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Economic Policy Analysis

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Labour productivity growth in the market sector returned to a normal level of 1% in 2022.

The productivity gap between firms at the productivity frontier and non-frontier firms seems to widen in the Netherlands after 2015.

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Summary

The growth of labour productivity in the market sector returned to a normal level of 1.0% in 2022. Total Factor Productivity growth remained high at 2.2%.

The link between market concentration and aggregate productivity differs between the US and Europe. This result follows from research of Bighelli et al. (2023). For the US a rising market concentration is combined with higher markups and lower allocative efficiency. In contrast, in Europe a rising concentration is associated with stable markups and a more productive business economy. This picture also emerges for the Dutch economy (except for the development of concentration). The finding that Europe seems to suffer less from the adverse consequences of increasing market power has important implications for industrial and competition policy.

Differences in productivity between frontier firms in the top decile and non-frontier firms seem to increase in the Netherlands after 2015. The productivity gap between the top-10% firms and the median firm is 3.8% larger in 2019 than in 2010. In addition, business dynamics contribute differently to productivity growth across the main industries. The fall in labour productivity of manufacturing firms from 2016 to 2019 is mainly attributed to a negative productivity growth within continuing firms. The productivity growth in the trade sector resulted from a favourable reallocation to more productive, continuing firms, whereas new firms mainly contributed to the growth of the services sector.

1 Introduction

The CPB is a National Productivity Board since 2017. This Annual Report summarizes research on productivity developments in the Netherlands.¹ It consists of three parts.

Section 2 summarizes growth accounting results reported by Statistics Netherlands (CBS, 2023). We discuss recent productivity developments and the contributions of the main industries.

In Section 3 we discuss the research of Bighelli et al. (2023). Leading studies on business dynamics and productivity slowdown discuss and explain observations for the US economy. Readers might assume that the main findings can be copy-pasted to European economies. Bighelli et al. (2023) is an example of uncovering a critical difference. Whereas rising concentration harms productivity growth in the US, they show it enhances market efficiency in continental Europe. After briefly summarizing their main findings, we sketch the picture for the Dutch economy.

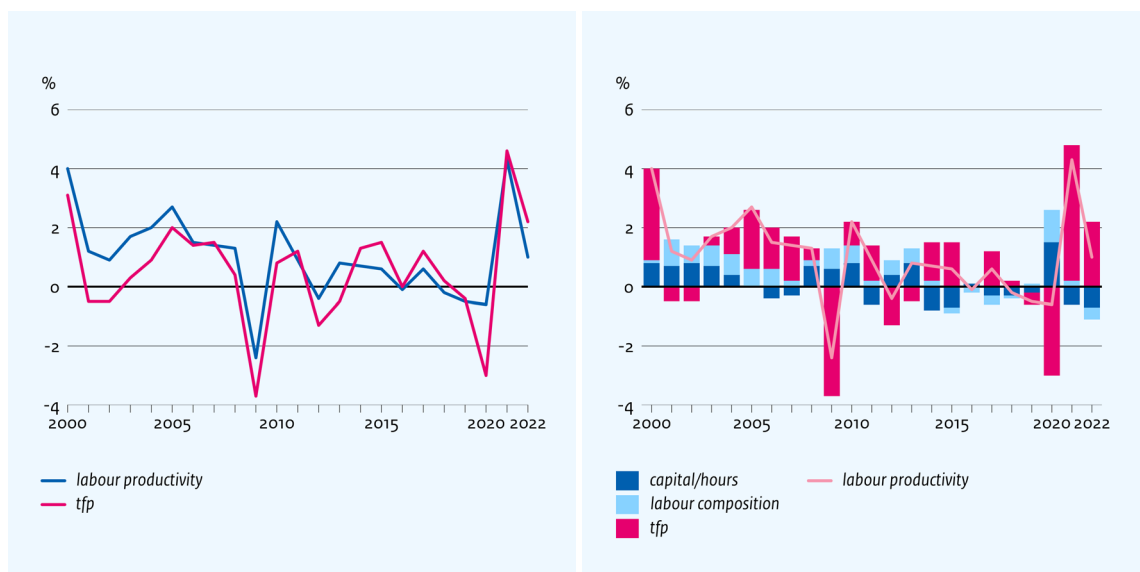
The final section is a contribution by Michael Polder (Statistics Netherlands). He presents recent evidence on firm-level productivity developments using novel datasets currently under development. He first documents that the productivity gap between frontier and non-frontier firms started increasing during the last years, in particular in 2020. Around 90% of the firms at the frontier remain there the year after, while their average size has been decreasing gradually over time. He then shows that the contribution of continuing firms, new firms and exiting firms to productivity growth differ between the main industries.

