Where Did Canada's Productivity Growth Go?*

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Abstract

This paper quantifies the forces behind Canada's long-run productivity growth slowdown using an industry-level accounting framework for the period 1961–2019. I decompose aggregate total-factor productivity (TFP) growth into contributions from: (1) within-industry productivity improvements, (2) structural change (Baumol effects), and (3) factor reallocation across industries. The results show that Canada's post-2000 stagnation is driven almost entirely by a sharp decline in within-industry TFP growth. Structural change increasingly weighs on aggregate TFP as the economy shifts toward slower-growing service sectors, though its overall magnitude remains modest. Factor reallocation contributes little throughout the sample.

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1 Introduction

Canada's productivity growth has slowed substantially over the past several decades, with the slowdown becoming especially pronounced at the turn of the millennium. This decline has translated directly into weaker wage growth and a noticeable erosion in the purchasing power of Canadian households. Understanding the origins of this slowdown requires disentangling whether it comes from declining productivity growth within industries or from structural shifts in economic activity across industries.

In this paper, I address this question using a growth-accounting framework that decomposes aggregate total-factor productivity (TFP) growth for the Canadian business sector into three components: within-industry productivity improvements, changes in the economy's industrial composition (Baumol effects), and the reallocation of capital and labor across industries. Building on the approach of Halperin and Mazlish (2024), the decomposition isolates how much TFP growth can be attributed to technological and efficiency gains within industries and how much reflects shifts in value-added or inputs toward industries with faster or slower productivity growth.

Distinguishing these forces is critical because each carries different implications. If the slowdown reflects structural shifts toward sectors with low productivity growth (i.e., Baumol's cost disease), then weaker TFP growth may be an unavoidable consequence of preferences or technological constraints outside the reach of policy. If it reflects adverse patterns of factor reallocation, such as productive industries drawing too little capital or labor due to rising market power, the slowdown may instead reflect misallocation that competition policy could address. If the decline occurs within industries, it points toward underinvestment in technology adoption or development. Disentangling these forces can help us determine whether the Canadian TFP growth decline is a structural inevitability or a policy-relevant challenge.

I implement a growth-accounting decomposition using industry-level data (3-digit NAICS) on value-added, multifactor productivity, and capital and labor inputs from Statistics Canada for 1961–2019. In line with Baqaee and Farhi (2019), I do not impose the efficiency conditions required for Hulten's theorem to hold, allowing factor reallocation to have first-order effects on aggregate productivity growth. The results show that Canada's post-2000 productivity stagnation is driven overwhelmingly by a sharp decline in within-industry TFP growth. Although Baumol effects increasingly weigh on aggregate productivity as activity shifts toward slow-growing sectors, their overall contribution remains modest, and factor reallocation plays only a minor role throughout the sample. These findings mirror the U.S. evidence documented by Halperin and Mazlish (2024).

I also address the role of the resource sector, a frequent culprit in discussions of Canadian economic performance. I find that the oil and gas sector contributes disproportionately to the Baumol effect, accounting for approximately half of the structural drag. However, even after excluding the energy sector, the central finding holds: the "pure" productivity term (within-industry TFP growth) collapses from over 0.8% per year prior to 2000 to just 0.2% thereafter. This suggests that Canada's productivity growth malaise is not merely a symptom of its resource dependence or a mechanical shift to services, but a widespread failure to deliver efficiency gains across a broad range of industries.

The remainder of the paper is organized as follows. The following section reviews the relevant literature. Section 2 presents the theoretical framework underlying our productivity growth decomposition. Section 3 describes the data used in the analysis. Section 4 presents the empirical results and Section 5 discusses them. Section 6 concludes.

Literature review

The analysis in this paper is grounded in the foundational literature on productivity measurement. Hulten (1978), building on the work of Solow (1957) and Domar (1961), showed that in efficient economies, aggregate TFP growth can be expressed as a sales-weighted average of industry-level productivity growth. More recent work relaxed the assumptions underlying Hulten's theorem. Notably, Baqaee and Farhi (2019) show that factor reallocation can have first-order effects on aggregate TFP in distorted economies. I adopt their framework to decompose Canadian TFP growth into three distinct components: within-industry productivity improvements, Baumol effects, and factor reallocation.

This framework allows us to directly engage with the literature on structural change and "Baumol's cost disease." Baumol (1967) famously theorized that as technologically progressive sectors drive up economy-wide wages, stagnant sectors—unable to offset rising labor costs with efficiency gains—experience increasing relative prices. If consumer demand for these stagnant services is price inelastic, they capture an ever-growing share of nominal GDP, mechanically dampening aggregate productivity growth. Nordhaus (2006) and Halperin and Mazlish (2024) took this insight to the data by measuring sectoral contributions to U.S. productivity growth and highlighting the central role of this sectoral reallocation. Duernecker, Herrendorf and Valentinyi (2023) develop a macroeconomic model of structural change and argue that Baumol's cost disease in the U.S. will be less severe in the future than it was in the past.

Within the Canadian context, a growing body of work documents and examines the productivity problem. A long tradition of empirical work documents Canada's persistent productivity underperformance relative to the United States. Early analyses—such as Dion (2007), Boothe and Roy (2008), Baldwin and Gu (2009), and Sharpe (2010)—highlight chronically weak multifactor productivity growth and an emerging pattern of slower technical progress. More recent contributions bring additional structure to the diagnosis. Conesa and Pujolas (2019) show that the 2002–2014 stagnation cannot be explained by measurement issues or simple compositional effects. Loertscher and Pujolas (2024) show that the oil and gas extraction sector explains much of Canada's relative productivity growth gap vis-à-vis the United States. Complementing this evidence, Alexopoulos and Cohen (2018) and Mollins and St-Amant (2019) document a slowdown in technology commercialization and ICT adoption, suggesting these phenomena have contributed directly to weaker TFP growth. Finally, Kiarsi (2025) decomposes Canada's real GDP per capita growth and confirms that the deceleration in living standards is overwhelmingly driven by the TFP growth slowdown.

My contribution is to place these different explanations within a unified growth-accounting framework capable of quantifying the relative importance of within-industry technical progress, structural change, and allocative efficiency over six decades of Canadian economic history. In doing so, I extend the existing evidence in three directions: (1) I examine a long time period (1961–2019), (2) I incorporate allocative inefficiencies using the Baqaee and Farhi (2019) theoretical framework, and (3) I quantify the contribution of sectoral reallocation relative to the collapse in within-industry productivity growth.

2 Theoretical framework

To decompose the sources of Canadian productivity growth, I adopt the general equilibrium growth-accounting framework of Baqaee and Farhi (2019). This approach allows us to aggregate industry-level shocks into economy-wide TFP growth while explicitly accounting for input-output linkages and allocative inefficiencies.

Input-output definitions. Consider an economy with N industries indexed by $i \in \{1, \ldots, N\}$ and two factors of production: capital and labor. Let $\mathbf{b}_t$ be the $(N+2) \times 1$ vector whose i-th element is equal to the share of industry i in aggregate nominal value-added:

$$b_{it} \equiv \frac{P_{it} Y_{it}}{\sum_{j=1}^{N} P_{jt} Y_{jt}}, \quad \forall i \in \{1, \ldots, N\}.$$

The first N elements of $\mathbf{b}_t$ correspond to industries, while the last two correspond to capital and labor. Since factors do not enter in final demand, the last two elements of $\mathbf{b}_t$ are equal to zero. Let us further define the cost-based input-output matrix $\mathbf{\Omega}_t$ of dimension $(N+2) \times (N+2)$ whose (i,j)-th element is equal to industry i's expenditures on inputs from j as a share of its total expenditures:

$$\Omega_{ijt} \equiv \frac{P_{jt} X_{ijt}}{\sum_{k=1}^{N} P_{kt} X_{ikt}}.$$

The first N rows of $\mathbf{\Omega}_t$ correspond to industries, while the last two correspond to capital and labor. Since capital and labor require no intermediate inputs, the last two rows of $\mathbf{\Omega}_t$ are filled with zeros. The Leontief inverse of the cost-based input-output matrix is defined as:

$$\mathbf{\Psi}_t \equiv (\mathbf{I} - \mathbf{\Omega}_t)^{-1}.$$

Finally, the cost-based Domar weights are defined as:

$$\boldsymbol{\lambda}_t' \equiv \mathbf{b}_t' \mathbf{\Psi}_t.$$

For expositional convenience, we denote by λ_t^K and λ_t^L the last two elements of $\boldsymbol{\lambda}_t'$, which measure their importance in final demand, indirectly through the production network of the economy.

