Productivity trends and policies in the Netherlands

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Date:
December 2025

Pro-Productivity Policies: Country Experiences Series

The Productivity Institute
Productivity Insights Paper No. 069

Key words
Labour productivity, productivity slowdown, education, manufacturing.

Suggested citation

M. van der Plaat, K. Sommer, L. Bettendorf (2025) *Productivity trends and policies in the Netherlands.* Productivity Insights Paper No. 069, The Productivity Institute.

The Productivity Institute is an organisation that works across academia, business and policy to better understand, measure and enable productivity across the UK. It is funded by the Economic and Social Research Council (grant number ES/V002740/1).

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Abstract

The Netherlands is among the advanced economies characterized by high levels of labor productivity but persistently slow productivity growth. This paper studies long-run productivity trends and reviews policies of the last 70 years with potential effects on productivity in the Netherlands. We start documenting the productivity slowdown in the Netherlands which is driven primarily by weaker within-sector productivity growth. This slowdown coincided with a drop in TFP and reduced capital deepening. Next, we follow the typology of van Ark et al. (2023) to systematically categorize and compare a wide range of productivity-related policies. The paper concludes by drawing lessons for future pro-productivity policies for the Netherlands, based on the combined insights from our empirical analysis and policy review.

1 Introduction

The Netherlands belongs to a group of countries that combine high levels of labor productivity with slow productivity growth. The Netherlands remains among the most productive economies in the European Union today. Between 1980 and 2007, the Dutch labor productivity was broadly comparable to that of the United States. Yet, productivity growth has been weak for more than two decades, and the Dutch economy has fallen behind the US frontier. Following the financial crisis of 2007-08, productivity growth in the Netherlands has hovered around the EU average. The average annual labor productivity growth in the EU in 2020s is about 20% lower than in the US (Draghi, 2024).

There is a large variety of productivity-related policies implemented by countries around the world. Many countries implement policies that affect productivity growth. Some policy measures do so directly by, for example, stimulating investment or innovation, while others do so indirectly by (de)regulating markets or opening up industries to international trade. Governments have a wide range of policy measures at their disposal to strengthen productivity growth. As a consequence, there is a large variety of productivity-related policies implemented by countries around the world. Understanding the channels through which such policies affect productivity, and the extent to which these effects vary across institutional contexts, is essential for designing effective pro-productivity strategies.

In this paper we study long-term productivity trends in the Netherlands and review productivity-related policies over the last 70 years. Dutch productivity developments are driven by the specific sector structure of the economy and its high degree of openness to trade. Tradable-service industries—such as administrative and technical business services—account for a sizable share of value added, distinguishing the Netherlands from neighboring economies like Germany and France, while being more similar to Belgium. In this paper, we document trends in productivity in the Netherlands and its neighboring countries since the 1950s, where we differentiate between common trends and trends that are unique to the Netherlands. We also provide a structured overview of productivity-related policies in the Netherlands, using the typology proposed by van Ark et al. (2023). This overview provides a base that can be used in future research to study the diversity and impact of pro-productivity policies. Our analysis builds on a substantial body of literature on productivity growth in Europe and the Netherlands.[1]

The remainder of the paper is organized as follows. Section 2 analyzes productivity growth in the Netherlands since the 1950s, presenting several quantitative analyses that document long-run trends in productivity growth, compare the performance of different sectors, and compare the Netherlands with other European economies. Section 3 reviews productivity-related policies implemented since the 1950s and discusses their potential policy implications. We do so descriptively, and do not aim to provide new causal evidence for the effects of any of these policies. Section 4 concludes with a forward-looking perspective on the challenges that pro-productivity policies will face in the future.

[1] A large number of studies focus on innovation and R&D (Bartelsman et al., 1996; Jacobs et al., 2000, 2002; Klomp & Roelandt, 2004; Polder et al., 2009; Polder & Veldhuizen, 2012; Raymond et al., 2015; Soete et al., 2020; Van Leeuwen & Klomp, 2006), technology (Borowiecki et al., 2021; van Ark & de Haan, 2000), and human capital (Mason et al., 1992; Minne et al., 2007). There are also comparative studies (Inklaar et al., 2024; Timmer et al., 2010; van Ark et al., 1993, 2008), studies on business dynamics (Freeman et al., 2021), and on public investment (Manshanden & Dröes, 2011). Lastly, there are a few overview papers (Ando, 2020; van Ark, 2003).

2 Productivity in the Netherlands

In this section, we provide a quantitative overview of productivity growth in the Netherlands since 1950 and examine how changes in the country's sectoral structure have shaped aggregate productivity. We also apply standard growth-accounting methods to decompose productivity growth into its key components and explore the role of intangible assets in the composition of firms' investments. Together, these analyses allow us to document long-run trends, identify shifts in those trends, and highlight differences across sectors.

To place Dutch developments in a broader European context, we compare the Netherlands with four other economies. Belgium and Austria serve as benchmarks for small, open economies, while France and Germany are included as two of the Netherlands' largest trading partners and the major economies of the European Union. These comparisons help us distinguish common drivers of productivity growth from factors that are specific to the Dutch economy.

We begin by describing labor productivity developments in the Netherlands relative to these four peer economies. We then assess the contribution of structural change using a standard shift–share decomposition. Finally, we decompose labor productivity growth into changes in labor composition, capital deepening, and total factor productivity (TFP)—both for the aggregate economy and across individual sectors—and examine the evolving role of intangible investment.

2.1 Long-term productivity trends

Productivity per worker in the Netherlands and the four reference countries has grown rapidly between 1950 and 2020. The left panel of Figure 2.1 shows the evolution of real GDP per worker, a broad measure of labor productivity. In all countries, this measure of productivity has increased five-fold, from around 20,000$ per person in 1950 to around 100,000$ per person in 2019.[2]

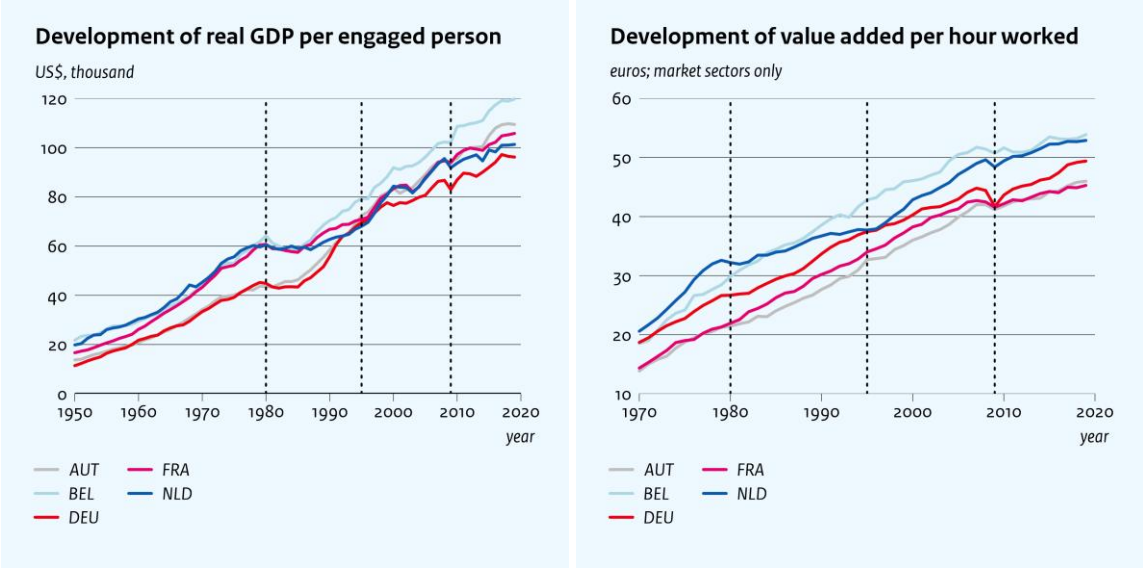
The Netherlands has experienced four distinct phases of productivity growth. The first extends from the aftermath of the Second World War to around 1980, during which Dutch productivity rose sharply, mirroring the postwar catch-up of Western European economies with the United States (Van Ark et al., 2008). This was also a period of rising government expenditure and an expanding welfare state. By the late 1970s, productivity growth began to slow, especially following the energy crisis of 1979.

The beginning of the productivity slowdown around 1980 coincided with a global recession. The fall of the Persian Shah in 1979 triggered the second energy crisis. Energy prices rose quickly, hitting the Netherlands especially hard. At the time, the Dutch manufacturing sector relied on cheap gas. A sharp increase in gas prices raised manufacturing prices, putting pressure on the sector's international competitiveness (Van Zanden, 1997). Even before the crisis, competitiveness had been under strain due to an appreciation of the Dutch guilder, and rising real wages. Combined with increasing labor market frictions, this meant that unemployment increased sharply. The 1982 Wassenaar Agreement, in which employer and employee organizations and the government agreed to moderate wages in exchange for shorter working hours, marked a shift toward wage moderation and structural reforms. The results of these reforms were, however, not

[2] Measured in constant US dollars at purchasing power parity.

immediately reflected in productivity statistics. Chapter 3 examines the link between such policy changes and productivity in more detail.

Figure 2.1 Labor productivity for the aggregate economy and market sector for selected economies



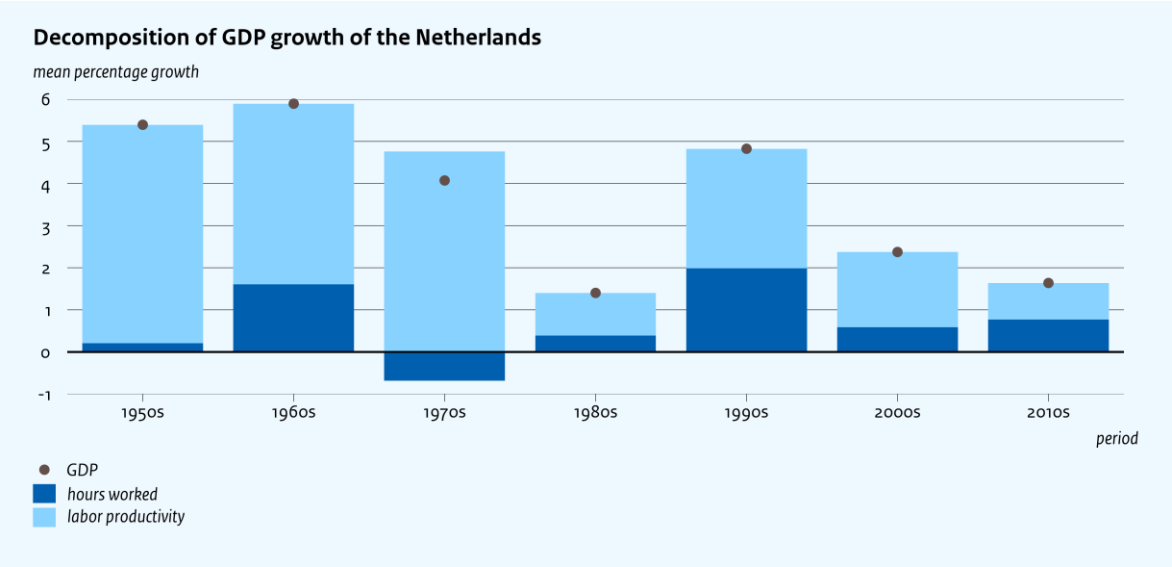
Notes: The left panel shows the development of real GDP per engaged person in US dollars at purchasing power parity for the Netherlands, Austria, Belgium, Germany and France. The right panel shows the development of value added per hour for market sectors only measured in constant 2015 euros. The market sector contains the following NACE sectors: agriculture and mining (A and B), manufacturing and construction (C and F), trade and transport services (G and H), personal services (D, E, I, R and S), and professional services (J, K, M, N).
Sources: Penn World Tables, 10.01 (Feenstra et al., 2015) (left panel), EU-KLEMS (Bontadini et al., 2023) (right panel)

Productivity growth accelerated again during the 1990s, coinciding with the widespread diffusion of information and communication technologies (ICT). Although the ICT revolution originated in the US, European countries, including the Netherlands, also benefitted from this development (Fernald et al., 2025). Productivity growth began to weaken once more in the late 2000s. During the Great Recession of 2008, productivity fell across most sectors in the Netherlands and its reference countries. Post-crisis, productivity growth did not return to pre-crisis rates, particularly not in mining, construction and professional service sectors. We take the onset of the Great Recession as the beginning of the final period. The recession should, however, not necessarily be treated as a common shock to productivity, as the decline in productivity growth does not coincide with the recession itself (Fernald et al., 2025). Yet, it is often regarded as marking the end of the Great Moderation, a period of low macroeconomic volatility.

