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Ticino's Economic Leap: Closing the Gap with Zurich

Image: Locarno, Ticino

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Abstract

This study analyzes the evolution of economic performance in the Swiss cantons of Ticino and Zurich over the period 2011–2022, focusing on the drivers of Gross Value Added (GVA) per capita. Using an extended IPAT decomposition framework, GVA per capita is broken into components related to productivity and labor utilization, with a specific adjustment for cross-border commuting. In addition, a sectoral decomposition of labor productivity is conducted to identify the key industries responsible for observed changes. The results reveal a striking convergence between the two cantons: Ticino, traditionally lagging behind Zurich, has significantly narrowed the gap in GVA per capita by 2022. This catch-up is primarily attributed to strong productivity gains in a limited number of sectors, which disproportionately contributed to overall growth. The findings underscore the importance of targeted sectoral development in regional economic planning and highlight the role of structural composition in shaping long-term economic trajectories.

Contents

Glossary

EU European Union. 9, 11

FSO Swiss Federal Statistics Office. 7

FTE Full Time Equivalent. 8, 11

GDP Gross Domestic Product. 4, 7, 17

GNH Gross National Happiness. 17

GVA Gross Value Added. 1, 4–12, 14, 17, 18, 23, 25

ILO International Labor Organization. 8

IPAT Impact Population Affluence Technology. 1, 9, 10, 12, 23, 25

NACE Statistical Classification of Economic Activities in the European Community. 11

NOGA General Classification of Economic Activities. 7, 8, 11, 17

OECD The Organization for Economic Cooperation and Development. 6

Chapter 1

Introduction

The cantons of Ticino and Zurich present a compelling contrast for comparative economic analysis within Switzerland. Zurich, located in the German-speaking part of the country, is Switzerland's largest and most economically dominant canton. It is home to a highly diversified economy with a strong emphasis on finance, insurance, professional services, and global headquarters of multinational firms. Zurich consistently ranks among the wealthiest regions in Switzerland, with high productivity levels and a robust innovation ecosystem.

Ticino, by contrast, is situated in the Italian-speaking south and has historically displayed lower levels of GDP per capita and productivity. Its economy is more reliant on tourism, cross-border commuting, and sectors such as construction and manufacturing that are generally less capital- and technology-intensive. At the same time, Ticino plays a unique role as a gateway to Italy, with strong economic and labor market linkages across the border.

While Switzerland's national economy has been thoroughly analyzed, less attention has been paid to regional disparities—particularly in the period surrounding the COVID-19 shock. Recently, a notable spike in economic activity has emerged in the canton of Ticino. As shown in Figure 1.1, Ticino's GVA per capita approached that of Zurich by 2022. Indeed, looking back to 2017, Ticino recorded a GVA per capita of CHF 79 961, rising to CHF 98 914 in 2022, which represents an increase of 23.70%. By contrast, Zurich recorded a GVA per capita of CHF 95 263 in 2017 and CHF 100 844 in 2022, constituting an increase of only 5.86%.

This surprising trend raises several key questions: How did a relatively small economy such as Ticino—historically dependent on tourism and agriculture—narrow the economic gap with a major financial and industrial center like Zurich? What factors explain this sudden increase in production? Ticino's unexpected convergence provides a valuable case study for understanding how smaller or structurally distinct regions can catch up with leading economic centers. Exploring the drivers of this shift is essential for both economic research and policy-making, as it sheds light on how structural changes, sectoral dynamics, and external shocks can reshape regional economic hierarchies—even within a highly developed country. The insights derived may also offer guidance for regional development strategies in other high-income economies facing similar disparities.

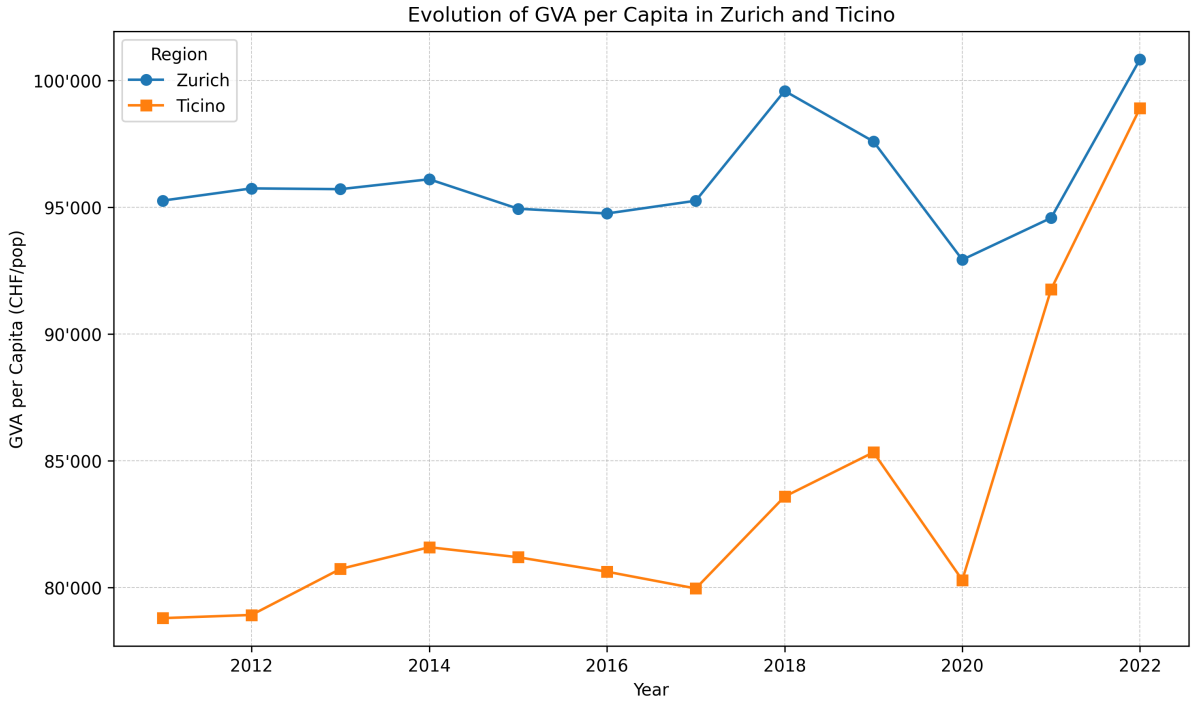

Figure 1.1: Gross Value Added (GVA) per capita in Ticino and Zurich from 2011 to 2022.

