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Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

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Mathieu Cros - mathieu.cros@dauphine.eu
Paris Dauphine - PSL University

Anne Epaulard - anne.epaulard@dauphine.psl.eu
University Paris Dauphine

Philippe Martin - philippe.martin@sciencespo.fr
SciencesPo and CEPR

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Will Schumpeter Catch Covid-19?*

Mathieu Cros¹, Anne Epaulard¹, and Philippe Martin²

¹Paris Dauphine - PSL University and France Stratégie

²SciencesPo and CEPR

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Abstract

We estimate the factors predicting firm failures in the COVID crisis based on French data in 2020. Although the number of firms filing for bankruptcy was much below its normal level (- 36% compared to 2019) the same factors that predicted firm failures (primarily productivity and debt) in 2019 are at work in a similar way as in 2020. Hence, the selection process, although much reduced, has not been distorted in 2020. At this stage, partial hibernation rather than zombification characterises the selection into firm survival or failure. We also find that the sectoral heterogeneity of the turnover COVID shock (proxied by the change in credit card transactions) has been largely (but not fully) absorbed by public policy support because it predicts little of the probability of bankruptcy at the firm level. Finally, we sketch some potential scenarios for 2021-2022 for different sectors based on our empirical estimates of predictors of firm failures.

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1 Introduction

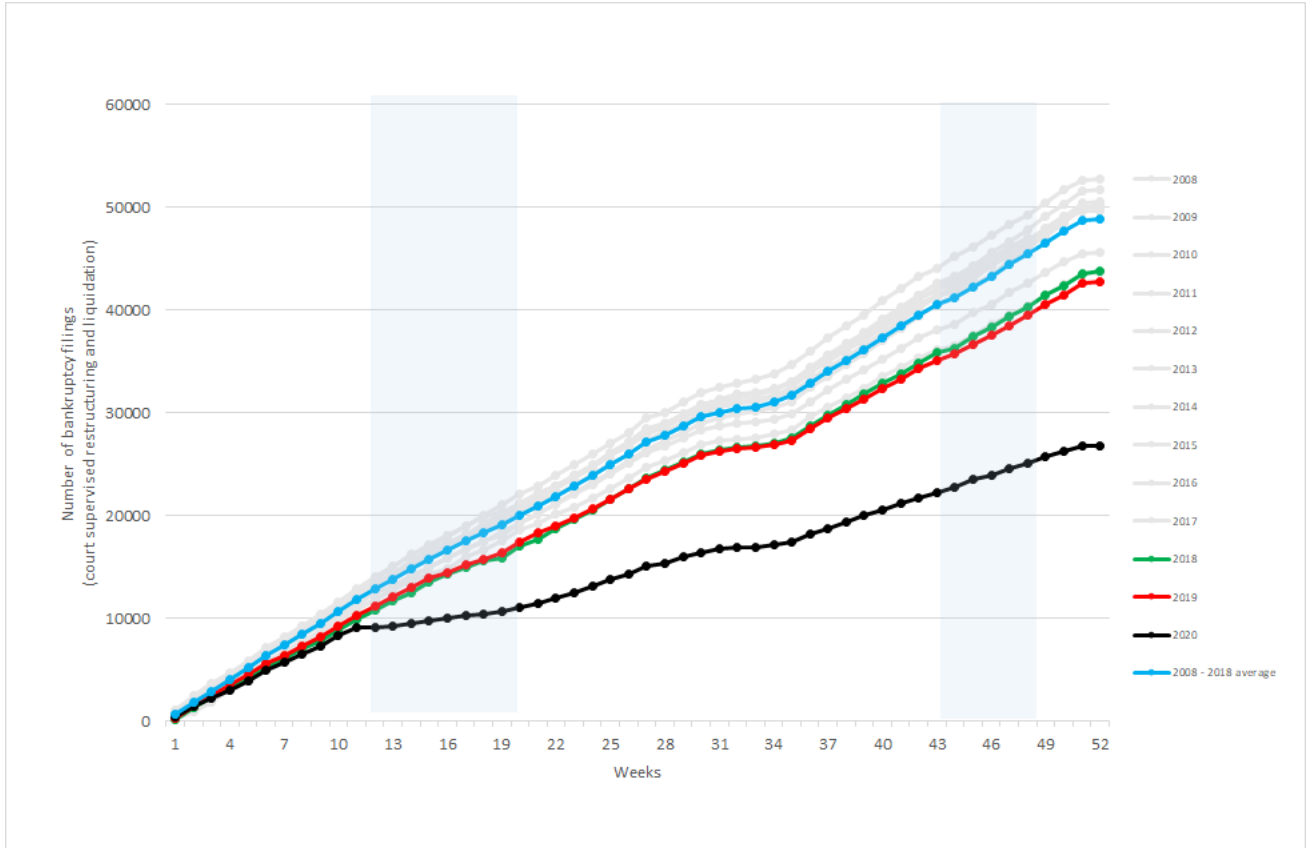
The COVID-19 crisis, a global shock ‘like no other’, has had dire consequences on several economic variables: consumption, production, employment, trade, productivity, business and consumer confidence etc... However, one economic impact that was anticipated very early on (see for example the simulations by Gourinchas et al....) did not materialise so far: firm bankruptcies. Indeed, the number of bankruptcy filings has decreased significantly. In France for example, as illustrated in graph 1 the number of firms filing for bankruptcy is much below its normal level: - 36% at the end of 2020 (week 52) compared to 2019. The last time the French economy experienced a large downturn was in 2009 with the GDP contracting by 2.9%. That year, the number of firms filing for bankruptcy jumped by 14% compared to 2008 (and 23% compared to 2007). This paradoxical situation is observed in other countries. Even if international comparisons are not easy on bankruptcy filings, the UK and German situations are similar. In the UK for the third quarter of 2020, filings are 39% below the same period in 2019 and 9% below the second quarter of 2020². In Germany, where the obligation to declare insolvency has been suspended on March 1st, the number of firms filing for bankruptcy has decreased by 10% in the first semester of 2020 relative to 2019. In both Germany and France, no catching up in the past few months is observed. In the US, a recent study (Wang et al. (2020)) shows that although there is a sizeable decrease in direct bankruptcies there is still a substantial increase of Chapter 11 filings by large corporations but which are a small share of overall bankruptcies.