Similar patterns emerge when we look at value added per hour worked in market sectors. We present this in the right panel of Figure 2.1. The market sector includes NACE Rev. 2 sectors A–K, M, N, R, and S, and excludes government-related activities such as education and health, where productivity measurement is more difficult. By moving from a value added per person to a per hour measure, changes in workings hours per person are also accounted for in the productivity measure. This is our preferred measure of labor productivity, which we will use in the remainder of this study. Compared to GDP per engaged person, value added per hour in the Netherlands grew somewhat faster since the 1950s and slowed down considerably more in the 1980s. Also the productivity slowdown after the great recession has been more pronounced. The Netherlands' relatively high productivity per hour, as opposed to productivity per worker, reflects the prevalence of part-time employment alongside high labor-force participation—a topic discussed further in Section 3.2.

Labor productivity growth has been the dominant driver of GDP growth in the Netherlands since the 1950s, although in recent decades increases in hours worked have contributed more than before. Figure 2.1 decomposes GDP growth into growth of total hours worked and labor productivity growth. Between 1950 and 1980, labor productivity contributed the lion's share (75% to 95%) to GDP growth. In the 1980s, labor productivity growth was slow. After a period of faster growth during the 1990s, labor productivity growth was again slow from the 2000s onward. In most decades, the contribution of the growth of total hours worked was small, but during the 2010s it contributed almost half to GDP growth.

Figure 2.2 GDP growth of the Netherlands decomposed into growth in hours worked and labor productivity growth



Notes: The figure shows GDP growth of all sectors, including non-market sectors.
Sources: Penn World Tables, 10.01 (Feenstra et al., 2015)

2.2 The effects of a changing sector structure on productivity growth

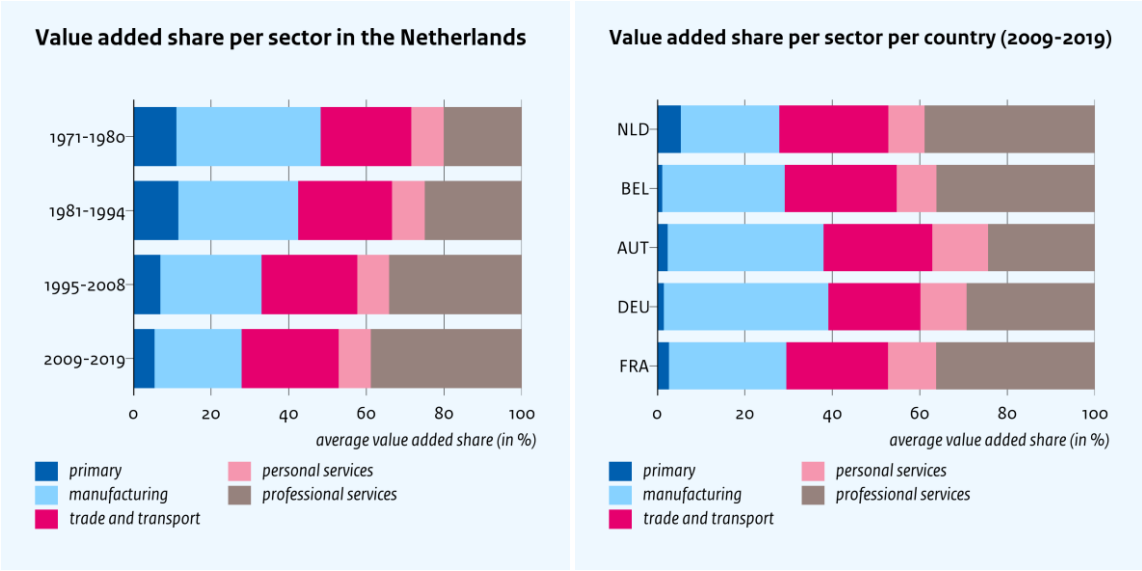
Over the past five decades, service sectors in the Netherlands have steadily increased in size relative to the rest of the economy. Figure 2.3 decomposes market-sector value added into five broad sector groups and shows their share in total value added over time. While manufacturing was still the largest sector during the 1970s, its share has decreased over time from around 33% to 23%. Conversely, professional services—including finance, ICT, and consultancy—expanded from about 23% to nearly 40% of market-sector value added and have been the largest sector group since 1995. The share of personal services has remained relatively small and stable. Trade and transport services—including wholesale trade, warehousing, and transportation—have also gradually increased their share. The share of production of primary goods, i.e. agriculture and mining, has been small throughout, and has recently fallen with the gradual closing of gas fields.

Labor productivity growth across service sectors has been relatively low. In Table 2.1, we show average labor-productivity levels for each sector relative to that of the whole market economy. Professional services initially exhibited high productivity levels but show a declining trend, indicating slower productivity growth than the market average. Manufacturing and trade and transport services show the opposite pattern: starting

from below-average productivity levels at first, these sectors experienced above-average productivity growth. Primary sectors show an early rise followed by a decline in the most recent period, consistent with the development and subsequent closure of the northern natural-gas fields. Personal services exhibit below-average productivity levels throughout and slower-than-average growth.

These patterns provide circumstantial evidence consistent with the Baumol effect. Baumol (1967) describes how a shift in economic activity from manufacturing to services may reduce aggregate productivity growth relative to real wage growth. Because many services are inherently more labor-intensive, achieving productivity growth is more challenging than in other, more capital-intensive sectors. Over time, service sectors have increased in size, while manufacturing has decreased in size. This is coupled with low productivity growth in service sectors, but high growth in manufacturing. When we combine the results from the left panel in Figure 2.3 with Table 2.1, we find some circumstantial evidence of the Baumol effect.

Figure 2.3 Service sectors in the Netherlands grew over time, and are also large in reference countries



Notes: Value added per aggregate sector group in the Netherlands and reference countries relative to total value added of the full market economy. The primary sector includes NACE Rev. 2 sectors A and B. Manufacturing is C and F, trade and transport G and H, personal services D, E, I, R and S, and professional services J, K, M, N. Based on current year prices.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations.

Table 2.1 Relative labor productivity levels of sectors in the Netherlands

Period	Primary	Manufacturing	Trade and Transport	Personal Services	Professional Services
1971-1980	139.01	95.73	78.73	94.65	134.74
1981-1994	163.31	98.13	80.76	84.54	116.41
1995-2008	143.60	102.77	87.43	74.75	111.83
2009-2019	128.75	104.19	92.07	67.26	111.87

Notes: Labor productivity in levels per sector relative to the aggregate market economy labor productivity level (which is set at 100 in each period). The primary sector includes NACE Rev. 2 sectors A and B. Manufacturing is C and F, trade and transport G and H, personal services D, E, I, R and S, and professional services J, K, M, N. Based on current prices.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations.

The sectoral composition of the Dutch economy differs from that of other European countries. The right panel of figure 2.3 shows average value-added shares for the reference countries between 2009 and 2019. Austria and Germany have substantially larger manufacturing sectors and smaller professional service sectors

than the Netherlands. One possible explanation is that manufacturing firms in Germany and Austria provide many service activities internally, whereas in the Netherlands these activities may have been more extensively outsourced to the professional-services sector. In Germany, manufacturing firms have increasingly bundled product-related services with their goods in recent years (Lehmann et al., 2025). Belgium and France resemble the Netherlands more closely, with relatively large professional, and trade and transport service sectors, though still with a somewhat smaller share than in the Netherlands. Austria and France also have a large personal service sector, a large share of which is accounted for by tourism and hospitality. Overall, all countries exhibit a long-run shift toward a service economy (also see appendix 5.1, where we present the equivalent of Figure 2.3 for each of the countries over time).

Shift-share analysis

We employ a shift-share analysis to quantify the contribution of changes in sectoral structure to aggregate productivity growth. Following the methodology of Duernecker and Sanchez-Martinez (2023) and EU-KLEMS data (see appendix 5.2), we decompose changes in labor productivity into three components: a within effect, capturing changes in productivity within sectors; a static shift effect, capturing changes in shares between sectors with different productivity *levels*; and a dynamic shift effect, reflecting changes in sector shares between sectors with different productivity *growth*. The sum of the latter two constitutes the full shift effect. Together, the within effect and the full shift effect sum to the total change in labor productivity between the base and final years of each period.

The decomposition is performed for four subperiods. For each period, we denote the initial (base) year by b and the final year by t. Let V denote value added in base-year euros and H total hours worked; labor productivity is therefore measured as value added per hour worked, $\frac{V}{H}$. We then sum over sectors i, where a variable without the sector index describes the aggregate over all N sectors to obtain each element as:

Within component: $\sum_i^N \frac{\left(\left(\frac{V}{H}\right)_{it} - \left(\frac{V}{H}\right)_{ib}\right)}{\left(\frac{V}{H}\right)_{ib}} * \frac{V_{ib}}{V_b}$

Static shift: $\sum_i^N \frac{\left(\frac{V}{H}\right)_{ib}}{\left(\frac{V}{H}\right)_b} * \left(\frac{H_{it}}{H_t} - \frac{H_{ib}}{H_b}\right)$

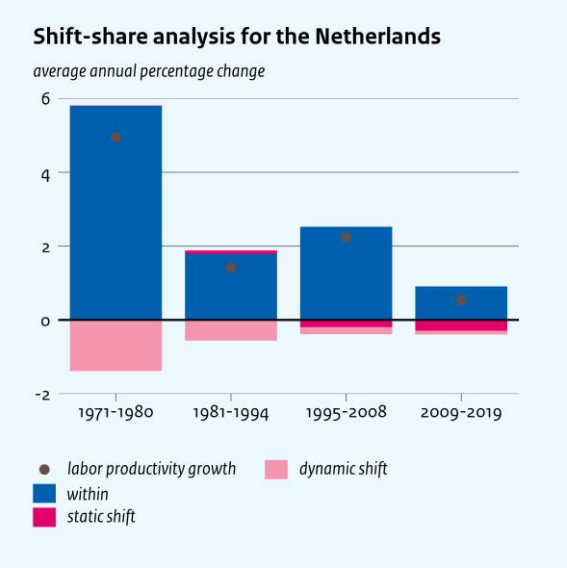
Dynamic shift: $\sum_i^N \frac{\left(\left(\frac{V}{H}\right)_{it} - \left(\frac{V}{H}\right)_{ib}\right)}{\left(\frac{V}{H}\right)_{ib}} * \left(\frac{H_{it}}{H_t} - \frac{H_{ib}}{H_b}\right)$

The effect of sector shifts on aggregate labor productivity is small but consistently negative. We show the shift-share results for the Netherlands in Figure 2.4, expressed in average annual growth rates to facilitate comparisons across periods. The negative contribution, particularly pronounced in the first two periods, stems primarily from the dynamic component, which captures the reallocation of hours from sectors with relatively high productivity growth toward sectors with lower productivity growth. The magnitude of this dynamic shift effect declines over time, falling from approximately –1.5% per year in the earliest period to about –0.1% in the most recent one. Initially, this shift is largely driven by the expansion of professional services, which exhibit slower productivity growth than manufacturing. Including non-market sectors such as health care and public administration would likely amplify these negative reallocation effects (cf. Duernecker & Sanchez-Martinez, 2023).