¹ Our Annual Report of 2021 and 2022 can be found at [annual report 2021](#) and [annual report 2022](#), respectively. The reports of the other NPBs are collected at this [EC-website](#).

2 Productivity developments

The growth of labour productivity in the market sector returned to a normal level of 1.0% in 2022, whereas Total Factor Productivity growth remained high at 2.2%.² Labour productivity in figure 1 (left) is defined as value added per hour worked.³ The decomposition in three parts in figure 1 (right) shows that labour productivity growth mainly results from TFP growth, as the contribution of both capital deepening (-0.7%) and of labour composition (-0.4%) are negative in 2022.⁴

Figure 1 TFP growth remains the main driver of labour productivity growth in the market sector



The two industries that contributed most to the growth of labour productivity are Hospitality (0.5% point) and Renting & other business services (0.5% point). The largest negative contributions are found for the industries Trade (-0.5% point) and Financial institutions (-0.3% point); see CBS (2023).

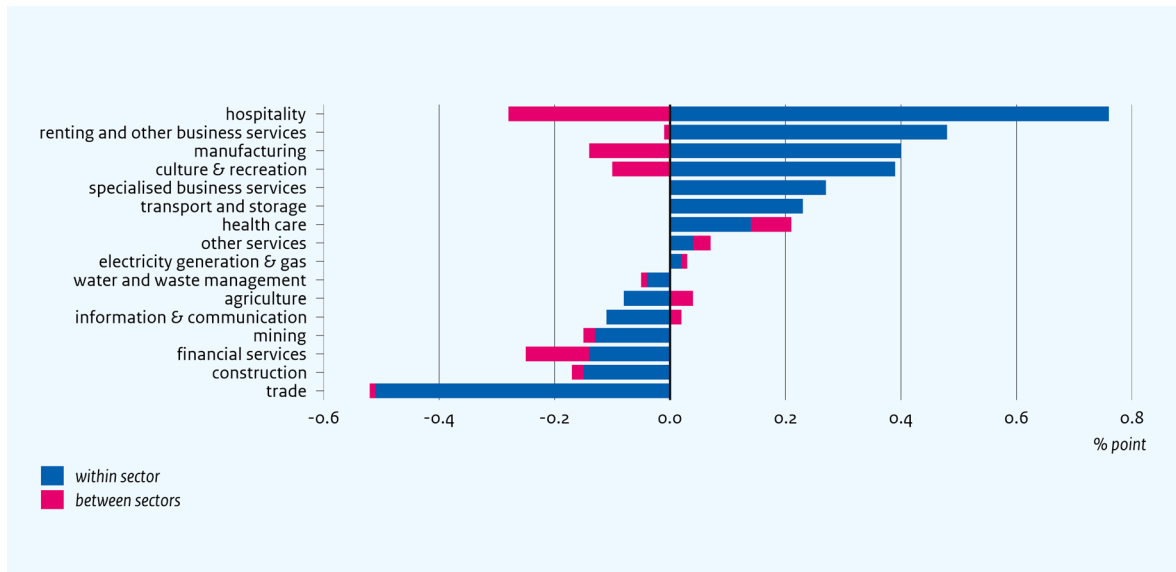
The contribution of each industry is mainly driven by productivity changes within the industry. The contribution of an industry is decomposed into two sources (CBS, 2023). The *within* component is equal to the productivity change within the industry. The *between* (or reallocation) component originates from changes in the share of that industry, measured by hours worked. When a more productive industry expands at the cost of a less productive industry, the reallocation effect on productivity growth is positive. Figure 2 shows that the strong increase of productivity (relative to 2021) within the Hospitality industry is partially undone by a negative reallocation effect. The latter effect results from the combination of an increase in employment and a productivity that is lower than the average productivity of the market sector. The same pattern is found for Manufacturing but the negative reallocation component is due to opposite reasons: the industry is shrinking, while its productivity is above average. A final observation is that both components are negative in the four industries for which productivity decreased most in 2022.