The main explanation of this unexpected observation is that governments have provided ample liquidity to firms most affected by the pandemic. They have reduced their wage bill (in Europe through short time work schemes) and made direct transfers for example to pay for some fixed costs. The objective was clearly to freeze the economy during the crisis and put firms most at risk in hibernation. The sharp reduction in bankruptcies in France and Germany suggests this objective was attained. But did governments go too far? Some concerns in the public debate ³have emerged that these policies may create zombies by reducing the exit of non productive firms. According to Schumpeter, the least productive firms are more likely to go bankrupt during recessions and Schumpeterian creative destruction may therefore be put into danger by an over generous policy response. If so this may have dire consequences on productivity in the following years as exit of unproductive firms is likely to be a substantial share of aggregate productivity growth. Foster et al. (2001) find that entry and exit of plants account for around 25 percent of US manufacturing

²see *UK Insolvency Service Quarterly* (2020)

³see *The-Economist* (September 26,2020) or *Financial-Times* (December 3, 2020)

Figure 1: Cumulative number of collective procedure filings (2008-2020)



Reading note: At the end of 2020 the cumulative number of procedure filings had reached 26,779, while at the end of 2019, the cumulative number of procedure filings had reached 42,687.

Source: BODACC data up to December 2020

productivity growth over the period 1977 - 1992 and that the impact of net entry is probably larger in the service sector. This effect comes from exiting firms that are less productive - and/or less innovative - than both continuing and entering firms (see [Syverson \(2011\)](#)). As in other countries, entry and exit of firms is a sizeable component of labour productivity growth in France: [David et al. \(2020\)](#) show that more than 60 percent over the period 2011 - 2017 is caused by creative destruction⁴. This is so even though net entry is a small component of TFP growth volatility⁵. This accounting decomposition of productivity growth does not take into account the potential negative additional impact of low productivity firms (zombie firms) on the growth of continuing firms. [Adalet-McGowan et al. \(2018\)](#) find that zombie firms reduce the growth of more productive firms and might also reduce entry. This further increases the potential burden of surviving low productivity firms on aggregate productivity.

⁴see also [Turner \(2013\)](#) who shows that 40% of hourly productivity growth in the retail sector in France over the period 1997 - 2007 comes from entry and exit of firms.

⁵see [Osotimehin \(2019\)](#)

The concern that public policies to support firms may impair the cleansing effect of the recession by saving unproductive firms from exit is therefore legitimate. But the opposite concern that productive firms may go bankrupt because of the COVID crisis is also legitimate. The cleansing effect is based on the implicit assumption that markets efficiently select the most productive firms. However, several studies show that the probability of firm failure depends not only on their productivity but also on their access to credit. [Barlevy \(2002\)](#) studies the consequences of credit frictions on resource allocation during recessions and shows that credit frictions can lead to the opposite of the cleansing effect during recessions. [Fougère et al. \(2013\)](#) confirm the fundamental role of credit constraints on the probability of bankruptcy. They find that payment delays and cash flow difficulties disproportionately affect SMEs. During recessions, these delays are longer, commercial credit between companies is more risky and SMEs are the first to suffer from this via a considerable increase in their probability of bankruptcy. However, [Osotimehin & Pappadà \(2016\)](#) find that there is a cleansing effect of recessions in the presence of credit frictions, despite their effect on the selection of exiting and entering firms.

The impact of the COVID crisis on productivity through its effect on the firm bankruptcy process is therefore ambiguous. In this paper, we analyse whether there is early evidence that the selection process of firms bankruptcies is not only partially frozen but also distorted. We offer a preliminary answer to this question based on French data. At this stage the answer is only tentative because the dynamics of firm bankruptcies in 2021-2022 is difficult to anticipate. Although, firm bankruptcies have been sharply reduced we still observe some (more than 60% of the "normal" level) and we can therefore analyse whether the determinants of the mechanism of firm destruction has been sharply distorted by the crisis. Two risks co-exist that both would reduce aggregate productivity: that low productivity firms are unduly protected and that high productivity firms are not protected enough. In both cases, this would point to misguided public policies. Our results, again at an early stage, are relatively reassuring:

- The risk of an increase in productive firms going bankrupt during the pandemic did not materialise: in 2020 the firms filing for bankruptcy were in 2018 already less productive and/or had higher debt. A logit model shows that the main predictors of bankruptcy are at work in 2020 as in 2019 and 2018: productivity, debt, age are still associated with bankruptcy probability. Moreover, the coefficients for these variables are not statistically different from one year to another. Creative destruction has been partially frozen but not distorted.
- Not surprisingly, the reduction in the number of bankruptcies comes from lower bankruptcy

filing of less productive firms. In the short run however, the impact on the aggregate productivity gain is likely to be small. This is only true if the process of creative destruction is unfrozen once the crisis is over.

- The COVID shock has been very heterogeneous across sectors. This is particularly true for the commerce sector (e.g. restaurants versus food-stores). We measure the shock for these sectors by the change in credit card transactions. We find that sectors more affected by the COVID shock are more likely to file for bankruptcy. However, the predictive power of the sectoral COVID shock on bankruptcy is much smaller than that of firm productivity or debt. This suggests that public policies did compensate, in the short term, a very large part of the sectoral nature of the COVID shock.
- The legacy of the pandemic on firm balance sheets will likely be large. The reduction of bankruptcies thanks to generous liquidity measures comes at the cost of an increase in corporate debt especially in sectors that are most affected by the pandemic. For firms in these sectors, a return to normal of the bankruptcy process would predict a large increase in bankruptcies from 1.1% in 2019 to 1.8% in 2021 (and after 0.7% in 2020). This is large but most of the increase comes from a catch up process of bankruptcies that did not take place in 2020. One political economy issue for the government is that this return to normal through catch-up may be interpreted as a policy failure.

