

# Belgian firms and the COVID-19 crisis

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## Introduction

Around Mid-March 2020 the Belgian government announced strict lockdown measures to contain the first wave of the COVID-19 pandemic<sup>1</sup>. The totally unprecedented situation had a serious impact on businesses, with stringent health measures, disruption of working conditions, and some activities being forced to close. Firms also encountered a decline in demand from both consumers and businesses, and problems in obtaining goods from their suppliers. Overall, it was an unprecedented shock. Since then, periods of declining infection rates accompanied by the lifting of restrictions have alternated with new waves of infection when measures were imposed<sup>2</sup>.

The economic literature comprises several contributions analysing the aggregate impact of the pandemic on various aspects: activity (Barro *et al.*, 2020), value chains (Baldwin and Evenett, 2020, Antràs *et al.*, 2020) and consumption habits (Andersen *et al.*, 2020, Goolsbee and Syverson, 2020)<sup>3</sup>. For Belgium, Coppens *et al.* (2021) describe the situation and trends in Belgium one year after the crisis. However, to the best of our knowledge, there are few descriptive analyses of the situation of individual firms during the COVID-19 crisis. Alfaro *et al.* (2020) analyse the impact on the stock market value of companies. Tielens *et al.* (2020) focus on the liquidity and solvency of Belgian firms during the first two waves of the pandemic. The regular release of the survey conducted by Economic Risk Management Group on a small sample of Belgian firms and self-employed provided already some early but limited and mostly qualitative information about the situation of those firms during the crisis. The purpose of this article is to supplement the existing literature by documenting the heterogeneity of firms' individual situations during the epidemic using data covering the entire population of Belgian non-financial corporations<sup>4</sup>.

For the twelve-month period from 1 April 2020 to 31 March 2021 – defined in this article as the crisis period<sup>5</sup> – the value added of the non-financial corporations' sector declined by 8% compared to 2019<sup>6</sup>. However, that figure conceals very considerable disparities between firms, as they did not all suffer losses, and those that did

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1 The strict rules allowed only a few critical sectors (e.g. agriculture, food manufacturing and distribution, and the health sector) to operate. In other sectors, activity was either closed (e.g. hospitality, cultural and recreational services, education, personal care services) or, where feasible, working from home became compulsory. People movements were severely constrained and limited to what was strictly necessary.

2 See Wikipedia "COVID-19 pandemic in Belgium" for a detailed description of the measures.

3 There is also an extensive literature on the impact of COVID-19 on the labour market (see the many publications by COVID Economics).

4 According to P. Eavis and N. Chokshi, the situation of businesses during the crisis is extremely heterogeneous. See "While the Pandemic Wrecked Some Businesses, Others Did Fine. Even Great", *The New-York Times*, 9/11.

5 The choice of the crisis period is arbitrary and dictated by circumstances. In fact, the crisis started earlier and did not end in March 2021. We do not include March 2020 in the crisis period since that month was only partially affected by restrictions. Furthermore, as some data are only available quarterly, that would have forced us to include the whole of the first quarter of 2020 in the crisis period. We terminate the crisis period on 31 March 2021 because of data availability, as some data on the situation in the first two quarters of 2021 were still missing when this article was written. The choice of a twelve-month period also facilitates the analysis by neutralizing seasonal effects.

6 Provisional figures as at 22/7/2021 (source: NAI).

were not all affected to the same degree. While it is easy to see that a hotel, hairdressing salon or cultural venue was in a much less favourable position than a pharmaceutical company, it is less clear that within a specific activity – such as the restaurant trade – some firms experienced a dramatic fall in turnover while others saw only a small decline, and some recorded increased business.

To provide a comprehensive review of the situation, we use the sales figures in the VAT returns of around 470,000 non-financial corporations (see Appendix A1 for a description of the data). Sales include all domestic and international sales<sup>1</sup>. The population of firms we consider in this paper exclusively covers non-financial corporations. Self-employed workers, non-profit institutions, financial corporations and the public sector are therefore excluded from our analysis. Our population of firms covers almost all branches of activity in the economy<sup>2</sup>, from agriculture to personal services, and includes manufacturing industry, construction, trade and business services. Only a few branches, such as financial services, education, public administration and health care<sup>3</sup>, are excluded from our analysis.

Over the one-year period from 1 April 2020 to 31 March 2021, just over half of firms suffered a drop in turnover compared to 2019. Based on these figures, the immediate conclusion might be that the crisis drove those firms into the red. That is not entirely true. We can assume that, even if 2020 had been a normal year, some of those firms would have seen their turnover decline in any case. It is obviously impossible to know what would have happened without the COVID-19 epidemic. What we can do is to compare the exceptional crisis situation with the situation in a normal year without any major shock.

Based on such a comparison, we can state that the crisis generated more disparity in firms' performance than in normal times. For a quarter of firms – the best performers – their performance during the COVID-19 crisis was comparable to that of the best firms in a normal year. But for three-quarters of firms, sales performance deteriorated, sometimes very sharply. That is the first stylised fact in our analysis.

This article expresses the disparities between firms via eight other stylised facts that illustrate various aspects of the crisis. Thus, we find that:

- Compared to the 2008-2009 financial crisis, the health crisis had a greater adverse impact on a larger percentage of firms (fact #2)
- The economic repercussions were most severe during the first wave of infections, and the situation in the first quarter of 2021 was mixed: over a quarter of firms were still struggling, while the very good performers were doing well (fact #3)
- Accommodation and food service activities, arts and entertainment, and personal services were the sectors recording the weakest performance, and it was firms in the subsectors subject to the most stringent restrictions on activity that suffered the most (fact #4)
- Firm size had little effect on the median performance level. Conversely, there was much greater disparity among small firms (fact #5)
- There is little difference in firms' performance between the Belgian regions, provinces and districts, although Brussels suffered more and there is greater disparity in the more densely populated districts (fact #6)
- Firms' investment does not appear to have been affected (fact #7).

An 8<sup>th</sup> stylised fact concerns firms' economic health. If we compare the sales figures with the variable costs, we obtain a mixed picture. 48 % of firms were in the green zone, with sales rising by more than their variable costs during the crisis period. In contrast, 36 % of firms were in the orange zone with a margin which was still positive despite the disproportionate increase in variable costs. Finally, 16 % of firms were in the red with a disproportionate increase in variable costs and a negative margin at the end of the crisis period.

1 It's worth noting that, when evaluating the financial situation of a firm during the crisis, we do not take into account any federal or regional support that it may have received.

2 Our population of firms covers around 1,775,000 workers.

3 In these branches of activity, business is not accurately reflected in VAT sales.

To conclude the analysis, a 9<sup>th</sup> and final stylised fact explains the performance of firms in terms of economic or geographical factors. Unsurprisingly, the sector of activity is a key factor explaining performance. The geographical dimension and firm size had less impact. In addition, we estimate that the shock hitting their suppliers or customers was partly passed on to firms. These explanatory factors are significant, and their impact is substantial in quantitative terms.

## Firms during the health crisis: 9 stylised facts

**Fact #1. The crisis generated greater disparity in firms' performance. For a quarter of firms – those recording the strongest sales growth – performance during the COVID-19 crisis was comparable with the performance of the best firms in a normal year. But for almost three-quarters of firms, sales performance was weaker, with sometimes very substantial reductions.**

As stated in the introduction, not all firms suffered a fall in their turnover: the average figure for the economy according to the macroeconomic statistics in fact conceals diverse situations. If we compare the period from April 2020 to March 2021 with the 2019 period, we find that 55 % of firms recorded a decline in sales, while 45 % saw their sales increase. By going into more detail in the analysis, we find that 25 % recorded extreme turnover losses (more than 33 %), 19 % suffered substantial losses (between 10 % and 33 %) and 12 % experienced smaller losses (less than 10 %).