² Compared to an average labour productivity growth and TFP growth of 1.0% and 0.6% in the period 2000-2022, respectively.

³ The market sector includes all sectors, with the exception of the government, education, households and rental & trading of real estate. Growth rates in 2021 and 2022 are still provisional. Source: <https://opendata.cbs.nl/#/CBS/nl/dataset/84546NED/table>.

⁴ We use the identity: $\tilde{Y}_t - \tilde{H}_t = \alpha_t(\tilde{K}_t - \tilde{H}_t) + (1 - \alpha_t)\tilde{C}_t + \tilde{A}_t$, where \tilde{Y} is value added growth, \tilde{H} is growth in hours worked, \tilde{K} is capital growth, \tilde{C} is labour composition growth, \tilde{A} is TFP growth and α is the share of capital costs.

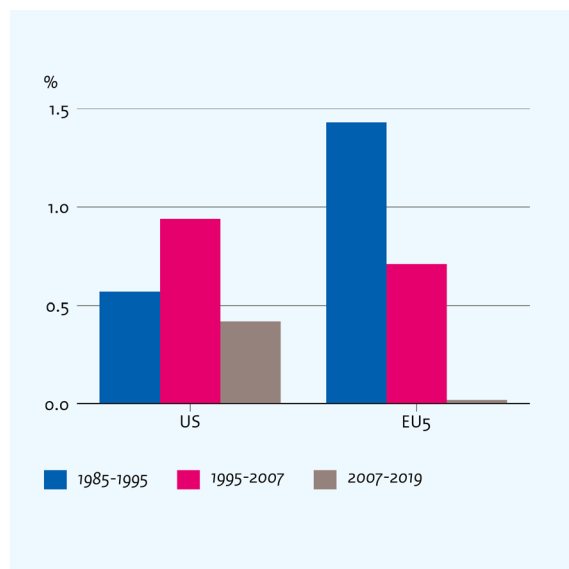
Figure 2 The contributions of industries to aggregate labour productivity growth, 2022



3 Similarities and differences in business dynamics between US and Europe

Not all the stylized facts on business dynamics in the US are observed in the European economies. Akcigit and Ates (2021) list ten stylized facts for the US economy, ranging from the slowdown in productivity growth (fact 1) to the rise in market concentration (fact 10).⁵ The slowdown in productivity growth is a well-known worldwide phenomenon (see figure 3). As in the US, the average market concentration in Europe is rising (Bighelli et al., 2023). This average result hides heterogeneous developments across countries and across industries. First, the result is driven by the increase in Germany, since concentration is decreasing in 10 out of 15 countries. The Netherlands displays a falling trend in concentration (during the period 2007-2017).⁶ Second, concentration in Europe doubled in the manufacturing sector, whereas concentration outside of manufacturing, in particular in the ICT sector, declined by 30%.

Figure 3 TFP growth slows down in US and Europe (per year)



Note: Fernald and Inklaar (2022, table 1B), EU5 include Germany, France, the Netherlands, Belgium, and Finland

Most remarkable is the different development of markups (fact 2). Phillipon (2019) stressed that the decline in US market competition was not matched by the European markets. The product markup, defined as the ratio of the price and the marginal cost, is used as a measure of market power. De Loecker et al. (2020) find a strong rise in average markups in the US, indicating that the rise in concentration was harmful for market competition. In contrast, Bighelli et al. (2023) estimate a stable trend in all 15 European economies, resulting in an increase of the average markup by only one %-point. Their finding that the markup in the Netherlands hardly changed in the period 2007-2016 supports our estimation in van Heuvelen et al. (2021). The different findings on markups reflect a different link between concentration and productivity growth.

⁵ De Loecker et al. (2022, table 2) compare stylized facts in the US and the UK. They conclude that similarities are quite striking.

⁶ Concentration is measured by the HH-index, which is calculated as the sum of the squared market shares of firms. Kingma et al. (2024) find that concentration strongly increased in 2021-2022.

The rise in market concentration in the US is bad for aggregate productivity. A firm can get a competitive advantage by investing initially in innovative products and processes. Once the firm dominates the market, it seeks to reduce competition and create entry barriers, which leads to slower productivity growth (the-winner-takes-all hypothesis). This channel seems to dominate in the US. De Ridder (2024) argues that the rise in intangible capital explains these developments. Since intangible inputs feature a combination of low marginal costs and high fixed costs, they foster the growth of large firms and a lowering of productivity growth.