Chapter 2

Current state of research

Numerous studies have explored how different labor-market factors drive growth. One notable example is issue No.246 of Trésor-éco (Direction Générale du Trésor, 2019), published by the Directorate General of the Treasury at the French Ministry of Economy and Finance. Through a detailed labor-market decomposition, it emphasized the crucial roles of the employment rate, average workload, cross-border commuting, and participation rate in Switzerland's robust GVA growth compared to France.

Other studies focus on Switzerland's internal dynamics, and in particular on the role of productivity in this evolution. One such example is OECD Economics Department Working Paper No.1443, Boosting Productivity in Switzerland by Patrice Ollivaud (Ollivaud, 2017), which shows that in Switzerland, over the period 1998–2015, energy, media, scientific and technical services (including law, accounting, engineering and architecture) accounted for most of the increase on productivity growth, boosting economic output. This finding underscores how a few sectors can influence overall economic performance. Moreover, when examining inter-regional differences, they found that labor productivity was the main factor driving variations in economic output between cantons.

In addition, the paper (Grether and Tissot-Daguette, 2021) studies in more detail the productivity growth of Swiss regions over the 2011-2015 period. The authors decompose this growth into 4 factors: structural and competitive effects, as well as absent and emerging sector effects. The last two factors had a marginal impact on total sectorial productivity growth compared to the first two factors. The study finds Ticino as the region with the greatest productivity growth in the aforementioned period.

In our work, we apply a detailed labor-market decomposition of GVA per capita. First, the contribution of the more commonly known factors such as labor productivity, participation rate, employment rate, and average workload will be put forth and quantified using an identity decomposition. Moreover, our approach considers robust variables that underline the evolution of intercantonal and international commuting into account. In addition, a further decomposition of the seven major economic sectors will be analyzed, emphasizing on the structural and competitive effects of productivity, later referred to as reallocation and productivity effects. This two-stage approach highlights the labour-market mechanisms behind Ticino's convergence during the COVID-19 shock, a period that remains underexplored in existing analyses. Our findings will inform public-policy design in areas such as targeted productivity support, crisis-resilient sectoral strategies, flexible work-time regulations, and cross-border commuting infrastructure.

Chapter 3

Methodology

3.1 Context

Established in 1937 by Simon Kuznets, GDP has served as the primary metric for assessing national economic performance since the Bretton Woods agreement of 1944 (Dickinson, 2011). Gross Domestic Product aggregates the market value of all final goods and services produced within an economy over a calendar year.

To assess the drivers of Ticino's convergence, this study instead focuses on Gross Value Added (GVA). Compared to GDP, GVA provides a more precise measure of sectoral labor productivity across cantons, as it reflects the value of output net of intermediate consumption and excludes taxes and subsidies.

The dynamics of the labour market play a fundamental role in shaping GVA per capita, and analyzing their evolution is key to moving beyond aggregate trends. The relevant factors for this analysis are presented in Section 3.1.1. These are influenced by both structural and institutional levers, and disentangling their contributions can offer valuable insights for policy design.

The analysis is based on annual data from the Swiss Federal Statistical Office (FSO) covering the period 2011-2022, focusing on the cantons of Ticino and Zurich.

3.1.1 Variables

In the following, we present the key variables used in the analysis, based on data from the Swiss Federal Statistical Office (FSO). The subscripts c, t, a denote, respectively, the granularity of the data by canton c, year t, and economic activity a.

- **Gross Value Added** $\text{GVA}_{\boldsymbol{c,t,a}}$ (Swiss Federal Statistical Office, 2024c): GVA is a more accurate measure than GDP for comparing sectoral labor productivity between cantons, as it captures the value of output net of intermediate consumption, excluding the effects of taxes and subsidies. GVA is expressed in current prices (Swiss francs) and is reported across eight macro-blocks, which aggregate sectoral activities based on NOGA-2 codes (see Section 3.5).

- **Employment in Full-Time Equivalent $E^*_{c,t,a}$** (Swiss Federal Statistical Office, 2024b): This variable captures the volume of labour input in full-time equivalent units, reflecting the number of people working full-time in each canton. Data are available at the NOGA-2 level and aggregated into the same eight macroblocks used for the GVA series to ensure alignment.

- **Employment $E_{c,t}$** (Swiss Federal Statistical Office, 2024a): This variable counts all employed individuals working in the canton, including both permanent residents and in-commuters (inter-cantonal and international), regardless of multiple job holdings.

- **Population $POP_{c,t}$** (Swiss Federal Statistical Office, 2024d): Total population is defined as the number of permanent residents in each canton, excluding all commuters residing in other cantons or abroad.

- **Workforce $W_{c,t}$** (Swiss Federal Statistical Office, 2024a): This represents the economically active population, including employed persons (employees, self-employed, apprentices, family business workers) and unemployed individuals as defined by the International Labor Organization (ILO)—those without work, available for work, and actively seeking employment. This series excludes commuters who are not permanent residents.

3.2 IPAT-Based Decomposition of GVA per Capita

The component-wise analysis of GVA per capita for the cantons of Zurich and Ticino is based on the identity expressed in Equation (3.1). Using an identity-based decomposition ensures that all growth in GVA per capita is fully and transparently attributed to measurable labor market components, namely each factor in our decomposition (see Table 3.1), with no residual. This guarantees consistency and interpretability, making it possible to precisely identify which factors drove regional convergence or divergence.

$$\frac{GVA}{POP} = \frac{GVA}{E^*} \times \frac{W}{POP} \times \frac{E}{W} \times \frac{E^*}{E}. \tag{3.1}$$

Symbol	Description
$\frac{\text{GVA}}{\text{POP}}$	GVA per capita (CHF of value added per capita)
$\frac{\text{GVA}}{E^*}$	Labour productivity (CHF of value added per FTE)
$\frac{W}{\text{POP}}$	Participation rate (%)
$\frac{E}{W}$	Employment rate (%)
$\frac{E^*}{E}$	Average workload (%)

Table 3.1: Interpretation and units of each component in the IPAT-based identity.

This formulation enables to decompose changes in GVA per capita over time into contributions from each multiplicative component using the logarithmic approximation

for percentage changes. Letting $\%\Delta(x)$ denote the percentage change in x over a time interval, we obtain (as detailed in Appendix B.1):

$$\%\Delta\left(\frac{GVA}{POP}\right) = \%\Delta\left(\frac{GVA}{E^*}\right) + \%\Delta\left(\frac{W}{POP}\right) + \%\Delta\left(\frac{E}{W}\right) + \%\Delta\left(\frac{E^*}{E}\right). \tag{3.2}$$

3.3 Adjustment for Cross-Border Commuting

The above framework assumes a closed labor market. However, Switzerland's geographic location and elevated wage levels attract a substantial number of cross-border commuters, especially from neighboring EU countries. As of Q1 2025, Switzerland hosts over 406,000 cross-border workers daily (Swiss Federal Statistical Office, 2025), with Ticino alone accounting for 78,433—over 30% of its resident workforce. Ignoring this element makes the interpretation of our workforce-related factors less accurate.