Total-factor productivity. As shown by Baqaee and Farhi (2019), aggregate TFP growth in inefficient economies can be calculated as:

$$\mathrm{d}\ln(A_t) = \mathrm{d}\ln(Y_t) - \lambda_t^K \mathrm{d}\ln(K_t) - \lambda_t^L \mathrm{d}\ln(L_t)$$

where A_t is aggregate TFP, Y_t is aggregate real value-added, K_t is aggregate capital, and L_t is aggregate labor. The growth rate of aggregate real value-added is given by:

$$\mathrm{d}\ln(Y_t) \equiv \sum_{i=1}^{N} b_{it} \mathrm{d}\ln(Y_{it}).$$

Here, the growth rate of real value-added in industry i is given by:

$$\mathrm{d}\ln(Y_{it}) = \mathrm{d}\ln(A_{it}) + \alpha_{it}^K \mathrm{d}\ln(K_{it}) + \alpha_{it}^L \mathrm{d}\ln(L_{it})$$

where A_{it} is industry i's TFP, K_{it} its capital input, L_{it} its labor input, and α_{it}^K and α_{it}^L are the elasticities of its output with respect to capital and labor, respectively. Here, we make the standard assumption of constant returns to scale at the industry level such that $\alpha_{it}^K + \alpha_{it}^L = 1$. Under the additional assumption that the representative firm in industry i minimizes its costs and is a price-taker in input markets, the elasticity of output with respect to the capital input is given by:

$$\alpha_{it}^{K} = \frac{r_{it}K_{it}}{r_{it}K_{it} + w_{it}L_{it}}.$$

The growth rate of aggregate capital is given by:

$$\mathrm{d}\ln(K_t) \equiv \sum_{i=1}^{N} \omega_{it}^{K}\mathrm{d}\ln(K_{it}) \quad \text{where} \quad \omega_{it}^{K} \equiv \frac{r_{it}K_{it}}{\sum_{j=1}^{N} r_{jt}K_{jt}}$$

and the growth rate of aggregate labor is given by:

$$\mathrm{d}\ln(L_t) \equiv \sum_{i=1}^{N} \omega_{it}^{L}\mathrm{d}\ln(L_{it}) \quad \text{where} \quad \omega_{it}^{L} \equiv \frac{w_{it}L_{it}}{\sum_{j=1}^{N} w_{jt}L_{jt}}$$

and where r_{it} and w_{it} are the rental rate of capital and the wage rate in industry i at time t, respectively.

Productivity growth accounting. Combining the above equations, we can express aggregate TFP growth as:

$$\begin{aligned}
\mathrm{d}\ln(A_t) = &\sum_{i=1}^{N} b_{it}\mathrm{d}\ln(A_{it}) \\
&+ \sum_{i=1}^{N}(b_{it}\alpha_{it}^{K} - \omega_{it}^{K}\lambda_{t}^{K})\mathrm{d}\ln(K_{it}) \\
&+ \sum_{i=1}^{N}(b_{it}\alpha_{it}^{L} - \omega_{it}^{L}\lambda_{t}^{L})\mathrm{d}\ln(L_{it}).
\end{aligned}$$

Following Halperin and Mazlish (2024), adding and subtracting the term $\sum_{i=1}^{N} b_{it_0}\mathrm{d}\ln(A_{it})$ and summing from time t_0 to t_1, we can further decompose the cumulative aggregate

TFP growth between these two dates into the following components:

$$\sum_{t=t_0}^{t_1} \mathrm{d}\ln(A_t) = \sum_{t=t_0}^{t_1}\sum_{i=1}^{N} b_{it_0}\mathrm{d}\ln(A_{it}) \qquad \text{Productivity} \tag{1}$$

$$+ \sum_{t=t_0}^{t_1}\sum_{i=1}^{N}(b_{it} - b_{it_0})\mathrm{d}\ln(A_{it}) \qquad \text{Baumol} \tag{2}$$

$$+ \sum_{t=t_0}^{t_1}\sum_{i=1}^{N}(b_{it}\alpha_{it}^{K} - \omega_{it}^{K}\lambda_t^{K})\mathrm{d}\ln(K_{it}) \qquad \text{Capital} \tag{3}$$

$$+ \sum_{t=t_0}^{t_1}\sum_{i=1}^{N}(b_{it}\alpha_{it}^{L} - \omega_{it}^{L}\lambda_t^{L})\mathrm{d}\ln(L_{it}) \qquad \text{Labor.} \tag{4}$$

The interpretation of these four terms is as follows.

1. Within-industry productivity. Term (1) weighs industry-level TFP growth by each industry's initial share of value-added. That is, if we freeze each industry's share of nominal value-added, we capture the contribution of within-industry productivity improvements alone—how much aggregate TFP has grown purely because each industry became more productive over time.

2. The Baumol effect. Term (2) instead weighs industry-level TFP growth by the change in each industry's share of value-added between dates t_0 and t_1. Therefore, it measures how the changing industrial composition of the economy contributes to aggregate TFP growth. This term is negative when industries with low productivity growth become more important in the economy, or vice-versa.

3. Factor reallocation. Terms (3) and (4) capture the contribution of reallocating factors across sectors. It weighs changes in industry-level capital and labor inputs by the difference between two terms. The first term is the product of the industry's share of total value-added and the elasticity of its output with respect to inputs. The second term is the product of the industry's share of total factor expenditures and the elasticity of aggregate output with respect to inputs. Intuitively, moving inputs into industries where they are more productive than the economy-wide average ($\alpha_{it}^{K} > \lambda_t^{K}$ or $\alpha_{it}^{L} > \lambda_t^{L}$) and where the receiving industries are more important in output than costs ($b_{it} > \omega_{it}^{K}$ or $b_{it} > \omega_{it}^{L}$) (i.e., high markup industries) raises aggregate productivity growth.

3 Data

The empirical analysis covers the Canadian economy over the period 1961 to 2019. To implement the decomposition described in Section 2, I construct a dataset combining industry-level productivity measures with input-output linkages at the 3-digit North American Industry Classification System (NAICS) level. The data are drawn from two primary Statistics Canada sources.

Productivity and factor inputs. I use industry-level production data from Statistics Canada Table 36-10-0217-01 (Multifactor productivity, value-added, capital input and labor input in the aggregate business sector and major sub-sectors). This table provides the core variables required for the growth accounting components of the decomposition:

- **Output and TFP:** Nominal value-added ($P_{it}Y_{it}$) is measured using Gross Domestic Product at basic prices. For technical change, I use the index of Multifactor Productivity (A_{it}) based on value-added.
- **Factor inputs:** I obtain indices for capital input (K_{it}) and labor input (L_{it}) to track real factor growth.
- **Factor weights:** To construct the required cost shares and elasticities, I use data on capital cost ($r_{it}K_{it}$) and labor compensation ($w_{it}L_{it}$).