The static shift effect only turns negative after 1995, indicating a reallocation from sectors with high productivity levels toward sectors with lower productivity levels. The effect of the static component is -0.2% between 1995 and 2008 and -0.3% between 2009 and 2019. Before 1995, the effect of the static

component is close to zero. During the earlier periods, two opposing developments largely offset each other: a shift toward professional services, which have high productivity levels, and a shift away from primary industries, which have even higher productivity levels. In the last period, the negative contribution appears to be driven mainly by a reallocation from high-productivity such as manufacturing and primary industries—particularly natural gas extraction—toward lower-productivity trade and transport services. The continued shift toward professional services does not show up in the static component, because these services maintain relatively high productivity levels, despite slow productivity growth. The combined dynamic and static components describe the Baumol effect, the productivity effect of reallocation from manufacturing to services. This effect is present in all periods, though its magnitude remains modest throughout.

Figure 2.4 Productivity growth slowdown in the Netherlands is largely driven by a slowdown within sectors



Notes: Shift share analysis of labor productivity in the Netherlands based on Duernecker and Sanchez-Martinez (2023). We decompose labor productivity of the aggregate market economy into three components. The within component captures changes in productivity within defined sectors. Static shift captures changes in sector shares between sectors with different productivity *levels* and the dynamic shift captures changes in sector shares between sectors with different rates of productivity *growth*.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations.

A slowdown of within sector productivity growth is the primary driver of weak aggregate productivity growth in the Netherlands after 2009. The within component, which captures productivity growth within individual sectors, has been the dominant contributor to aggregate productivity growth in all periods. Between 1971 and 1980, the within component averaged around 6% per year. As seen in Figure 2.1, total labor productivity growth was very high during this period. After 1980, the within component dropped to around 2%. In the last period, from 2009 to 2019, the within component decreased further to around 1% per year. Although sectoral reallocation continues to have a small negative effect, the marked slowdown in aggregate productivity growth since 2009 is driven primarily by weaker within-sector growth. Our results are similar to those from de Vries and van Leeuwen (2024). Since 2019, within-sector productivity growth has remained low on average, while the effects of sectoral change have stayed small, but negative (CBS, 2025a).

For all reference countries, we observe a drop in the within component in the 2009-2019 period compared to previous periods. This is shown in Table 2.2, in which we show the shift-share analysis for multiple countries. We combine the dynamic and static shift into a full shift effect. The Netherlands is not unique in experiencing a slowdown; the within component is the principal driver of productivity dynamics across all countries examined.

Only in Belgium and the Netherlands we observe a consistently negative shift effect. After 1995, the average full shift effect for both countries is around -0.4%. In other countries, sectoral reallocation has a small but positive effect on productivity growth.

After 2009, the fall in aggregate productivity growth in the Netherlands is larger than in other countries due to the winding down of gas extraction. Following the start of the phase-out in 2014, productivity in the mining sector declined steeply, further depressing already modest aggregate productivity growth. Statistics Netherlands quantifies this effect at -0.3%-point per year since 2014 (De Vries & Van Leeuwen, 2024). Because of its high value added per unit of labor input, a decrease in mining contributes significantly to a decline in aggregate productivity growth. The contribution of mining to labor productivity in the Netherlands is much higher than in other countries (De Vries & Van Leeuwen, 2024).

Table 2.2 Shift-share analysis, average annual values

Component	1971-1980	1981-1994	1995-2008	2009-2019
Austria				
Within	3.7	2.7	2.3	1.1
Full shift	0.8	0.2	0.0	0.1
Labor productivity growth	4.3	2.8	2.3	1.2
Belgium				
Within	5.6	2.9	2.0	1.0
Full shift	-0.3	-0.5	-0.6	-0.3
Labor productivity growth	5.4	2.5	1.5	0.7
Germany				
Within	3.5	2.4	1.7	1.7
Full shift	0.2	0.0	0.1	0.1
Labor productivity growth	3.6	2.4	1.8	1.7
France				
Within	3.7	2.9	2.0	1.0
Full shift	0.9	0.3	-0.2	0.1
Labor productivity growth	4.4	3.1	1.9	1.0
Netherlands				
Within	5.8	1.8	2.5	0.9
Full shift	-1.4	-0.5	-0.4	-0.4
Labor productivity growth	4.9	1.4	2.2	0.5

Notes: Shift share analysis of labor productivity in the Netherlands based on Duernecker and Sanchez-Martinez (2023). We decompose labor productivity of the full market economy into two components. The within component captures changes in productivity within defined sectors. The full shift captures changes in sector shares between sectors with different productivity *levels* and *growth*.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations.

2.3 Decomposition of labor productivity growth

After 2009, a decline in total factor productivity growth (TFP) accounts for most of the slowdown in Dutch labor productivity growth. We decompose labor productivity growth into three components: capital deepening, changes in labor composition, and TFP. Capital deepening reflects increases in capital per worker, which raise output per hour. Labor composition captures improvements in the quality of labor input, holding hours worked constant. TFP—often interpreted as the Solow residual—captures the portion of productivity growth not explained by capital deepening or labor composition and is generally associated with technological progress and efficiency improvements.

We apply the standard growth-accounting methods on EU KLEMS data. Decomposing the growth rate of labor productivity, ΔLP, defined as value added per hour worked, leads to:

$$\Delta \text{lnLP} = \Delta \ln VA_t - \Delta \ln H_t = \alpha_t(\Delta \ln K_t - \Delta \ln H_t) + (1-\alpha_t)\Delta \ln LC_t + \Delta \ln TFP_t \ , \qquad (1)$$

where α_t is the capital share, calculated as the mean over year t and t-1 (using current price values), K is capital input, LC is labor composition, and H is the amount of hours worked. Growth in value added, capital input and labor composition are measured in constant prices (i.e. as quantity indices). The change in labor composition itself is calculated as

$$\Delta \ln LC_t = (\Delta \text{ln} L_t - \Delta \ln H_t) \ , \qquad (2)$$

with L as total labor input, calculated as the weighted average of the growth of employees with different education levels, where the weights are determined by the relative wages of the different groups. TFP is calculated by subtracting $\alpha_t(\Delta lnK_t - \Delta lnH_t)$ and (1 - α_t) $\Delta lnLC_t$ from the left-hand side. We estimate equation (1) at both country and sector levels and aggregate subsectors using appropriate value-added, capital, or labor weights. We report average annual growth rates by period and extend coverage to earlier decades using growth rates from the EU KLEMS 2011 and 2012 releases (see Appendix 5.2).

TFP has been the main driver of Dutch labor productivity growth since 1995, but it weakened considerably since the mid-2000s. This can be seen in the left panel of Figure 2.5, in which we decompose labor productivity growth in the components from equation (1), expressed in average yearly grow rates.[3] Before 1995, the average TFP growth was 0.3%. Van Zanden (1997, p. 214) argues that this low figure partly reflects measurement bias: during the energy crisis, accelerated depreciation of industrial capital was not fully captured in official statistics, inflating measured capital stocks and thus overstating capital deepening while understating TFP growth. In the 1995-2008 period, annual TFP growth increased to 1%, which is a growth rate similar to what van Ark et al. (2008) find. In the last period, TFP growth drops to an annual rate of 0.1%.[4]

Capital deepening and labor composition consistently contributed positively to labor productivity. Between 1981 and 1994, capital deepening contributed most to labor productivity growth (about 0.7 percentage

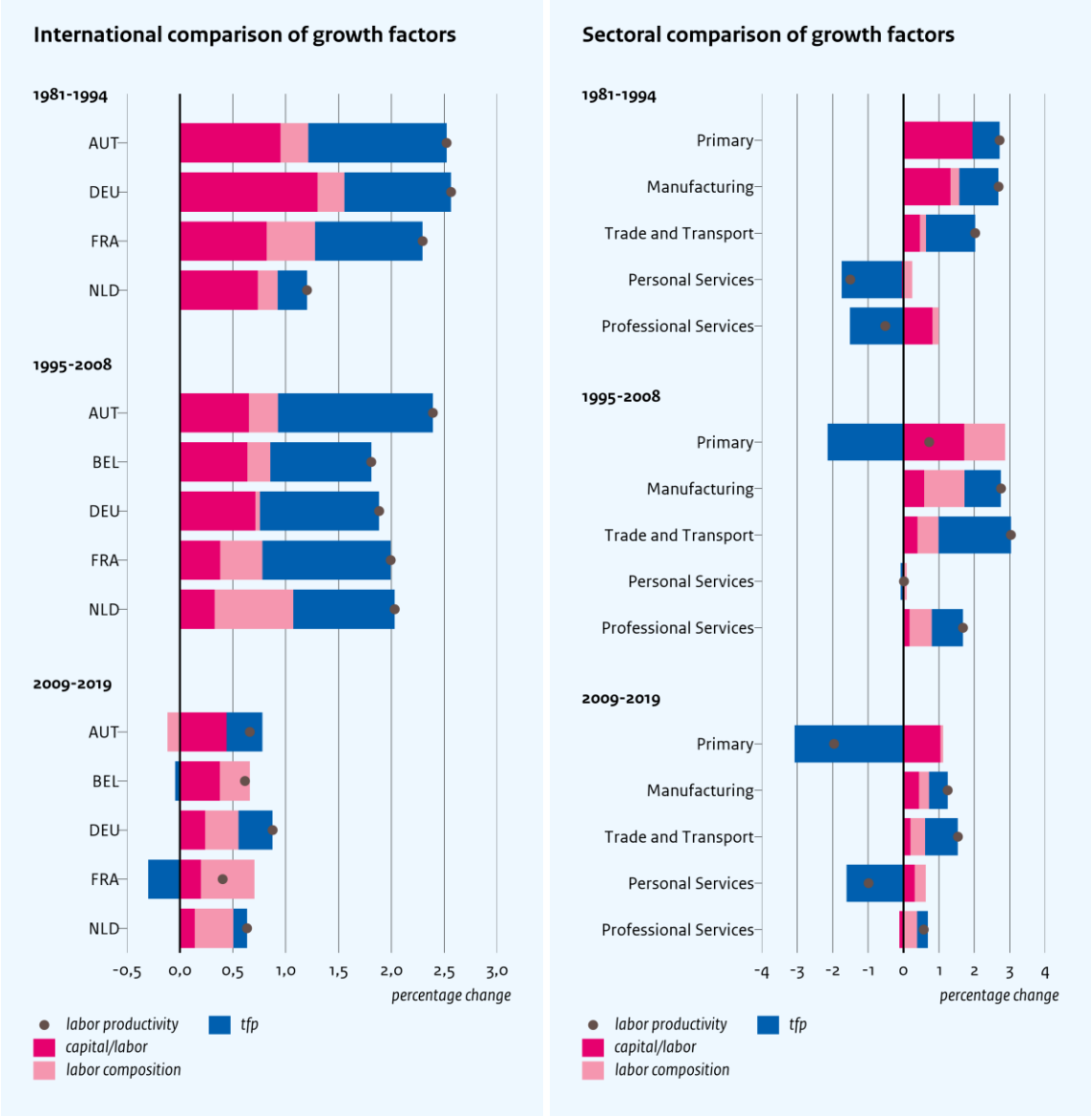
[3] The data include NACE Rev. 2 sector B, mining and quarrying. As in the shift-share analyses, removing this sector increases overall labor productivity growth in the Netherlands. This becomes especially apparent in the last period, where we see an increase of about 0.3 percentage points in labor productivity growth, mainly due higher TFP growth.