To address this issue, we modify the terms related to the workforce to distinguish between the resident workforce ($\boldsymbol{W}^{\text{res}}_{\boldsymbol{c,t}}$), which corresponds to the previously introduced workforce, and the adjusted workforce ($\boldsymbol{W}^{\text{adj}}_{\boldsymbol{c,t}}$).

- **Adjusted Workforce $\boldsymbol{W^{adj}_{c,t}}$:** The adjusted workforce accounts for both inter-cantonal and international commuting flows:

$$W^{\text{adj}}_{c,t} = W^{\text{res}}_{c,t} + \left(IC^{\text{in}}_{c,t} - IC^{\text{out}}_{c,t}\right) + IT^{\text{in}}_{c,t}, \tag{3.3}$$

  where IC^{in} and IC^{out} are the inflow and outflow of inter-cantonal commuters, and IT^{in} represents international commuter inflow. Outbound cross-border commuting is negligible due to the relatively lower wages in neighboring countries and the high cost of living in Switzerland, allowing us to disregard it safely without impacting our analysis.

The modified IPAT-based identity becomes:

$$\frac{GVA}{POP} = \frac{GVA}{E^*} \times \frac{W_{\text{res}}}{POP} \times \frac{E}{W_{\text{adj}}} \times \frac{E^*}{E} \times \frac{W_{\text{adj}}}{W_{\text{res}}}. \tag{3.4}$$

Here, $\frac{W_{\text{adj}}}{W_{\text{res}}}$ is a commuter adjusting ratio that isolates how much GVA per capita growth comes from importing labour. $\frac{W_{\text{res}}}{POP}$ is our regular resident participation rate and $\frac{E}{W_{\text{adj}}}$ is the adjusted employment rate that is based on the adjusted workforce.

Taking percentage changes yields the following decomposition:

$$\%\Delta\left(\frac{GVA}{POP}\right) = \%\Delta\left(\frac{GVA}{E^*}\right) + \%\Delta\left(\frac{W_{\text{res}}}{POP}\right) + \%\Delta\left(\frac{E}{W_{\text{adj}}}\right) + \%\Delta\left(\frac{E^*}{E}\right) + \%\Delta\left(\frac{W_{\text{adj}}}{W_{\text{res}}}\right). \tag{3.5}$$

3.4 Sectoral Decomposition of Productivity

To gain more insights into the productivity dynamics, we decompose the aggregate productivity into sectoral contributions. Let i index the economic sectors. We define two variables as follows:

$$p_i = \frac{\text{GVA}_i}{E_i^*} \qquad \text{Sectoral productivity (CHF/FTE)} \tag{3.6}$$

$$s_i = \frac{E_i^*}{\sum_j E_j^*} \qquad \text{Sectoral employment share} \tag{3.7}$$

Now, we can decompose the aggregated productivity P into the weighted average of sectoral productivity, with weights as sectorial employment share:

$$P := \frac{GVA}{E^*} = \sum_i s_i p_i. \tag{3.8}$$

Substituting into the adjusted IPAT-based expression, we obtain:

$$\frac{GVA}{POP} = \left(\sum_i s_i p_i\right) \times \frac{W_{\text{res}}}{POP} \times \frac{E}{W_{\text{adj}}} \times \frac{E^*}{E} \times \frac{W_{\text{adj}}}{W_{\text{res}}}, \tag{3.9}$$

where i in the summation corresponds to different sectors. Accordingly, the percentage change in GVA per capita is expressed as:

$$\begin{aligned} \%\Delta\left(\frac{GVA}{POP}\right) = \sum_i \frac{GVA_i}{GVA}\left(\%\Delta(p_i) + \%\Delta(s_i)\right) + \%\Delta\left(\frac{W_{\text{res}}}{POP}\right) \\ + \%\Delta\left(\frac{E}{W_{\text{adj}}}\right) + \%\Delta\left(\frac{E^*}{E}\right) + \%\Delta\left(\frac{W_{\text{adj}}}{W_{\text{res}}}\right), \end{aligned} \tag{3.10}$$

where each term of the sum over sectors i, replacing total productivity growth, can be divided into 2 parts:

- **Within Sectors Productivity effect**, expressed as $\frac{GVA_i}{GVA}\%\Delta(p_i)$, which denotes the impact of the total productivity growth caused by the sectorial productivity growth. (How much GVA growth comes from the sectors simply getting more efficient)
- **Between Sectors Reallocation effect**, expressed as $\frac{GVA_i}{GVA}\%\Delta(s_i)$, which denotes the impact of the total productivity growth caused by the sector i through the employment influx into the sector. (How much GVA growth comes from shifting labour input toward higher-productivity sector)

The full mathematical derivation is available in the Appendix B.2. This extended decomposition enables us to attribute growth in GVA per capita to detailed sectoral dynamics and labor market structures.

3.5 Macro-Blocks

The mapping between GVA and FTE data is conducted by associating eight macroblocks of GVA with their corresponding FTE categories according to the NOGA-2 classification. NOGA is Switzerland's national classification of economic activities and is harmonized with the EU's NACE Rev. 2 standard. The macro-blocks used in our sectoral decomposition are as follows:

- **A:** Agriculture, forestry and fishing
- **BCF:** Extractive industries, manufacturing industries, and construction
- **DEPQ:** Utilities (electricity, gas, water, waste management), education, health and social work
- **GHIJ:** Trade, transportation, accommodation, food services, and information and communication
- **K:** Financial and insurance activities
- **LMNRS:** Real estate, professional and technical services, administration, arts, entertainment, and personal services
- **O:** Public administration

For reproducibility, the full sector mapping is available in Appendix A. During data processing, we encountered 44 missing FTE values (out of 2,280 observations) for Zurich and Ticino at the NOGA-2 level which were handled by linear interpolations for mid-series gaps and forward- or backward-filling for boundary gaps.