This first finding might make us jump to the conclusion that the COVID-19 crisis penalised 55 % of firms and benefited the other 45 %. That is not the case<sup>1</sup>. Every year, some firms manage to increase their sales while others record a decline. The crucial question here is to establish what percentage of firms suffered a decline in their business which would not have occurred in the absence of any health crisis. Obviously, such an exercise is surrounded by great uncertainty. On the other hand, we can compare firms' performance during this year of the health crisis with the performance of firms in a normal year.

In a normal year<sup>2</sup> – when there was no major crisis – we find that 45 % of firms experience a loss of turnover. That leads us to our first finding. The percentage of firms suffering a loss of turnover increased from 45 % in a normal situation to 55 % during a health crisis. Overall, we can estimate that 10 % of firms recorded a loss of turnover which they would probably not have suffered in a normal situation.

Chart 1 compares the distribution of turnover growth rates in a crisis year (blue curve) and in a normal situation (red curve). It gives a detailed description of the situation, showing the proportion of firms concerned for each variation in turnover. A first finding is that the crisis increased the disparity in performance between firms. In normal times, the curve is much closer to its average and the probability of recording extreme growth rates – in either direction – is much smaller.

On the right-hand side of the chart, the two curves are superimposed: the good performance achieved by about a quarter of firms – the ones recording the strongest growth – was comparable to the good performance of the best firms in a normal year. Conversely, about three-quarters of firms clearly performed less well than in a normal year. During the crisis there was in fact a much larger number of firms recording decidedly negative growth rates (left-hand zone of the chart), whereas in normal times they would record weak to moderate growth rates (central zone of the chart). To sum up, a large proportion of firms recorded weaker performance than in normal times, and the reductions are sometimes very substantial.

1 In many instances, firms have received support from the federal and regional authorities. This is beyond the scope of this paper.

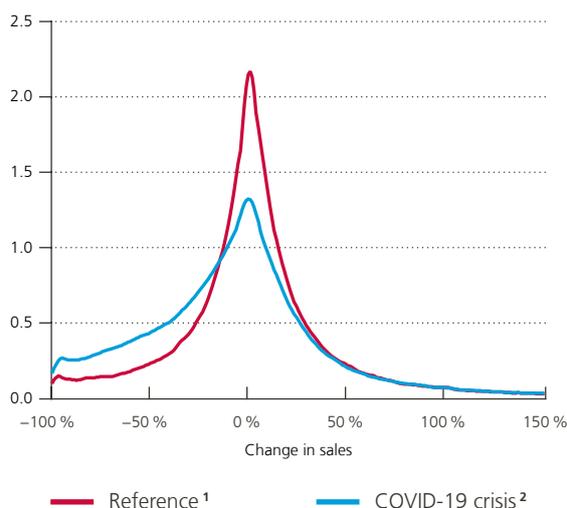
2 We take our reference year as 2019. It is preferable to use a reference year which is as recent as possible to ensure that the economic fabric is the same as that in the crisis year.

To provide a simple illustration of this shift, we can rank the firms in order of performance and select five pivot firms: the very good performer, the good performer, the median performer, the weak performer and the very weak performer<sup>1</sup>. The idea is to compare the performance of these pivot firms in a normal year with that of the corresponding pivot firms in a crisis year. We are not talking about the same firms. We are comparing different firms that share the same ranking.

## Chart 1

### Performance of firms compared to the reference situation

(distribution of the change in sales, density)



Source: NBB calculations.

1 2019 period compared to 2018 period.

2 Period from April 2020 to March 2021 compared to the 2019 period.

Note: For clarity of presentation, the distributions are truncated at +150%.

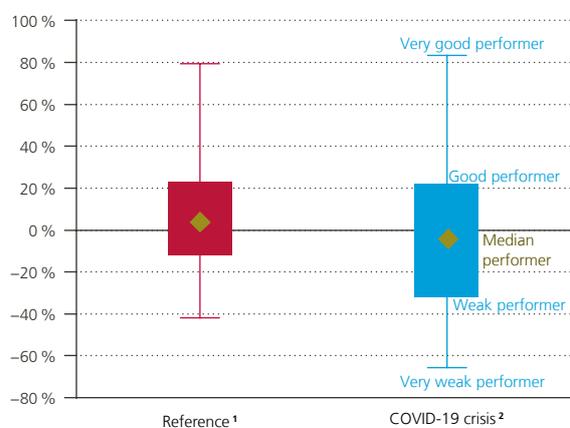
What can we conclude from comparing the performance of firms in a health crisis with that in a normal situation? In the case of good and very good firms, the performance is comparable with that in a reference year, with turnover up by around 20% and 80% respectively. Conversely, the performance of the other pivot firms falls short of that of their peers in normal times. The median firm recorded a 4% decline in its turnover, compared to a rise of 2% in the reference period. The weak and very weak performers recorded losses of 33% and 66% in the crisis period, compared to losses of 13% and 42% for corresponding firms in the reference period, i.e. a reduction of more than 20 percentage points.

1 These pivot firms correspond respectively to p10, p25, p50, p75 and p90 of the distribution. Firm p10 is a very weak performer because it does better than 10% of firms and worse than 90% of firms. Firm p25 is a weak performer, because it does better than 25% of firms and worse than 75% of firms. Firm p50 is the median firm which does better than half of the firms and worse than the other half. Finally, the good and very good performers are firms p75 and p90 respectively. We would point out that other pivot values also make sense, such as p1, p5, p95 and p99, for example. We chose a small number of pivot values arbitrarily by excluding extreme values.

## Chart 2

### Performance of pivot firms compared to the reference situation

(change in sales)



Source: NBB calculations.

1 2019 period compared to the 2018 period.

2 Period from April 2020 to March 2021 compared to the 2019 period.

### Fact #2. Compared to the 2008-2009 financial crisis, the health crisis had a greater adverse impact on a larger percentage of firms

A comparison with the 2008-2009 financial crisis is useful for establishing the scale of the economic repercussions of the health crisis. Admittedly, the two crises are very different: one is a health issue, the other was due to severe economic and financial imbalances symbolised by the collapse of Lehman Brothers bank. They also differ in terms of developments over time. While the scale of the health crisis shock was unprecedented outside of the two world wars, the economy nevertheless displayed great resilience in the subsequent quarters and began to return to a degree of normality as soon as the stringent measures were lifted, at least for many sectors of activity. In the case of the financial crisis, the initial shock was smaller, even though it was already exceptional in terms of economic history. However, the financial and economic imbalances which came to light in October 2008 took some time to disappear, particularly in Europe. In addition, the sectors affected are also very different in the two crises. In the case of a classic economic crisis, including the financial crisis, it is generally industry that reacts most strongly to the economic cycle. In contrast, the specific nature of the health crisis implied a greater impact on services, where social contacts predominate.

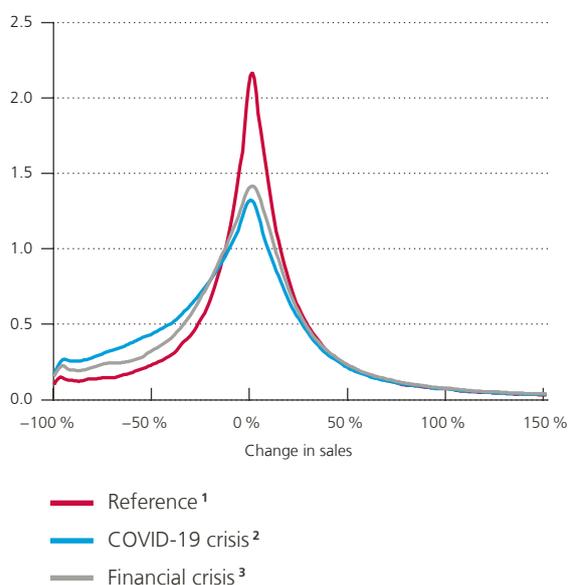
Comparison of the first twelve months following the eruption of each crisis<sup>1</sup> shows a relatively similar general picture for the growth rate distributions (see chart 3). However, we do find some differences which reflect the exceptional nature of the health crisis. During the financial crisis, 50% of firms recorded a decline in turnover, compared to 55% in the COVID-19 crisis, i.e. a 5 percentage point difference. The main difference is seen in the left-hand part of the distribution, where the growth rates are very negative. We find 6% more firms here during the health crisis than during the financial crisis. An exceptionally large number of firms therefore recorded very sharp decline in their turnover.