Input-output linkages. To construct the cost-based Domar weights, I use the Symmetric Input-Output Tables from Statistics Canada Table 36-10-0001-01 and its historical predecessors. These tables provide the intermediate input expenditures ($\{P_{jt}X_{ijt}\}_{j=1}^{N}$) between industries. I use these flows to construct the cost-based input-output matrix $\mathbf{\Omega}_t$ and the resulting Leontief inverse $\mathbf{\Psi}_t$ for each year in the sample. By harmonizing these two data sources at the 3-digit NAICS level, we obtain a balanced panel of N industries spanning nearly six decades, allowing us to track the evolution of aggregate TFP through the lens of the Baqaee and Farhi (2019) framework.

4 Empirical results

The findings are presented in three steps. First, I examine the raw correlations in the industry-level data to test for the "symptoms" of Baumol's cost disease as in Nordhaus (2006). Second, I present the decomposition of aggregate TFP growth to isolate the relative contributions of within-industry growth, structural change, and reallocation.

Third, I analyze the sectoral contributions, with a specific focus on the outsized role of the oil and gas sector.

4.1 The symptoms of a cost disease

Before turning to the formal decomposition, I first assess whether Canadian data display the classic features of unbalanced growth identified by Baumol (1967). Baumol's hypothesis rests on a particular transmission mechanism: in industries with rapid productivity growth, efficiency improvements push relative prices downward and wages upward. Stagnant industries, drawing on the same labor pool, must match these wage increases despite lacking corresponding productivity gains. To preserve profit margins under rising labor costs, firms in these sectors are compelled to raise prices. If consumer demand for their services is price inelastic, households continue to purchase them even as costs climb. As a result, these stagnant, high-cost sectors absorb an increasingly large share of nominal GDP.

Figure 1: Prices, wages, and TFP growth

(a) Prices

(b) Wages

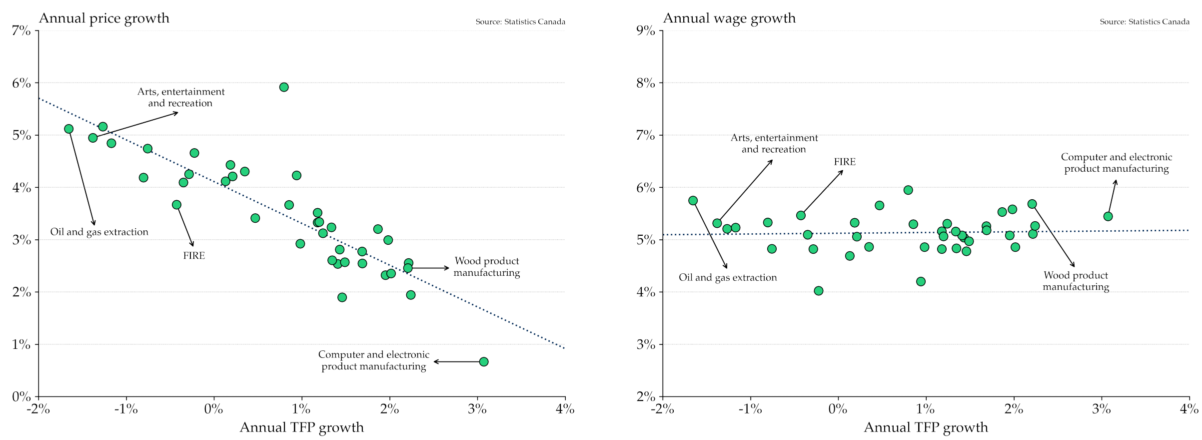
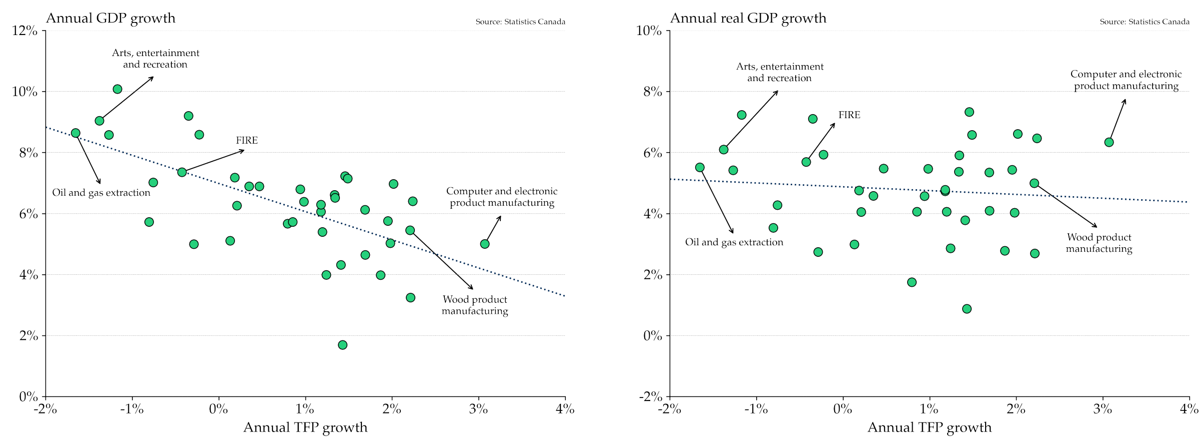


Figure 1 offers strong evidence for the first half of this mechanism. Indeed, Panel 1(a) documents a pronounced negative relationship between long-run relative price growth and TFP growth across Canadian industries: sectors with rapid productivity gains (e.g., "computer and electronic product manufacturing" or "wood product manufacturing") have experienced substantial price declines, while more stagnant sectors (e.g., "arts, entertainment, and recreation", "finance, insurance, and real estate", or "oil and gas extraction") have undergone marked price inflation. The presence of the arts, entertainment, and recreation sector is particularly noteworthy, as its labor-intensive production processes famously provided the original motivation for Baumol's formulation of the cost-disease hypothesis. By contrast, Panel 1(b) shows no systematic association between wage growth and productivity growth, in line with Baumol's hypothesis.

Figure 2 corroborates the second part of the mechanism: the "stagnant" sectors are indeed capturing a larger share of the economy. Panel 2(a) shows a pronounced negative relationship between TFP growth and nominal GDP growth. As technologically progressive manufacturing industries contract in relative value because of declining prices, spending shifts toward low-productivity service sectors. Panel 2(b) reveals a far weaker correlation between real GDP growth and TFP growth, indicating that demand for stagnant sectors is indeed relatively inelastic. Taken together, these patterns suggest that the Canadian economy exhibits the key symptoms of Baumol's cost disease.

Figure 2: GDP and TFP growth

(a) Nominal GDP (b) Real GDP



In Appendix A, I show that these patterns are remarkably stable over time. Replicating Figures 1 and 2 for the periods 1961–1980, 1980–2000, and 2000–2019 reveals that the same relationships persist across all three intervals. This robustness suggests that the forces underlying Baumol's cost disease are not episodic but structural: for decades, sectors with slow productivity growth have consistently seen their prices rise and their market share expand. I also show that input (labor and capital) cost shares are not systematically related to TFP growth.

4.2 The productivity growth diagnosis

To quantify these forces, Table 1 decomposes aggregate TFP growth into its three constitutive parts: within-industry productivity (*Productivity*), structural change (*Baumol*), and factor reallocation (*Capital* and *Labor*). The table reports this decomposition for the full sample (1961–2019) as well as for three sub-intervals: 1961–1980, 1980–2000, and 2000–2019.