[4] More recent data on labor productivity and its components for the Netherlands is available at Statistics Netherlands (see de Vries and van Leeuwen (2024)). Labor productivity growth is negative in 2020 and 2023, but positive in 2021 and 2022. Positive labor productivity growth in 2021 and 2022 is mainly driven by TFP. The declines in labor productivity in 2020 and 2023 are respectively due to the Covid19 crisis and a large increase in hours worked relative to value added growth. Both years also had negative TFP growth.

points per year), while labor composition only added 0.2 percentage points. In 1995–2008, the combined contribution of capital deepening and labor composition (1.1 percentage points) slightly exceeded that of TFP, with labor composition alone accounting for 0.8 percentage points. In the 2009-2019 period, capital deepening and labor composition combined contribute by far the most to labor productivity growth. Together they are responsible for roughly 80% of the productivity growth in that period. Labor composition is the largest component in this period.

Patterns across the reference countries are broadly similar. First, TFP growth declined sharply after 2009 everywhere, and turned slightly negative in Belgium and France. This suggests that weak TFP growth is a central factor behind the broader productivity slowdown. Second, capital deepening has decreased across all countries. While this is partly consistent with a shift toward service sectors—which generally rely less on tangible capital—capital deepening has also fallen in Austria and Germany, indicating that structural reallocation is not the sole explanation. Third, the contribution of labor composition remains positive in all periods; given low productivity growth overall, improvements in labor composition are an increasingly important driver in proportional terms.

Figure 2.5 TFP growth has reduced considerably since 2009 in all sectors in the Netherlands



Notes: Growth decomposition for the Netherlands, Austria, Belgium, Germany and France (left panel), and sector growth decomposition of the Netherlands. The primary sector includes NACE Rev. 2 sectors A and B. Manufacturing is C and F, trade and transport G and H, personal services D, E, I, R and S, and professional services J, K, M, N. Data only available from second period onwards.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations (see section 3.2 and appendix 5.2).

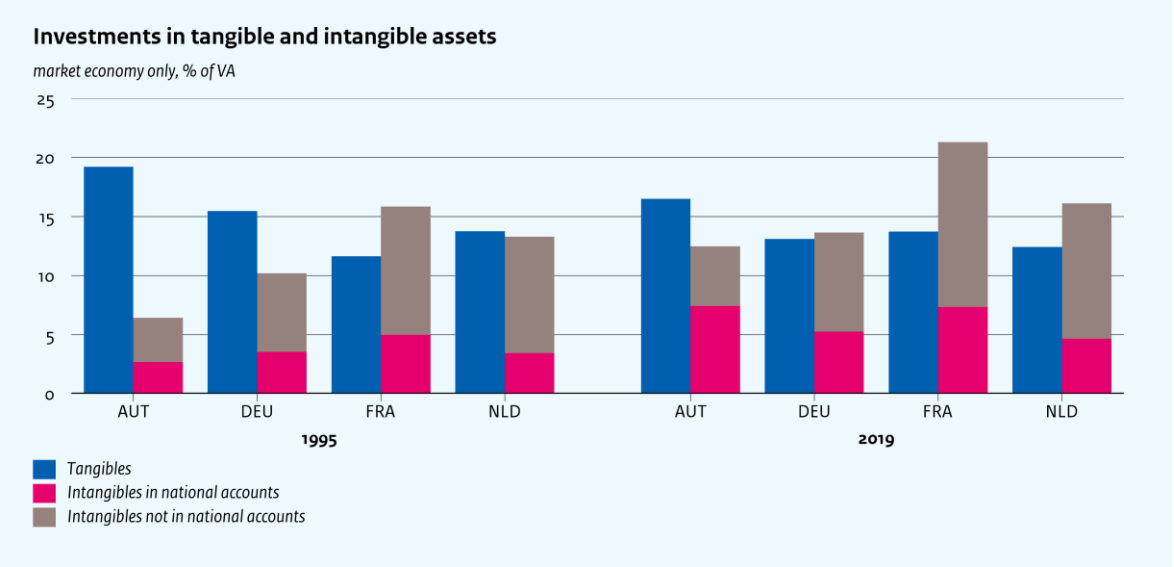
At the sector level, the primary sector, manufacturing, and trade and transport services exhibit the strongest growth in capital deepening and labor composition. In the first two periods, capital deepening grew rapidly in the primary sector and manufacturing, reflecting substantial investment in capital stock (Figure 2.5, right panel). Between 1995 and 2008, labor composition also contributed significantly to productivity growth in these sectors—manufacturing, for instance, experienced labor-composition growth of about 1.1 percentage points annually. Surprisingly, professional services did not show a strong increase in capital deepening during the IT boom of the late 1990s and early 2000s, despite substantial investment in IT capital economy-wide (see Section 2.4).

Within the Netherlands, low to negative TFP growth is concentrated in the primary and service sectors. As Figure 2.5 (right panel) shows, manufacturing and trade and transport services posted positive TFP growth in all periods, with relatively high rates in 1995–2008. These rates dropped to 0.5% for manufacturing and 0.9% for trade and transport services. Personal and professional services, in contrast, exhibited low or negative TFP growth. Especially before 1995, growth rates were low (-1.7% and -1.5%, respectively). During the IT boom, TFP in professional services turned positive (0.8%), though personal services saw no improvement. In the last two decades, TFP growth again turned negative in personal services, while remaining modestly positive in professional services (0.3%).

2.4 The rise of intangibles

Investments in intangible capital have become an increasingly important component of firms' total investment. Figure 2.6 shows investments in tangible and intangible capital for the Netherlands, Austria, Germany and France. Investments in intangibles is split into intangibles included in the official statistics of the national accounts (items like expenditures on software or R&D), and intangibles not included in the national accounts (like branding expenditures or investments in organizational capital) (cf. Corrado et al., 2005). The latter category is not incorporated in our growth decompositions. Between 1995 and 2019 investments in both categories of intangible assets have increased in all countries. However, for all countries, a large part of intangibles is not recorded in the national accounts, particularly for the Netherlands and France.

Figure 2.6 The role of intangible investments



Notes: Belgium is excluded from this exercise as its data was not available.
Source: EU-KLEMS (Bontadini et al., 2023) and own calculations

Between 1995 and 2017, Dutch intangible investment caught up with levels observed in the UK and US. Before 1995, the UK and US had much higher investments in intangibles than the Netherlands (Freeman, 2020). By 2019, the Netherlands devoted 16% of total value added to intangible assets, second only to France at 21% (Figure 2.6). Over the same period, investments in tangible capital grew much less or even declined, suggesting that the decline in capital deepening observed in Figure 2.5 primarily reflects a slowdown in tangible capital accumulation (Van Ark et al., 2024). Austria and Germany started from lower intangible investment levels in 1995 but experienced substantial increases, reaching 13% and 14% of value added by 2019, close to Dutch levels.

For France and the Netherlands, intangible investments not recorded in national accounts are roughly twice the size of those recorded. While these investments are economically akin to capital, they are not capitalized in official statistics (Karabarbounis & Neiman, 2018). Including them as investment would likely affect measured labor productivity and TFP, since they would no longer be treated as intermediate costs. The effect of higher investments in intangible capital does not necessarily lead to higher labor productivity and TFP, because intangible capital can either be an input (organizational capital) or an output (brand name). Measurement challenges also remain substantial, as capitalization requires assumptions about depreciation rates, investment prices, and the value of own-account investment (Freeman, 2020).

The impact of intangible capital on productivity often follows a J-curve, as described by Brynjolfsson et al. (2021). In the early stages of adoption, productivity gains may be underestimated because firms focus on building intangible assets rather than producing output. Over time, as intangible capital is fully integrated in productio, productivity growth accelerates and may even be temporarily overestimated. Eventually, as investment in intangibles stabilizes, measurement biases diminish, and the long-term contribution of intangible capital to productivity becomes more accurately reflected in the data.

2.5 Reflection on key trends in productivity growth

Our analyses identify and confirm several key trends in productivity growth in the Netherlands. During the 1980s, labor productivity growth slowed, coinciding with a decline in TFP growth. The productivity slowdown observed over the past two decades also coincides with a drop in TFP growth. A notable difference between the two periods is the role of capital deepening: while it remained an important driver of productivity growth in the 1980s, its contribution is much lower today.

We find that a slowdown of within-sector productivity growth is the main culprit of the productivity slowdown since the early 2000s—a pattern also observed in other countries. In the Netherlands, the shift effect is consistently negative across periods, indicating that sectors with lower productivity or slower productivity growth have expanded relative to others. These results are in line with de Vries and van Leeuwen (2024) and Duernecker and Sanchez-Martinez (2023). In contrast, the shift effect in other countries is generally positive or close to zero, with Belgium as the only exception showing a negative shift similar to the Netherlands.

From our growth decomposition we distill four key trends. First, TFP growth has been a major source of labor productivity growth across countries but has been slow in the past two decades. Fernald et al. (2025), de Bondt et al. (2021), and Cette et al. (2021) also find this for the Netherlands and many other countries. Second, negative TFP growth in the Netherlands is mostly concentrated in the primary and service sectors (see also de Bondt et al., 2021). Third, capital deepening has decreased over time across countries, while investments in intangible assets have increased. Fourth, the impact of labor composition on labor productivity growth has been slowly declining over time. Together these trends highlight that the recent slowdown in Dutch productivity is driven less by structural shifts between sectors and more by persistent weaknesses in within sector productivity growth and TFP, compounded by lower capital deepening.

3 Productivity policies

In this section, we review the most important trends in productivity-related policies in the Netherlands since 1950. We focus on selected policy areas that are most closely linked to productivity, including EU-level policies, labor markets, investment and innovation, education, natural gas extraction, and industrial and competition policy. Our aim is to contextualize these policies and relate them to the quantitative patterns described in Section 2. Rather than attempting to establish causal links between individual policies and productivity outcomes, we provide a structured overview of their potential effects, drawing on the existing literature where relevant.

We adopt the typology of pro-productivity policies by van Ark et al. (2023). This typology distinguishes four categories of productivity-related policies: accumulation of production factors, technological and structural change, markets and resource allocation, and internationalization. The first two categories target the direct drivers of economic and productivity growth, such as capital and labor inputs, TFP, and sectoral composition. The latter two categories capture indirect drivers, including incentives for firm investment, resource allocation, and the international economic environment. The typology also includes a fifth category of foundational policies. This framework allows for a systematic and standardized comparison of productivity-related policies over time. Table 3.1 provides a broad overview of pro-productivity policies in the Netherlands.

In policy making, productivity is usually not the sole or the actual goal of a policy. There are many goals that governments try to achieve. For example, environmental policies stimulate firms to invest in green technology, while other policies try to improve overall welfare. In this chapter, we focus exclusively on the potential links between policies and productivity and do not discuss other welfare effects, highlighting trade-offs where they are particularly relevant.

