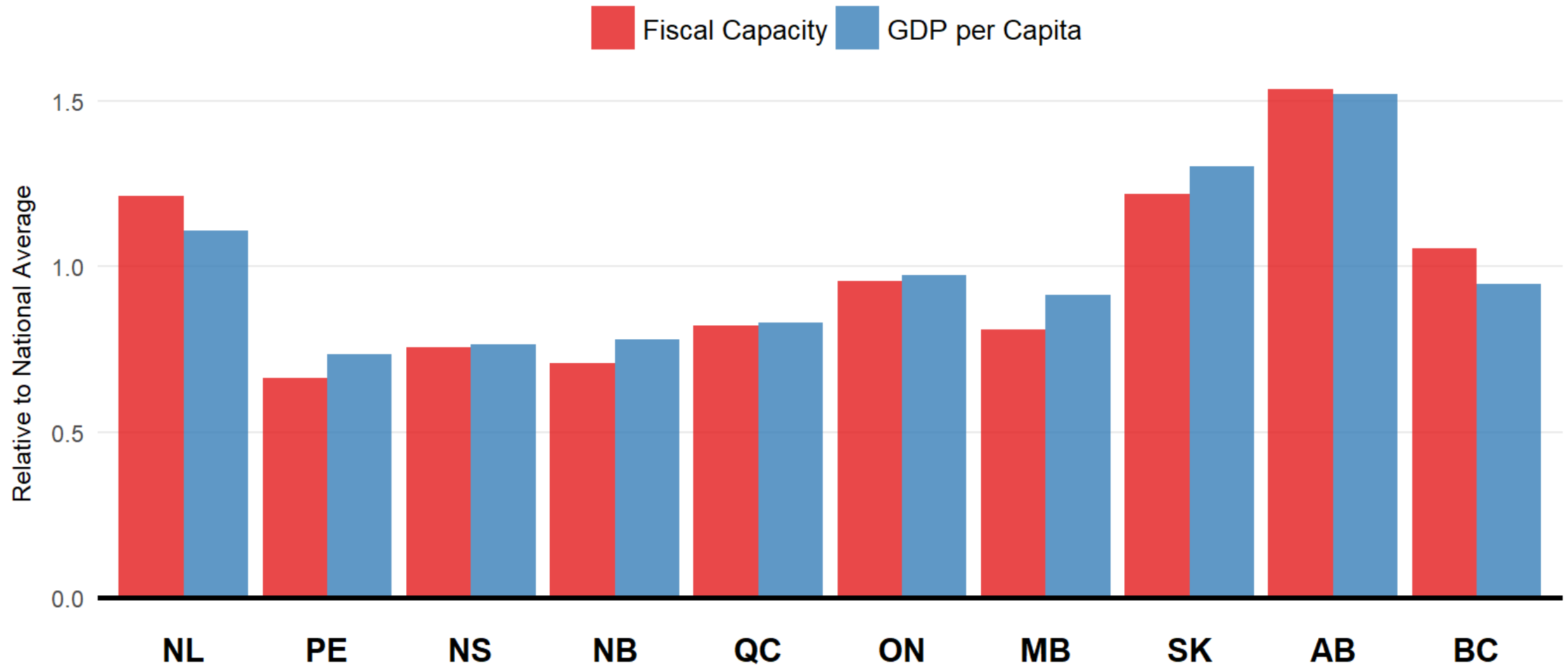
# Have-Not-Ness is Driven by GDP/Capita

Own calculations from Federal Equalization Workbook, and Various CANSIM sources.