Table 1: TFP growth decomposition

	1961–2019	1961–1980	1980–2000	2000–2019
Productivity	0.78%	1.11%	0.76%	0.12%
Baumol	-0.27%	-0.08%	-0.16%	-0.20%
Capital	-0.11%	-0.19%	-0.08%	-0.08%
Labor	0.10%	0.16%	0.08%	0.07%
Total	0.50%	0.99%	0.60%	-0.09%

Note: This table presents the decomposition of average annual TFP growth into its different components for the periods 1961–2019, 1961–1980, 1980–2000, and 2000–2019.

Across the entire sample, aggregate TFP growth averages 0.5% per year and is overwhelmingly propelled by within-industry productivity gains (0.78 percentage points). The Baumol component contributes –0.27 percentage points, indicating that the economy's gradual shift toward slow-productivity sectors exerts a sizable drag on aggregate growth. Factor reallocation plays only a minor role: capital and labor reallocations contribute –0.11 and 0.10 percentage points, respectively, largely offsetting one another. Figure 3 visually summarizes these results.

However, the full-sample decomposition masks a striking shift over time. In the early period (1961–1980), aggregate TFP growth averages nearly 1% per year, but by 2000–2019 it falls to –0.1% per year. The decomposition highlights three central insights behind this TFP growth collapse.

The collapse occurs within industries. The first row of Table 1 shows that the slowdown is clearly a within-industry phenomenon. From 1961 to 1980, within-sector productivity gains contributed 1.11% to annual TFP growth; by 1980–2000, this contribution had slowed to 0.76%, and after 2000 it fell sharply to just 0.12%, explaining most of the decline. These patterns indicate that the core issue is not a structural reallocation toward low-productivity sectors but a widespread loss of momentum in productivity improvements within industries.

Figure 3: TFP growth decomposition

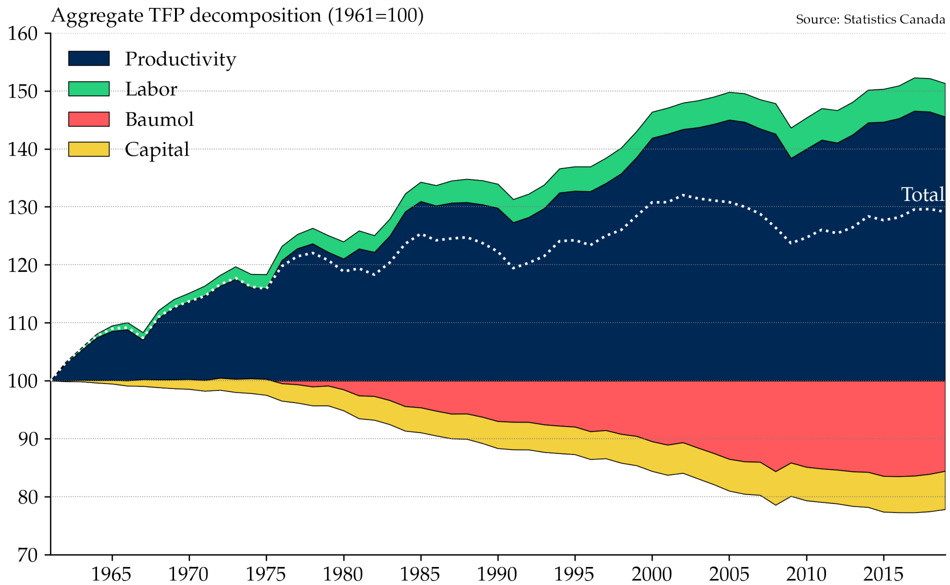
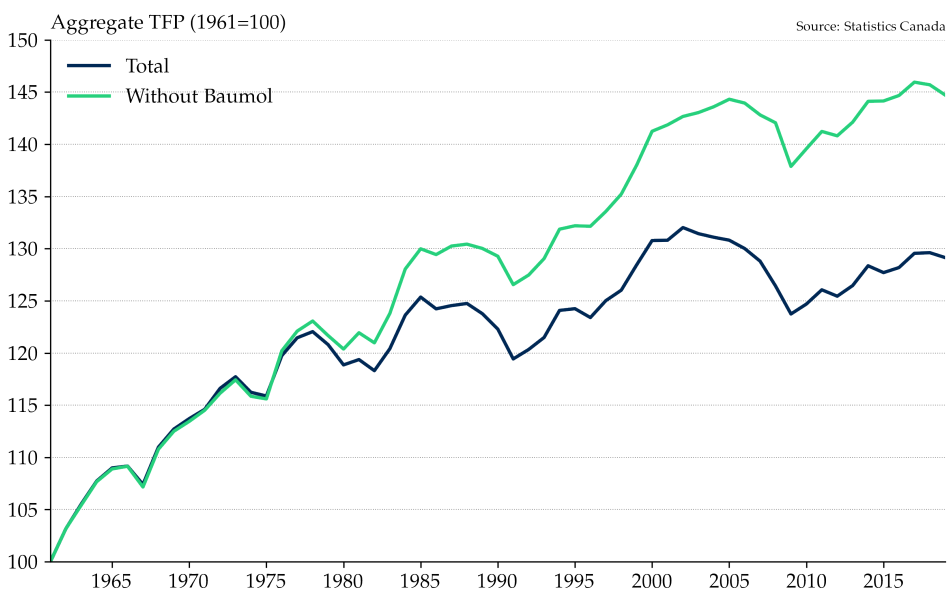


Figure 4: TFP growth and the Baumol effect



The Baumol effect is a steady headwind. The Baumol term is persistently negative, confirming that economic activity continues to shift toward slower-growing sectors. Its magnitude, however, evolves only modestly—from –0.08% in 1961–1980 to –0.16% in 1980–2000 and –0.20% in 2000–2019. Although this structural drag aggravates the slowdown, it is not its principal driver. Figure 4 illustrates the cumulative impact of this drag: absent this adverse reallocation, aggregate Canadian TFP would be roughly 12% higher by 2019.

Factor reallocation plays a minor role. The contributions from capital and labor reallocation are small and largely offset each other, indicating that the slowdown cannot be attributed to a worsening of allocative inefficiency that would impede resources from flowing toward high-productivity sectors. This is noteworthy in light of growing concerns that market power has been increasing in Canada, potentially distorting competitive pressures and resource allocation (Competition Bureau Canada, 2023). The decomposition suggests that, despite these concerns, factor misallocation is not the primary force behind the aggregate TFP growth decline.

4.3 The sectoral anatomy of the slowdown

While the aggregate decomposition reveals that the Baumol effect is not the dominant driver of Canada's productivity stagnation, it remains highly informative to examine the specific industry-level forces at play. The theoretical framework allows us to additively separate the contribution of each industry to aggregate TFP growth, providing a granular look at where efficiency is being gained or lost. Figure 5 presents this industrial breakdown over the entire sample period. The results highlight a stark contrast across sectors: while retail and certain manufacturing industries have contributed positively to aggregate TFP growth, the oil and gas extraction, FIRE (finance, insurance, and real estate), and mining sectors have exerted significant negative pressures.

The sources of these negative contributions become clearer when comparing industry-level TFP growth (Figure A.9) with nominal GDP growth (Figure A.10) in Appendix A. The sectors with the largest negative contributions—especially oil and gas extraction—are those experiencing the deepest TFP contractions in the entire dataset. Yet these same industries have expanded markedly in nominal terms. This decoupling, in which a sector becomes less efficient while claiming a larger share of the economy, is the defining signature of the Baumol-style structural drag highlighted earlier.

Given this particularly large footprint of resource industries, it is natural to ask whether Canada's productivity malaise is essentially a resource-sector phenomenon. To assess this, Table 2 replicates the decomposition after excluding oil and gas extraction. The results show that the resource sector does indeed amplify the slowdown: removing it raises post-2000 aggregate TFP growth from –0.09% to a modestly positive 0.11%. However, the broader picture remains unchanged. Even after excluding oil and gas, within-industry productivity growth collapses from 0.82% to just 0.21%.