In section 2, we provide an empirical estimate of the determinants of bankruptcies in the French COVID crisis. Section 3 sketches some potential scenarios for 2021-2022 based on these estimates. In section 4, we conclude with a discussion of some policy implications.

2 The determinants of bankruptcies in the Covid-19 crisis

2.1 Data sources and summary statistics on bankruptcy filings in the pandemic

We follow bankruptcy filings in France from 2009 to 2020. Our database is based on daily electronic files of BODACC⁶, an official online publication that reports all commercial court decisions relative to French firms and notably all bankruptcy filings. We then merge this database with SirenE, an INSEE database that gives information regarding the geographical location of firm headquarter and their industry. Attrition between these two database is negligible (with a loss of around 4000 firms

⁶Bulletin Officiel des Annonces Civiles et Commerciales

for an initial database of 600 000 bankruptcy filings over the period 2009 - 2020). In a second step, this database is matched with the FARE database, which contains firms accounting information (balance sheet and income statement). We use this information to compute labour productivity (EBITDA per worker) and leverage (total debt over total assets).

Since, the crisis (and the reduction of bankruptcies) only started in March 2020, we only account for the companies that went bankrupt from March 1 to September 30. In order to be able to compare our results to previous years and since there may be seasonality in insolvency procedures or commercial court activity, we do the same for all the years in our study. Hence, all firms that filed for bankruptcy in January, February, October, November or December of any year are systematically excluded from the sample. Moreover, since we want to analyse what drives bankruptcy in SMEs (small and medium-size enterprises), we focus on companies with at least one employee⁷ and less than 250 employees. Moreover, we exclude from the sample all the companies that we consider not being in our framework because they have odd debt ratio below 0 or over 1, or because their labour productivity is above 300 thousand euros per worker or under -100 thousand euros. Therefore, the sample consists of 863,162 observations in 2013 and has 1,118,379 observations in 2020. Summary statistics for the 2019 and 2020 samples are presented in Table 1. Since the last income statements and balance sheet available are from 2018, we report labour productivity, debt ratios, age and number of employees with a two year lag. That is, 2018 firm characteristics are used for the 2020 sample and 2017 firm characteristics are used for the 2019 sample.

Except for bankruptcy rate, which we comment below, the two samples (2019 and 2020) are quite similar. This is normal since most firms appear in the two samples and do not change drastically from one year to the next. The average firms is 15 year old, has 8 employees and an annual labour productivity slightly below 70 000 euros. The average debt to assets ratio is around 45%. Bank debt is on average around 14% of total asset, supplier debt on average around 12%. For these firms "Other debt", which consist mainly in tax and social security debt is almost 20% of total assets.

As mentioned in the introduction, bankruptcy filings in 2020 was dramatically lower than in 2019. The default being calculated over March to September was respectively 1.1% in 2013, 0.7% in 2019 and only 0.4% in 2020. Liquidations and court supervised restructurings in 2020 are 36% below their 2019 levels. Both the number of direct liquidations and court-supervised restructuring stands well below year 2019 levels which was already low. Nevertheless, the reduction in court-

⁷Self-employed workers and auto-entrepreneurs are excluded from the sample

Table 1: Summary statistics - 2019 and 2020 samples

	N	Mean	St. Dev.	Median	D1	D9	Min.	Max.
2019 sample								
Bankruptcy (0/1)	1,097,795	0.007	0.084	0.000	0.000	0.000	0.000	1.000
Labour productivity ('000 euros)	1,097,795	67	50	56	19	130	-100	300
Total debt (/assets)	1,097,795	0.451	0.237	0.426	0.152	0.802	0.000	1.000
Bank debt (/assets)	1,097,795	0.137	0.170	0.072	0.000	0.383	0.000	1.000
Supplier debt payable (/assets)	1,097,795	0.122	0.126	0.083	0.011	0.285	0.000	1.000
Other debts (/assets)	1,097,795	0.192	0.175	0.135	0.034	0.435	0.000	1.000
Age (in years)	1,097,795	15	14	12	3	32	2	119
Nb of employees	1,097,795	8	20	3	1	18	1	249
2020 sample								
Bankruptcy (0/1)	1,118,379	0.004	0.066	0.000	0.000	0.000	0.000	1.000
Labour productivity ('000 euros)	1,118,379	68	52	57	19	135	-100	300
Total debt (/assets)	1,118,379	0.440	0.238	0.412	0.144	0.792	0.000	1.000
Bank debt (/assets)	1,118,379	0.137	0.170	0.072	0.000	0.384	0.000	1.000
Supplier debt payable (/assets)	1,118,379	0.119	0.125	0.080	0.010	0.279	0.000	1.000
Other debts (/assets)	1,118,379	0.184	0.174	0.127	0.031	0.422	0.000	1.000
Age (in years)	1,118,379	15	14	12	4	32	2	127
Nb of employees	1,118,379	8	20	3	1	18	1	249

Source: BODACC, FARE 2017, FARE 2018.

supervised restructuring filings is even greater than that of liquidations: reorganisations are 49% below their 2019 level while liquidations decreased only by 31%. When compared to the 2008-2018 average, liquidations are down by 41% and reorganisations by 53%.

To measure the size of the demand shock that hit firms in the retail and personal service sectors, we use data from Cartes Bancaires CB, the leading consortium of payment service providers, banks and e-money institutions. These data have been exploited by [Bounie et al. \(2020\)](#) to measure the consumption behaviour of French households during and after the first lockdown. Here we use this data set from the merchant perspective. We have access to the weekly total of CB payments by merchant category code (MCCs). These MCCs are used by payment brands to classify merchants and businesses by the type of goods or services provided. Based on the available data, we created an association between sectors codes of the MCC nomenclature (Merchant Category Code) and the French NAFRév2 nomenclature (INSEE) to be able to match the credit card spending changes to the companies of our sample.