1 To compare these two crises, we consider the first twelve months of each crisis, namely April 2020 to March 2021 for the health crisis and October 2008 to September 2009 for the financial crisis. And we compare sales during these twelve months with the sales figures for the latest preceding year (2019 and 2007 respectively). By taking the whole of the preceding year instead of the previous twelve months we avoid pre-crisis periods which may already be partly affected, notably via exports or imports concerning regions already affected by the crisis.

Chart 3

### Performance of firms compared to the 2008-2009 financial crisis

(distribution of the change in sales, density)



Source: NBB calculations.

1 2019 period compared to the 2018 period.

2 Period from April 2020 to March 2021 compared to the 2019 period.

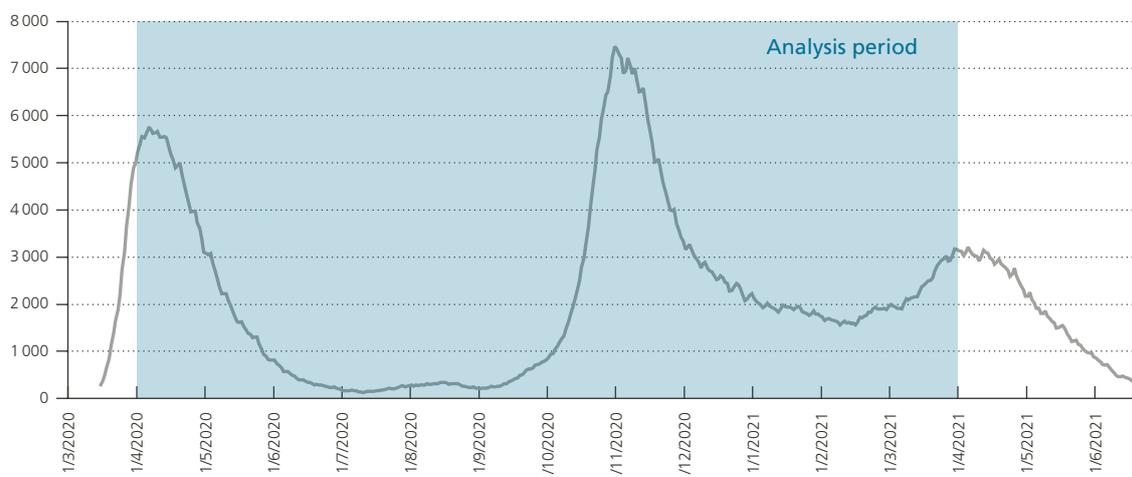
3 Period from October 2008 to September 2009 compared to the 2007 period.

Note: For clarity of presentation, the distributions are truncated at +150%.

**Fact #3.** The economic repercussions of the COVID-19 crisis were most severe during the first wave, particularly in april 2020. The situation in the first quarter of 2021 was mixed: over a quarter of firms were still struggling, while the very good performers were doing well.

Chart 4

### Number of COVID-19 hospitalisations in Belgium



Source: Sciensano.

In April, but also to a lesser degree in March and May, a very large majority of firms suffered a deterioration in their performance compared to a normal situation (see chart 5). In April 2020, the median firm recorded a 27 % decline in its sales (compared to April 2019). Some firms were seriously affected: weak performers recorded a decline of 65 % and very weak performers saw a decline of 89 %. Even among the good performers, the situation was not favourable. Very good performers achieved only 61 % turnover growth. Although that may seem a lot, it is actually very little since very good performers generally achieve growth rates more than 100 %.

The second wave of the epidemic in November 2020 had fewer economic repercussions than the first one, whereas it was no less serious in health terms (see chart 4). The measures for firms were no longer as drastic as those in force during the first lockdown. Many firms were able to continue their activities, even though health measures applicable to workers or customers remained in force. For example, industry and construction adapted to the situation by introducing health protocols. Trade also adapted, with the introduction of systems such as click and collect, online sales, etc.

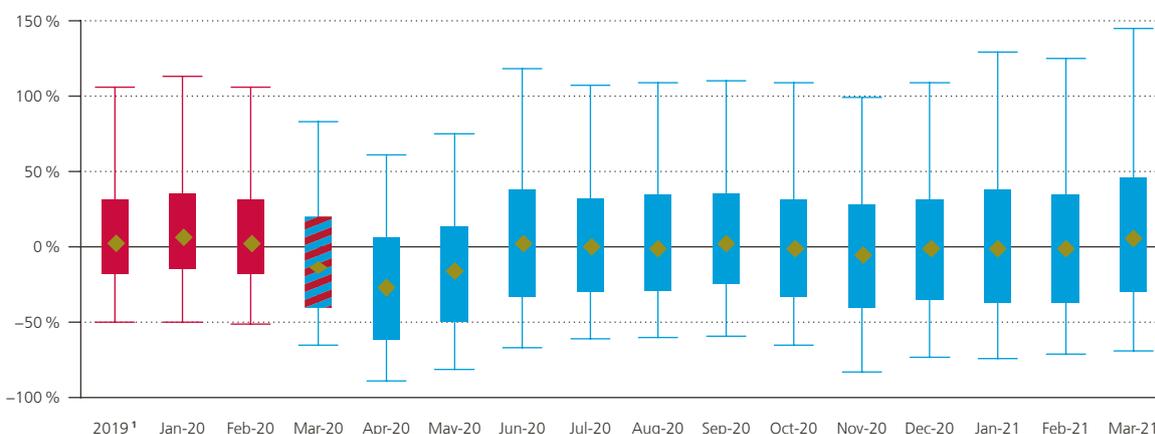
Very soon – in fact, by June 2020 – the good and very good performers regained growth rates in line with a normal situation. More than a quarter of firms managed to prosper, and they form a group that gained from the COVID-19 crisis.

In contrast, other firms suffered throughout the crisis year, performing less well than in a normal situation. The weak and very weak performers recorded a poorer performance than in normal times in each of the twelve months following the outbreak of the health crisis. The losers resulting from the COVID-19 crisis are found in certain specific sectors. That is the subject of the next stylised fact.

## Chart 5

### Firms' performance month by month

(change in sales compared to the corresponding month in 2019)



Source: NBB calculations.

<sup>1</sup> Compared to 2018.

**Fact #4. Accommodation and food, arts and entertainment, and personal services recorded the weakest performance. It was firms in the subsectors subject to the most stringent restrictions on activity that suffered the most. On average, it is estimated that each day of restricted activity reduced turnover by 0.26 %.**

To contain the pandemic, the government took several measures, notably to limit contact between people. The service sectors where social contact is at the heart of the business model, such as accommodation and food, arts and entertainment, and the contact professions, were subjected to the toughest restrictions. It is therefore unsurprising that these are the sectors where we find the firms recording the poorest performance. All firms in these sectors were affected, because even good performers recorded low growth rates compared to good performers in other sectors.