Figure 5: Industrial contributions to TFP growth

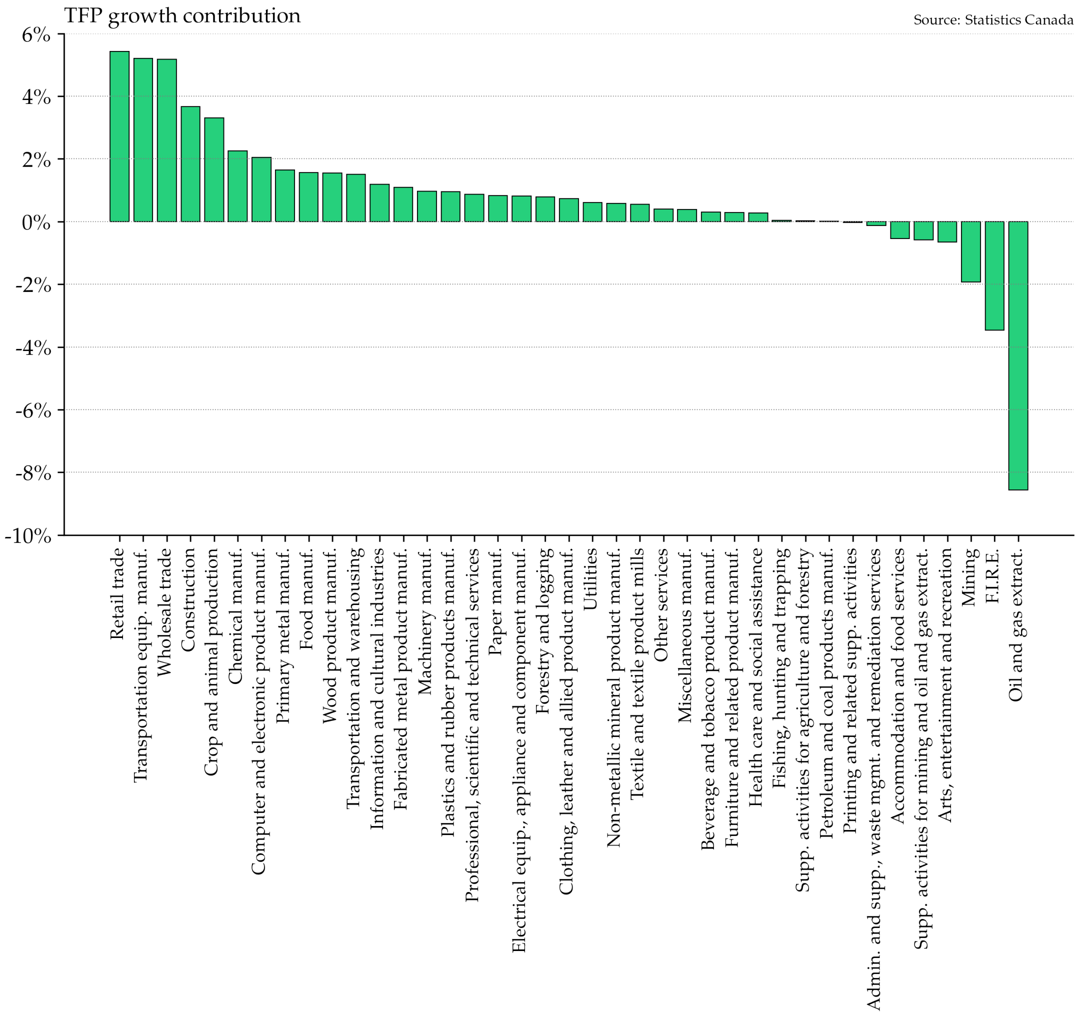


Table A.4 in Appendix A extends this exercise by further excluding the mining and FIRE (finance, insurance, and real estate) sectors—two industries that, like oil and gas, have displayed a combination of weak productivity growth but strong nominal GDP growth. In particular, the FIRE sector's growing economic importance is closely tied to Canada's elevated housing prices, which have become a central part of the country's broader productivity debate. Even after removing these additional stagnant sectors, however, the collapse in within-industry productivity growth remains strikingly persistent. This reinforces that while sector-specific headwinds are an important part of the story, they are layered atop a deeper, economy-wide decline in within-industry efficiency growth.

Table 2: TFP growth decomposition (without O&G)

	1961–2019	1961–1980	1980–2000	2000–2019
Productivity	0.81%	1.14%	0.82%	0.21%
Baumol	-0.16%	0.03%	-0.15%	-0.10%
Capital	-0.10%	-0.17%	-0.06%	-0.07%
Labor	0.10%	0.16%	0.08%	0.07%
Total	0.65%	1.16%	0.68%	0.11%

Note: This table presents the decomposition of average annual TFP growth into its different components for the periods 1961–2019, 1961–1980, 1980–2000, and 2000–2019, excluding the oil and gas extraction industry.

4.4 A comparison with the United States

To place the Canadian experience in perspective, I compare my results with those for the United States. Halperin and Mazlish (2024) apply the same decomposition to U.S. data over the 1947–2016 period to analyze the post-1973 productivity slowdown, which is presented in Table 3. The parallels between the two economies are striking.

First, the dominant source of stagnation is the same on both sides of the border. Halperin and Mazlish (2024) show that the U.S. productivity slowdown is driven overwhelmingly by a collapse in the within-industry component; they estimate that this contribution fell by roughly 0.75 percentage points after 1973. This mirrors my results for Canada and suggests that the slowdown is not an idiosyncratic national phenomenon but part of a broader global deceleration in technological progress—a pattern consistent with the view that "ideas are getting harder to find" (Bloom, Jones, Van Reenen and Webb, 2020).

Second, both countries experience a persistent yet secondary drag from structural change. Halperin and Mazlish (2024) estimate that Baumol's cost disease accounts for around one-quarter of the U.S. slowdown, subtracting about 25 basis points annually. The Canadian decomposition yields a remarkably similar pattern: the Baumol term reduces growth by about 0.27 percentage points per year over the full sample. In each case, the shift toward stagnant service sectors acts as a steady headwind, not the principal driver of the post-2000 decline. Finally, the evidence on factor reallocation is broadly comparable, suggesting that static misallocation is unlikely to be the primary

Table 3: U.S. TFP growth decomposition

	1947–2016	Pre-1973	Post-1973
Productivity	1.04%	1.52%	0.77%
Baumol	-0.28%	-0.13%	-0.37%
Capital	-0.01%	-0.04%	-0.01%
Labor	-0.00%	-0.00%	-0.01%
Total	0.75%	1.35%	0.41%

Note: This table reproduces the U.S. TFP growth decomposition from Halperin and Mazlish (2024) using their reported estimates. The sample covers the period 1947–2016, with a break at 1973 to capture the post-oil shock productivity slowdown.

force behind North America's productivity slump.

It is worth noting that the collapse of the within-industry component in the U.S. has proven robust to scrutiny regarding statistical methodology. A prominent counter-hypothesis posits that official price indices fail to fully capture quality improvements, leading statisticians to misinterpret value derived from higher-quality products as pure price inflation (Bils and Klenow, 2001). If the price deflators used to adjust nominal expenditures are overstated because they miss these quality improvements, real output—and consequently productivity—will be systematically understated.