We structure the section in five parts. Section 3.1 discusses the general context that is important to understand the development of the Dutch economy and labor productivity over the last seven decades. Sections 3.2 and 3.3 review policies affecting the direct drivers of productivity: production factors and technological/structural change. Sections 3.4 and 3.5 examine policies targeting indirect drivers: markets and resource allocation, and internationalization.

3.1 The Netherlands' specific policy context

"Polder model"

Labor market decision-making in the Netherlands is often based on consensus forming between the government, and the employee and employer organizations. The latter two are also known as the social partners and are joined, together with independent experts, in the Social Economic Council (SER). This consensus-based approach is commonly referred to as the "polder model," a term derived from the Dutch tradition of reclaiming land from the sea and protecting it with dikes, which historically required extensive cooperation among stakeholders. Rooted in a long-standing institutional tradition, the polder model gained particular prominence in economic policymaking with the signing of the Wassenaar Agreement in 1982 (see below). While the system promotes stability and inclusivity, it can also lack transparency and sometimes delay decision-making.

Relationships with the EU

European Union policymaking has a strong influence on the Netherlands. The EU makes and harmonizes policies for its member states, ranging from general guidelines to binding supranational policies. It does so in many policy fields. A few examples include: the creation of the internal market (ECSC, 1951; EEC, 1957; EU, 1993), the common agricultural policies (1962), the European monetary union (Maastricht treaty; 1994), common migration policies (Treaty of Amsterdam; 1999), the Bologna higher education reform (1999), the EU Lisbon innovation strategy (2000) and the recent Green Deal (2020). In this section, we primarily focus on Dutch-specific policies but discuss EU policies where they are relevant for context.

Natural gas extraction

The discovery of a large natural gas field in Groningen in 1959 led to a substantial inflow of government revenue. While searching for oil, a large gas field in the northeast of the country was discovered. From then onwards, gas extraction was ramped up rapidly. Since 2014, however, gas extraction has gradually declined, due to large public discontent about an increased rate of earthquakes and land subsidence. Extraction from the Groningen field ceased in April 2024, although smaller fields remain operational (Rijksoverheid, 2024). Over six decades, the Dutch government earned over 400 bln. euros from natural gas (CBS, 2019). As natural gas extraction is very capital intensive and generates high levels of labor productivity, the closing down of the gas field has also led to lower aggregate productivity growth (see section 2.2).

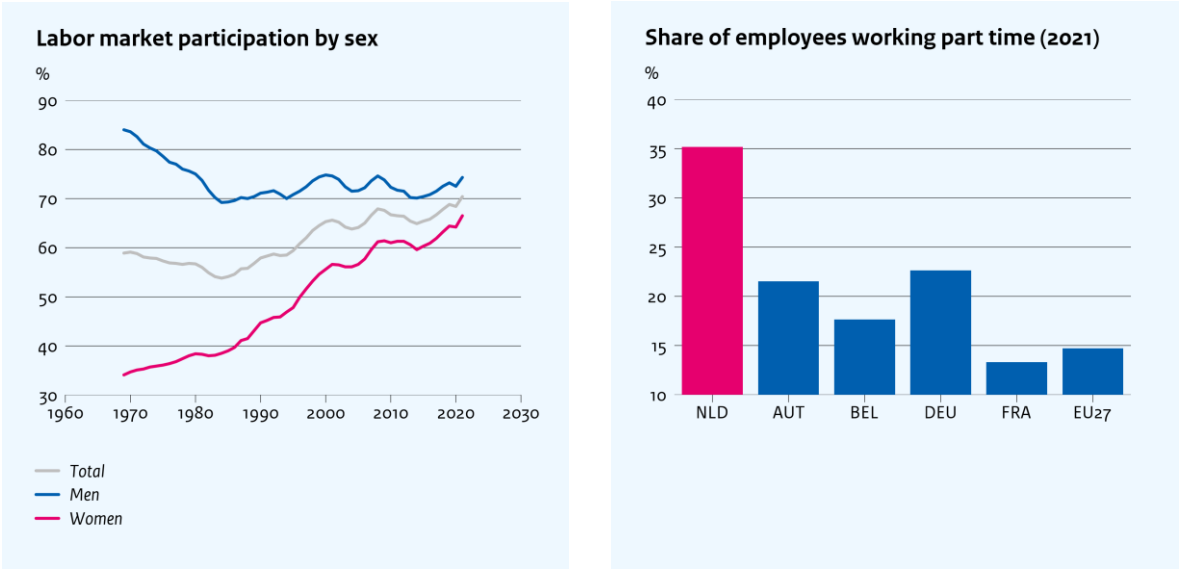
Gas extraction also enabled the growth of energy-intensive manufacturing sectors, as the availability of cheap gas lowered energy costs. This supported the development of a relatively energy-intensive manufacturing sector and horticulture industries (Saussay & Sato, 2024). At the same time, gas extraction

contributed to the so-called Dutch disease: resource reallocation towards the gas sector and currency appreciation reduced the competitiveness of other tradable sectors (Kiev, 2014). This may have contributed to the shift away from the high productivity-growth manufacturing sector, as described in Section 2. Consequently, the overall effect of gas extraction on aggregate productivity growth in the 1960s and 1970s is ambiguous.

Labor market participation and part-time work

The Dutch labor market is characterized by high labor market participation and a large share of part-time work. Between the 1960s and 1980s, female labor market participation was considerably lower than in other European countries (De Neubourg, 1990). Participation increased sharply from the 1980s onward, accompanied by a rise in part-time employment (Figure 3.1, left panel). Today, the Netherlands has one of the highest shares of part-time workers globally (Figure 3.1, right panel). This labor market structure helps explain the large difference between value added per employee and per hour worked (Figure 2.1).

Figure 3.1 Labor market participation has increased considerably since the 70s, high share of part-timers in 2021



Source: Left panel: (CBS, 2024a) , right panel: (OECD, 2024)

The effect of part-time work on productivity is unclear. This is partly because evidence is limited, and where it does exist, the results differ between studies that focus on the effects of shorter working weeks and those that deal with part-time work specifically. Evidence from firm-level and employee-level studies suggests that shorter working weeks can contribute to increases in productivity due to lower levels of fatigue or stress (Collewet & Sauermann, 2017; Pencavel, 2015). On the other hand, using firm-level data from Italy, Devicienti et al. (2018) show that part-time work can lower productivity, likely because individual workers spend more time on start-up tasks and communication. Given these mixed findings and the limited macro-level evidence, the impact of the Netherlands' high participation coupled with widespread part-time work on overall productivity remains an open question.

3.2 Accumulation of production factors

Public and private investments

Public investment in infrastructure was substantially higher in the 1950s and 1960s than it is today. During this period, major public works, such as the Delta Plan to protect the country from coastal flooding, drove public investment to around 2.5% of GDP. Since 1970, public investment has stabilized at roughly 1.5% of GDP (Van Sonsbeek et al., 2023). Part of this investment was financed through gas revenues. Overall, traditional infrastructure in the Netherlands is well developed, with a good network of public roads and trains. International comparisons show that Dutch citizens report high satisfaction with national infrastructure, particularly roads, flood defences, and digital networks (Marshall, 2024). High-quality infrastructure supports productivity by reducing transport and transaction costs and by attracting firms. For more information on the relationship between infrastructure and productivity (see Aschauer (1990) and Foster et al. (2023)).

Regarding relevant infrastructure for the 21st century, the Netherlands performs well in terms of digital infrastructure, but faces growing challenges with electricity infrastructure. The Portulans Institute's Network Readiness Index ranks the Dutch digital infrastructure sixth globally (Dutta & Lanvin, 2024), helping attract new and potentially highly productive firms and technologies. By contrast, increasing congestion in the electricity grid is becoming a significant bottleneck (Van Heuven, 2025). Firms struggle to connect to the grid, slowing the adoption of green technologies and delaying production expansion. Investments in grid capacity and other critical infrastructure will be essential to support the green transition and maintain future competitiveness (Van Koesveld, 2025).

In the 1970s and 1980s, government policy was aimed at subsidizing private investments. The Investment Account Law (WIR), introduced in 1978, provided subsidies and tax benefits for capital investments. During the WIR period, government transfers to firms were far higher than in later decades (Van Sonsbeek et al., 2023). However, rising fiscal costs led to its abolition in 1989. Although WIR was not reinstated, an investment tax credit was introduced in 1990, allowing firms to deduct certain investment categories from corporate taxes. As in many countries, the statutory corporate income tax rate was lowered in recent times, from 35% in 1998 to 25% in 2020. However, the resulting reduction of capital costs has not led to higher investment rates so far (CPB, 2022).

Start-ups in the Netherlands today struggle to secure follow-up finance. The Netherlands has many young, innovative firms, but these firms often struggle to obtain follow-up finance (>€50 mln) compared to start-ups in other European countries (Berg, 2024). It is difficult to achieve the required scale in venture capital markets in the Netherlands to meet demand for funding. Similar financing gaps exist across Europe, though they tend to be less severe (Arnold et al., 2024). Several key barriers for completing European capital markets have been identified: a lack of an integrated supervisory ecosystem and weak insolvency practices (Arampatzi et al., 2025; Bhatia et al., 2019; Pekanov, 2024) and information transparency in financial markets (Bhatia et al., 2019), while trading and post-trading markets and securitization markets should be improved (Arampatzi et al., 2025).

Table 3.1 Typology of Dutch pro-productivity policies

	1950-1980	1981-1995	1996-2008	2009-2019
		Institutions and Frameworks		
Institution building	Building European institutions (from 50s) Establishment advisory institutions	Establishment EU/EMU	Formal independence Central Bank	
Government capabilities		Intensifying Polder model (80s and 90s)		
Macroeconomic policy and taxation	Multiple tax reforms (harmonization with EU rules, introduction VAT) Structural long-term oriented fiscal policy	Tax reform (simplifications) after commission Oort (1986) and Zalm (2001) Trend-based fiscal policy	Monetary authority transferred to ECB	Era of government budget cuts
		Factor accumulation		
Investments	Large-scale investments Tax investment allowance	Law on the Investment account (1978-1988)	Fund for Strengthening the Economic Structure (1995)	
Education and Skills	Large-scale education reforms to make education more accessible	Reform higher and professional education	Higher education becomes more accessible for European students and reform student finance	Tailored education and mandatory examination in primary education (2014)
Natural resources	Discovery of natural gas fields (1959)			Closing Groningen gas field
		Technology		
Innovation and Strategy	Creation European patents	Policy focus changed to stimulation (generic) innovation to technology policy	EU Lisbon strategy (2000)	From generic to specific innovation policies National Growth Fund

		Focus changed to knowledge growth and innovation, policy effectiveness and budget cuts Update Dutch patent laws (1995)		
Industrial Policy	Period of active industrial policy to stimulate strong industrialization after the war Increased importance of EU In industrial policy Move towards reactive industrial policy mid 1960s	Shift to market-oriented industrial policy Privatization and deregulation	Entrepreneur deduction (2001) SDE/SDE++ subsidies (2008)	
Creative destruction			Reform bankruptcy law (1998)	
		Markets		
Financial Markets		Several international banking regulation reforms (from late 80s onward	Introduction of Euro (1999/2002)	
Product Markets			Market order, deregulation, and legislative quality	
Labor Markets	Wages start to rise because of scarce labor Introduction of early retirement scheme Growing labor participation Expansion employment insurance and social welfare schemes	Start wage moderation: Wassenaar Agreement (1982) Reduction in government expenditure on social welfare	Flexibilization of labor market Early retirement scheme scrapped (2004) Labor activation laws	Increase retirement age (2013) Partial de-flexibilization of the labor market
Competition Policy	Cartel formation still common		Competition law and setup of Dutch competition authority (1998)	EU Merger Regulation (2004)
		Internationalization		

Trade	Period of international (re)integration		Introduction euro
FDI	Marshall plan		
Migration	Guest workers arrival 30% tax rule introduced (1964)	Schengen introduction (1995)	EU eastern accession (2004&07)

Education policy

The Bologna reform (1999) harmonized higher education across the EU and accelerated internationalization of Dutch universities. The reform introduced a European-wide three-cycle education system (Bachelor, Master, PhD), the mutual recognition of qualifications, encouraged cross-border student mobility, and implemented of systems of quality assurance. Dutch universities have since become considerably more international. Today, the Netherlands has one of the highest shares of international students in Europe (Rathenau Instituut, 2024). Bolhaar et al. (2019) estimate the long-term benefits of international students on government finances by calculating the value of future government income (e.g. through labor income taxes) net of expenditures (such as e.g. per-student subsidies for universities). On average, they find a positive net present value for incoming international students, though the magnitude depends on the stay-rate of students after graduation. The study also finds that international students can facilitate knowledge spillovers between countries.