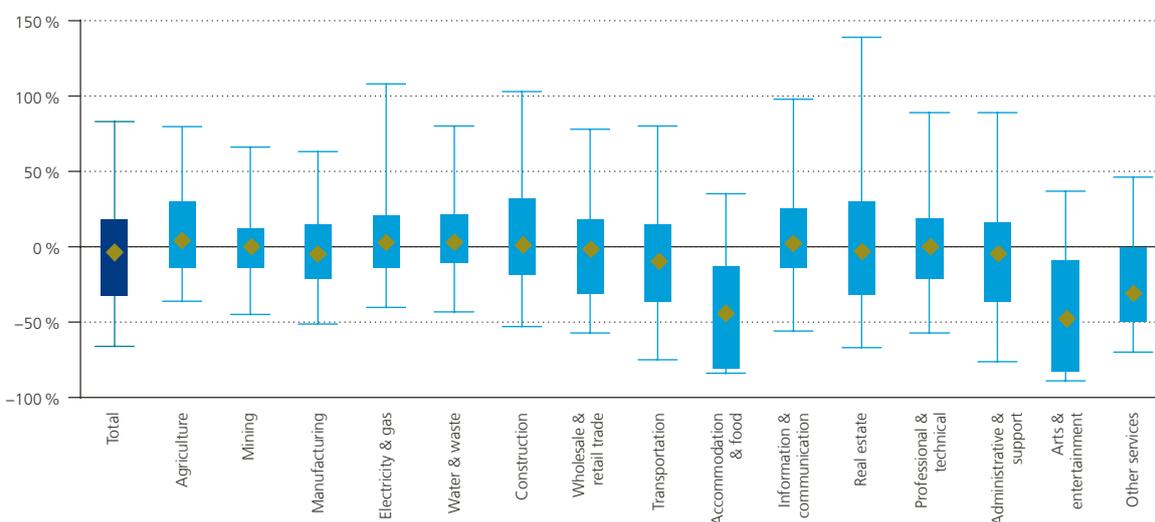
In contrast, firms in other sectors were in a better position. In real estate, energy, construction or information and communication, firms recorded relatively high turnover growth.

Finally, the picture is mixed in some sectors. In trade, some sub-branches of activity had some firms performing well (food retailers, for example), while the great majority of firms in other subsectors recorded weak to modest turnover growth (particularly “non-essential” retailers).

Chart 6

### Performance of firms by branch of activity

(change in sales<sup>1</sup>)



Source: NBB calculations.

1 Period from April 2020 to March 2021 compared to the 2019 period of the corresponding branch.

Firms' performance was evidently influenced by the measures imposed on their sector of activity. For instance, we can establish a close link between the number of days of restricted activity for a sector and the performance of the median firm in that sector<sup>1</sup>. Chart 7 shows this link for all the subsectors affected by the health restrictions. Unsurprisingly, we find firms performing very poorly in the hardest hit subsectors (such as air passenger transport, discotheques and dance halls, the organisation of trade fairs and conferences, baths, saunas and solariums).

We estimate that, on average, each day of (complete or partial<sup>2</sup>) restrictions on activity reduced turnover by 0.26%<sup>3</sup>, i.e. a 2.6% reduction in turnover for 10 days of restrictions, or a 26% decline over 100 days.

1 The choice of the median firm is arbitrary, but the link does not depend on that choice. There is still a close link with the performance of any other pivot firm (p10, p25, p75 or p90).

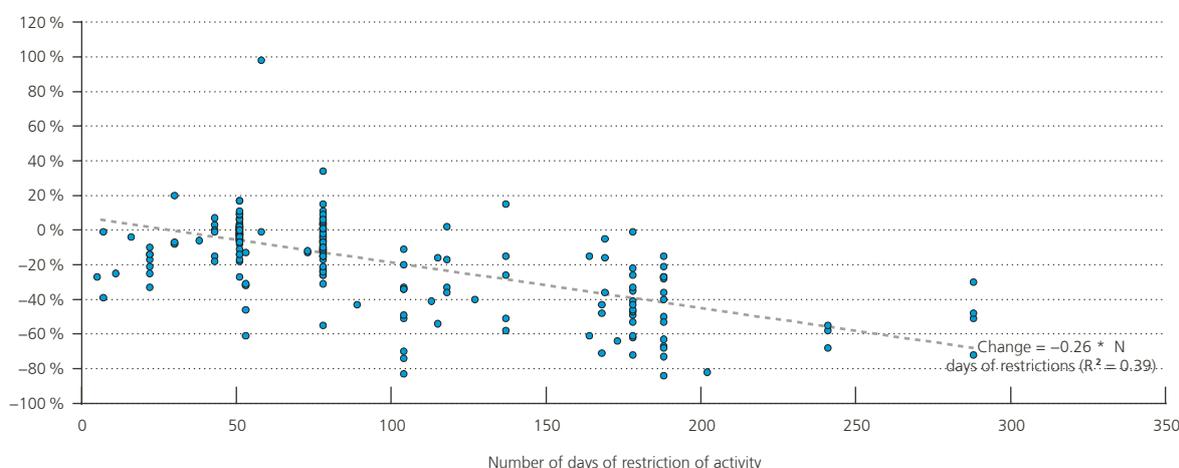
2 For example, nightclubs had to close permanently during the crisis, while restaurants had to close but could still offer take-away services, which is considered here as partial closure.

3 This figure is provided by the coefficient of the variable “number of days of restricted activity” in the regression on the change in turnover.

## Chart 7

### Link between firms' performance and restriction of activity

(change in sales of the median firm in the subsector of activity<sup>1</sup>)



Sources: Federal Public Service Economy and NBB calculations.

<sup>1</sup> Period from April 2020 to March 2021 compared to the 2019 period.

Note: the subsectors are defined at a very detailed level (5-digit code), i.e. about a thousand subsectors. The number of days of restrictions is computed at the NACE 5-digit level based on detailed information provided by the Federal Public Service Economy. It covers both full closure and partial restrictions of activities.

### Fact #5. Firm size had little effect on the median performance level. Conversely, there was much greater disparity among small firms.

Did small firms suffer more than large ones? Chart 8 shows that, in fact, the performance of the median firms is very comparable across the various size classes<sup>1</sup>. The median change in turnover in the group of small firms is very similar to that for large firms.

While size does not strongly affect the median performance, it does affect disparity. Among large firms, the performance gap between very good and very weak performers was narrow. Among small firms<sup>2</sup> we find some recording an excellent performance but also some performing very badly. Thus, conditionally to record losses, small firms suffered the most. Small firms are therefore over-represented in the extreme performance zones – both very good and very weak. In other words, the situation was much riskier for small firms than for large firms. This result is not specific to crisis time. In a normal year, small firms also display higher disparity in their performance. But it turns out that disparity among small firms was greater during the COVID-19 crisis than usual.

As we have seen in the previous stylised fact, firms in the service sectors such as accommodation and food, arts and entertainment, and the contact professions, suffered the most. Even though these firms are on average small, we find no significant relationship between size and performance. The reason behind this result is that firms in these sectors represent a tiny share of all small firms (see Table 3 in appendix). Most small firms belong to construction or wholesale and retail trade, two sectors that performed relatively well during the crisis.

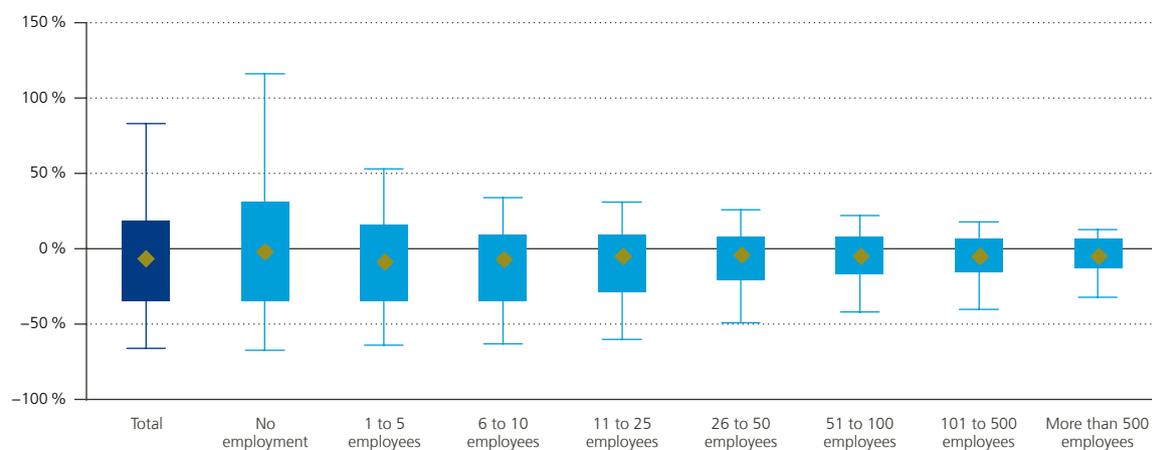
<sup>1</sup> We use employment in 2019 as a measure of firm size. The result does not depend on that choice, and other measures of firm size (sales, value added, etc.) produce the same result.