However, Byrne, Fernald and Reinsdorf (2017) emphasize that for mismeasurement to account for the productivity slowdown, the extent of mismeasurement would need to have intensified over time. Their evidence points in the opposite direction: the understatement of IT's contribution does not appear to have worsened since the early 2000s and was, if anything, more pronounced in earlier decades. They also note that while the proliferation of "free" digital services has undeniably expanded consumer welfare, these benefits primarily accrue to non-market leisure time and are not large enough to explain the slowdown in business sector TFP growth. Taken together, these findings suggest that the North American productivity deceleration reflects a real phenomenon rather than a mere statistical artifact.

5 Discussion

The growth-accounting decomposition yields a clear conclusion: the productivity growth slowdown in Canada is driven by a decline in within-industry efficiency improvements. The direct contributions of structural change (Baumol effects) and factor misallocation appear modest by comparison. However, interpreting these components as entirely independent forces may be misleading. It is plausible that the macroeconomic forces driving structural change and factor reallocation exert significant indirect influence on within-industry innovation and technology adoption incentives.

Consider the role of the resource sector. While the decomposition in this paper isolates the direct "Baumol drag" of this sector, it does not capture the general equilibrium consequences of a resource boom on other industries. If the Canadian economy suffers from a "Dutch disease"—where strong resource exports drive up the real exchange rate—technologically progressive tradeable sectors (such as manufacturing) may become less competitive in international markets. This contraction in their effective market size may thus reduce the return on investments in research and development (R&D), consistent with the findings of Aghion, Bergeaud, Lequien and Melitz (2024). In this scenario, the resource boom would manifest in the accounting framework not just as a Baumol effect, but as a collapse in the "within-industry" TFP growth contribution of manufacturing industries, as their incentives to innovate are eroded by currency appreciation.

There is evidence supporting this channel in the Canadian context. Indeed, Baldwin and Yan (2015) show that larger export markets enhance productivity by enabling Canadian firms to exploit economies of scale and product specialization, intensifying competitive pressure that rewards efficiency, and expanding the incentives and opportunities for firms to innovate. Complementarily, Baldwin, Gu and Yan (2013) link Canada's manufacturing productivity slowdown to declining export growth and rising excess capacity, consistent with exchange-rate pressures during the 2000s commodity boom.

A similar logic applies to the role of market power. The reallocation terms in the decomposition only capture the static cost of resource misallocation—the efficiency lost because capital and labor are not directed towards the industries where their marginal product is highest. They do not, however, capture the dynamic consequences of market power. R&D typically entails high fixed costs; therefore, the incentive to invest in technology adoption or productivity improvements is increasing in the scale of production. If rising market power leads firms to restrict output to support prices, it simultaneously reduces the scale over which they can amortize the costs of innovation (Arrow, 1962). Consequently, distortions that appear quantitatively small in the static reallocation terms may nonetheless be responsible for a significant portion of the decline in the within-industry residual by depressing firm-level incentives to develop or adopt new technologies.

This perspective is consistent with a broader Canadian literature documenting a gradual erosion of competitive intensity. Recent evidence from Competition Bureau Canada (2023) points to rising concentration, weaker business dynamism, and higher markups across a range of industries since 2000—patterns indicative of weaker competitive intensity. These developments are unlikely to register strongly in the static reallocation terms of the decomposition, yet they may still matter greatly for productivity growth by slowing the development, diffusion, and adoption of new technologies.

Therefore, while my results highlight the *proximate* cause of the slowdown as a failure of within-industry efficiency, the *ultimate* causes may still be rooted in the structural composition of the economy and the competitive environment. Policy interventions addressing market power, misallocation, or sectoral imbalances may thus yield productivity gains that exceed the modest direct contributions inferred in the static decomposition.

6 Conclusion

In this paper, I revisited the puzzle of Canada's productivity slowdown using a general growth-accounting framework that accounts for input-output linkages, allocative inefficiencies, and structural change. By decomposing aggregate TFP growth from 1961 to 2019, I sought to determine whether Canada's stagnation reflects an inevitable structural shift toward services (Baumol's cost disease), a worsening allocation of resources, or a widespread decline in technical efficiency growth.

My results point to a clear diagnosis: the post-2000 TFP growth stagnation is driven overwhelmingly by a collapse in within-industry productivity growth. While the contribution of "pure" technical progress averaged 0.76% annually between 1980 and 2000, it fell to just 0.12% in the subsequent two decades. By contrast, while I find evidence of a persistent "Baumol cost disease"—whereby economic activity shifts toward stagnant, high-price sectors—this force acts as a stable headwind rather than the driver of the recent deceleration. Similarly, the direct contribution of factor reallocation remains quantitatively small throughout the sample.

I also scrutinized the role of the resource sector, often cited as a source of Canadian economic underperformance (Loertscher and Pujolas, 2024). I find that the oil and gas industry is indeed an important source of structural drag, accounting for approximately half of the economy-wide Baumol effect. However, the core finding remains robust to excluding the energy sector: even in the non-resource economy, within-industry productivity growth has collapsed. This suggests that the productivity crisis is not a localized symptom of the resource boom, but a broad-based malaise.

These results carry important policy implications. If the slowdown were primarily a misallocation problem, competition policy and barriers to factor mobility would be the natural levers. If it were purely a Baumol effect, the slowdown might be regarded as a structural inevitability. Instead, the dominance of the within-industry component points to weakened incentives for innovation, technology adoption, and productivity- or quality-enhancing investments. As discussed, forces such as misallocation, reduced competitive intensity, and exchange-rate dynamics may not leave strong signatures in the decomposition's static reallocation terms, yet they may still suppress productivity growth through dynamic channels.

Ultimately, my findings underscore the need for a deeper investigation into the microeconomic origins of the within-industry productivity collapse. Aggregate decompositions can reveal *where* growth is faltering, but they cannot identify the firm-level mechanisms behind the slowdown. Progress on this front requires micro-datasets that track firms with sufficient granularity to disentangle different possible explanations. By opening this microeconomic black box, future work can move from diagnosing the slowdown to understanding—and ultimately addressing—the structural forces that have eroded Canadian productivity growth.

References

Aghion, Philippe, Antonin Bergeaud, Matthieu Lequien, and Marc J. Melitz, "The Heterogeneous Impact of Market Size on Innovation: Evidence from French Firm-Level Exports," *The Review of Economics and Statistics*, 05 2024, *106* (3), 608–626.

Alexopoulos, Michelle and Jon Cohen, "Canadian Productivity Growth, Secular Stagnation, and Technological Change," *International Productivity Monitor*, 2018, (35), 113–137.

Arrow, Kenneth J., "The Economic Implications of Learning by Doing," *The Review of Economic Studies*, 06 1962, *29* (3), 155–173.

Baldwin, John R. and Beiling Yan, "Empirical Evidence from Canadian Firm–Level Data on the Relationship Between Trade and Productivity Performance," Technical Report 11F0027M, no. 97, Statistics Canada, Economic Analysis Division, Research Paper Series 2015. Accessed: 2025-12-07.

Baldwin, John R and Wulong Gu, "Productivity Performance in Canada, 1961 to 2008: An Update on Long-Term Trends," *Statistics Canada Research Paper*, 2009, (025).

Baldwin, John R., Wulong Gu, and Beiling Yan, "Export Growth, Capacity Utilization, and Productivity Growth: Evidence from the Canadian Manufacturing Plants," *Review of Income and Wealth*, 2013, *59* (4), 665–688.

Baqaee, David Rezza and Emmanuel Farhi, "Productivity and Misallocation in General Equilibrium," *The Quarterly Journal of Economics*, 09 2019, *135* (1), 105–163.

Baumol, William J., "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis," *The American Economic Review*, 1967, *57* (3), 415–426.

Bils, Mark and Peter J. Klenow, "Quantifying Quality Growth," *American Economic Review*, September 2001, *91* (4), 1006–1030.