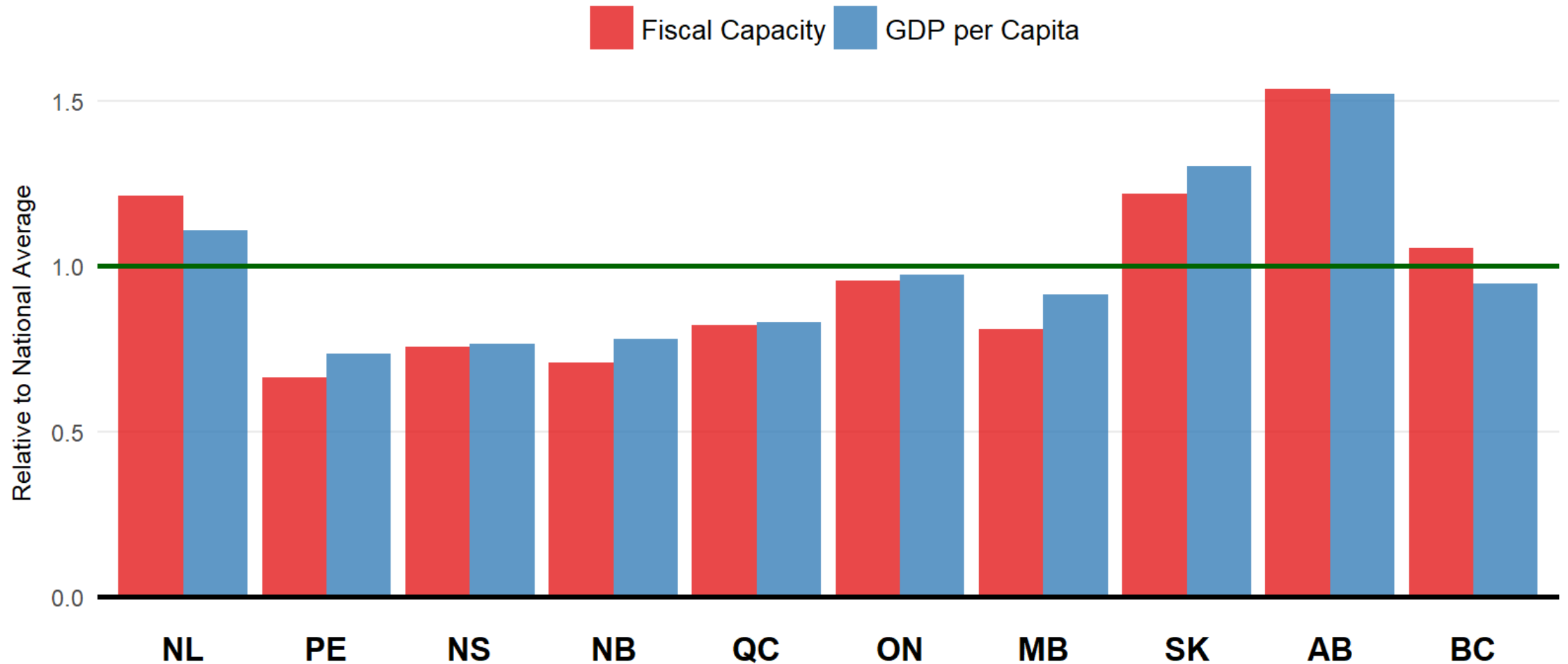
# Fiscal Capacity vs GDP/capita

Own calculations from Equalization Worksheets and CANSIM 384-0038. Using same three-year weighted average as in EQ.



# Fiscal Capacity vs GDP/capita

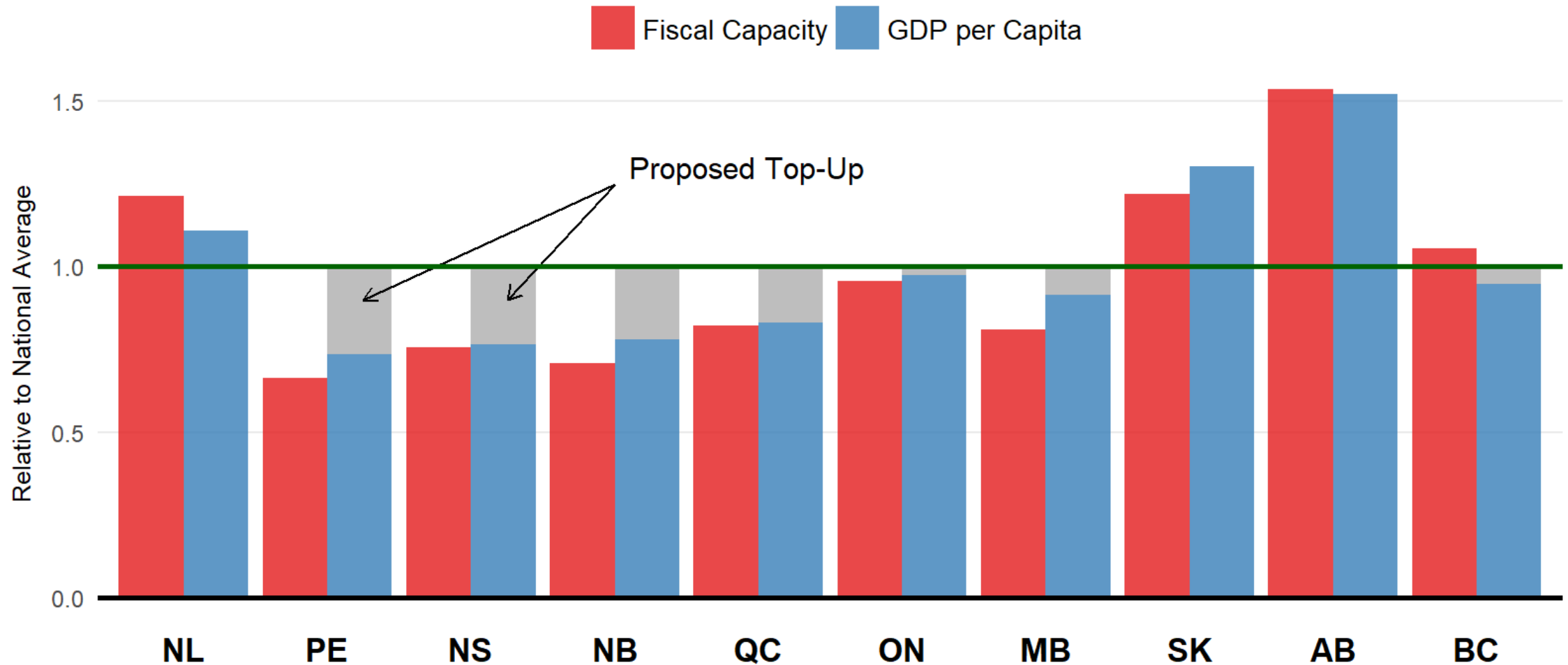
Own calculations from Equalization Worksheets and CANSIM 384-0038. Using same three-year weighted average as in EQ.