2.2 Empirical estimates

There are two potential effects on productivity of the very unusual dynamics of bankruptcies of 2020. First, if this drop was persistent it could affect the productivity level because more firms (and among them low productivity) would be allowed to remain active. Second, the very process of bankruptcy may be distorted by the mix of the financial difficulties faced by firms and the very large policy response to support firms. It is possible indeed that high productivity firms (but with

high levels of debt) may go more into bankruptcy than in normal circumstances, at the same time as low productivity firms are allowed to remain active. The answer to the first question "will a lower number of bankruptcies generate lower productivity?" depends on whether the drop is persistent or not. The answer to the second question "is the bankruptcy process distorted?" depends on the characteristics of firms that are still going into bankruptcy.

The second question is the one we focus on. To do this we compare the determinants of bankruptcies since the COVID crisis and the years before.

Comparing distributions of labour productivity and leverage debt of companies filing for bankruptcy in different years is a first way to assess whether the characteristics of the Schumpeterian process have changed. We use labour productivity (added value per worker) and a debt ratio (overall debt divided by total assets) to measure whether companies that filed for bankruptcy in 2020 were more or less productive and indebted than those that went bankrupt in 2019 and companies that neither went bankrupt in 2019 nor 2020 (Figure 2 and 3). Since 2018 is the last year of available companies' balance sheet data, we look at 2018 balance data for companies that filed in 2020 and for companies that never filed for bankruptcy, and 2017 data for companies that started a procedure in 2019. We observe that bankrupt companies of 2019 and 2020 had a very similar productivity and debt ratio distribution two years before whereas non-bankrupt firms were both more productive and less indebted.

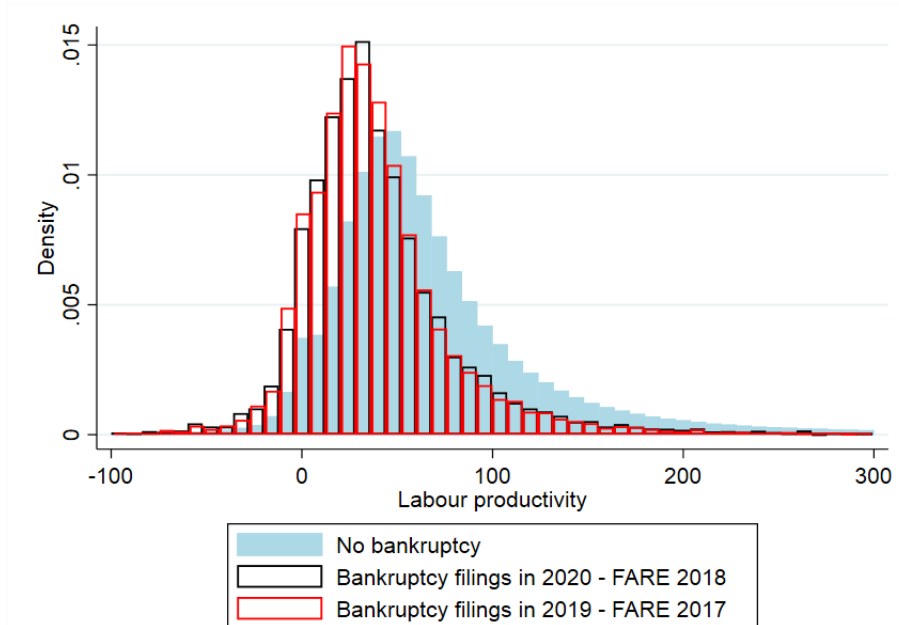
To analyse further this issue we estimate a Logit model to identify the main predictors of business failures. Logit models are better suited than standard OLS to estimate the probability of occurrence of rare events, which is the case for bankruptcy as less than 1% of firms filing for bankruptcy in a given year.

The benchmark model explains the probability of bankruptcy in year t for firm i on the base of the firm characteristics in year $t - 2$. The explanatory variables are labour productivity (measured as it added value by worker), the overall leverage of the firm (measured by the ratio of the firm's total debt to its total assets), the age of the firms (a dummy for each subcategory: 0 to 5 years, 6 to 10 years, 10 to 30 years and more than 30 years), its size (measured by the log of the number of employees) and its industry (with 15 industry dummies - see Figure ??). The equation is the following:

$$Y_t = \frac{1}{1 + e^{-(\alpha + X_{it-2}\beta + \mu_s)}} \quad (1)$$

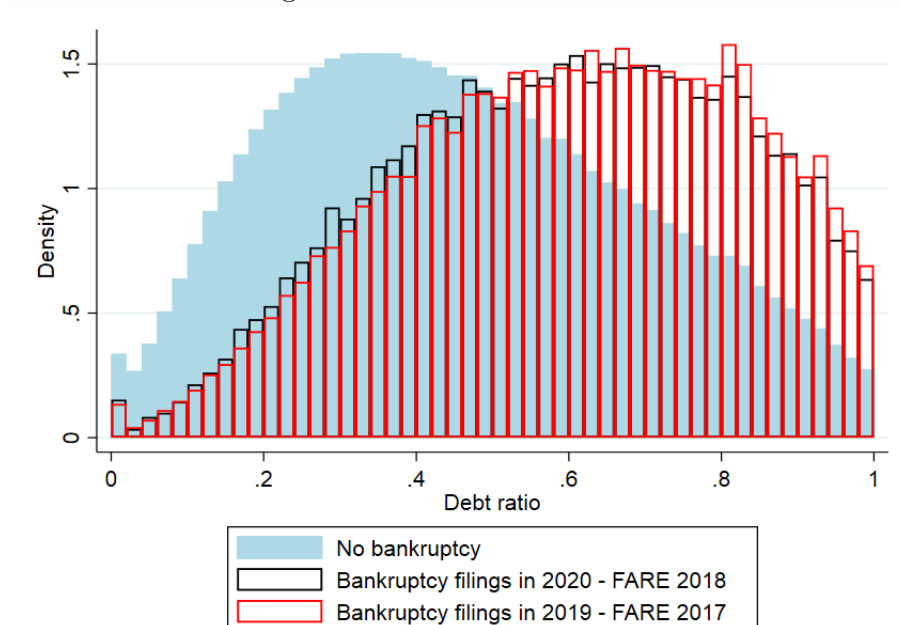
where μ_s is the industry fixed effect and X_{it-2} contains all other firm characteristics. There is