Additionally, macro-block **T** (private households and undifferentiated services for own use) appears in the GVA dataset but is absent from the FTE series due to the lack of consistent data on hours worked in non-market activities. Following European productivity conventions (Statistical Office of the European Communities, 2007), this block is excluded from our analysis. It accounts for less than 0.5% of total GVA and its exclusion does not significantly affect results.

Chapter 4

Results and Discussion

4.1 IPAT-based decomposition

This section presents the results of the IPAT-based growth decomposition—adjusted to account for cross-border commuting—for the cantons of Ticino and Zurich between 2012 and 2022. Figures 4.1 and 4.2 display the annual contributions of each component—labour productivity ($\frac{GVA}{E^*}$), resident workforce participation rate ($\frac{W_{\text{res}}}{POP}$), commuter adjusting ratio ($\frac{W_{\text{adj}}}{W_{\text{res}}}$), adjusted employment rate ($\frac{E}{W_{\text{res}}}$) and the average workload ($\frac{E^*}{E}$)—to the overall evolution of GVA per capita, for Ticino and Zurich respectively.

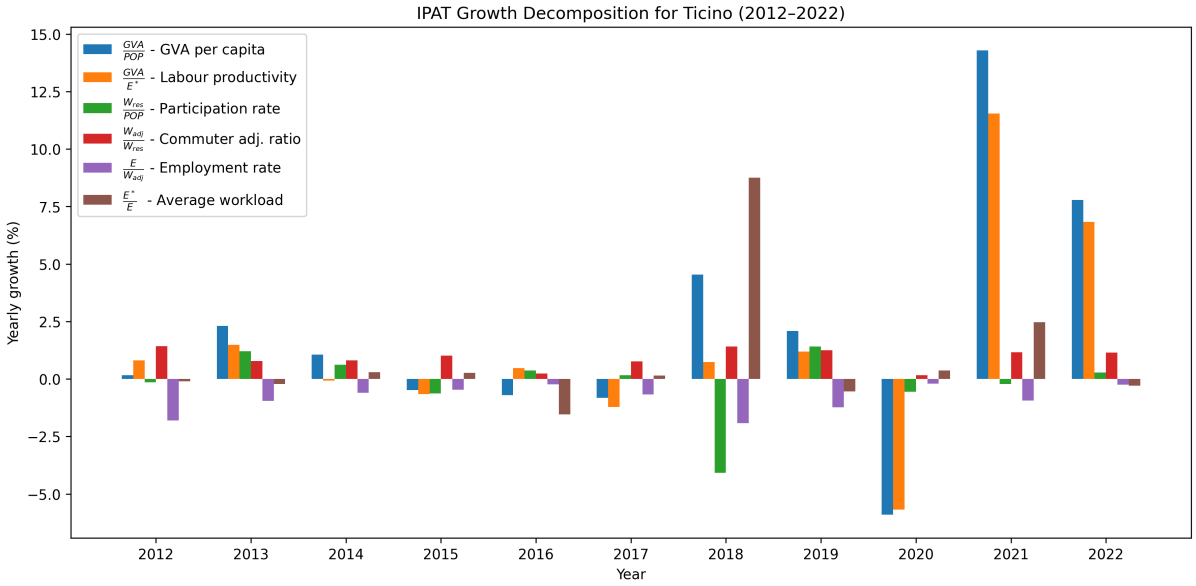

Figure 4.1: IPAT-based growth presented in equation (3.5) for Ticino between 2012 to 2022.

From 2012 to 2017, both cantons exhibit relatively stable trends across all components, indicating a period of steady economic development without major structural disruptions. However, beginning in 2018, the decomposition reveals a strong divergence across the contributing components, particularly in Ticino (note the larger range on the y-axis). Both cantons experienced a decline in productivity in 2020 due to the COVID-19 pandemic. In addition to widespread shutdowns and direct restrictions on economic

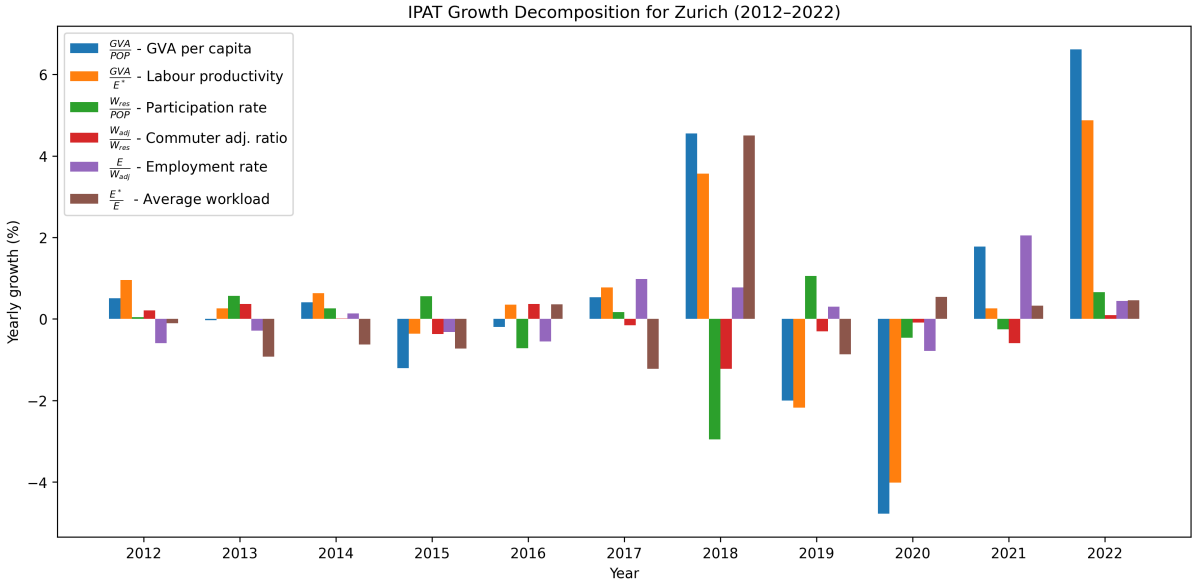

Figure 4.2: IPAT-based growth presented in equation (3.5) for Zurich between 2012 to 2022.

activity, the drop was also driven by precautionary shifts in consumer behavior, reduced interactions among firms and workers—crucial for innovation—and heightened uncertainty, which delayed investment and constrained productivity (OECD, 2021).