In the 1990s and 2000s, various laws were introduced to cut education costs. Schools were given lump sum budgets that were no longer earmarked for specific purposes. This meant more budgetary freedom for schools, while pushing them to become more efficient as budgets were squeezed (Blank & van Heezik, 2015). Public spending on education fell from nearly 8% of GDP in the mid-1970s to just under 5% around 2000. Since then, government spending on education has hovered around 5% of GDP. Education expenditure per student, however, has increased over time (CBS, 2025b). In 1995, expenditure on primary and secondary education per student were 4,400 and 7,100 euros (measured in constant 2015 prices) respectively. In 2022, these expenditures almost doubled to 8,900 and 11,400 euros, largely driven by demographic shifts and declining numbers of school-age children (Van Sonsbeek et al., 2023).

Despite these investments, student performance has fallen considerably over the last decade. A well-known international student assessment is the Programme for International Student Assessment (PISA) by the OECD. Before 2015, PISA scores in the Netherlands were substantially above the OECD and the EU14 averages. However, test scores have fallen since 2015, close to or below the OECD average (Meelissen et al., 2023). The decline in reading and mathematics scores are corroborated by other international and national assessments (Meelissen et al., 2024; Swart et al., 2023). For example, the periodic monitoring of the Dutch Inspectorate of Education shows a decline in the reading skills of pupils in the final year of primary school (Spit, 2025). Although the obligatory test for all pupils at the end of primary school shows that almost all pupils still reached the fundamental levels required for reading skills, language and mathematics in 2024, only about half of the pupils reached the aspirational level (Spit, 2025).

Falling student performance turned the government's focus to 'core competences' like reading and mathematics (Inspectie van het Onderwijs, 2021). In 2022, the government introduced the Masterplan Core Competences (Wiersma, 2023). The goal of the plan is to ensure that all pupils reach a fundamental level in reading, mathematics, digital literacy, and citizenship by 2027 (Rijksoverheid, 2023). It introduces subsidies for schools to invest in the core competences of their pupils.

Government policy on lifelong learning has changed regularly in recent years, but the number of people in training hasn't increased. Due to the demographic shift, the Netherlands can no longer rely on a steady inflow of young, educated people in the workforce. Therefore, upskilling of the current labor force has become a major focal point. Since the 1980s, the government has aimed at stimulating lifelong learning by making it tax deductible for households. The effects of the tax scheme are small and positive, but mostly concentrated at high-income households (Van Den Berge et al., 2017). The policy had a large deadweight loss: many households would have invested in schooling regardless of the tax deductibility. In recent years, the policy has been replaced by multiple new instruments. People in the Netherlands participate in post-initial

education more often than in other countries, but the number of people in training has remained stable (SCP, 2022), with large disparities by education level. In 2019-2020, about a quarter of the vocationally trained people took a course or training program, whereas almost half of higher-educated people received training. Current policies around lifelong learning are based on a patchwork of schemes and there is no harmonization of rules, limiting their effectiveness (SER, 2023).

3.3 Technological and structural change

Innovation policy

The 1980s mark the beginning of innovation-focused policies in the Netherlands. In 1974, the Minister for Scientific Research issued a memorandum arguing, for the first time, that (scientific) research should also serve societal objectives. This view was elaborated in a 1979 policy note on innovation, which aimed to raise private-sector innovation and strengthen the role of public knowledge institutions as intermediaries between universities and firms (Harkema, 2017; Velzing, Evert-Jan, 2013). Whereas institutions such as TNO (Netherlands Organization for Applied Scientific Research) traditionally focused on coordinating the transfer of scientific knowledge to firms and government, their mandate shifted in the 1980s towards conducting applied research themselves to stimulate innovation.

These efforts were continued in the 1990s. Notable policy instruments introduced during this period include a tax reduction on labor costs in R&D projects (WBSO), the "innovation box"—a tax incentive for profits related to patented innovations—and the "top sector" policy ("topsectorenbeleid"), which provided subsidies to consortia in nine broadly defined priority sectors. The CPB has evaluated these policies (CPB, 2016, 2020). These evaluations show that the WBSO was an effective policy for stimulating R&D investments, though the effects of further expanding the policy were found to be less certain. In contrast, the innovation box has mostly focused on already patented innovations, which were already well developed and protected, making the policy ineffective. The impact on new innovative efforts was deemed minor. Evaluations of the top sector policy suggest that it may have supported valorization of academic research but at high fiscal cost, with long-run productivity effects that are small at best (CPB, 2016). Although cooperation between public research organizations and private firms increased in targeted sectors, productivity growth in these sectors did not (Inklaar, 2025; Janssen et al., 2017). A national innovation fund was launched in 2020 to support projects contributing to the sustainable earning capacity of the economy, but systematic evaluations of this program are not yet available.

R&D investment in the Netherlands remains below those in peer countries and the Lisbon targets. While the link between R&D and productivity is not immediate, effective R&D expenditure can be an important driver of innovation and long-run productivity growth (Bloom et al., 2019). This relationship especially holds for smaller firms, which have high R&D intensity and tend to undertake more radical and original innovations (Akcigit, 2009). R&D expenditures in the Netherlands have been below the EU-27 average since the late 1980s (Van Geest, 2016), amounting to around 2.3% of GDP in 2022. This is also far lower than the goal set out by the EU Lisbon strategy, which was to achieve 3% of GDP by 2020. Whereas many peer countries increased R&D spending after the mid-2000s, the Netherlands did not, mainly because privately financed R&D did not rise (Van Geest, 2016; Van Kempen et al., 2000; Van Kempen, Van Oosteren, et al., 2025). Sector structure also plays a role: the Netherlands has a relatively large business services sector, which typically has low R&D intensity, explaining part of the gap with high-R&D countries (Erken et al., 2021). Moreover, R&D expenditures are highly concentrated in a few large firms (Van Kempen, De Heide, et al., 2025).

Industrial policy and sector structure

Following the second world war, industrial policy in the Netherlands aimed to establish a strong manufacturing base. The government was motivated by a desire for a more balanced trade account, compensation for the loss of income sources from the colonies, and the belief that a new structure of the economy was necessary (Schot et al., 2003). These efforts were supported by large increases in labor supply. Although only few direct policies were implemented and only two companies received major financial support, the government's policies at the time did lead to a shift in focus and resources towards manufacturing in the first years after the war (Van Zanden, 1997).

In 1963, the focus of industrial policy shifted to broad economic growth and reactive support programs. From the mid-1960s onward, several industrial subsectors became uncompetitive due to rising production costs and increased international competition, particularly from Asia. As a result, employment in the manufacturing sector started to decline. The Dutch government turned its focus on aiding struggling manufacturing sectors and make them more competitive (Schot et al., 2003). Struggling industries included textiles, mining, and shipbuilding. Shipbuilding, in particular, became a notorious example of sustained fiscal support without success. Most of these industries employ only a few people today. Labor intensive industries like textiles shrank, while more capital intense industries like chemicals and refineries expanded. These reallocations contributed to the strong growth in productivity within the manufacturing sector, as firms in less productive sectors exited the market.

Since the 1980s, industrial policies have become increasingly market-oriented. The shift in policy focus to market-oriented approaches fit the prevailing spirit of the 1980s. As in other countries, the Dutch government wanted to lower public expenditures and reduce the role of the state in the economy. The two largest privatization projects in the 1980s were in telecommunications and postal services (Schenk & Hulsink, 1998). Policy focus shifted to improving general business conditions and stimulating innovation and firm clusters, while avoiding attempts to pick "winners". As a result, industrial policy increasingly overlapped with innovation and investment policies. A prime example is the "top sector" policy described above. Other examples include the tax deductions for entrepreneurs (since 2001) and the SDE/SDE++ subsidies (since 2008). The former offers tax deductions for several types of firms such as startups, firms with R&D spend (the WBSO), and self-employed people. The SDE/SDE++ offer subsidies to firms and NGOs to generate green energy or lower greenhouse gas emissions. These policies also highlight a new shift towards greener production technologies.

Recently, calls for more active industrial policy have re-emerged. These calls are driven by the desire of national and EU policymakers to invest in the green transition, strategic autonomy, and defense. Although traditional economic views have often been sceptical about industrial policy, recent research highlights conditions under which it can be effective (Juhász et al., 2024). A prominent Dutch example is the creation of ASML, now one of the most valuable firms in Europe. It was created by a joint venture between ASM and Phillips, and supported by a relatively large government subsidy. Later on ASML benefitted in various ways from both national and EU government support, for example through export insurance and guarantees, cheap credit and investment subsidies. Recently, ASML's expansion of production locations was also supported through large scale infrastructure investments. The national growth fund, discontinued in 2025, was the latest large-scale attempt to stimulate innovation in the Dutch economy. Industrial policy also features prominently in the report by Mario Draghi about the future of European competitiveness (Draghi, 2024). The insights from the Draghi report are echoed in Dutch policy circles, e.g. in a recent column by the Secretary General of the Ministry for Economic Affairs (Gaastra, 2025) and a response by Inklaar (2025).

3.4 Markets and resource allocation

Labor market reforms

A rapid increase in real wages in the 1970s was followed by an extended period of wage moderation beginning in the early 1980s. After the Second World War, Dutch wage policy initially emphasized moderation to strengthen international competitiveness. These policies ended around 1960, after which real hourly wages grew rapidly, especially in the 1970s (Van Zanden, 1997, pp. 201–203). This trend was seen as the main cause of increasing unemployment and deteriorating competitiveness. In addition, the Netherlands went through a severe economic crisis in the early 1980s (see section 2.1), which increased unemployment even further. As a result social partners, including employer and employee organizations and the government, signed the so-called Wassenaar Agreement in 1982. They agreed to moderate wages and allow for working time reduction. The aim was to stimulate firms to hire more people without increasing their total wage bill. The agreement also facilitated part-time employment, possibly accelerating its widespread adoption (Maassen van den Brink, 2019).

Real wage and productivity growth declined after Wassenaar, triggering a debate on the causal link between them. In the mid-1980s, unemployment started to fall and real wage growth was slow. Wage growth recovered only later in the decade, but at a slower pace than in the 1970s. Whether the Wassenaar Agreement was the trigger for these changes is hard to pinpoint, but the transition from an economy with high real wages and high unemployment to low real wages and low unemployment caught international attention (e.g. Visser, 1998). However, productivity growth also declined in the 1980s (see Figure 1.1, right), which sparked a debate on the causal relationship between wages and productivity.