Figure 2: Labour productivity distribution



Reading note: the companies that respectively filed for bankruptcy in 2020 and 2019 had a labour productivity distribution two years before that was on the left of the distribution for firms that neither opened a procedure in 2020 nor before. Around 12.5% of the companies that filed for bankruptcy had a labour productivity comprised between 16 and 24 thousand euros per worker while it represented only a little more than 5% of the companies that never filed for bankruptcy.

Figure 3: Debt ratio distribution



Reading note: the companies that respectively filed for bankruptcy in 2020 and 2019 had a debt ratio distribution two years before that was on the right of the distribution for firms that neither opened a procedure in 2020 nor before. Around 7% of the companies that filed for bankruptcy had a debt ratio comprised between 0.98 and 1 whereas it represented only around 2.5% of the companies that never filed for bankruptcy.

no time fixed effect as we estimate this equation for each year separately from 2013 to 2020. In a given year t , the sample considered for the estimation contains all firms for which we have the balance sheet and income information in the year $t - 2$ and for which a bankruptcy process was not started in the year $t - 1$.

This model is estimated every year since 2013 on the firm sample described above. Results of these year by year estimations are reported in Tables 2 and 3, the later table presenting an empirical model with leverage being divided between bank debt, supplier debt and "other debts" (mainly fiscal and social security debt).

Table 2: Predictors of the bankruptcy probability (2013-2020) - All sectors - Total debt

VARIABLES	(1) 2013	(2) 2014	(3) 2015	(4) 2016	(5) 2017	(6) 2018	(7) 2019	(8) 2020
Labour Productivity	-0.0124*** (0.000354)	-0.0134*** (0.000380)	-0.0132*** (0.000388)	-0.0142*** (0.000402)	-0.0147*** (0.000436)	-0.0114*** (0.000376)	-0.00956*** (0.000318)	-0.00919*** (0.000382)
Debt / Assets	2.588*** (0.0527)	3.061*** (0.0560)	3.115*** (0.0573)	2.963*** (0.0583)	2.821*** (0.0617)	2.804*** (0.0572)	2.488*** (0.0529)	2.469*** (0.0653)
ln(Number of employees)	-0.00998 (0.0107)	0.00567 (0.0110)	-0.0480*** (0.0116)	-0.0237** (0.0119)	-0.0526*** (0.0129)	-0.0495*** (0.0124)	-0.160*** (0.0112)	-0.154*** (0.0142)
Constant	-5.181*** (0.359)	-5.603*** (0.323)	-6.024*** (0.384)	-5.143*** (0.310)	-5.195*** (0.361)	-6.347*** (0.505)	-5.222*** (0.359)	-6.328*** (0.582)
Observations	863,162	854,087	847,743	859,037	847,294	925,521	1,097,795	1,118,379
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.0782	0.0892	0.0867	0.0907	0.0843	0.0843	0.0713	0.0588
Bankruptcy percentage	0.0110	0.0104	0.00963	0.00900	0.00766	0.00792	0.00709	0.00434

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Predictors of the bankruptcy probability (2013-2020) - All sectors - Debt components

VARIABLES	(1) 2013	(2) 2014	(3) 2015	(4) 2016	(5) 2017	(6) 2018	(7) 2019	(8) 2020
Labour productivity	-0.0124*** (0.000354)	-0.0131*** (0.000383)	-0.0130*** (0.000392)	-0.0140*** (0.000408)	-0.0144*** (0.000441)	-0.0112*** (0.000379)	-0.00926*** (0.000321)	-0.00895*** (0.000386)
Bank debt / assets	2.258*** (0.0656)	2.567*** (0.0693)	2.631*** (0.0716)	2.285*** (0.0741)	2.251*** (0.0806)	2.223*** (0.0753)	1.816*** (0.0729)	1.875*** (0.0899)
Supplier debt / assets	3.108*** (0.0723)	3.492*** (0.0756)	3.489*** (0.0788)	3.421*** (0.0799)	3.285*** (0.0854)	3.220*** (0.0793)	3.004*** (0.0762)	3.029*** (0.0952)
Other debt / assets	2.488*** (0.0653)	3.169*** (0.0668)	3.249*** (0.0681)	3.180*** (0.0690)	2.892*** (0.0730)	2.895*** (0.0668)	2.590*** (0.0636)	2.502*** (0.0789)
ln(Number of employess)	-0.0188* (0.0108)	0.00291 (0.0111)	-0.0489*** (0.0117)	-0.0230* (0.0120)	-0.0537*** (0.0130)	-0.0477*** (0.0125)	-0.156*** (0.0114)	-0.154*** (0.0143)
Constant	-5.181*** (0.359)	-5.603*** (0.323)	-6.024*** (0.384)	-5.143*** (0.310)	-5.195*** (0.361)	-6.347*** (0.505)	-5.222*** (0.359)	-6.328*** (0.582)
Observations	863,162	854,087	847,743	859,037	847,294	925,521	1,097,795	1,118,379
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.0794	0.0909	0.0882	0.0936	0.0862	0.0863	0.0737	0.0607
Bankruptcy percentage	0.0110	0.0104	0.00963	0.00900	0.00766	0.00792	0.00709	0.00434

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The ability of the model to explain the individual heterogeneity in bankruptcy is - not surprisingly - low. The Pseudo-R2 varies between 0.094 in 2014 and 0.061 in 2020. The lower explanation power in the year 2020 model suggests that the usual bankruptcy predictors (size, age, productivity, leverage) are less informative on individuals' propensity for bankruptcy in 2020 than in other years. However, the key finding in these tables is that coefficients for these predictors are very stable over

time, notably when comparing 2019 and 2020.

