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National Productivity Board 2022 annual report

The dip in productivity growth in 2020 was followed by a strong recovery in 2021. The recovery can be mostly attributed to productivity growth in the Health care and Manufacturing sectors. The turnover of firms within sectors was unevenly affected in 2020. We find that firms with a higher pre-corona share of teleworkers realized higher turnover growth. The relationship with other measures of digitization is less clear.

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Samenvatting

De dip in de productiviteitsgroei in 2020 is gevolgd door een sterk herstel in 2021. Zoals in de meeste jaren wordt de groei van de arbeidsproductiviteit in 2021 vooral gedreven door de groei van de Totale Factor Productiviteit (TFP). Het herstel is vooral toe te schrijven aan de productiviteitsgroei in de bedrijfstakken gezondheidszorg en industrie. Bedrijfstakken met een hoge gemiddelde TFP-groei in de periode 1996-2021 worden gekenmerkt door zowel een hoge exportintensiteit als een hoge r&d-intensiteit.

We vinden dat digitalisering mogelijk heeft bijgedragen aan het snelle omzetherstel van succesvolle bedrijven in 2020. Dit eerste speciale thema is gebaseerd op Freeman en Bettendorf (2023). De constatering dat bedrijven binnen sectoren heel verschillend hebben gepresteerd in 2020, roept de vraag op of bedrijven die meer gedigitaliseerd waren vóór de pandemie een hogere omzetgroei hebben gerealiseerd. We vinden dat de omzet sterker is gestegen voor bedrijven met een groter aandeel telewerkers in 2019. We vinden geen bewijs dat bedrijven met goede startposities door investeringen in ICT en software weerbaarder waren dan andere bedrijven in 2020.

Door het uitgebreide steunpakket in 2020 zijn relatief meer stopzettingen van laagproductieve bedrijven voorkomen. Het tweede speciale thema is gebaseerd op Davies e.a. (2023). Statistieken tonen duidelijk aan dat door de steunmaatregelen meer opheffingen van laagproductieve bedrijven zijn voorkomen dan van hoogproductieve bedrijven. Een meer verfijnde analyse houdt rekening met de bevinding dat niet-levensvatbare bedrijven minder vaak steun hebben ontvangen dan levensvatbare bedrijven. Ook deze analyse vindt een negatieve relatie tussen het aantal stopzettingen dat voorkomen is en productiviteit. Het steunpakket verminderde dus de productiviteitsgroei door ten minste de stopzetting van minder levensvatbare bedrijven uit te stellen.

Summary

The dip in productivity growth in 2020 was followed by a strong recovery in 2021. As in most years, the growth in labour productivity in 2021 is mainly driven by the growth in Total Factor Productivity (TFP). The recovery can mostly be attributed to productivity growth in the Health care and Manufacturing sectors. Sectors with a high average TFP growth in the period 1996-2021 are characterised by both a high export-intensity and a high R&D-intensity.

We find that digitization may have contributed to the quick recovery of turnover by successful firms in 2020. This first special topic is based on Freeman and Bettendorf (2023). The observation that turnover of firms within sectors is unevenly affected in 2020 raises the question if this is related to measures of their pre-corona digitization. We find the expected, positive relationship between the initial share of teleworking and turnover growth of firms. However, we do not find evidence that firms with good starting positions in ICT and software investments to be more resilient than other companies in 2020.

The extensive support package in 2020 prevented relatively more exits of low-productive firms. We summarize as second special topic the CPB study by Davies et al. (2023). Observations clearly show that support measures have reduced the exit rates of low-productive firms more than of high-productive firms. A more refined analysis takes into account the finding that non-viable firms have received aid less often than viable firms. This analysis also finds a negative relationship between the number of exits prevented and productivity. The support package thus reduced productivity growth by at least postponing the exits of unviable firms.

1 Introduction

The CPB was appointed a National Productivity Board in April 2017. This Annual Report summarizes findings on productivity developments in the Netherlands.¹ It consists of three parts.

Section 2 starts with a description of the development of labour productivity in the years 1996-2021. We summarize growth accounting results reported by Statistics Netherlands (CBS, 2022a).² We use a slightly different decomposition of the labour productivity growth, both at the macro and the sectoral level. The main finding is that labour productivity growth is mainly driven by Total Factor Productivity growth, in particular during the corona pandemic in 2020 and 2021.

