

Resource Misallocation Across Canadian Provinces: Evidence from 2015–2023

ECO451 Macroeconomic Growth Country Case Study

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1 Introduction

Efficient allocation of capital and labor is the key to economic growth. In theory, these inputs should flow to regions where they are most productive. In the real world, frictions and policy differences often prevent this, leading to misallocation and productivity losses. While most studies on misallocation focus on developing countries such as China and India, this report focuses on Canada, a high-income country with considerable differences across provinces. These gaps suggest inefficiencies in how resources are utilized.

This study examines misallocation in Canada from 2015 to 2023. There are significant differences between provinces in Canada including education system, policy, infrastructures, tax and etc. Using data from Statistics Canada and a Cobb-Douglas production function, we estimate labor and capital input gaps, calculate efficient-to-actual output ratios, and measure potential GDP gains under efficient allocation. All values are reported in chained 2017 Canadian dollars, in millions in this report. The findings help us understand how misallocation changes over time in a matured and developed economy.

2 Literature Review

This report follows the framework developed by Hsieh and Klenow (2009), who show that misallocation reduces total factor productivity. They measure dispersion in TFPR and argue that, in efficient markets, these values should be equal across firms or regions. Restuccia and Rogerson (2008) extend this idea to a macroeconomic setting, highlighting how policy and entry barriers can worsen misallocation. More recent work by Restuccia et al. (2022) uses household data in China to show how land and capital frictions affect productivity. This study applies their methods to the Canadian context. While labor mobility is more flexible, persistent regional gaps suggest that misallocation remains a relevant issue.

3 Model Framework

The analysis follows a Cobb-Douglas production structure where each province i produces output as $Y_i = (As_i)^{1-\gamma}(L_i^{1-\alpha}K_i^\alpha)^\gamma$, where A is the common technology factor (same across provinces, normalized to 1), s_i is province-specific TFP, and the returns to scale is set to $\gamma = \frac{2}{3}$.

Under efficient allocation, labor and capital are distributed in proportion to productivity: $\ell_i = \frac{s_i}{\sum_j s_j} \cdot L$ and $k_i = \frac{s_i}{\sum_j s_j} \cdot K$. This ensures that more productive provinces receive more capital and labor. Efficient allocation also implies an equalized capital-labor ratio across provinces: $\frac{k_i}{\ell_i} = \frac{K}{L}$.

Revenue productivity (TFPR) is measured as $TFPR_i = \frac{Y_i}{K_i^\alpha L_i^{1-\alpha}}$. Distortion wedges are calculated as $\tau_i = \frac{TFPR_i}{\overline{TFPR}} - 1$, where \overline{TFPR} is the average across all provinces. Positive τ_i implies under-allocation (inputs overpriced), while negative τ_i suggests over-allocation.

4 Results

4.1 Capital Share Dynamics

The capital share of income, α , declined steadily from 0.37 in 2015 to 0.18 in 2023 (Figure1), indicating a rising labor share in income distribution. This shift suggests a gradual transition toward more labor-intensive sectors. The trend may reflect changes in investment behavior, relative input prices, or broader structural transformations in the Canadian economy. In a Cobb-Douglas framework, this decline increases the weight of labor in output determination, which has implications for the measurement of misallocation. Estimating a time-varying α improves model accuracy and ensures that misallocation estimates reflect real changes in factor dynamics rather than static assumptions.

4.2 Labor and Capital Input Gaps

The labor gap graph (Figure2) displays the difference between efficient and actual labor allocation across provinces. Positive values indicate underuse of labor, while negative values indicate overuse. Newfoundland and Labrador consistently shows the highest positive labor gaps, peaking in 2016 and again in 2023, suggesting persistent under-allocation of labor despite its productiv-

ity. In contrast, Alberta, Quebec, and Saskatchewan generally exhibit negative gaps, indicating overuse of labor inputs. Capital input gaps (Figure 3) reveal even larger deviations. Prince Edward Island and Nova Scotia exhibit consistent and significant under-allocation of capital throughout the period, with PEI nearing a gap of +1M. Alberta, Newfoundland and Labrador, and Saskatchewan show substantial over-investment, with actual capital levels well above the efficient benchmark. These patterns highlight a misalignment between provincial productivity and factor allocation. Some high-productivity regions lack sufficient inputs, while others receive more than efficient levels, suggesting frictions such as capital immobility or suboptimal investment incentives. Although some fluctuations occur over time, especially around 2020–2023, the overall patterns remain stable, indicating structural rather than cyclical causes.