The main take away from this estimation is that the COVID crisis and the policy measures put in place by the government have not changed drastically the determinants of bankruptcy, except the size of the process itself (see the fall in the constant in 2020). Firms that failed in 2020 are less productive and more financially fragile, just as in 2019. The difference in coefficients across types of debt (to suppliers, banks and social and fiscal administrations) is also very stable in 2019 and 2020.

2.3 The COVID shock and the role of emergency measures

We cannot directly assess the impact of public emergency measures on the bankruptcy in 2020. However, we know that both the COVID turnover shock on turnover and the policy measures that were put into place were heterogeneous across sectors. These policy measures are described in detail in appendix. Several- but not all - were targeted to firms in sectors most affected by the COVID crisis. The most important ones are the State-guaranteed loan, short-time work the solidarity fund for small business, and deferral of payment for social and/or fiscal charge.

The support of public policy to firms lies between two potential extremes. At one extreme, if public support to firms had not absorbed the COVID shock, bankruptcy rates would be much larger for firms in sectors hit more strongly by the COVID shock. At the other extreme, if public policy support had fully absorbed the COVID turnover shock, this shock at the sectoral level would not have any predictive power on bankruptcies. The net effect of the COVID shock and of the support measures to absorb the shock would be zero. In this section, we analyse how much of the sectoral heterogeneity due to COVID was absorbed by the French public policy support.

Our measure of the shock on turnover is based on credit card payments received by firms that serve consumers/households (as opposed to businesses, for which credit card receipts are not a large part of their overall receipts). Thus we focus on the retail sectors in the broadest sense (it includes for example car dealerships, restaurants, hairdressers, beauty salons and funeral services - amongst others - that are not included in the narrow retail sector). Summary statistics for this broadly defined retail sector sample for the year 2020 are in Table 4. For the year 2020, there are 377,334 firms in the retail sector. With an average of 6 employees, firms in this sector smaller than the whole sample used in previous section, the labour productivity is also below that of the whole sample and these firms have marginally lower debt ratio. The default rate from March to September was 0.44% in 2020, while it was 0.65% in the same months of 2019, a drop of nearly 33% in business bankruptcies.

Table 4: 2020 - Retail sector

	N	Moyenne	St. Dev.	Median	D1	D9	Min.	Max.
Bankruptcy (0/1)	377,334	0.004	0.066	0.000	0.000	0.000	0.000	1.000
Labour productivity ('000 euros)	377,334	60	44	50	18	113.	-100	300
Total debt (/assets)	377,334	0.458	0.247	0.434	0.146	0.822	0.000	1.000
Bank debt (/assets)	377,334	0.177	0.194	0.111	0.000	0.473	0.000	1.000
Supplier debt (/assets)	377,334	0.113	0.112	0.079	0.017	0.250	0.000	0.985
Other debt (/assets)	377,334	0.168	0.171	0.105	0.028	0.405	0.000	1.000
Age	377,334	15	12	11	4	31	2	120
Nb of employees	377,334	6	15	2	1	11	1	249

Source: BODACC, FARE 2018.

We proxy the Covid turnover shock by the change in credit card payments (Groupement des Cartes CB) received by these sectors between 2020 and 2019. As one would expect, the COVID shock was very heterogeneous across sectors⁸ depending on the type business: some were very affected (-61% of credit card transactions for travel agencies for example) and others actually benefited (+23% for tobacco shops and +18% for bakeries for example). (see table 9).

We include this Covid turnover shock (in a way such that a higher shock means lower turnover) in the regression for bankruptcy in addition to other predictors of bankruptcy. The regression now estimated on the sub-sample of firms operating in the retail sectors as defined above⁹. Results are shown in Table 5.

Table 5: Predictors of the bankruptcy probability + credit card shock (2018-2020) - Retail

VARIABLES	(1) 2018	(2) 2019	(3) 2020	(4) 2020 + Shock
Credit card shock				1.576*** (0.253)
Labour productivity	-0.0169*** (0.000818)	-0.0127*** (0.000695)	-0.0146*** (0.000839)	-0.0141*** (0.000844)
Bank debt / Assets	2.551*** (0.121)	2.247*** (0.120)	2.132*** (0.143)	2.143*** (0.143)
Supplier debt / Assets	3.960*** (0.150)	3.987*** (0.144)	3.651*** (0.175)	3.669*** (0.174)
Other debt / Assets	2.541*** (0.125)	2.429*** (0.121)	2.167*** (0.144)	2.128*** (0.144)
ln(Number of employees)	-0.307*** (0.0267)	-0.340*** (0.0248)	-0.327*** (0.0301)	-0.329*** (0.0302)
Constant	-5.889*** (0.116)	-5.012*** (0.114)	-5.641*** (0.147)	-5.404*** (0.152)
Observations	324,602	374,856	377,334	377,334
Sector FE	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes
Pseudo-R2	0.0831	0.0795	0.0687	0.0705
Bankruptcy percentage	0.00712	0.00655	0.00433	0.00433