The rise in market concentration in Europe is good for aggregate productivity. When more productive firms gain market shares at the expense of lower productive firms, the reallocation channel contributes to aggregate productivity growth. In line with the stable markups, Bighelli et al. (2023) find a positive association between concentration, allocative efficiency and productivity in Europe. Half of Europe's productivity growth between 2009 and 2016 results from an increase in allocative efficiency. This finding has important consequences for European industrial and competition policy. Under the condition that Europe manages avoiding the adverse consequences of market power, we need to concern less about the rising concentration.

The picture for the Dutch economy seems similar, except for the development of concentration. The average markup is stable. Market concentration is not increasing as in Germany, and concentration is significantly and positively related to aggregate productivity (Bighelli et al., table 9). These results imply that an increase of the (average) concentration not need to deteriorate the aggregate productivity growth. In the next section we discuss new evidence on the productivity gap between frontier and laggard firms (fact 6) and the contribution of business dynamics to productivity growth (fact 7).

4 Lost in aggregation: some firm-level perspectives on productivity

Michael Polder (Statistics Netherlands)

We present new evidence on the dynamics of firm-level heterogeneity in labour productivity, and the relation between business dynamics and aggregate (industry-level) productivity. Understanding more about heterogeneity and the role of dynamics is essential for understanding aggregate growth. In particular, statistics about the within-industry dispersion in productivity are informative about whether the performance of firms in a particular industry is similar, or whether there are “winners” and “losers”. A stylized fact in the literature is that the latter is the case (e.g. Syverson, 2011): the degree of heterogeneity is pervasive, even within narrowly defined industries. This is indicative for firm-level differences in things such as production technologies and innovation, as well as market frictions (Bartelsman and Wolf, 2018). In addition, productivity differences are found to be closely linked to differences in remuneration of workers (Cunningham et al. 2023). The relevance of business dynamics has already been highlighted in section 3. In short, macroeconomic growth depends in part on creative destruction, through which the least productive firms are driven out of the market, making way for new innovative and more productive firms, as well as reallocation of market shares towards more productive incumbent firms.

Note on data used

We use two experimental datasets on firm-level productivity that are currently under development at Statistics Netherlands. The outcomes presented in this paper should therefore also be regarded as experimental. In addition, due to differences in delineation of the research population, methodological choices (e.g. outlier exclusion), and variable definitions, these figures may not align with official statistics. The first dataset allows analysis of dispersion of productivity, from 2010 onwards. The second dataset is more suited for the analysis of the role of business dynamics, but starts in 2015. In upcoming work the aim is to integrate these lines of work to produce a single dataset suited for both type of analyses.

Productivity dispersion from the great financial crisis to Covid

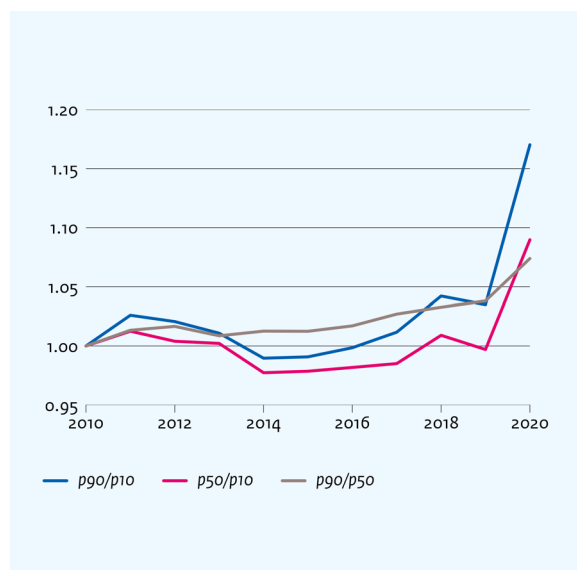
Productivity dispersion is measured by differences between different percentiles of the productivity distribution. In particular, we look at the difference between the annual frontier (top decile), the median, and the bottom decile. Growing dispersion has been documented globally (Andrew et al., 2016), but there is variation across countries (Berlingieri et al., 2017) and over time (e.g. in the case of US manufacturing, Cunningham et al., 2023).