Bloom, Nicholas, Charles I. Jones, John Van Reenen, and Michael Webb, "Are Ideas Getting Harder to Find?," *American Economic Review*, April 2020, *110* (4), 1104–44.

Boothe, Paul and Richard Roy, "Business Sector Productivity in Canada: What Do We Know?," *International Productivity Monitor*, 2008, (16).

Byrne, David, John G Fernald, and Marshall Reinsdorf, "Does Growing Mismeasurement Explain Disappointing Growth?," *FRBSF Economic Letter*, 2017, *4.*

Competition Bureau Canada, "Competition in Canada from 2000 to 2020: An Economy at a Crossroads," https://competition-bureau.canada.ca/en/how-we-foster-competition/education-and-outreach/competition-canada-2000-2020-economy-crossroads 2023. Accessed: 2025-12-07.

Conesa, Juan Carlos and Pau S. Pujolas, "The Canadian productivity stagnation, 2002–2014," *Canadian Journal of Economics/Revue canadienne d'économique*, 2019, *52* (2), 561–583.

Dion, Richard, "Interpreting Canada's Productivity Performance in the Past Decade: Lessons from Recent Research," *Bank of Canada Review*, 2007, *2007* (Summer), 19–32.

Domar, Evsey D., "On the Measurement of Technological Change," *The Economic Journal*, 12 1961, *71* (284), 709–729.

Duernecker, Georg, Berthold Herrendorf, and Ákos Valentinyi, "Structural Change within the Services Sector and the Future of Cost Disease," *Journal of the European Economic Association*, 05 2023, *22* (1), 428–473.

Halperin, Basil and Zachary J. Mazlish, "Decomposing the Great Stagnation: Baumol's Cost Disease vs. "Ideas Are Getting Harder to Find"," Working Paper 2024.

Hulten, Charles R., "Growth Accounting with Intermediate Inputs," *The Review of Economic Studies*, 10 1978, *45* (3), 511–518.

Kiarsi, Mehrab, "The Facts of Canadian Economic Growth," Working Paper, University of Ottawa Manuscript 2025.

Loertscher, Oliver and Pau S. Pujolas, "Canadian productivity growth: Stuck in the oil sands," *Canadian Journal of Economics/Revue canadienne d'économique*, 2024, *57* (2), 478–501.

Mollins, Jeff and Pierre St-Amant, "The Productivity Slowdown in Canada: An ICT Phenomenon?," Technical Report, Bank of Canada Staff Working Paper 2019.

Nordhaus, William D, "Baumol's Diseases: A Macroeconomic Perspective," Working Paper 12218, National Bureau of Economic Research May 2006.

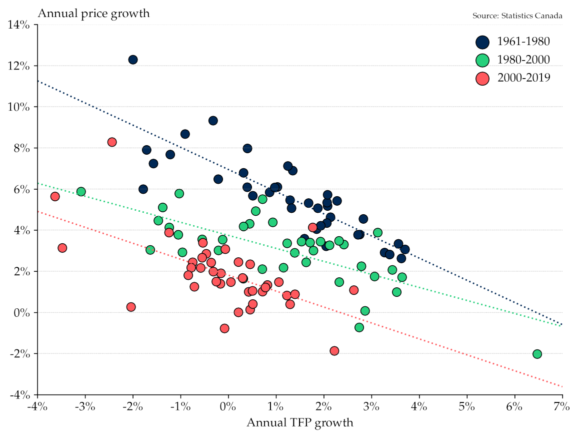
Sharpe, Andrew, "The Paradox of Market-Oriented Public Policy and Poor Productivity Growth in Canada," Technical Report, Centre for the Study of Living Standards 2010.

Solow, Robert M., "Technical Change and the Aggregate Production Function," *The Review of Economics and Statistics*, 1957, *39* (3), 312–320.

A Appendix

Figure A.6: Prices, wages, and TFP growth over sub-periods

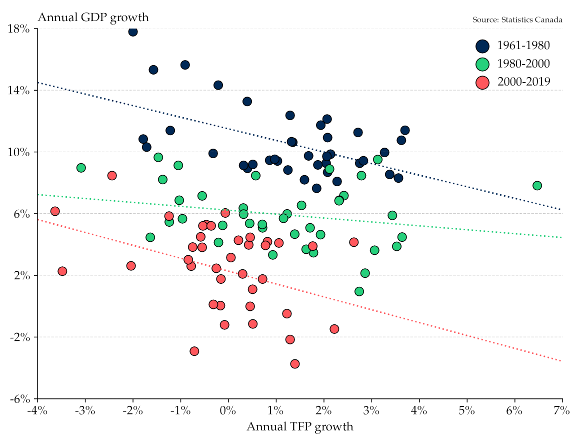
(a) Prices



(b) Wages

Figure A.7: GDP and TFP growth over sub-periods

(a) Nominal GDP



(b) Real GDP

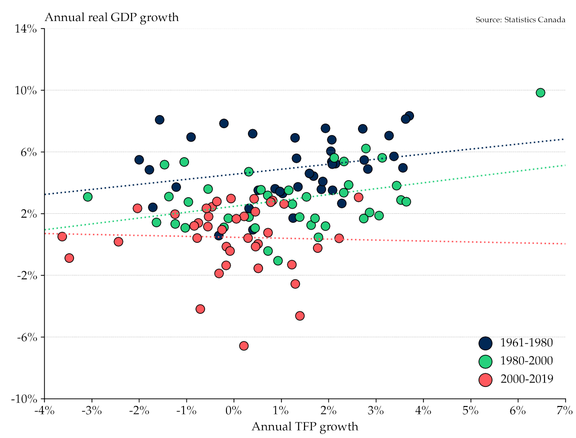
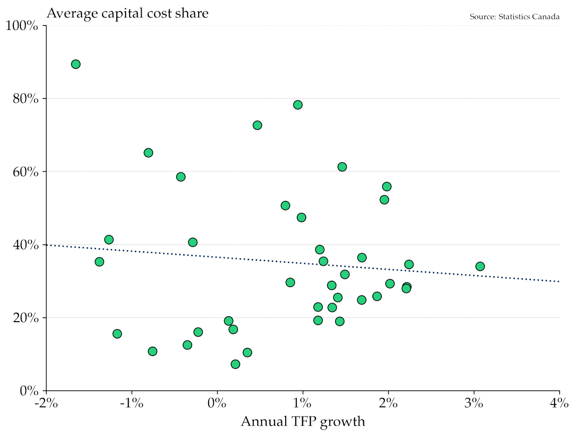


Figure A.8: Input cost shares and TFP growth

(a) Capital



(b) Labor

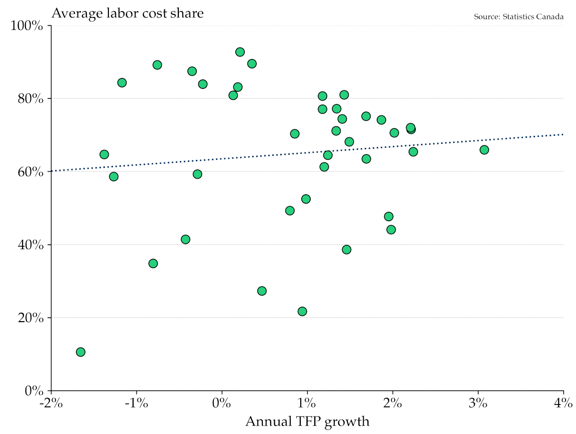


Table A.4: TFP growth decomposition (without O&G, FIRE, and mining)

	1961–2019	1961–1980	1980–2000	2000–2019
Productivity	0.89%	1.40%	0.79%	0.10%
Baumol	-0.17%	0.03%	-0.10%	-0.07%
Capital	-0.07%	-0.11%	-0.04%	-0.06%
Labor	0.10%	0.15%	0.07%	0.07%
Total	0.74%	1.47%	0.73%	0.03%

Note: This table presents the decomposition of average annual TFP growth into its different components for the periods 1961–2019, 1961–1980, 1980–2000, and 2000–2019, excluding the oil and gas extraction, finance/insurance/real estate, and mining industries.