4.3 Efficient-to-Actual GDP Ratios

The efficient-to-actual GDP ratio (Figure 4) confirms the presence of these inefficiencies. Nova Scotia and Prince Edward Island consistently exhibit the highest ratios, peaking around 1.25–1.30, suggesting that a significant portion of potential output remains unrealized. This is consistent with earlier findings of persistent capital shortages. Newfoundland and Labrador experiences substantial fluctuations, dipping below 0.9 in 2018, reflecting periods of input overuse without proportional output gains. New Brunswick, British Columbia, and Ontario maintain moderate efficiency ratios near one, indicating relatively aligned input use. Alberta and Saskatchewan begin the period with ratios well below one but improve toward the end of the sample, suggesting partial rebalancing. The convergence trend in 2022–2023 points to gradual improvement, though gaps remain.

4.4 Aggregate GDP Gains from Reallocation

At the national level, the potential GDP gain from reallocation (Figure 5) peaked at 2.6% in 2016 and declined steadily to 0.7% in 2023. The earlier part of the period reflects high levels of misallocation, while the decline in later years suggests improved aggregate efficiency. The trend aligns with the narrowing of input gaps and improved alignment between input usage and productivity at the provincial level. Though the economy appears to be converging toward efficient input use, the remaining gap still implies room for policy-driven gains.

4.5 TFPR Dispersion Over Time

The strong positive correlation between log TFP and log TFPR (0.73) shown in (figure8) suggests that more productive provinces tend to have higher revenue productivity. This pattern indicates a misalignment in factor allocation, as efficient markets should exhibit no systematic relationship between TFP and TFPR. Ideally, TFPR should be equalized across regions regardless of TFP levels. However, the observed slope implies that high-TFP provinces may face frictions that prevent full factor utilization. This finding aligns with the observed decline in TFPR dispersion over time (Figure 6), from 0.10 in 2016 to 0.05 in 2023, suggesting some convergence. The improvement indicates that marginal revenue products are becoming more uniform across provinces, pointing to reduced regional distortions. Nonetheless, the correlation signals that some inefficiencies remain, especially for high-productivity regions that still exhibit elevated TFPR

4.6 Distortion Wedges Across Provinces

The distribution of distortion wedges τ_i (Figure7), defined as proportional deviations of TFPR from the national average, further illustrates these regional disparities. Nova Scotia, Prince Edward Island, and Ontario exhibit consistently positive wedges, indicating under-allocation of capital and labor relative to their productivity. In contrast, Alberta and Saskatchewan show large negative wedges, implying persistent over-allocation of inputs with comparatively low returns. Newfoundland and Labrador displays high dispersion, suggesting fluctuating distortions over time. Quebec and Manitoba hover close to zero, implying relatively efficient resource use. These wedges are not random but structurally embedded, reinforcing the need for policies that promote factor mobility and correct regional distortions.

5 Conclusion

Taken together, the results show that while allocative efficiency in Canada has improved over the past decade, considerable regional misallocation remains. These inefficiencies reflect the underlying frictions and imbalances in regional economic structures, underscoring the importance of policy reforms and support for a more productive deployment of resources across provinces.