We find an increase in dispersion in the Netherlands in recent years. Van Heuvelen et al. (2018) find no evidence for a growing dispersion in total factor productivity between the frontier and the median in the period 2007-2015. Figure 4 looks at labour productivity for the period since the financial crisis up to and including the first year of the Covid period.⁷ While the resulting picture roughly confirms the stable pattern up to 2014/2015, an increase in dispersion can be detected for more recent years. Especially the top-median gap has been increasing gradually over time with around 0.4% annually, cumulating to a 3.8% larger gap between the frontier and the median in 2019 compared to 2010.

⁷ The picture for total factor productivity looks essentially the same.

The dispersion increased dramatically in 2020. When the economy was hit by the Covid-shock for the first time, especially the bottom decile has endured the largest blow to productivity. Covid-measures such as lockdowns had a negative impact on output in many industries, while at the same time government support allowed many firms to survive and not to shed workers. The upshot of those two developments has been a substantial decrease in aggregate productivity (as shown in figure 1).⁸ Nevertheless, figure 4 shows that this impact has been uneven across the business population, resulting in a productivity spread much higher than in previous years and notably a higher gap for the lowest part of the distribution.

Figure 4 Labour productivity dispersion increases in recent years, business economy, 2010-2020 (2010 = 1)



Note: p90, p50, and p10, refer to respectively 90th percentile, median, and 10th percentile of the productivity distribution. Ratios are expressed relative to the value in 2010. Productivity is measured as real value added over persons employed in full-time equivalents. Percentile deviations are calculated within-industry (NACE Rev. 2, two digit) and year. Only enterprises with 3 or more persons employed and legal personality (corporations) have been included, that are part of the Business Economy (NACE Rev. 2 B-N, excl. K, incl. 95; we also exclude 19 and L). Nominal value added is deflated using National Accounts industry-level deflators. For more on the underlying data, see CBS (2022, Chapter 2).

We find a rather high persistence at the frontier. The group of firms at or off the frontier are redefined each year, and therefore not necessarily the same over time. In fact, van Heuvelen et al. (2018) find substantial dynamics on the top decile of productivity. They report that most dynamics comes from firms entering the frontier group in one year and leaving the next. By contrast, the results in table 1 suggest that persistence is rather high with around 90% of enterprises remaining at the frontier from year to year.⁹

⁸ Of note, the value added measure is at factor cost and includes any wage subsidies received, such as those part of the Covid support measures (NOW). Employment is in full-time equivalents and refers to hours worked according to contract.

⁹ While there are various methodological differences, and more research is needed to investigate the difference in the results, one candidate explanation is that unlike the earlier research, smaller firms (with 2 persons employed and less) have now been excluded. This is a particularly large and highly dynamic group, both in terms of business dynamics and productivity, which dominates the frontier group, and is likely to dominate the degree of dynamics observed as well. Moreover, to improve the ability to follow enterprises over time, we have now adjusted the enterprise identification number whenever possible in case where those numbers change for statistical purposes.

Table 1 Persistence at the productivity frontier is high (fraction of firms that stays in top decile)

	manufacturing	energy and construction	services	trade
%				
2011	89	89	85	87
2019	91	89	87	90
2020	92	90	87	90

The average size of frontier firms has been decreasing gradually over time. Another stylized fact in the productivity literature is that larger firms are on average more productive. Table 2 shows that at the beginning of the period frontier firms are indeed larger on average than non-frontier firms. However, the average size of firms at the frontier has been declining gradually, up to the point where in recent years the size differential has vanished and frontier firms are in fact slightly smaller than non-frontier firms.¹⁰ The fact that frontier firms have become smaller dampens their contribution to both labour demand and productivity. In this light, the results are in line with a decline in allocative efficiency, i.e. the correlation between productivity and firm size (Decker et al., 2017), which can be associated with the macroeconomic productivity slowdown and diminishing labour share.

Table 2 Average size of frontier and non-frontier firms (employment in full-time equivalents)

	non-frontier	frontier
2010	32	38
2011	30	34
2012	30	35
2013	31	35
2014	31	35
2015	31	33
2016	32	34
2017	32	36
2018	33	35
2019	34	33
2020	33	32

¹⁰ We note that frontier firms in the trade sector are smaller on average than their non-frontier counterparts throughout the whole period of analysis.