Figure A.9: TFP growth by industry

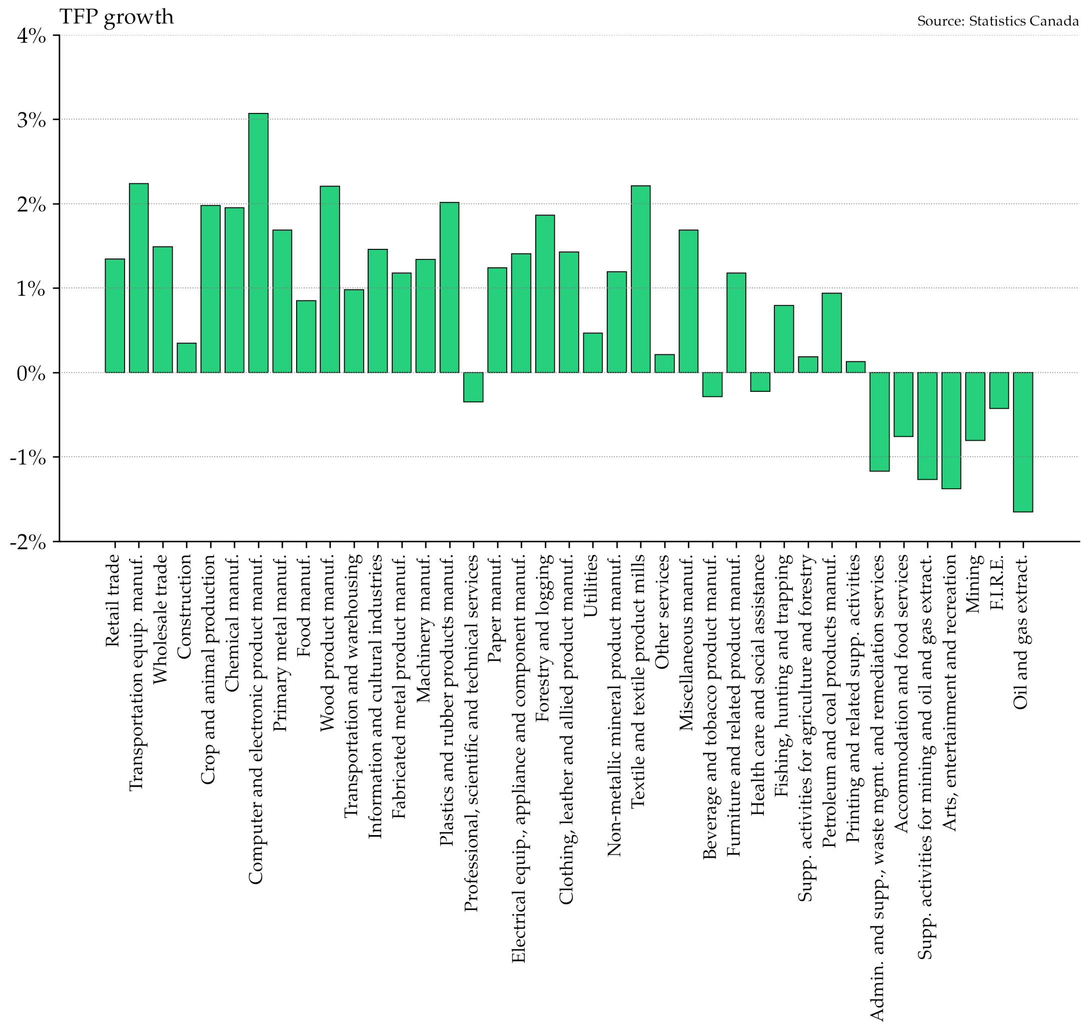


Figure A.10: GDP growth by industry

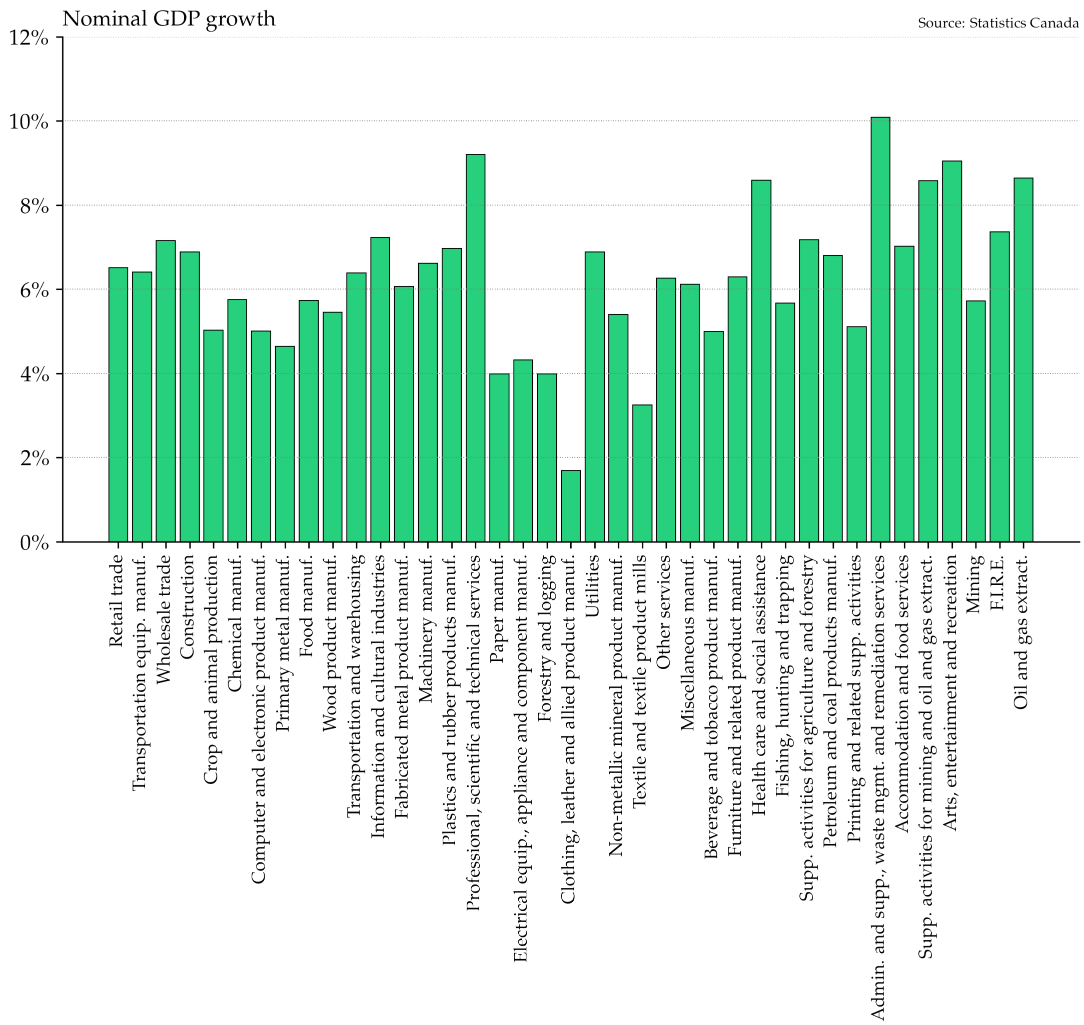


Figure A.11: TFP growth and the Baumol effect (without O&G)