The dominant factor in Ticino's catch-up with Zurich between 2020 and 2022 is the productivity (despite the temporary decline in 2020 due to the COVID-19 pandemic). Indeed, productivity in Ticino displays a sharp increase in 2021–2022, coinciding with the post-pandemic economic rebound. This recovery reflects broader global trends of restructuring, during which many firms adopted new technologies, reorganized workflows, and accelerated digitization (OECD, 2021). In contrast, Zurich exhibited a more stable productivity trajectory, with a less pronounced rebound after COVID-19 even though its initial decline in 2020 was comparable to Ticino's. This muted response aligns with trends typically seen in financial and capital hubs, where productivity is already high and the economic structure is more stable, making large post-crisis shifts less likely (OECD, 2021).

One reason for Ticino's stronger productivity growth in the post-pandemic period is that digital transformation had a particularly large impact on sectors that historically exhibited lower productivity—such as parts of the service industry that had been slower to adopt new technologies. By comparison, Zurich's economy, with its strong finance and professional services sectors, had already achieved high levels of digital integration prior to the pandemic. The specific sectors contributing to Ticino's productivity gains are analyzed in greater detail in the sectoral breakdown in Section 4.2. Moreover, Ticino's productivity gain also reflects a compositional shift: the temporary closure of low-productivity activities followed by a selective reopening likely increased average productivity—a phenomenon observed in multiple countries during COVID-19, sometimes called a "batting average effect" (Criscuolo, 2021). Finally, it is important to note that the figures represent year-on-year changes, meaning that part of the observed increase in 2021–2022 is a natural rebound following the contraction in 2020.

A secondary factor in Ticino's convergence is the notable rise in the average workload factor ($\frac{E^*}{E}$) in 2018, representing an approximate 9% increase. This change, mirrored to a lesser extent in Zurich (around 5%), reflects increased work intensity, a shift toward full-time contracts, or a reduction in involuntary part-time employment.

Moreover, Ticino's commuting adjustment ($\frac{W_{\text{adj}}}{W_{\text{res}}}$) shows a consistent upward trend over the entire 2012–2022 period, underscoring the region's growing reliance on non-resident cross-border labor from Italy. In contrast, Zurich's ratio remained relatively stable and fluctuated around zero, reflecting its lower dependence on daily cross-border or inter-cantonal commuters. To better understand the catch-up process, we focus on the 2017–2022 period, during which most of the convergence occurred. By isolating this window, as shown in the figure 4.3, we can clearly see that in Ticino, strong gains in labour productivity (+14.6 %) and average workload (+10.9 %) were the primary drivers of its 23.7 % rise in GVA per capita, only partially offset by declines in participation (–3.2 %) and employment rates (–4.5 %). Zurich's more modest 5.9 % growth was supported mainly by productivity (+2.2 %), employment rate (+2.8 %), and workload (+5.0 %), while commuter adjustments (–2.1 %) and participation (–2.0 %) slightly slowed growth.

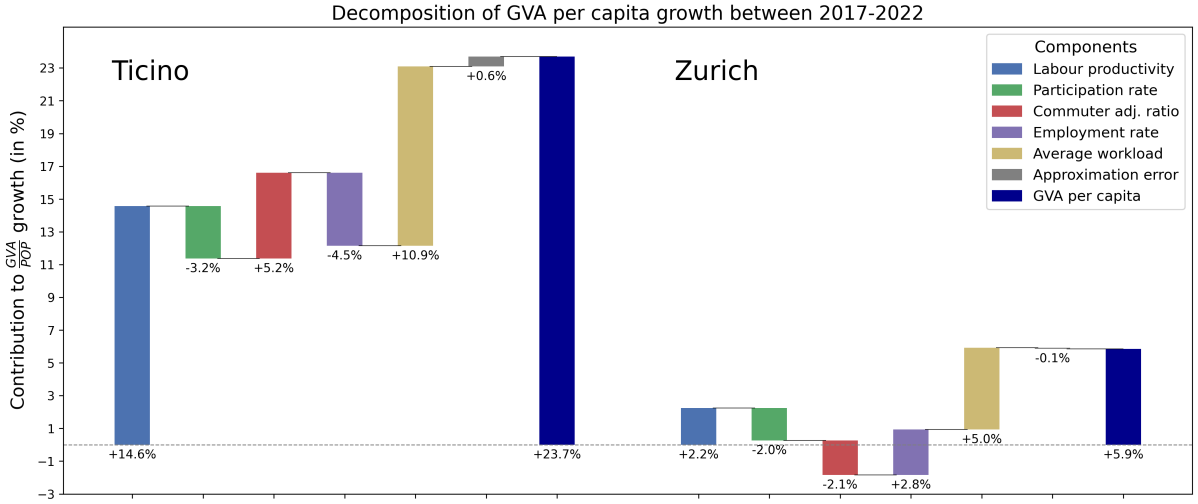

Figure 4.3: Decomposition of GVA per capita growth for Ticino and Zurich between 2017-2022.

4.2 Sectoral Decomposition of Productivity

The previous decomposition highlighted that Ticino's surge in productivity between 2021 and 2022 was the primary driver of its convergence with Zurich in terms of GVA per capita. This section aims to identify which sectors contributed most to this increase. For this purpose, a sectoral decomposition is conducted, as outlined in Section 3.4.

Figure 4.4 show the change in sectoral productivity ($\%\Delta p_i$) and the change in FTE employment share ($\%\Delta s_i$), both weighted by the sector's contribution to total GVA, for Ticino and Zurich in 2021 and 2022 respectively, sorted by the difference between Ticino and Zurich's contributions per sector. This weighting ensures that productivity increase in sectors contributing more to overall GVA are appropriately emphasized, since a 1% productivity increase in a large GVA-contributing sector has a greater impact than a 1%

productivity increase in a smaller sector. The other components from the Equation (3.10) are excluded here, having been previously analyzed.