# Fiscal Capacity vs GDP/capita

Own calculations from Equalization Worksheets and CANSIM 384-0038. Using same three-year weighted average as in EQ.



# An Alternative Equalization Formula

Simple. Robust. Independent. Sustainable.

Determine payments as a function of GDP/capita ( $y$ ) gaps:

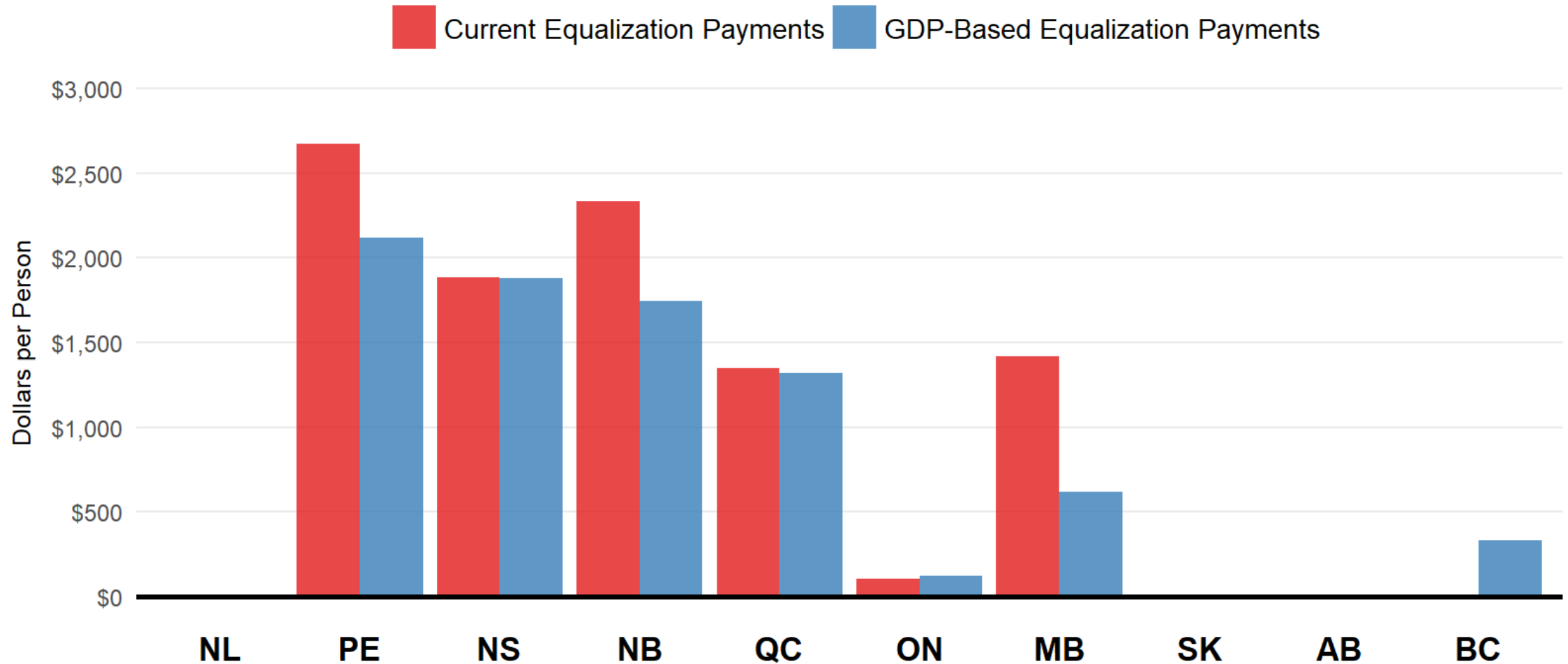
$$Gap_i \equiv (\bar{y} - y_i)$$

$$Equalization_i = \begin{cases} \gamma \times Gap_i \times Population_i & \text{if } Gap_i > 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $\gamma$  is the average tax-to-GDP ratio (15.3% in 2016; prov+local)

# Actual Equalization vs Simple Alternative

Own calculations from Equalization Worksheets, CANSIM 384-0038, and proposed GDP-based equalization formula.



# Concluding Thoughts

- **Regional transfers are large in Canada (and elsewhere)**
- **Equalization payments are a small part of total transfers**
  - *Income taxes, benefit programs account for large majority*
- **Internal trade *critical* to understand effect of transfers**
  - *Freer trade means transfers have greater effect*
  - *Internal trade liberalization needs to be pushed harder*
- **Equalization can be improved (need calm/thoughtful debate)**
  - *My preferred approach: use GDP gaps, not fiscal capacity*