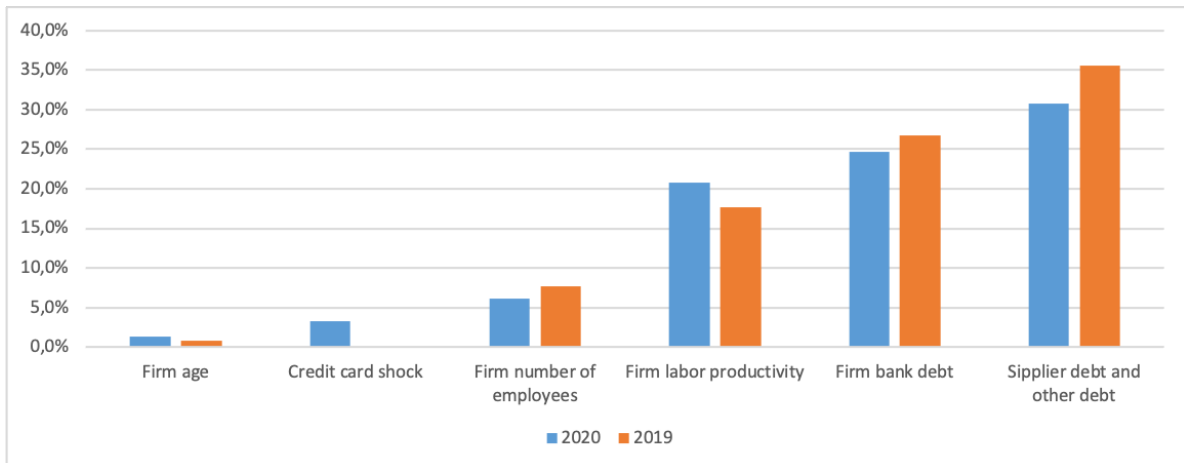
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

⁸Although this indicator should give us an idea of how the sectors were actually affected at a very fine level, shopkeepers in some sectors may have adopted new strategies that may have fostered the use of credit cards, among which pick-and-collect strategies including full credit card payments. For this reason, there may be sectors which have increased their credit card income while their actual sales level is still below 2019 level. Nevertheless, we cannot take into account the sectors' true turnover since we only have high-frequency data on credit card, but we make the assumption that this indicator provides a good proxy of the heterogeneity of the COVID shock across sectors.

⁹Summary statistics for this subsample the year 2020 are presented in Table

The COVID shock as measured by the sectoral decrease in credit card transactions is a very significant predictor of the probability for a firm to fail. From this point of view we can conclude that public policy measures did not fully absorb the sectoral heterogeneity of the COVID shock. However, note that the other predictors of bankruptcy are not much affected by the introduction of the size of the COVID shock and are not very different either from the recent years without COVID shock. The comparison between regressions (3) and (4) in table 5 shows a slight increase in the model accuracy (the pseudo-R2 increased by 0.018). However, the quantitative impact of the COVID shock on the probability of default compared to the other traditional factors is minor. Figure 4 shows the influence of the different predictors on the pseudo-R2. Quantitatively, debts, labour productivity and size of the company are much more important predictors of the probability of failure than the COVID sectoral shock. Hence, we conclude that although public support to the retail sector in France has not fully absorbed the COVID shock, our estimates suggest that it has absorbed a very large share given that the shock explains little of the risk of failure. This suggests that a large part of the sectoral heterogeneity in turnover variation between 2020 and 2019 has been compensated by symmetric heterogeneity in public support.

Figure 4: Contributions of different predictors to bankruptcy risk in 2019 and 2020



Reading note: In 2019, including the ratio of bank debt to corporate assets among the explanatory variables for default increases the explanatory performance of the econometric model by 25% compared to a model where all the other variables listed here are present, as well as sector fixed effects.

3 The expected rise in firm failures

Micro simulations (Gourinchas et al. (2020), Guerini et al. (2020), Demmou et al. (2021)), predict a sharp increase in SME failures compared to 2018 and 2019, up to 25% for example in the ac-

commodation and food sector. However, these simulations do not take into account all the public support measures.

Our empirical model can shed light on this question although it is too simple and incomplete to offer a forecast of firm failures in 2021-2022. Rather we estimate three scenarios to analyse how different sectors could be affected. We propose a simple method based on our econometric model by considering that the increase in insolvencies to be expected in the trade sector for 2021 would be the sum of 2 effects: 1) the catching up on bankruptcies that did not take place in 2020 and 2) the turnover fall over the period 2020-2021 and additional debt accumulated by firms.

We focus on the broadly defined retail trade firms and consider 3 plausible scenarios depending on the impact of the COVID-19 shock on productivity on the two year period (2020-2021) and debt of companies.

- The least affected firms would experience a 3% drop in labour productivity, but their debt levels would remain unchanged.
- The intermediate firms would experience a 6 percent drop in labour productivity and a 2.5 point increase in their debt ratio (all debts combined, i.e. bank debt, tax and social security debt, and supplier debt).
- The most affected firms would see labour productivity decrease by 12 percent and their debt ratio increase by 5 points.

These scenarios are not meant to be precise but indicative and are based on the following assumptions:

- Concerning the drop in productivity, the assumption is that all retail trade firms have faced a drop in labour productivity, if only because of periods of mandatory closure, social distancing measures and the drop in demand. For companies moderately affected by the shock, the drop in labour productivity would be 6%, which corresponds roughly to the cumulative annual growth decline expected over the period 2020-2021¹⁰. For the least affected companies, the impact on labour productivity would be half as large (-3%) and twice as large (-12% for the most affected companies).
- Concerning the increase in indebtedness, to calibrate a plausible shock we observed the distribution of state-guaranteed loans at the end of November 2020 as published on the government

¹⁰In the draft amending finance bill presented at the end of November 2020, the government forecasts a negative growth rate for the French economy in 2020 (-11%) followed by a rebound of around 6% in 2021, i.e. an average annual growth rate over the two years of around -3%.

website Etatlab on public data. This information is then used to compute the relative change in the ratio of overall debt to the total assets at a sectoral level based on balance sheets data of firms. According to our calculations, the state guaranteed loan corresponds to an increase in the debt ratio up to 2.7 points (see Table 6). From there we constructed three scenarios. In the worst-case scenario, the debt ratio at the end of the second lockdown (December 2020) would increase by 5 points compared to the situation at the end of 2019 due not only to the state-guaranteed loan scheme, but also to the tax and social security arrears accumulated thanks to government measures and possible moratorium in supplier invoice payments. For the companies least affected, the debt ratio would not increase due to the combination of lockdown periods and strong catching up in post lockdown periods. Finally, the moderately affected companies would see their debt ratio (all debts combined) increase by 2.5 points compared to the level at the end of 2019. To give an idea of the magnitude of the simulated debt shocks, the debt ratio in the wider retail trade sector, which averaged 40 percent at the end of 2019, would remain unchanged for the least affected retail trade companies and would rise to 45 percent for the most affected companies.