In Section 3 we study the claim that the Dutch economy recovered strongly after the dip in the second quarter of 2020 as a result of the high degree of digitization.³ We first document the very heterogeneous growth in turnover of firms within the same sector in 2020. We then estimate the relationship between turnover growth and various measures of digitization. We find that firms with a higher pre-corona share of teleworking are on average associated with a higher turnover growth in 2020.

In the final section we summarize the results by Davies et al. (2023). They estimate the impact of the corona support package for firms on firm dynamics. The refined analysis, applying machine learning techniques, endorses that the support measures prevented more exits of low-productive corporations than of high-productive corporations.

¹ Our Annual Report of 2021 can be found at <u>national-productivity-board-2021-annual-report</u>

² We thank Michael Polder (CBS) for his suggestions.

³ This section is a translation of Freeman and Bettendorf (2023).

2 Productivity developments

The average annual growth of labour productivity in the market sector was low at 1.1% in the period 1996-2021. Labour productivity in Figure 2.1 (left) is defined as value added per hour worked.⁴ The dip in corona-year 2020 (-2%) is similar to the dip in the Great Recession year 2009. The strong recovery of the growth rate in 2021 (2.8%) remains remarkable and needs more research. This recovery can be mostly attributed to the Health care and Manufacturing sectors (CBS, 2022b).

The growth in labour productivity is mainly driven by the growth in Total Factor Productivity (TFP). In Figure 2.1 (right) we show the decomposition of the labour productivity growth in three parts.⁵ TFP growth, at an average rate of 0.6%, mainly drives labour productivity growth. The average contribution of capital deepening (0.1%) and of labour composition (0.4%) are smaller. The contribution of the growth of ICT capital is about three times larger than the contribution of other capital (CBS, 2022a, Figure 1.4.1). We observe in particular that the dip in 2020 and the recovery in 2021 are mostly due to changes in TFP. The slowdown in labour productivity growth due to a slowdown in TFP growth is observed in many OECD countries (Fernald et al., 2023).



Figure 2.1 Growth in labour productivity in market sector is driven by TFP growth

Labour productivity growth can be attributed to TFP growth for most of the sectors, but average TFP

growth rates vary across the sectors. The largest average TFP growth in Figure 2.2 is found for the sector Information & communication (2.3%). Manufacturing and Trade are the two largest sectors, as measured by total value added. TFP growth of both sectors is above average (1.7% and 1.6%, respectively), which contributes to the aggregate productivity growth. Data are also available for subsectors within manufacturing. TFP has grown on average the most for the subsectors Telecommunications (5.2%), Manufacture of petroleum products (4.9%) and Pharmaceutics (4.3%).⁶ In contrast, the largest reduction in TFP growth is found for the sector Mining & quarrying (-3.1%). The strong fall in the gas production attenuates its negative contribution to

 $^{^4}$ The market sector includes all sectors, with the exception of the government, education, households and rental \mathcal{E} trading of real estate.

⁵ 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.

⁶ Source: https://opendata.cbs.nl/statline/#/CBS/en/dataset/84546ENG/table?dl=87E46.

aggregate TFP growth. A large and growing sector is the health care sector. Its small but negative TFP growth (- 0.2%) has depressed aggregate productivity growth. These figures raise the question why productivity has developed differently between sectors.



Figure 2.2 Average productivity growth in sectors (1996-2021)

Sectors with a higher TFP growth are export-intensive and R&D-intensive. CBS (2022a) documents that the average TFP growth of a sector is associated with a larger share of exports in its sales. Figure 2.3 illustrates the positive relationship between the average TFP growth and the export intensity. One notable exception is the sector Mining & quarrying, which features a negative TFP growth and an export intensity above 50%. A positive relationship implies that aggregate productivity growth is associated with a larger international exposure. A second characteristic is the R&D intensity, defined as the ratio of the R&D capital stock to output. Manufacturing (sub)industries that are more productive relative to the total manufacturing sector have a relatively high average R&D intensity (CBS, 2022a, Figure 1.4.6). Findings on both relationships are supported when firm-level data are used (CBS, 2022a, chapters 2-5).