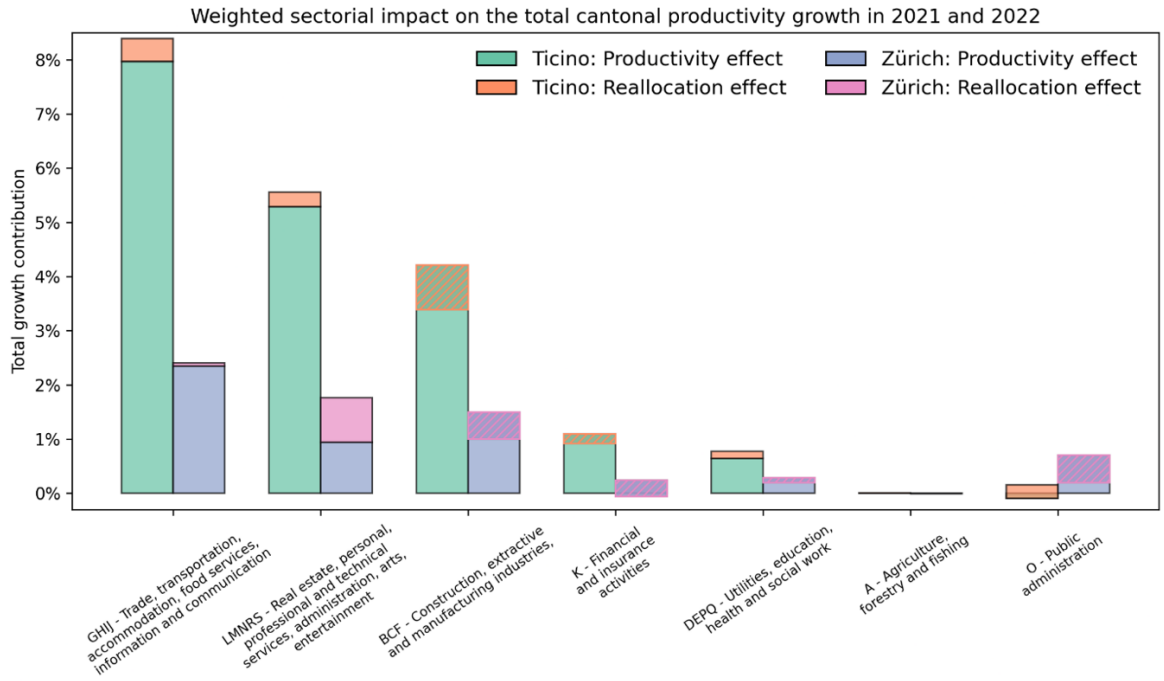

Figure 4.4: Weighted sectorial impact on the total cantonal productivity growth in 2021 and 2022 for Ticino and Zurich

In 2021 and 2022, Ticino experienced significant weighted productivity gains in three macro-sectors: GHIJ (Trade, transportation, accommodation, food services, and information and communication) (8.5%), LMNRS (Real estate, professional and technical services, administration, arts, entertainment, and personal services) (5.5%), and BCF (Construction, extractive and manufacturing industries)(3.5%). In contrast, Zurich's performance was much more modest, with the GHIJ sector showing the largest productivity growth of only around 2.5%.

We can note that the within productivity effect played the most important role in the variation of productivity, both for Zurich and Ticino. The reallocation effect is generally smaller and, for example, intervenes negatively for both cantons in the macro block BCF, suggesting a transfer of labor input toward more productive sectors.

There are several reasons why specific sectors in Ticino may have outperformed others. First, the GHIJ sector includes digital and logistics-intensive industries such as information and communication, e-commerce, and transport. Those are sectors that transformed substantially from accelerated digitalization and supply chain reorganization after the pandemic. For instance, retailers in Ticino that set up e-commerce solutions in 2020 could have mitigated losses during lockdowns and later handled higher demand with fewer staff, thereby lifting productivity in 2021. The rebound in productivity is not as visible in Zurich, likely because firms there had already adopted such technologies prior to the pandemic. As shown in Figure 4.5, which presents the productivity ratio for Zurich and Ticino across sectors, it is clear that for GHIJ, Ticino, initially lower in productivity in 2020, catches up significantly with Zurich by 2022. The GHIJ sector in Ticino also benefited from a strong post-COVID tourism rebound. In particular, the accommodation

and food services segment recovered robustly in 2021 and 2022 as Swiss domestic tourism increased. Tourists who could not travel abroad increasingly turned to local destinations such as Ticino. During this rebound, many hospitality businesses operated with reduced staff due to hiring difficulties or new cost-saving strategies. Digital innovations like online booking systems, mobile ordering, and streamlined check-in/out may have enabled them to do more with fewer employees, further boosted productivity.

Secondly, the BCF sector, including manufacturing and construction, also saw strong productivity gains post-pandemic in Ticino (and small gains in Zurich). These gains could be partly explained by the rebound of delayed infrastructure and real estate projects, which resumed once restrictions were lifted. The rebound was led by more efficient firms, as some smaller or less productive contractors may have not survived the crisis. This "cleansing" effect in the construction industry helped raise the average productivity of the remaining firms. Moreover, manufacturing in Ticino benefitted from renewed demand and restructuring. Again, the relatively lower baseline of digital maturity may have created more space for productivity growth through the adoption of digital tools and automation, technologies already used in Zurich's industrial base. This could explain the observed catch-up in productivity, visible in the productivity ratio plot (Figure 4.5). Another possible explanation for the lower increase in Zurich in this sector could be its lower R&D expenditures, which limited innovation-driven productivity growth during the recovery phase (Swiss Federal Statistical Office, 2023).

Finally, the LMNRS group also contributed positively to productivity in Ticino. This group includes real estate, professional services, administrative support, arts, and personal services: sectors that were able to adapt quickly to remote work models and automation tools, improving efficiency without the need for large capital investments. For instance, legal, consulting, and technical firms were able to maintain or increase their output while reducing office-related costs.

In Zurich, in contrast, these same sectors were already operating at higher productivity levels before the pandemic. As a result, the scope for dramatic post-crisis gains was more limited. Much of the digital transformation had already been realized before 2020, leaving less space for sudden improvements.

As discussed in Section 4.1, Zurich's growth remained more diffuse and moderate across sectors, reinforcing the image of a mature economy characterized by lower volatility and smaller marginal productivity gains, partially due to its already high productivity baseline and a stronger concentration in financial services (sector K), which tend to exhibit slower short-term shifts.

Overall, the sectoral decomposition shows that Ticino's convergence with Zurich was not driven by uniform improvements across the entire economy. Rather, it resulted from concentrated productivity growth in a few key sectors, accompanied by modest employment shifts toward these same areas. This points to a focused structural transformation in Ticino's economy, where sectors with greater scope for technological catch-up and pandemic-driven restructuring emerged as the primary engines of regional growth.