The causal link between wages and labor productivity growth is ambiguous. The idea behind a prominent argument is that high wage growth may stimulate investment in capital and labor-saving technologies, implying that wage moderation policies disincentivize firms to invest in new technologies or machines, reducing labor productivity growth and increasing the survival of low productivity firms (Den Butter, 1991; Naastepad & Kleinknecht, 2004). This view contrasts with classical growth theory, which assumes that rising wages dampen innovation and productivity growth (Broer & Huizinga, 2004). More recent growth theories building on the concept of tasks, show that the relationship between wage growth and innovation depends on whether new technology is labor saving or labor augmenting (Acemoglu & Restrepo, 2018). Yet**,** empirical identification of these different types of technological change is difficult and empirical evidence pointing one way or the other is weak (Meager & Speckesser, 2011). By contrast, the evidence for an effect of productivity on real wage growth is clearer. Adema and van Tilburg (2018) show in a decomposition of real wage growth that slow labor productivity growth was an important factor behind low real wage growth since the 2010s.

The large rise in the use of disability insurance and other forms of social assistance in the 1970s triggered substantial reforms from the 1980s onward. The sharp increase in disability insurance (WAO) enrollment led to stricter eligibility rules in the 1980s, making it more difficult to exit the labor force without substantial income loss (Gielen & Dahl, 2018). In the early 2000s, policymakers implemented further reforms aimed at increasing labor force participation, which contributed to a decline in social assistance inflows (Stegeman & van Vuren, 2006; Van Es, 2010). These reforms might have temporarily brought more employees at the lower end of the productivity distribution back into the workforce. However, the effects on productivity in the longer term are less clear. In addition, the statutory retirement age has been raised from 65 in 2012 to 67 years in 2025. There is empirical evidence that increasing the retirement age has modest effects on labor productivity through increased investments in human capital (Hernæs et al., 2023; Matsuda, 2021).

Since the 1990s, labor market policy has increasingly emphasized flexibility. One of the advantages of a more flexible labor market is that it allows firms to respond more easily to demand shocks. Another advantage is the added flexibility it provides to workers to choose their own working hours (Euwals et al., 2016). However, the incentive for firms to invest in the training of workers is likely to be higher for permanent staff (Euwals et al., 2016; Poulissen et al., 2023). The higher flexibility may also have led to higher labor force participation rates and more part-time work, in particular for women, with ambiguous effects on productivity. More recently, substantial increases in the statutory minimum wage may raise productivity without significant employment losses, especially in a tight labor market such as the current Dutch one (Van Essen et al., 2020).

Cartels and competition policy

Until the 1990s, the Netherlands had a lenient stance on competition law and was reluctant to dismantle existing cartels. This was based on a long history of cooperation between firms and close connections between companies and the government. Regulations on competition were far less stringent than in most other European countries (Schenk & Hulsink, 1998), and also less strict than the EU wide legislation based on the Treaty of Rome (see articles 85 and 86). Due to the Treaty and other European legislation, cartels that operated in European markets were prohibited. Up to 1990, most European antitrust cases were targeted at the Netherlands and the other Benelux countries. Some economists at the time argued that the strong presence of cartels reduced the incentives for firms within the cartel to innovate (De Jong, 1990).

The Competition Act of 1998 marked a decisive shift toward stricter enforcement. This followed extensive discussion in the 1990s on the disadvantages of lenient anti-trust regulation and ended up bringing the Netherlands in line with the EU rules. The Competition Act also introduced a merger control framework, which used to be absent on a national level until then. The antitrust body, now called the Netherlands Authority for Consumers and Markets (ACM), remains a well-established institution. Although competition policy mostly focuses on reducing prices for consumers, it can have profound implications for productivity as well. The Competition Act of 1998 marked a decisive shift toward stricter enforcement (Bloom et al., 2019), especially for countries starting from low levels of competition, as was the case for the Netherlands. However, the link between the level of competition and the pace of innovation is ambiguous and predicted to follow an inverted U-shape (Aghion et al., 2005).

Regulatory burden

Regulation is implemented to achieve a wide range of policy goals, which often involves a trade-off between welfare and productivity. Regulations often aim at goals other than economic growth and productivity, such as protection for consumers, workers or the environment. These regulations might increase welfare, which obviously goes beyond mere GDP growth. Nevertheless, they could create a regulatory burden that can hinder firms from entering and leaving the market, decreasing market dynamics, and potentially lowering aggregate productivity (Nicoletti & Scarpetta, 2003). The European carbon market (ETS), for example, lowers emissions within the EU, but also poses both transactional and production-related costs on companies, as firms have to switch to greener, but potentially costlier, technologies. There is some empirical evidence indicating that cutting red tape might have positive impacts on economic performance, including productivity growth (Ciccone & Papaioannou, 2007; Costa & St. Aubyn, 2012; Gelauff & Lejour, 2006; Jacobzone et al., 2010; Jalilian et al., 2007).

Regulatory burden in the Netherlands and the EU is perceived as high by firms and the government itself. KMPG (2025) maps the regulatory burden of SMEs and show that 16% of the applicable regulations in the Netherlands are deemed poor or unworkable. In 2024, the independent Advisory Board on Regulatory Burden estimated that new regulations adopted the first half of the year added €175 million in additional costs per

year for firms and citizens (ATR, 2024). As a reaction to this increasing burden, parliament passed a motion in 2025 to reduce the regulatory burden by 20% (Kisteman, 2025). The European Commission calculates that the administrative costs are €150 billion annually in the EU (European Commision, 2025). A complete overview of the regulatory costs resulting from EU legislation at both European and national levels is lacking (ATR, 2025).

3.5 Internationalization

Trade and EU integration

The Netherlands is an open economy and is deeply integrated in European and global trade networks. It ranks among the world's largest trading nations, with goods and services exports amounting to roughly 30% of GDP (CBS, 2022, 2024b). The EU is by far the most important trading partner, and on many dimensions the Dutch economy is even more globally integrated than other advanced European economies. For example, the Netherlands receives the most capital inflows from the US among all EU economies (Meijerink et al., 2024). Additionally, there are relatively many multinational enterprises (MNEs) in the Netherlands. The Netherlands is home to almost as many MNEs as Germany, the largest base for MNEs within the EU (Eurostat, 2025). In 2021, MNEs accounted for around 35% of total employment (CBS, 2023). While this openness has delivered substantial economic benefits, it also increases exposure to external shocks, particularly those originating in Europe.

The Dutch economy benefitted from EU integration, which stimulated productivity growth. Multiple studies document that the Netherlands is among the member states that benefitted most from the creation of the Single Market (Freeman et al., 2022; Hessel et al., 2017; Straathof et al., 2008). Indeed, it might have even been one of the member states which benefitted most from being part of the EU. Gains from EU integration come from increased trade, greater competition, specialization and innovation, and an increased market scale (Bijlsma et al., 2011). Most of these channels likely also contributed to productivity improvements. For example, not only are firms that trade internationally more productive, but so are their suppliers, underlining the importance of international trade to the Dutch economy (Freeman et al., 2024).

Migration and labor composition

Migration has shaped the composition of the labor force over the last 60 years, with varying effects on average productivity. In the 1960s and 1970s 200,000 guest workers came to the Netherlands to work in relatively low wage, low productivity occupations. The main reason were major labor shortages, particularly in Dutch textile, metal and mining industries (Van Stiphout-Kramer et al., 2024). Since the early 2000s EU expansion led to an increase in migration from Eastern Europe (Rojas-Romagosa & Bollen, 2018). Again, many of these migrants worked in low wage, low productivity jobs. At the same time, the Netherlands started to attract knowledge workers since the 1960s by offering tax benefits for highly educated migrants (Bijlsma et al., 2024; Timm et al., 2022). This led to an increase in the average skill level of the Dutch work force and boosted innovation (Laursen et al., 2020). Various reasons make the Netherlands an attractive place for high skilled migration, including the generally high level of safety, widespread English proficiency and excellent international connectivity. Recent discussions on migration have, however, led to concerns among companies about the future availability of such high-skilled migrants (Kassam, 2024).

4 Lessons for the future

The coming decades will require a novel and multi-faceted policy mix. As former Federal Reserve Chair Janet Yellen once quipped, productivity growth can "die by a thousand cuts." Similarly, boosting productivity in the Netherlands will require coordinated policies across multiple fronts. In this paper we tried to illustrate how policies in the past impacted productivity growth through the intermediate channels of investment in tangible and intangible assets, including human capital and innovation.

Since the 1980s, the Dutch government has sought to reduce the state's direct role in the economy. The effect can be seen in many policy domains. Industrial and innovation policies became less targeted and more market-oriented, while competition policies were developed and implemented. At the same time, many government organizations were privatized, reducing the direct influence of the government in the economy. Also, the impact of the EU on policy making in the Netherlands has gradually increased. This started in the 1950s and 1960s with the harmonization of trade and agricultural policy. While national policy harmonization is still an important aspect of the EU, it has also become more pro-active in setting the policy agenda. Examples of this are the Lisbon strategy on innovation and the Green Deal on climate neutrality. This means that national policies need to align with current and future EU rules and guidelines. Against this background, we present in this section seven main lessons for future productivity policy in the Netherlands.

1. Look beyond traditional measures of productivity

When designing policy, it is important to consider both traditional and broader measures of productivity. Traditional productivity measures assess how efficiently labor and capital are used to produce goods and services. Yet, the production process impacts so-called broader measures of welfare and well-being. It is therefore important to a track how productivity interacts with measures of broader welfare and well-being in the Netherlands. In recent years, experts have examined how broader measures of productivity can be calculated. For example, De Ridder and Rachel (2025a, 2025b) find that, when taking account of the reduction in carbon-dioxide emissions in production, productivity growth in the Netherlands has accelerated rather than declined since the mid-2010s. Jones and Klenow (2016) illustrate that the difference in trans-Atlantic welfare levels is much larger when only considering GDP per capita than when additionally considering differences in, for example, income inequality and health. These new insights show that productivity growth, when narrowly measured, does not always translate in welfare growth. Policymakers should therefore assess trade-offs between conventional productivity metrics and broader welfare measures, ensuring that policies support sustainable and inclusive growth.

2. Exposure to foreign competition can foster productivity growth

Exposure to international competition and markets can increase the productivity growth of Dutch firms. As we have shown in section 3.5, the Netherlands benefitted considerably from international trade. Important mechanisms behind this include access to larger markets, greater economies of scale, increased competition, stimulating innovation, and more opportunities to learn from leading companies. Foreign competition also accelerates creative destruction, allowing more productive firms to expand at the expense of less productive ones. Maintaining an open economy is therefore a cornerstone of future productivity policy. At the same time, it is important to remain alert to the possible abuse of market power of both domestic and foreign companies.

3. Invest in European initiatives and integration

Invest more in European initiatives and integration to promote productivity growth. Many challenges and opportunities for Dutch productivity growth are closely linked to developments in the European economy, policy initiatives, and legislation. Further integration offers economies of scale, specialization opportunities, and the ability to address challenges that are too large for the Netherlands alone. Therefore, policymakers should invest in European initiatives. There are many European initiatives in which the Netherlands can invest. Draghi (2024) and the International Monetary Fund (2024) show that many markets in Europe are still primarily national markets and that there are considerable (implicit) barriers between these markets. Policymakers could therefore invest in further integration of European product markets especially in services markets, where the barriers are greatest. This is also true for capital markets, which are currently unable to provide sufficient financing for innovative start-ups (see section 3.2). The same applies to innovation funds: at the European level, innovation funds can achieve sufficient scale to enable large investments in new technologies. Current examples of such funds include the European Defense Fund, Horizon Europe, and Digital Europe. Europe is also important when it comes to the energy transition or to increasing strategic autonomy. Achieving these goals without deeper cooperation within Europe will be costly and will leave the Dutch economy vulnerable.