<sup>2</sup> Even though we exclude self-employed workers from our analysis, many firms have no employment. This size category includes either legal entities created by one or more self-employed workers to operate their business, or legal entities that are part of a group of firms and operate without any employee. For instance, SNCB, Infrabel and HR Rail are three legal entities of the Belgian railways group. In this group, all workers are recorded in HR Rail, so that SNCB and Infrabel have no employment.

Chart 8

**Performance of firms by firm size**

(change in sales<sup>1</sup>)



Source: NBB calculations.

1 Period from April 2020 to March 2021 compared to the 2019 period of the corresponding group.

**Fact #6. There is little difference in firms' performance between the Belgian regions, provinces and districts, although it can be said that Brussels suffered more and there is greater disparity in the more densely populated districts.**

Chart 9

**Performance of firms by province**

(change in sales<sup>1</sup>)



Source: NBB calculations.

1 Period from April 2020 to March 2021 compared to the 2019 period of the corresponding geographical area.

Note: This chart takes account of multi-establishment firms and does not attribute the firm's performance solely to the firm's headquarters (see Annex A1 on the data).

The health crisis has affected all businesses in Belgium because the measures were often imposed nationwide. Should we therefore expect geographical divergences? The simple answer is: not really. The difference between regions or provinces is very small. Firms in the Flemish provinces tend to perform slightly better, but the difference is not very robust (see chart 9). The Brussels Region is a rather special case. The performance of firms there is poorer than in the rest of the country. There is also greater disparity in Brussels. In this region the proportion of firms recording more extreme results – i.e. highly positive or highly negative changes in turnover – was larger than elsewhere.

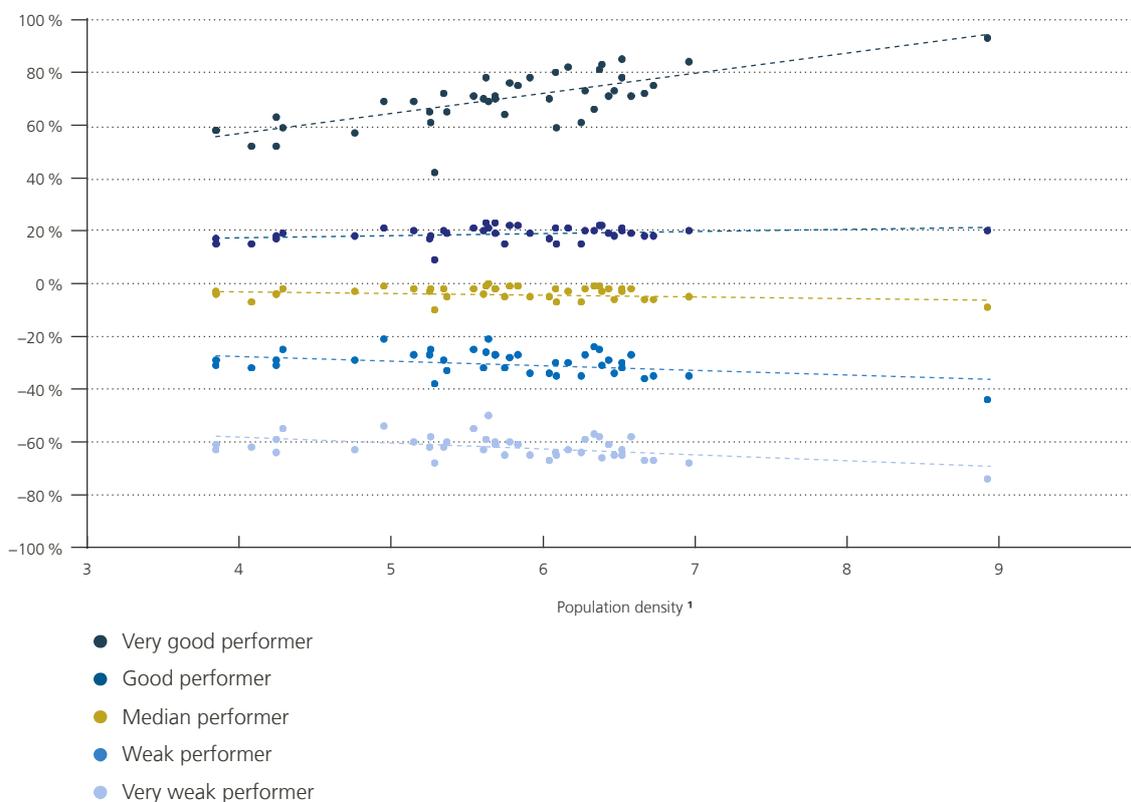
There are indications of a fall in the number of tourists and commuters in large cities, especially in Brussels. Can we generalise this finding and state that firms in urban centres have experienced less favourable situations than those located in rural areas? It is difficult to answer this question without an analysis in very fine geographical detail, which is beyond the scope of this article. On the other hand, we can explore the link between firms' performance and variations in population density among the Belgium's 43 administrative districts.

This comparison tells us that population density has little influence on the median firm's performance (see chart 10). As in the case of results per province, the median performance is similar from one district to another. Here, too, the difference between districts concerns the size of the disparity. The difference between good and weak performers is greater in the most densely populated districts, such as Brussels, but also Antwerp or Charleroi.

### Chart 10

#### Link between firms' performance and population density

(change in sales, data per district)



Source: NBB calculations.

1 Density as a logarithm.

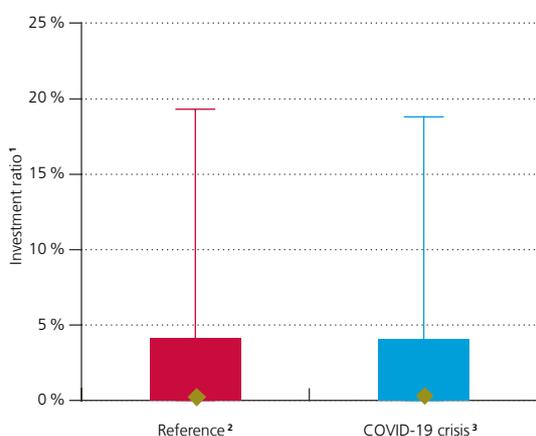
### Fact #7. Firms' investment has been practically unaffected.

In times of crisis, firms might tend to reduce their investments. The uncertainty might drive some of them to delay their plans, or access to funding sources might dry up for a while. On the other hand, firms might count on the shock being temporary so that it does not cast doubt on their plans for the future. Which story is right?

An initial investment analysis indicates that the distribution of the investment ratio, defined here as the ratio of investment to sales<sup>1</sup>, changed very little during the crisis year<sup>2</sup>. It is true that weak and very weak investors – like practically half of all firms – did not invest. But that happens every year. The median investor firm invested a fairly small amount, as was the case in the reference year. And in the crisis year, good investors recorded an investment ratio similar to that in the reference year. Only the major investors seem to have spent slightly less than major investors in the reference year, but the difference is small. This might still have an effect on total investment in the economy, as a few large investments account for a very large share of total investment.

### Chart 11

#### Firms' investment



Source: NBB calculations.

1 The investment ratio for a period is defined as investment in that period divided by sales in 2019.

2 2019 period compared to the 2018 period.

3 Period from April 2020 to March 2021 compared to the 2019 period.

**Fact #8. We obtain a mixed picture if we compare the change in firms' sales with the change in their variable costs. 48% Of firms were in the green zone, with sales rising by more than their variable costs during the crisis period. In contrast, 36% of firms were in the orange zone with a margin which was still positive despite the disproportionate increase in variable costs during the crisis. Finally, 16% of firms were in the red zone with a disproportionate increase in variable costs and a negative margin at the end of the crisis period.**

1 We use 2019 sales figures because the aim is to focus exclusively on the numerator (investment) and not the denominator (sales) because the crisis affected sales, as demonstrated by the preceding stylised facts. In other words, we use investment in the crisis period divided by sales in 2019 for the crisis year, and investment in 2019 divided by sales in 2019 for the reference year.