References

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Appendix

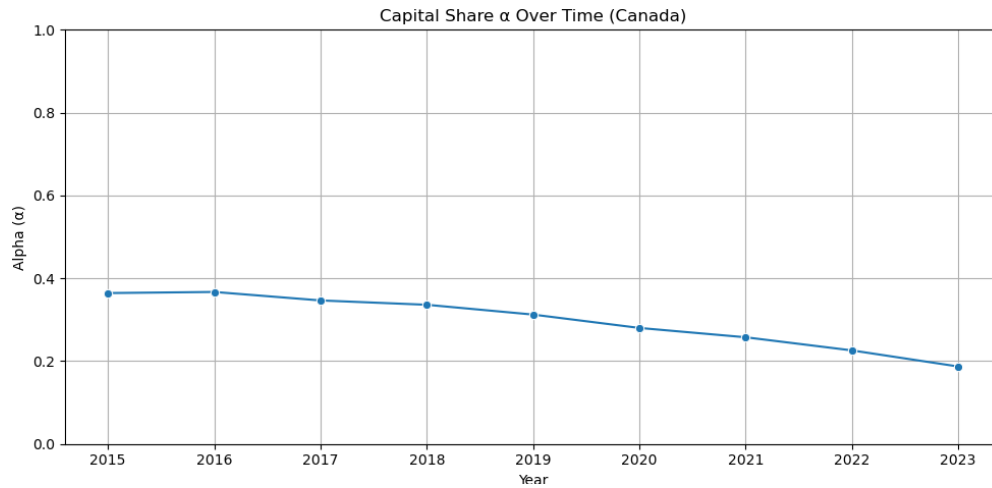


Figure 1: Capital Share α Over Time (Canada)