Figure 2.3 Average TFP growth is larger in sectors with a higher export intensity (1996-2021)

Growth in aggregate productivity is dominated by growth within sectors. Aggregate growth of the market sector can have two sources. First, a growing average productivity *within* sectors. Second, a reallocation of inputs *between* sectors, like workers moving from low-productive to high-productive sectors. CBS (2022a, Figure 1.5.2) reports that the within component outweighs the between component.⁷ Bun and de Winter (2022a) find that the non-optimal allocation of capital and labour between firms within a sector has considerably harmed productivity growth. This misallocation of capital and labour has strongly increased after 2000 and 2013, respectively. In an update (2022b), they show a worsening of the allocation of in particular labour in 2020, likely as a result of the extensive support package (see also the discussion in Section 4).

⁷ Freeman et al. (2021) and CBS (2022a, chapter 3) discuss a decomposition analysis with firm-level data.

3 Digitization partly increased turnover in corona year 2020

The Dutch economy in general, and successful companies in particular, recovered quickly after the dip in the second quarter of 2020. The advanced digitization is often suggested as one of the explanations (Ambrosio, 2022; D'Adamo et al., 2021). For example, the Netherlands was the European leader in teleworking from 2015 to 2020 (Eurostat, 2023). Flexible companies could respond to lockdowns by selling more online and by facilitating teleworking. We examine the question: Have digital technologies contributed to corporate resilience?

We observe that companies in the same sector have performed very differently after the shocks and policy responses during the corona crisis. We measure company performance with turnover growth in 2020 compared to 2019. We consider companies that have managed to at least maintain their turnover to be more resilient than companies that have not achieved this.

Digitization may have played an important role in the resilience of companies in 2020. Comin et al. (2022) show for companies in Brazil, Vietnam and Senegal that there is a positive relationship between adoption of digital technologies before 2020 and turnover growth during 2020. In addition, Bai et al. (2021) indicate for the US that listed companies with existing ICT and teleworking facilities achieved a higher turnover in 2020. Groenewegen et al. (2021) find that companies with a higher management score had a higher digital turnover.

The analysis consists of two parts. We first illustrate with descriptive statistics the substantial differences in business performance in 2020, between and within sectors. We then relate company performance to various measures of their pre-corona digitization. We use this to analyse whether companies that were more digitized have achieved higher turnover growth in 2020.

3.1 Uneven sales growth

Sectors have been unevenly affected. We use annual firm-level data to calculate turnover growth in 2020. For this we use Statistics Netherlands turnover data that includes all companies in the market sector (except the financial sector). As is well known, sectors have been unevenly affected by the consequences of the corona pandemic and government measures such as lockdowns. The turnover of business services and catering has been hit hardest, as can be seen at the bottom of Figure 3.1 (see also CBS (2021) and Adema et al. (2021)). At the top of Figure 3.1 we see the sectors that have performed relatively well, in particular agriculture and construction.

Turnover of firms within sectors is unevenly affected. In Figure 3.1 we illustrate the heterogeneity in firm turnover with the spread between the 25th and 75th percentile. Even in many severely affected (service) sectors, there are companies that have achieved strong turnover growth. Heterogeneity has grown especially in business services. Many companies performed worse in 2020 (blue lines) than in 2019 (pink lines), but the top of the distribution has barely shrunk or even increased.



Figure 3.1 Turnover change, moments of the distribution of companies: 25th, 50th (median) and 75th percentile

Blue lines are for 2020, the pink lines for 2019.

Differences in developments in firm heterogeneity become sharper when we look at the distribution as a whole. In Figure 3.2 we compare the distribution of turnover growth in 2020 (blue) with that in 2019 (pink) of four sectors. In 2019, the mode (the peak of the distribution) for all these sectors was at or near zero percent. In 2020, the mode has shifted strongly to the left for the hardest hit sectors, such as cafes and restaurants (top left) and passenger transport (top right). This indicates, as Figure 3.1 already showed, that most companies in these sectors did worse in 2020. While the distribution for passenger transport shifts almost uniformly, we observe an increase in the spread for restaurants and cafés in Figure 3.2: the peak of the distribution is lower and the tails have become wider. We also see an increase in heterogeneity for the retail sector (bottom right), but without the shift in the distribution. So there is an increase in both companies that have done worse and in companies that have done better. Finally, in manufacturing (bottom left) the distribution has remained (relatively) stable.