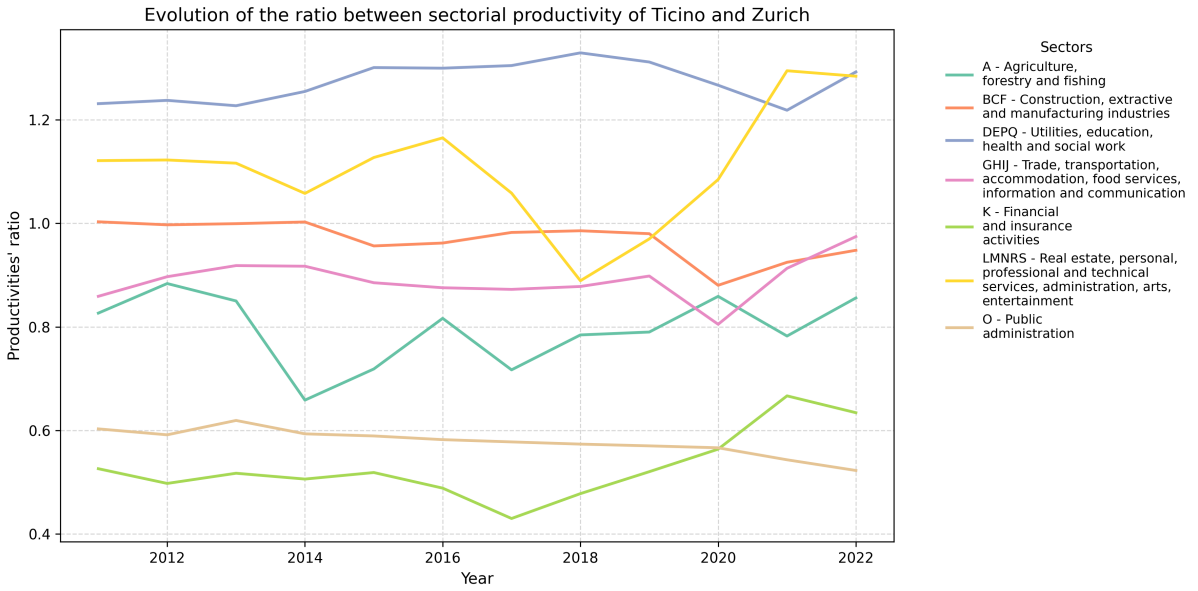

Figure 4.5: Sectorial productivity ratio (Ticino / Zurich) between 2011 to 2022 .

4.3 Limits to the analysis

It must be noted that, despite the widespread use of GDP, and by extension GVA, many economists have stated their concern regarding its limitations, many of which were acknowledged by Kuznets himself. In 1962, he wrote (Kuznets, 1962, p.1): "*Distinctions must be kept in mind between quantity and quality of growth, between costs and returns, and between the short and long run. Goals for more growth should specify more growth of what and for what.*"

This observation highlights a key issue: economic growth, as measured numerically, does not necessarily reflect improvements in living standards or societal well-being. Growth may be unequally distributed across the population and may have long-term adverse effects, such as environmental degradation. Consequently, numerous alternative indicators have been proposed to supplement or replace GDP, such as Bhutan's GNH which attempts to measure the happiness of its population (Revkin, 2005). However, these alternative indices often suffer from inconsistent definitions and subjective metrics leading to contradictory conclusions (Grégoir and Maurel, 2002). Hence, GDP remains the predominant global economic indicator despite its limitations and retains its relevance for economic analysis.

Beyond the conceptual limits of output-based indicators, the methodological structure of this analysis also introduces certain constraints. In particular, the sectoral decomposition relied on broad macro-blocks that aggregate multiple industries under the same classification. While this approach ensured comparability and data availability, it likely concealed important variations within sectors. For example, high-performing subsectors may have compensated for stagnation in others, obscuring the specific drivers of productivity gains. A more granular breakdown, below the macro-block level, such as at the NOGA-2 classification, could have provided a more detailed picture of structural shifts and more accurately attributed the sources of economic convergence between Ticino and Zurich.

Chapter 5

Conclusion

This study investigated the convergence in economic performance between the cantons of Ticino and Zurich from 2012 to 2022, focusing on the evolution of GVA per capita through an extended identity decomposition with a sectoral breakdown of productivity. The analysis revealed that while Zurich maintained a high and stable productivity level throughout the decade, Ticino exhibited a remarkable catch-up in the post-pandemic period, narrowing the gap in GVA per capita.

The decomposition highlighted productivity growth as the principal driver of Ticino's recent performance, particularly during the 2021–2022 recovery. Following the COVID-19 pandemic, Ticino's stronger productivity rebound, compared to Zurich's, was partly driven by accelerated digital adoption and structural adjustments. A secondary yet notable factor was the increase in the average workload, indicating a rise in the average work intensity. Moreover, growing net commuter inflows expanded the effective workforce and boosted per-capita output.

Sectoral decomposition showed that Ticino's productivity gains following COVID-19 were concentrated in three main macro-sectors: GHIJ (trade, transportation, accommodation, food services, and information and communication), LMNRS (real estate, professional and technical services, administration, arts, and personal services), and BCF (manufacturing, construction, and extractive industries). These sectors benefited disproportionately from pandemic-related restructuring, including accelerated digital adoption, renewed demand in domestic tourism and logistics, and a rebound in delayed construction and manufacturing projects. As a result, they experienced strong productivity gains, driven primarily by the within productivity effect, while the overall reallocation effect remained marginal. In contrast, Zurich's productivity gains were more moderate and diffuse, consistent with a mature and already digitized economic structure, where fewer low-productivity sectors remained to catch up.

Overall, the findings suggest that Ticino's convergence with Zurich was not the result of broad-based growth, but rather a focused structural transformation. Productivity gains were led by sectors that had previously lagged behind, taking advantage of the post-pandemic environment to leap forward through digitization, operational restructuring, and capital reallocation. This targeted sectoral progress underscores the importance of adaptability and sector-specific policy in driving regional economic development.

These findings suggest relevant implications for cantonal-level economic policy. In

the case of Ticino, maintaining the recent growth trajectory will likely require sustained attention to the sectors that have contributed most to the observed catch-up with Zurich, namely BCF, GHIJ, and LMNRS. Targeted policy support in these areas could help consolidate the structural improvements observed during the post-pandemic recovery.

More broadly, this sector-specific approach may hold relevance beyond Ticino. Other cantons with similar economic compositions could consider tailored interventions to support underperforming but high-potential sectors, rather than relying on uniform, economy-wide policies. The convergence between Ticino and Zurich illustrates that, even within a highly developed national context, targeted structural adjustments at the sectoral level can lead to meaningful shifts in regional economic performance.