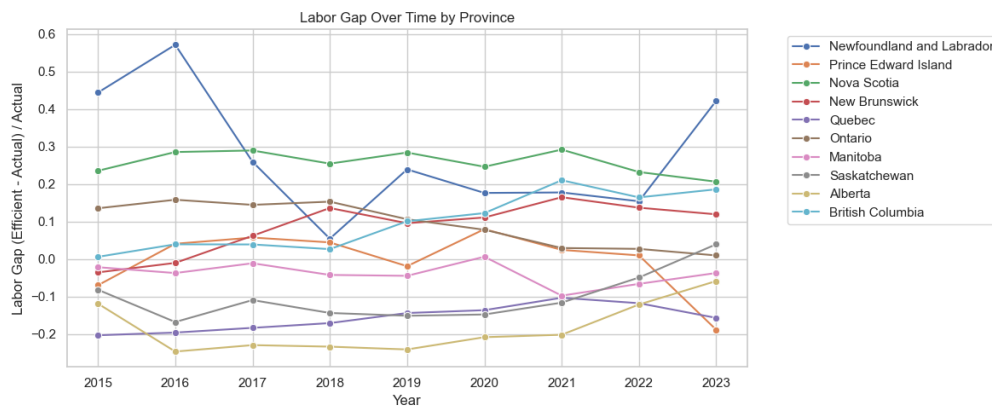


Figure 2: Labor Gap Over Time by Province

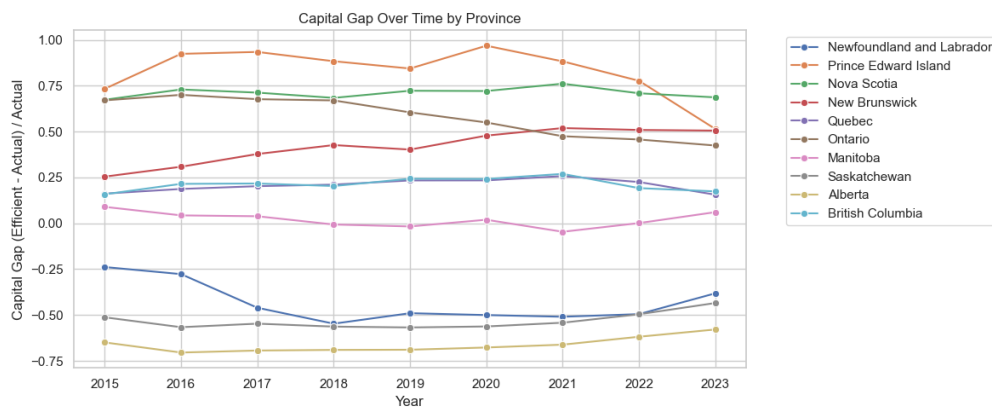


Figure 3: Capital Gap Over Time by Province

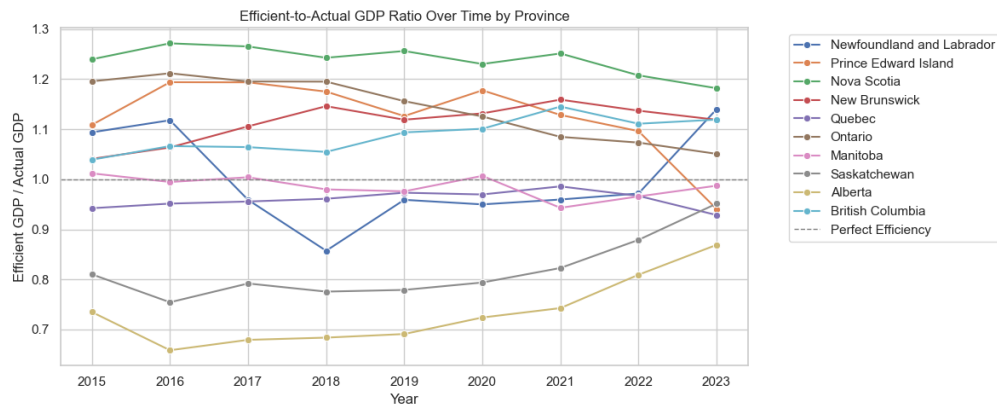


Figure 4: Efficient-to-Actual GDP Ratio Over Time by Province

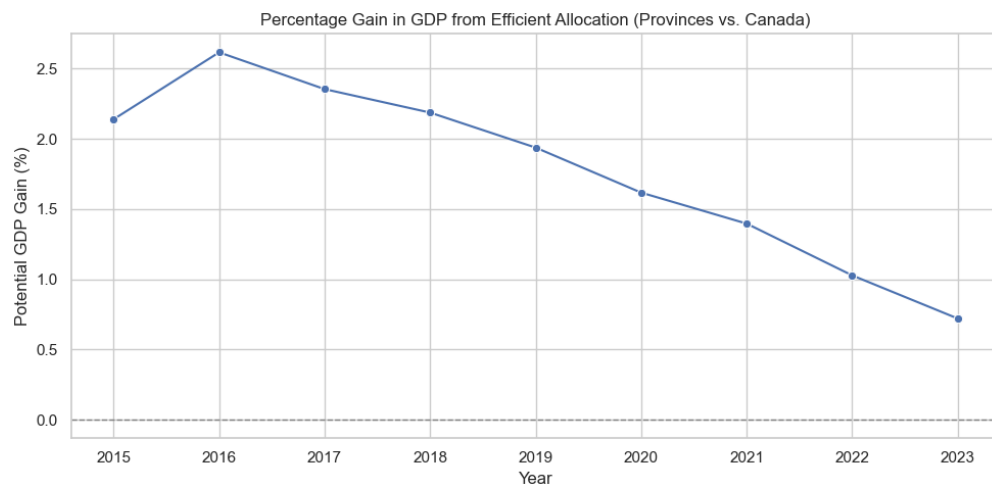