2 If investment has been quantitatively unaffected, survey evidence (ERMG) points to a qualitative change in investment as firms reported a change in the type of investment they made during the crisis compared to the pre-crisis period.

In this section, we look at sales and variable costs. Did firms adjust their input purchases and wage bill in line with the change in their sales? After covering their variable costs, were firms left with a smaller margin during the crisis period? This section aims to provide some of the answers<sup>1</sup>.

In general, firms modified their input purchases, i.e. the goods and services bought from other firms and used for their sales output. However, that adjustment was very imperfect. Some firms stepped up their purchases by more than the increase in their sales. In general, firms which recorded substantial sales growth were not always the ones also recording large increases in their input purchases. The same applies in the case of firms' whose sales declined.

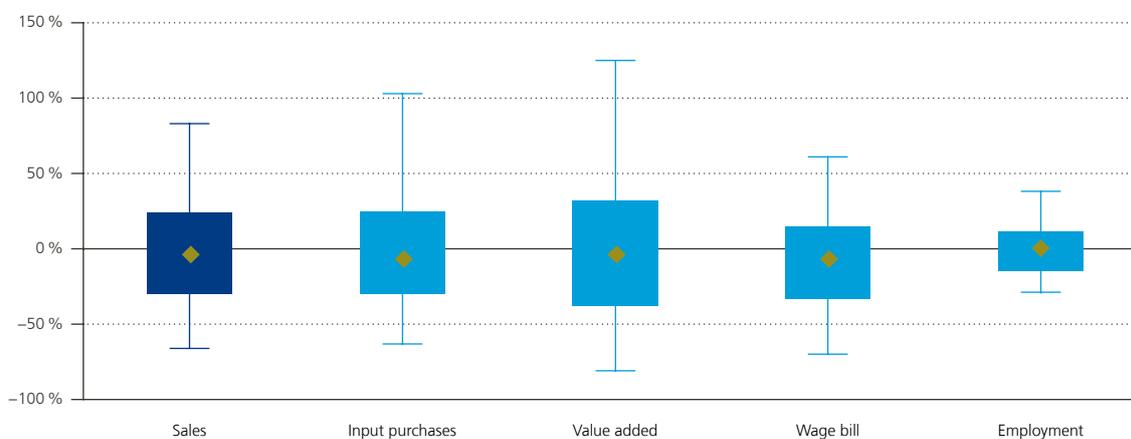
The imperfect adjustment between the change in sales and the change in purchases sometimes caused a significant shock to value added, defined as sales minus input purchases. The disparity between firms in terms of value added therefore increased during the crisis period, and the gap between good and weak performers widened. The picture is therefore mixed. On the one hand, some firms prospered, recording a rise in their value added which was substantial in some cases. In contrast, other firms recorded a decline in their value added, and in some instances that decline was dramatic. We find more firms in these two extreme situations in the crisis period than in a normal year (see chart 12).

Value added remunerates workers in particular. In our population of firms, around a third of firms have employees<sup>2</sup>. Overall, these firms adjusted their wage bill, notably by resorting to temporary layoffs. This scheme enabled firms to cut their labour costs without necessarily having to dismiss staff.

## Chart 12

### Input purchases, wage bill, employment and value added

(change during the COVID-19 crisis period compared to 2019)



Source: NBB calculations.

How did sales growth compare to the movement in variable costs, which include input purchases and wages? Here, too, the situation is more heterogeneous than in a normal year (see chart 13), resulting in a mixed picture.

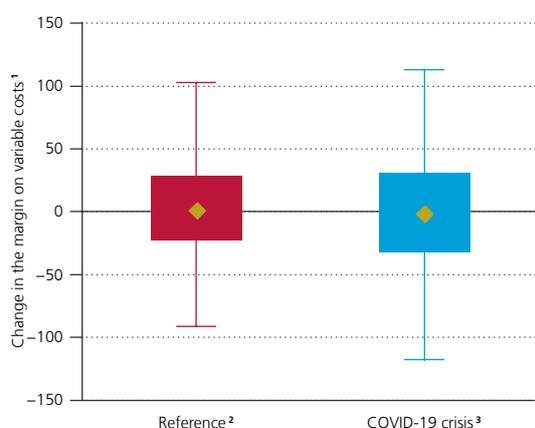
<sup>1</sup> It's worth noting that, when evaluating the margin of a firm, we do not take into account any federal or regional support that it may have received.

<sup>2</sup> See the discussion on firms with no employment in stylised fact #5.

On the one hand, 48% of firms recorded a change in sales which was more favourable than the change in their variable costs. While some of them had recorded a positive margin in 2019 (38 % of firms) and others a negative margin in 2019 (10 %), they all saw their position improve. On the other hand, for 52 % of firms, sales therefore grew by less than their variable costs, which means that their margin on variable costs became smaller. For 36 % of firms the margin on variable costs remained positive, even though it diminished. Conversely, 16 % of firms recorded a negative margin on variable costs at the end of the crisis period. A significant proportion of firms are therefore in a precarious position. Some of these firms had already recorded a negative margin in 2019 (5 % of firms), while others saw their position deteriorate from a positive margin in 2019 to a negative margin in the crisis period (11 % of firms).

Chart 13

### Margin on variable costs



Source: NBB calculations.

1 The margin on variable costs is equal to sales minus input purchases and wages. In € thousand.

2 2019 period compared to the 2018 period.

3 Period from April 2020 to March 2021 compared to the 2019 period.

**Fact #9. The sector of activity is a key factor explaining performance. Conversely, the geographical dimension and firm size had less effect on performance. Furthermore, it is estimated that the shock suffered by their suppliers or customers was partly passed on to firms. These explanatory factors are significant and they have a major quantitative impact. Nonetheless, all these variables still leave a substantial part of firms' performance unexplained.**

Stylised facts #1 to #6 analysed firms' sales performance by exploring various dimensions such as the sector of activity, firm size or geography. These dimensions were explored one by one. In this section, we try to pinpoint the decisive factors among these various dimensions. In other words, what were the determinants explaining firms' performance?

Table 1

**Explanatory power of the branch of activity, geography and size for firms' performance**

(results of regressions of the change in sales)

Variables	Sector	Municipality	Size	Sector + municipality + size	Sector # municipality # size
	(1)	(2)	(3)	(4)	(5)
<b>COVID-19 crisis</b>					
Observations	246 924	246 924	246 924	246 924	246 924
R-squared	0.055	0.006	0.004	0.060	0.226
<b>Reference</b>					
Observations	234 854	234 854	234 854	234 854	234 854
R-squared	0.010	0.003	0.005	0.017	0.189

Source: NBB calculations.

The subsector of activity<sup>1</sup> is undoubtedly a decisive factor (column 1 in table 1). The R<sup>2</sup> of the regression in fact indicates that this variable on its own explains just over 5 % of the change in firms' sales during the COVID-19 crisis. Conversely, as stated in stylised facts #4 and #5, the municipality<sup>2</sup> or firm size had much less influence on performance, as illustrated by their much lower R<sup>2</sup> (columns 2 and 3 in the table).

Does the combination of the three explanatory variables<sup>3</sup> account for the disparity in firms' performance? The answer is yes, but only partly. With the subsector of activity, the municipality of establishment and the size of each firm we can explain 23 % of the observed change in performance. That therefore leaves a large part of the sales shock unexplained. This is not at all unusual, though. In a normal year, these three explanatory variables are not able to explain more than 19 % of the observed variation. Interestingly, the subsector variable has much less explanatory power in reference year. The subsector of activity played a larger role during the crisis, as common shocks within subsector were much higher during the COVID-19 crisis compared to a normal year.