Each vertical bar represents the share (vertical axis) of companies with the matching turnover growth class (horizontal axis) in 2020 (blue) and 2019 (pink). The peak on the far left in each figure are companies that still existed in (part of) 2020, but did not generate any turnover for the entire year (-100%).

3.2 Digitization and turnover growth

Estimation approach

We estimate the relationship between turnover growth in 2020 and the starting position of digital technologies. For this we use various measures of digital technologies, based on business surveys by Statistics Netherlands. Specifically, we analyse the investment shares of ICT and software, the share of teleworkers, and the share of digital turnover (from web/app sales). Since this data comes from different surveys, the number of companies in each analysis is different. The number of companies surveyed each year is relatively small. We therefore combine data for the years 2017 to 2019 in the analysis. This means that, for example, the share of

software investments is equal to the value in one of these years, or an average, if a company is surveyed in several years.⁸

We expect a positive relationship between the starting positions of the four different digital measures and turnover growth:

(1) The initial share of teleworkers is an indication of the ability of companies to switch to teleworking.
Companies with teleworking experience were able to continue to operate during the lockdown. We expect that this has contributed to higher turnover growth for these companies than other companies (Bai et al., 2021).
(2) With the share of digital turnover, we measure the extent to which companies already had the infrastructure and knowledge to sell online. We expect this to have contributed to turnover in 2020 as reduced physical sales were more easily offset by online sales (Andrews et al., 2021).

(3) ICT and (4) software investments are broader measures of companies' digital development. We expect these to have contributed to turnover growth because companies are more flexible in communication, both between employees and with external parties such as suppliers (Comin et al., 2022).

In the regressions we control for a number of characteristics that may influence the relationship. We use a series of simple OLS regressions that relate a single digital measure to turnover growth. In addition, we always control for company age, size, and the share of flex workers. We find that turnover growth is, on average, higher for larger companies and for younger companies. The relationship with flexible work differs across the regressions. We report the simplest regression because the results are robust to additional control variables (such as a tax deferral indicator) and sector fixed effects. These additions have no significant impact on our results. The estimated relationship should not be interpreted as a causality; see Comin et al. (2022) for a similar regression analysis and the appendix of Freeman and Bettendorf (2023) for more details.

In Figure 3.3 we show the regression results, each point represents the standardized regression coefficient and the horizontal lines show 95% confidence intervals. Each line represents a separate regression. The coefficients can be interpreted as the change in turnover growth (in percentage points, on the horizontal axis) that is associated with a change in the measure of a digital technology of one standard deviation. For example, companies with a standard deviation higher share of teleworkers had an average of about 4 percentage points higher turnover growth in 2020.

⁸ See table 5.1 in the appendix of Freeman and Bettendorf (2023) for numbers of observations per indicator.

Figure 3.3 Regression results digitization and turnover growth



Sample with (1) all companies; (2) companies with turnover increase in 2020 and (3) companies with turnover decrease in 2020 (each point is a separate regression). All regressions were run with control for company age, size and the share of flexible workers.

We split the sample to see if the effects differ between high and low performing companies. The effects in the full sample may hide heterogeneity; digitization can have different effects on companies with an increase in turnover in 2020 and companies with a decrease in turnover in 2020. Both subgroups comprise roughly half of the companies.

One caveat to the results is that the current study does not account for the role of support policy. Government support plays an important role in the performance of companies in 2020 (Freeman et al., 2021). However, the design of the support policy poses an endogeneity problem in this analysis as the support was conditional on the (expected) turnover. It is therefore a challenge to correctly estimate the relationship between the realized turnover growth and the government support.

Results **Figure 3.3 shows that the starting positions of the digital technologies are related to turnover growth in different ways.** For all digitization indicators, the coefficient within the group with turnover losses is small and accurately estimated. This is because the degree of digitization is limited within this group.

We find the expected, positive relationship between the share of teleworking and turnover growth of companies. Companies with existing teleworking facilities have therefore proved more resilient during the first phase of the corona pandemic. These results do not prove a causal relationship, but it is plausible that these companies were able to build a teleworking capacity faster and more efficiently. As a result, growing companies have been able to generate even more turnover. The effect for the group with reduced turnover is zero, because teleworking was simply not possible for these companies or because these companies were not able to make good use of this option.