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Appendix A

Key mapping association

FTE (NOGA 2) to GVA (MACRO BLOCKS)

A:

- Agriculture, forestry and fishing → NOGA 01–03

BCF:

- B: Mining and quarrying → 05-09
- C: Manufacturing → 10-33
- F: Construction → 41-43

DEPQ:

- D: Electricity, gas, steam and air conditioning supply → 35
- E: Water supply; sewerage, waste management → 36
- P: Education → 85
- Q: Human health and social work activities → 86

GHIJ:

- G: Wholesale and retail trade; repair of motor vehicles → 45–47
- H: Transportation and storage → 49-53
- I: Accommodation and food service activities → 55-56
- J: Information and communication → 58-63

K:

- Financial and insurance activities → 64-66

LMNRS:

- L: Real estate activities → 68
- M: Professional, scientific and technical activities → 69–75
- N: Administrative and support service activities → 77–82
- R: Arts, entertainment and recreation → 90–92
- S: Other personal service activities → 94–96

O:

- Public administration and compulsory social security → 84

Appendix B

Mathematical details

B.1 Logarithmic approximation for percentages

Let $(P)_t; t \geq 0$ denote a variable taking values in a discrete time series. The logarithmic difference between two time periods is defined as follows:

$$\Delta ln(P) = ln(P_t) - ln(P_{t-1}) = ln\left(\frac{P_t}{P_{t-1}}\right) \tag{B.1}$$

Using the first-order Taylor expansion of the logarithm in the vicinity of 0:

$$ln(1+x) \approx x \tag{B.2}$$

We can rewrite:

$$ln\left(\frac{P_t}{P_{t-1}}\right) = ln\left(1 + \frac{P_t - P_{t-1}}{P_{t-1}}\right) \approx \frac{P_t - P_{t-1}}{P_{t-1}} = \frac{\Delta P}{P_{t-1}} \tag{B.3}$$

Multiplying both sides of the equation by 100 leads to our interpretation of the logarithmic difference as the percentage change over a time step of the variable $(P)_t$.

$$100 \times \Delta ln(P) = \%\Delta P \tag{B.4}$$

B.2 Percentage change per sector

The adjusted IPAT-based equation exposes the dependencies of GVA per capita on various factors and is shown below, with productivity defined as $P = \frac{GVA}{E^*}$:

$$\frac{GVA}{POP} = P \times \frac{W_{\text{res}}}{POP} \times \frac{E}{W_{\text{adj}}} \times \frac{E^*}{E} \times \frac{W_{\text{adj}}}{W_{\text{res}}} \tag{B.5}$$

Productivity can be further split to reflect the productivity per sector. For each sector i:

- E_i^*: full-time equivalent (FTE) employment in sector i

- GVA_i: gross value added in sector i

Define:

$$p_i = \frac{\text{GVA}_i}{E_i^*} \qquad \text{Sectoral productivity (value added per FTE)} \tag{B.6}$$

$$s_i = \frac{E_i^*}{\sum_j E_j^*} \qquad \text{Sectoral employment share} \tag{B.7}$$

By weighted averaging of sectors, aggregate productivity is obtained by:

$$\text{P} = \sum_i s_i p_i \tag{B.8}$$

Differentiating yields:

$$dP = \sum_i d(s_i p_i) = \sum_i (s_i \, dp_i + p_i \, ds_i) = \sum_i s_i \, dp_i + \sum_i p_i \, ds_i \tag{B.9}$$

Dividing by aggregate productivity, we get:

$$d(\ln P) = \frac{dP}{P} = \sum_i \frac{s_i}{P} \, dp_i + \sum_i \frac{p_i}{P} \, ds_i \tag{B.10}$$

In continuous time, the differential $d(x(t))$ represents an infinitesimal change in the function $x(t)$. Its discrete-time equivalent approximates this change over a finite time step. Specifically, we consider the forward difference:

$$\frac{dx(t)}{dt} \approx \frac{x[t + \Delta t] - x[t]}{\Delta t} \tag{B.11}$$

Considering unit time steps, i.e. $\Delta t = 1$, this approximation becomes:

$$d(x(t)) \approx x[t + 1] - x[t] \tag{B.12}$$

Hence, Equation B.10 under a discrete time setting becomes:

$$\ln(P_t) - \ln(P_{t-1}) = \ln\left(\frac{P_t}{P_{t-1}}\right) \approx \sum_i \frac{s_i}{P_{t-1}} (p_{i,t} - p_{i,t-1}) + \sum_i \frac{p_i}{P_{t-1}} (s_{i,t} - s_{i,t-1}) \tag{B.13}$$

Define:

$$\Delta p_i \coloneqq p_{i,t} - p_{i,t-1}, \quad \Delta s_i \coloneqq s_{i,t} - s_{i,t-1} \tag{B.14}$$

In each sum on the RHS we respectively multiply by $\frac{p_i}{p_i}$ and $\frac{s_i}{s_i}$ to obtain:

$$\ln\left(\frac{P_t}{P_{t-1}}\right) = \sum_i \frac{s_i p_i}{P_{t-1}} \cdot \frac{\Delta p_i}{p_i} + \sum_i \frac{s_i p_i}{P_{t-1}} \cdot \frac{\Delta s_i}{s_i} = \sum_i \frac{s_i p_i}{P_{t-1}} \left(\frac{\Delta p_i}{p_i} + \frac{\Delta s_i}{s_i}\right) \tag{B.15}$$

Using the logarithmic approximation for percentage changes derived in Appendix B.1:

$$\frac{\Delta P}{P_{t-1}} \approx \sum_i \frac{s_i p_i}{P_{t-1}} \left(\frac{\Delta p_i}{p_i} + \frac{\Delta s_i}{s_i} \right) \tag{B.16}$$

Equation B.16 can be interpreted as in Equation B.17. Indeed, the percentage change in aggregate productivity is the sum of the percentage changes of each sector weighted by each sector's contribution to total output: $\frac{s_i p_i}{P_{t-1}} = \frac{GVA_i}{GVA}$.

$$\%\Delta(P) = \sum_i \frac{GVA_i}{GVA} (\%\Delta(p_i) + \%\Delta(s_i)) \tag{B.17}$$

This provides us with a simple interpretation as to how productivity varies over time. Returning to the IPAT-based equation, percentage changes in GVA per capita can be approximated as follows, taking into consideration sectoral decomposition of productivity:

$$\begin{aligned} \%\Delta\left(\frac{GVA}{POP}\right) = \sum_i \frac{GVA_i}{GVA} (\%\Delta(p_i) + \%\Delta(s_i)) + \%\Delta\left(\frac{W}{POP}\right) \\ + \%\Delta\left(\frac{E}{W}\right) + \%\Delta\left(\frac{E^*}{E}\right) + \%\Delta\left(\frac{W_{adj}}{W_{res}}\right) \end{aligned} \tag{B.18}$$