4. Take the increasing importance of services as a given

Most of the shift from manufacturing to services documented in this study is driven by structural forces that are difficult for policymakers to influence. In section 2.2 we documented a shift towards a service-focused economy. The shift toward services is due to structural changes in demand both domestically and abroad. As countries become richer and their populations grow older, their consumption of services tends to rise, a pattern observed in the Netherlands and other European economies. This naturally leads to an expansion of the service sector relative to other sectors. This domestic trend reinforced by international developments, such as increased export demand for services. Both trends have proven difficult to influence without incurring high costs as evidenced by past efforts to support ailing industrial export industries (see section 3.3). Policy should therefore acknowledge the central role of services in the Dutch economy and design strategies that enhance productivity within this expanding sector.

5. Support productivity growth in sectors where future demand is increasing

Policy could focus on supporting productivity growth in growing sectors. The structural shifts in the economy that we have discussed above indicate a continued move toward a service-oriented economy. This trend is even more pronounced when the analysis is extended beyond the market economy to include healthcare, which is likely to gain importance in an aging society. Looking ahead, we expect this trend towards a greater role for services to persist, so boosting productivity in those sectors could generate significant gains. This is challenging, but achievable through a more active policy stance. For example, a broader diffusion of digital technologies, like AI, might support productivity growth in services. Government can play an enabling role, by targeted financing, smart procurement and through improved coordination of public and private initiatives. In addition, productivity growth might also be fostered in professional services and finance and insurance through harmonizing and simplifying regulation within the EU (Draghi, 2024).

6. Investment in education remains crucial for long-term and sustainable productivity growth

Investments in core competences like math and reading are key for future productivity growth. Poor reading and math skills reduce labor market prospects of pupils (Quintini, 2014). But the effects are larger as poor core competences hinder the attainment of new, more complex, skills later in life (Cunha et al., 2006). Core competences therefore also affect the effectiveness of lifelong learning. In addition to the direct effect on human capital, education improves the capacity of people to innovate and adopt new innovations and technologies (Hanushek & Woessmann, 2020). While causal relationships are hard to establish, various

studies show that higher student assessment scores are positively associated with GDP growth (Hanushek & Woessmann, 2012). It is therefore key to stop the trend of declining student reading and mathematics skills.

Lifelong learning could support productivity growth in an aging workforce. With lifelong learning, policy makers could help workers to adapt to new technologies and working environments, by providing training opportunities. Adaptability will become increasingly important in a society with more older employees and rapidly changing technologies. It is important to direct efforts at more vulnerable groups that currently have a low uptake of lifelong learning.

7. Directing innovation supports the pursuit of societal goals

Policy can help influence the direction of technological innovation. Steering the direction of innovation can contribute to the government's goals of increasing prosperity in the Netherlands. Importantly, policymakers do not determine the technologies of the future, but can try to ensure that technological advancements contribute to broader societal goals (Acemoglu & Johnson, 2024). The government has various instruments for this at its disposal. First, the government can stimulate innovation through pricing mechanisms. A prominent example is the European emissions trading system, which puts a price on CO2 emissions, stimulating the development of green technologies. Second, the government can promote the setting of standards and prescribe norms, such as the standardization of the GSM network or the European standards for privacy and data management (the GDPR). An extreme variant of regulatory policies is mandating or banning specific technologies. Since 2018, for example, newly built homes in the Netherlands may no longer be connected to the gas network. The government can also stimulate demand for certain technologies through public procurement and by stimulating private demand. A recent example of this is the development of Covid-19 vaccines. Finally, subsidies can promote the development and adoption of certain technologies, such as the Sustainable Energy Production and Climate Transition Incentive Scheme (SDE++), which encourages the production of clean renewable energy by providing subsidies. By strategically shaping the incentives and direction of innovation, the government can ensure that technological progress supports long-term societal and economic objectives.

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5 Appendix

5.1 Additional results

Figure 5.1 International comparison of value-added shares per sector

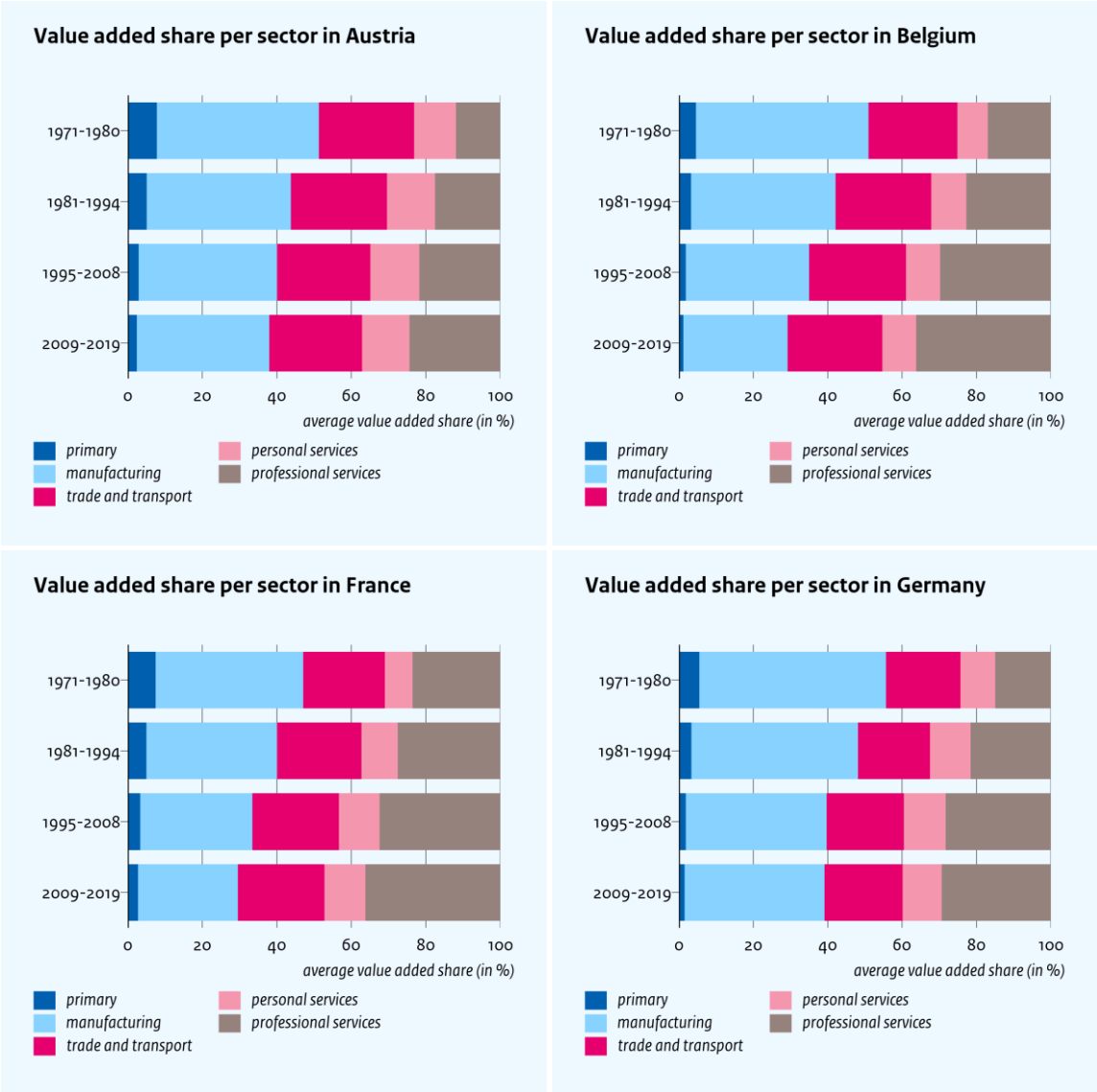

Table 5.1 International comparison of sector productivity

Country	Period	Primary	Manufacturing	Trade and Transport	Personal Services	Professional Services
AUT	1971-1980	16.90	120.42	96.79	188.09	135.13
AUT	1981-1994	16.43	120.96	95.04	155.89	117.13
AUT	1995-2008	19.14	129.76	91.56	117.56	106.69
AUT	2009-2019	27.00	125.59	94.89	92.73	106.46
BEL	1971-1980	25.24	67.65	130.23	132.67	161.18
BEL	1981-1994	33.28	81.97	110.15	115.12	126.28
BEL	1995-2008	43.63	98.98	99.30	102.21	107.64
BEL	2009-2019	43.95	112.51	103.59	89.80	97.03
DEU	1971-1980	43.33	106.82	65.00	152.80	157.86
DEU	1981-1994	49.42	102.37	66.09	127.32	156.63
DEU	1995-2008	48.04	104.49	75.90	97.36	135.76
DEU	2009-2019	56.09	108.34	87.71	83.85	114.87
FRA	1971-1980	24.86	93.62	84.68	156.59	222.72
FRA	1981-1994	35.96	92.44	85.92	130.07	160.34
FRA	1995-2008	44.63	96.55	93.82	108.91	122.83
FRA	2009-2019	52.95	98.73	94.28	91.05	119.03
NLD	1971-1980	83.01	85.32	68.87	192.89	153.72
NLD	1981-1994	104.42	93.16	73.75	129.58	133.52
NLD	1995-2008	108.26	98.44	84.22	95.32	116.51
NLD	2009-2019	95.89	105.43	93.96	71.75	112.15

Note: Labor productivity in levels per sector relative to the aggregate market economy labor productivity level (which is set at 100 for each country, in each period). The primary sector includes NACE Rev. 2 sectors A and B. Manufacturing is C and F, trade and transport G and H, personal services D, E, I, R and S, and professional services J, K, M, N. Based on current prices.
Sources: EU-KLEMS (Bontadini et al., 2023) and own calculations.

5.2 EU-KLEMS data

For our analysis in section 2, we rely on data from EU-KLEMS from 1971 to 2019. We combine two releases of EU KLEMS, as each of them covers different time periods. We start by creating growth rates for all required variables from the 2012 release, covering the period up to 1995. We then take these growth rates, together with variables from the 2012 release that are given in growth rates to extrapolate the values of the same variables in the newer data (the 2025 release) backwards. For each period, we then create a quantity index for value added with prices in the base year of that period by dividing the initial quantity series by the value of this quantity index in the base year, multiplied by the value in current prices of the base year. We then aggregate smaller industries to 5 larger sector groups that are also used in the previous and following analyses, by weighing the value-added by the hours worked share of the sector in the hours worked of the sector group. As before, we only use market sectors in this analysis.

In our growth accounting exercise, we use EU KLEMS data from 1982 to 2019, and rely on Fernand et al (2024) for some data preparation steps. These steps are necessary as the data in the newest KLEMS release only starts in 1995. In addition to the data merging described above, we first generate quantity index series for capital and labor input, which are not as frequently available in the old release than in the new release. We base those series on quantity indices for hours worked and labor composition as well as for tangible and

non-tangible assets. After merging the two data sets by creating growth rates in the old release, we create the growth variables for equation (1) for each variable within each available sector, x as:

$$\Delta \ln x_t = 100 * ln\left(\frac{x_t}{x_{\{t-1\}}}\right).$$

We then aggregate towards the larger sector groups, or the country level, by weighing the series by the sector's labor, capital, or VA-share, averaged over two periods, depending on the respective variable.