We do not find evidence that companies with good starting positions in ICT and software investments to be more resilient than other companies in 2020. This follows from the quite low economic and statistical significance in the estimated relationship with turnover (coefficient and standard error are small). This may indicate that existing investments in ICT and software have not provided additional protection to companies against the specific shock in 2020. It is also possible that this measure concerns spending that is too broad and we should look for more specific investments, such as teleworking, and/or complementarities with different characteristics (see also Cathles et al., 2020).

The share of digital sales is strongly related to turnover growth, but the uncertain estimates point to great heterogeneity of this effect. Here we also see a large difference between the estimates for the two groups of firms. It is quite possible that a group of companies has benefited greatly from expanded digital sales options, where this was not possible for others. More research is needed to further identify these different groups and their changing market shares, see also IMF (2021).

3.3 Conclusion

The turnover growth has become more heterogenous between companies in 2020. This illustrates that many companies have had a hard time during the corona crisis, but not all companies. Our results show that there are also companies that have limited the decline in turnover, or even increased turnover in 2020. We show that companies with a good starting position in teleworking more often belonged to the latter group and performed better. It is possible that this contributed to a relatively successful recovery of companies in the Netherlands. The contribution of other digital technologies is harder to assess with the current data.

Our results provide inspiration for further research. Here we use turnover growth as an indicator of the resilience of companies. This does not provide a useful indication of business performance in all cases. Turnover growth is a weak indicator of resilience if it is accompanied by (passed-on) cost increases. Future research can therefore study different measures of resilience, such as profitability and employment.

Analyses with broader datasets look also promising. Information at a more detailed sector level can provide more insight into the heterogeneous outcomes. With the current survey data, we can only look at specific sectors in a limited way. With broader data sets, more sector-specific dynamics can be captured, which may explain the heterogeneity found. In addition, gains can be made from an international perspective. A comparison between countries could strengthen the analysis by adding a broader set of companies in different contexts.

4 The impact of COVID-19 support on firm exits

Davies et al. (2023) apply machine learning techniques to predict the exit rate of corporations in 2020 by means of variables observed before 2020. Firms with a low predicted exit rate are considered viable firms in the absence of the pandemic. These results are used to elaborate on the question whether the extensive support has harmed the cleansing process by reducing the exit rate of low-productive firms more than that of high-productive firms.

Support measures have reduced the exit rates of low-productive firms more than of high-productive firms. We start by showing what the raw observations tell us about this issue. Figure 4.1 presents the relationship between firm exits prevented by support in 2020 and labour productivity classes in 2019 (in 20 equal sized groups). The unadjusted number of prevented exits (given by the blue bars) is computed as the difference in observed exit rates between firms using support and firms not using support, multiplied by the number of firms using support. Support is found to have prevented more exits of low-productive firms (see also Freeman et al., 2021).



Figure 4.1 The COVID-19 support measures in 2020 mainly prevented exit of low-productivity firms

Source: Figure 7(a) in Davies et al. (2023)

Correcting for selection effects does not change the basic finding. The finding on observed exit rates might suffer from a selection bias. The authors indeed find that the take-up rate of any support measure in 2020 is moderately falling in the predicted exit rate. A fraction of 30% of firms, which were predicted to leave the market in 2020 had COVID-19 not occurred, received some sort of support, against a fraction of 40% for firms which were expected to survive. The raw number of prevented exits is corrected for this selection effect, by subtracting the difference in predicted exit rates between both groups. As a result of the adjustment, the number of prevented exits falls for each productivity vigintile (see pink bars). Support measures lowered total exits by about 16%, or 1199 firm exits were prevented (this is equivalent to 637 firms with average labour productivity). Since the number of prevented exits still falls with initial productivity, the study supports the

conjecture that the support package has reduced productivity growth by at least postponing the exits of unviable firms.⁹

⁹ The same analysis is applied to study the tax deferrals due to the corona crisis. Corporations that have a higher predicted bankruptcy rate are found to have a higher outstanding tax debt. As a consequence, the study assesses that 4% to 7% of the total outstanding debt will be held by exiting firms (CPB, 2023).

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