Figure 5: Percentage Gain in GDP from Efficient Allocation

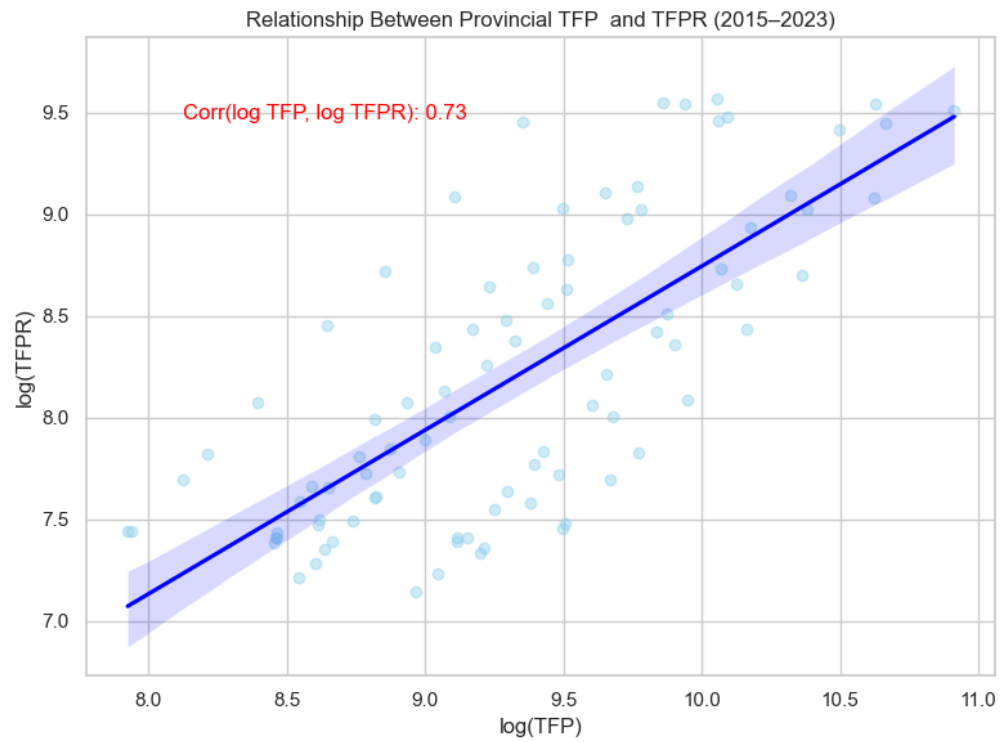


Figure 6: Relationship Between Provincial TFP and TFPR

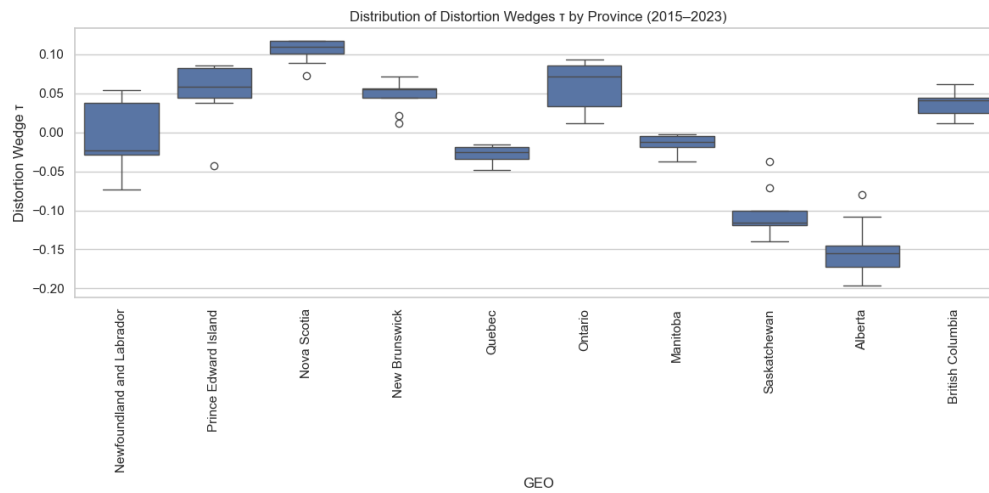


Figure 7: Distribution of Distortion Wedges τ by Province

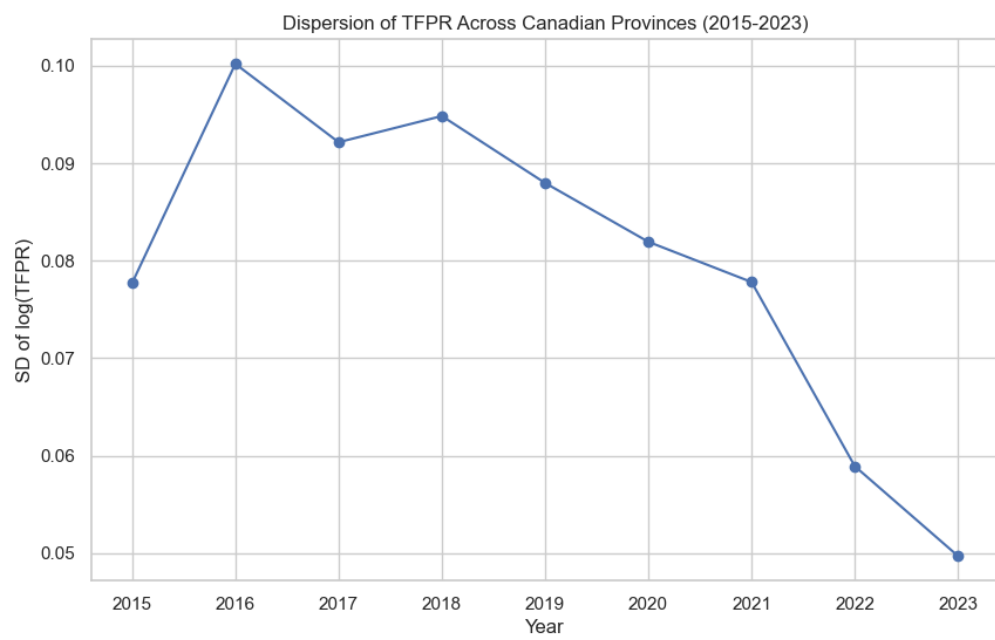


Figure 8: Relationship Between Provincial TFP and TFPR