Industry productivity growth: the contribution of business dynamics

The productivity growth of industries is decomposed into the contribution of continuing enterprises, new firms and those that exit. Productivity growth can be explained by changes in the population (through entry and exit), and changes in the relative size of firms (reallocation of inputs). Table 3 shows a decomposition of labour productivity growth for the period 2016 to 2019. The contribution of continuing enterprises is broken down further into a within component (i.e., the contribution of productivity growth within those firms), and a between component (i.e., the gain in aggregate productivity due to changes in the relative size of enterprises). The contributions of entry and exit are broken down further into those pertaining to actual enterprise birth or deaths, and those that are due to M&A activity, or other reasons (mainly restructures and split-offs).

The contribution of business dynamics differs across sectors. The top panel shows the results for the period 2016-2019. For manufacturing enterprises, we find a decrease in labour productivity of 1.2%, which can be attributed mainly to a decreasing productivity in continuing firms. Enterprises in the trade sector have realized a productivity growth of 1.9%, which is mainly due to a more efficient allocation of labour (i.e., the growth of highly productive enterprises). Services enterprises have a productivity growth of 2.7%, which is due mostly to enterprises that have entered the population for reasons other than birth or M&A (this category refers mainly to reorganizations and restructuring).¹¹

All sectors show a decrease in productivity in 2020, which is driven for the most part by within-firm productivity decreases. While the more efficient allocation of labour offers some counterweight, the contribution of exit is surprisingly low considering the size of the Covid shock (bottom panel). This finding is consistent with existing evidence on low productivity firms having had a higher likelihood of support during the Covid crisis (see e.g. Bettendorf et al., 2021).

Table 3 Decomposition of labour productivity growth differs across industries, 2016-2019 and 2019-2020

	manufacturing	trade	services	energy & construction
<i>A. 2016-2019 (annual growth, %)</i>				
total growth	-1.2	1.9	2.7	-0.1
<i>continuing firms</i>	-1.2	1.4	0.3	-0.5
within	-1.2	-0.5	0.3	-0.1
between	0.0	1.9	0.0	-0.4
<i>new firms</i>	0.2	-0.2	3.1	0.1
enterprise birth	-0.1	-0.1	-0.2	-0.2
new due to M&A	0.1	-0.1	0.1	0.1
new due to other	0.2	0.0	3.2	0.2

¹¹ Of course, considering a period of several years, there is more entry and exit than when looking at annual changes. Therefore, we find that the contributions of entry and exit are relatively large, compared to existing evidence where decompositions refer to annual changes or to contributions averaged across years.

<i>exiting firms</i>	-0.2	0.6	-0.7	0.3
enterprise death	0.2	0.4	0.4	0.3
exit due to M&A	0.0	-0.1	-0.1	0.1
exit due to other	-0.4	0.3	-1.0	-0.1
<i>B. 2019-2020</i>	<i>manufacturing</i>	<i>trade</i>	<i>services</i>	<i>energy & construction</i>
total growth	-4.0	-0.6	-9.5	-1.7
<i>continuing firms</i>	-4.1	-0.6	9.9	-1.7
within	-4.4	-1.5	-11.3	-2.3
between	0.3	0.9	1.4	0.6
<i>new firms</i>	0.0	-0.1	0.0	0.0
enterprise birth	0.0	-0.1	0.0	0.0
new due to M&A	0.0	0.0	0.1	0.0
new due to other	0.0	0.0	-0.1	0.0
<i>exiting firms</i>	0.1	0.1	0.4	0.0
enterprise death	0.0	0.2	0.0	0.0
exit due to M&A	0.0	0.0	0.0	-0.1
exit due to other	0.1	-0.1	0.4	0.1

Note: Productivity is measured as real value added over persons employed in full-time equivalents. Percentile deviations are calculated within-industry (NACE Rev. 2, two digit) and year. Only enterprises with 3 or more persons employed and legal personality have been included, that are part of the Business Economy (NACE Rev. 2 B-N, excl. K, incl. 95; we also exclude 19 and L). Nominal value added is deflated using National Accounts industry-level deflators. For more on the underlying data, see CBS (2022; Chapter 2). Enterprises in the top and bottom percentile in either the productivity level or growth distributions have been excluded. The decomposition follows the method suggested by Foster et al. (2001).

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