The health crisis and the restrictions on activity did not only affect the firms, they also affected branches of activity upstream (suppliers) or downstream (business customers). For example, take the situation of a restaurant which had to close. How big an impact had the closure of that restaurant on its suppliers or its customers? In general, how were the shocks transmitted via business-to-business relations?

To answer this question, we analysed the impact on firms of the average shock affecting their customers and suppliers<sup>4</sup>. The results are set out in table 2. In the final specification (column 6), we find that almost a quarter of the shock affecting their suppliers and almost half of that affecting their customers was transmitted to the firms. In other words, if the suppliers' sales declined by 10 %, the sales of the firm (the customer of those suppliers) declined by 2.5 %. And the effect was a 4.4 % fall in sales in the case of a 10 % fall in customers' sales. These effects are significant and confirm that a shock can spread throughout all branches of activity, even

1 The subsector of activity is defined at the most detailed level possible, i.e. the 5-digit level. There are about 800 subsectors in this exercise.

2 There are about 600 municipalities in this exercise.

3 Adding the three variables together does not change the quality of the regression, whereas combining the three variables greatly improves the R<sup>2</sup> of the regression. The reason is that the scale of the explanatory power increases exponentially if we switch from a set of 800 subsectors of activity to a set of around 50,000 possible combinations of the three variables. The adjusted R<sup>2</sup> which is not included in the table is smaller with the combination of the three variables than with only the branch of activity variable. That indicates that it is the multiplication of the explanatory variables that explains the improvement in the R<sup>2</sup> when the variables are combined.

4 All the customers and suppliers of each firm were identified based on the "customer declarations" for VAT, stating all the B2B customers of each VAT-registered firm. On that basis it is possible to identify not only each firm's business customers but also all its suppliers. Since the customer declaration for 2020 is not fully available, the exercise was carried out using the 2019 customer records as the reference.

those whose activity was never restricted (e.g. the supermarket sector or agriculture). A firm immune to the restrictions on activity may have suffered shocks indirectly via its suppliers or customers. In the end, if not all firms suffered a negative impact, the reason is that certain clusters were well protected, notably those in which firms recorded increased sales.

**Table 2**

**Transmission of shocks via suppliers and customers**

(results of regressions on the change in sales)

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Supplier shocks	0.103*** (0.003)		0.077*** (0.003)	0.293*** (0.017)		0.255*** (0.017)
Customer shock		0.226*** (0.004)	0.197*** (0.004)		0.516*** (0.017)	0.439*** (0.017)
Sector # municipality # size FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	246 924	246 924	246 924	246 924	246 924	246 924
R-squared	0.274	0.245	0.251			

Source: NBB calculations.

Note: All regressions include a constant and a fixed sector # municipality # size class effect. The supplier (customer) shock is the weighted change in supplier (customer) sales, weighted by the input share (revenue share) of each supplier (customer) in 2019. Only suppliers and customers meeting the necessary conditions for inclusion in our population of firms are considered here (see Annex A1 for details of these conditions). For customers, this means in particular that only business customers, not private consumers, are included. The first three columns present the OLS results. Since shocks affecting a firm's sales have repercussions on the performance of its suppliers or customers, it was necessary to use instrumental variables to control this endogeneity problem. For that purpose, the change in the sales of each supplier  $j$  of firm  $i$  was instrumented by the average change in the sales of the supplier's sector of activity  $s_j$ , excluding the contribution of supplier  $j$  to sectoral growth, those of the other suppliers or customers connected with firm  $i$  belonging to that sector  $s_j$  and that of firm  $i$  itself if it is also part of sector  $s_j$ . The IV results are presented in the last three columns. Since our sample is restricted to non-financial corporations, the coverage of the B2B transactions considered in this exercise varies from one firm to another and may be fairly low for some observations. To allow for that, we weight each individual observation by the share in B2B transactions of the firm covered by our sample. The unweighted regression results are set out in Annex A2. Standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ).

Overall, the “sector of activity – municipality of establishment – firm size” combination partly explains the performance of firms. In addition, shocks are also transmitted through the trading relations that firms maintain with their customers and suppliers. However, all these factors together only account for part of firms’ performance. We can thus argue that some firms responded or adapted better than others even though they share the same economic and geographical characteristics.

## Conclusion

This article aimed to explore the contrasting situation of firms faced with the COVID-19 crisis. The approach was to analyse performance in a crisis year – defined as the 12 months from 1 April 2020 to 31 March 2021 – and to compare it with performance in a normal year.

The main finding is that the crisis widened the performance gaps between firms. On the one hand, a proportion of firms – admittedly a minority – prospered, and equalled or even sometimes surpassed the performance that might have been expected of good performers in a normal year. Conversely, other firms suffered. The proportion of struggling firms was abnormally high, and the decline in their sales was abnormally steep. These weak performers are concentrated more in the branches of activity most affected by the restrictions and in small businesses.

In terms of economic policy, the diversity of situations is an argument in favour of specific targeted support. At the peak of the crisis, during the first wave of the epidemic, there was every justification for providing massive unconditional support to all firms. The drastic measures at the time of the first lockdown paralysed a large part of the economy and the watchword was to protect the economic fabric at all costs against a major crisis. Today, the measures are much more specific, and most firms no longer face any impediments to the development of their business. In contrast, some firms are still struggling, particularly those where contact between people is central to the business model. At a time when new waves of infections cannot be ruled out, it is important to allocate the available resources in the best possible way by targeting the support measures on the firms most affected.

We shall continue to analyse the situation of firms in the coming months and years, notably by describing the contrasting developments in the various business categories. Changes in firms' relations with their suppliers and customers will certainly also form the subject of future research.

## Annexes

### 1. Description of the data

The data used in this article come from firms' VAT returns. Those returns to the tax authority are compulsory and enable the State to calculate for each firm the difference between the VAT due and the deductible VAT. Firms are therefore required to pay the balance to the State. The returns state the amount of sales excluding VAT and the VAT charged which must be paid over to the State. As well as sales, the VAT returns also state purchases of goods and services, and purchases of investment goods (and the deductible VAT associated with those purchases). They are extremely reliable for three reasons. First, failure to respect the reporting obligation is punishable by fines. Next, the State can easily verify consistency between the amount excluding VAT and the VAT figure. Finally, firms are also required to report a full list of their customers, permitting a check on consistency between sales and purchases. In view of their quality and exhaustiveness, the VAT data are an essential source of microdata to produce the national accounts' statistics.

Declarants are obliged to submit returns either monthly or quarterly<sup>1</sup>, depending on firm size. Data relating to month M or quarter Q are generally available in the month following the end of the period considered. To obtain a monthly profile of sales (see chart 6 for stylised fact #4), quarterly returns are converted to monthly based on the seasonal profile seen in the monthly returns of the other firms in the same subsector (having the same NACE 5-digit code) if a minimum of 10 monthly returns were available. If not, the returns were converted to monthly figures based on a broader definition of the sector of activity (NACE 4-digit code or, failing that, NACE 2-digit code).

Throughout the article, we calculate the change during the COVID-19 crisis as the change between the figure for the period between 1 April 2020 and 31 March 2021, and the figure for 2019. To calculate the monthly changes (see stylised fact #4), each month is compared with the corresponding month in 2019. Thus, to assess activity growth in March 2021, we compare the March 2021 sales figures with the March 2019 sales figures. As a result, we avoid comparing the situation in March 2021 with March 2020, which was already partly affected by the pandemic. The rebound in March 2021 therefore reflects an improvement compared to the pre-crisis period and not an automatic catch-up effect.

None of the analysis in this article is weighted in the sense that all firms have the same importance, regardless of their size. It is totally possible to conduct a weighted analysis. Although that has the advantage of being closer to the macroeconomic analysis, it nevertheless makes the analysis and interpretation more difficult. Furthermore, a weighted approach makes no sense unless all firms are taken into consideration, but in this article, we explore various dimensions (branch of activity, geographical area, firm size etc.) by dividing our sample into sub-groups, making a weighted analysis less relevant. For these reasons we keep to a microeconomic analysis which explores firms' heterogeneity without attaching greater importance to bigger firms. As described in stylised fact #6, a firm's size is in any case not a crucial factor in its performance.

Taking account of the current tax rules, the amounts declared by some firms may include transactions by their subsidiaries in other countries. Those transactions are not always linked to their economic activity in Belgium. The NAI makes individual adjustments to neutralise those transactions. The amounts used in this analysis incorporate those adjustments. The data used for this article are therefore the same as those used by the NAI to draw up the national accounts.

To construct the sample of firms analysed in this, we take the directory of firms used by the NAI as our basis. We selected firms present in the 2018 and 2019 directories, 2019 being the latest available year at present.

<sup>1</sup> Firms with an annual turnover more than € 2.5 million are required to complete a monthly return (except in certain specific sectors where the threshold is € 250 000). Annual turnover is based on sales over the preceding 12 months.

Our analysis therefore excludes businesses set up in 2020 and 2021. While the entry of new firms during the crisis period is disregarded, the analysis nevertheless takes account of the exit of any existing firms. Exiting firms feature a growth rate of  $-100\%$ , in the same way as firms obliged to close during the crisis period.

In order to respect the privacy protection rules and to focus on the activity of the private sector, we used only declarants classified by the NAI in the non-financial corporations' sector, S11. This analysis therefore does not consider the situation of self-employed workers (S14), non-profit institutions (S15) and government (S13). We also do not consider the financial corporations (S12).

The declarants are allocated to branches of activity based on the NAI directory, ensuring consistency with the macroeconomic statistics. However, some branches were excluded from our population of firms. The following branches were disregarded: financial services (NACE 64-66), education (NACE 84), public administration (NACE 85) and health care (NACE 86). For these sectors, the amounts included in the VAT returns provide inadequate coverage of the activities.

The geographical distribution of declarants by districts is based on the 5-digit NIS code in the directory. We took account of the specific character of firms with multiple establishments located in different NIS districts. In their case we assigned the firm's performance to each establishment. Consequently, the geographical distribution of performance presented in this article takes account of the performance of establishments whose head office is located in a different NIS district.

In this article we have also used the quarterly NSSO declarations to ascertain changes in employment and labour costs for each firm. These data are likewise of very high quality because they are verified by the authority and used as the basis for calculating contributions<sup>1</sup>.

Finally, the econometric analysis presented in stylised fact 9 also uses information taken from the 2019 "customer" declarations. For each firm those declarations contain the full list of its VAT-registered customers. To respect the rules on personal data confidentiality, we only used B2B relations implying two VAT-registered parties, both listed as non-financial corporations in the NAI directory.

<sup>1</sup> Note however that the wage bill covered by the NSSO declarations does not include several labour cost aspects that firms also cover.

## 2. Unweighted regressions

The table below shows the unweighted results of the regressions presented in table 2 for stylised fact #9.

### Transmission of shocks via suppliers and customers

	OLS			IV		
	(7)	(8)	(9)	(10)	(11)	(12)
Supplier shocks	0.089*** (0.003)		0.078*** (0.003)	0.272*** (0.016)		0.232*** (0.016)
Customer shock		0.172*** (0.004)	0.166*** (0.004)		0.370*** (0.014)	0.342*** (0.015)
Sector # municipality # size FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	246 924	246 924	246 924	246 924	246 924	246 924
R-squared	0.228	0.234	0.236			

Source: NBB calculations.

Note: All regressions include a constant and a fixed sector # municipality # size class effect. The supplier (customer) shock is the weighted change in supplier (customer) sales, weighted by the input share (revenue share) of each supplier (customer) in 2019. Only suppliers and customers meeting the necessary conditions for inclusion in our population of firms are considered here (see Annex A1 for details of these conditions). For customers, this means in particular that only business customers, not private consumers, are included. The first three columns present the OLS results. Since shocks affecting a firm's sales have repercussions on the performance of its suppliers or customers, it was necessary to use instrumental variables to control this endogeneity problem. For that purpose, the change in the sales of each supplier  $j$  of firm  $i$  was instrumented by the average change in the sales of the supplier's sector of activity  $s_j$ , excluding the contribution of supplier  $j$  to sectoral growth, those of the other suppliers or customers connected with firm  $i$  belonging to that sector  $s_j$  and that of firm  $i$  itself if it is also part of sector  $s_j$ . The IV results are presented in the last three columns. Since our sample is restricted to non-financial corporations, the coverage of the B2B transactions considered in this exercise varies from one firm to another and may be fairly low for some observations. To allow for that, we weight each individual observation by the share in B2B transactions of the firm covered by our sample. The unweighted regression results are set out in Annex A2. Standard errors in parentheses (\*\*\*)  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ).

### 3. Structure of the population of firms during the crisis

	Numbers of employees								Total
	None	1-5	6-10	11-25	26-50	51-100	101-500	> 500	
Agriculture, forestry and fishing	7 793	1 999	353	312	97	30	9	0	10 593
Mining and quarrying	74	34	19	23	6	2	7	0	165
Manufacturing	13 228	6 491	1 987	2 006	1 104	485	546	110	25 957
Electricity, gas, steam and air conditioning supply	573	70	9	16	10	4	5	5	692
Water supply; sewerage, waste management and remediation activities	548	259	86	110	52	16	14	6	1 091
Construction	46 882	17 466	3 142	2 244	691	226	170	13	70 834
Wholesale and retail trade; repair of motor vehicles and motorcycles	59 600	29 944	5 966	4 350	1 440	428	320	51	102 099
Transportation and storage	8 940	4 193	1 191	1 166	566	216	155	24	16 451
Accommodation and food service activities	16 655	12 712	2 823	1 466	263	52	41	7	34 019
Information and communication	26 235	4 111	827	666	327	128	102	11	32 407
Real estate activities	15 233	3 161	337	194	56	32	13	0	19 026
Professional, scientific and technical activities	93 686	15 518	2 256	1 469	462	210	165	8	113 774
Administrative and support service activities	18 409	5 562	1 022	814	330	172	156	52	26 517
Arts, entertainment and recreation	11 218	2 221	304	217	76	26	14	1	14 077
Other service activities	6 210	3 684	614	312	93	32	14	1	10 960
<b>Total</b>	<b>32 5284</b>	<b>10 7425</b>	<b>20 936</b>	<b>15 365</b>	<b>5 573</b>	<b>2 059</b>	<b>1 731</b>	<b>289</b>	<b>478 662</b>

Source: NBB calculations.

## Bibliography

Alfaro L., A. Chari, A. Greenland and P. K. Schott (2020), "Aggregate and firm-level stock returns during pandemics, in real time", *COVID Economics*, 4, 2-24.

Anderson A. L., E.T. Hansen, N. Johannesen and A. Sheridan (2020), "Consumer responses to the COVID-19 crisis: Evidence from bank account transaction data", *COVID Economics*, 7, 92-118.

Antràs P., S.J. Redding and E. Rossi-Hansberg (2020), "Globalization and pandemics", *COVID Economics*, 49, 1-84.

Baldwin R. and S. Evenett (Editors) (2020), *COVID-19 and Trade Policy: Why Turning Inward Won't Work*, VoxEU.org ebook, CEPR Press.

Barro R. J., J. F. Ursua and J. Weng (2020), *The coronavirus and the great influenza pandemic: Lessons from the "Spanish flu" for the coronavirus's potential effects on mortality and economic activity*, NBER, Working Paper, 26866.

Coppens B., G. Minne, C. Piton and C. Warisse (2021), "The Belgian economy one year after the COVID-19 crisis", NBB, *Economic Review*, September, 133-159.

Goolsbee A. and C. Syverson (2020), *Fear, Lockdown, and Diversion: Comparing Drivers of Pandemic Economic Decline 2020*, NBER, Working Paper, 27432.

De Jonghe O., C. Piette and J. Tielens (2021), "Belgian corporate sector liquidity and solvency in the COVID-19 crisis: a post-first-wave assessment", NBB, *Economic Review*, June, 117-167.