Table 6: Bank debt ratio increase by sector

Sector	State Guaranteed Loan over Total Assets
Extrativives Indsutries	0.17
Manufacturing	0.57
Construction	1.43
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	1.38
Transportation and Warehousing	0.72
Lodging and Catering	2.71
Information and Communication	0.32
Financial and Insurances Activities	0.39
Real Estates Activities	0.10
Specialized, Scientific and Technical Activities	0.52
Administrative and Support Service Activities	0.62
Education	2.51
Human Health and Social Action	1.92
Arts, Entertainment and Recreation	2.05
Other Service Activities	2.09

Reading note: the take up of the state-guaranteed in the construction sector amounts to an increase of 1.43 point of the debt ratio.

Source: FARE 2018, Etatlab

From the baseline model, we simulate the different scenarios described above on retail trade companies. We keep the 2019 baseline estimation as the closest to the conditions that would be

those of year 2021 without government support measures. Based on three different scenarios for the three types of sectors, we estimate the increase in bankruptcy based on the logit estimation where we estimate the in-sample individual probability to go bankrupt using the actual characteristics of each company. We then simulate the individual changes in debt and labour productivity depending on the three scenarios explained above, and we measure how the probability of each individual is affected by those changes according to the model. We finally compute the variation of the average probability of bankruptcy before and after the simulated changes in characteristics. These are shown in table 7

Table 7: 3 plausible scenarios for retail trade companies and bankruptcy increase

Sector shock	low	intermediate	high
Shock 1 : Labour productivity fall	-3%	-6%	-12%
Impact on bankruptcy	+2,3%	+ 4,8%	+9,9%
Shock 2 : Debt ratio increase	+0pt	+2,5pt	+5pt
Impact on bankruptcy	0%	+6,9%	+14,4%
Combined shocks			
Impact on bankruptcy	+2,3%	12,1%	25,7%

Table 8: COVID-19 crisis and bankruptcy catch-up : Predicted bankruptcy rate in 2021-2022

Sector shock	low	intermediate	high
Bankruptcy rate in 2019 (1)	1,1%	1,1%	1,1%
Bankruptcy rate in 2020 (2)	0,7%	0,7%	0,7%
Bankruptcy rate in 2021 = (1) + (3) + (4)	1,53%	1,63%	1,78%
2020 catch-up (3) = (1) - (2)	0,4%	0,4%	0,4%
Covid combined shocks (4)	0,03%	0,13%	0,28%

The impact is quantitatively large for the most affected sectors but is small for the other sectors. Note also that the productivity fall has a larger quantitative impact than the increase in debt. In table 8 we translate this increase in failure probability in failure rates for the year 2021-2022. As a starting point, in 2019, 1.1% of the firms in those sectors filed for bankruptcy. For example, in the most affected sectors the 25% increase in failure rate due to the combined effect of lower productivity and higher debt would translate into 0.28% of firms failing in the next two years. The catch-up effect (firms that would normally have failed in 2020 but did not and would normally fail in 2021-2022) would actually be much larger as it would involve 0.4% of firms. Overall the bankruptcy rate would increase from 1.1% to almost 1.8% in the most affected sectors an increase that would be due in majority (around 60%) to the catch-up effect. These scenarios should be taken with great caution given the huge uncertainty on the validity of our assumptions. They suggest

however that the policy challenge in 2021-2022 may be to manage as much the wave of "normal" failures that did not occur in 2020 as the failures due to the COVID shock itself. Another challenge will be for commercial courts to deal with the wave of bankruptcies. [Iverson \(2018\)](#) shows that in the US, the insolvency framework becomes less efficient when courts are congested with a higher risk for viable firms to be liquidated.

The limitations of our scenarios should however be stressed:

- Our scenarios for retail trade companies implicitly assume that there will be no further deterioration of the economic situation nor additional public support.
- Our econometric model used lacks crucial features.
 - It does not take into account general equilibrium effects. In the case of business failures, these can be of two kinds: on the one hand, an increase in bankruptcies can lead to the weakening of other businesses through supply chain effects; on the other hand - and this has the opposite impact - a business can benefit from the difficulties of its competitors.
 - It does not take into account the endogeneity issue that potentially leads to overestimate the increase in insolvencies due to the COVID crisis. A firm with low productivity is likely to make low or negative profit and to accumulate debt because of low productivity. In this case, the accumulation of debt is more the symptom than the cause of the firm's problems. However, in the COVID crisis, the increase in debt is of different nature. This debt is a result of the shock suffered and not a symptom of the deterioration of the firm's ability to generate profits. Taking into account firms' labour productivity helps reduce this endogeneity, but we may still exaggerate the role of debt on firm failure in the present crisis. However, remember that our estimates of productivity and debt as predictors of firm failures in 2020 were very similar to those of 2019.

4 Conclusion

This paper is the first, to our knowledge, to estimate the factors predicting firm failures in the COVID crisis based on actual data in 2020. Although we are very aware of the limits of our exercise, we believe that several interesting messages emerge from it. First, at this stage Schumpeter has not caught COVID in the sense that the normal selection process in firm failure has not been distorted in 2020. The same factors that predicted firm failures (productivity and debt) in 2019 are at work and in a similar way in 2020. The reduction of firm failures is very large and is due to policy

measures to support firms but it has so far generated a partial "hibernation" of the destructive creation process rather than a massive "zombification" of the French economy. Of course, this early reassuring message should be taken with caution. The catch-up of failures in 2021-2022 will be large and will constitute a policy issue as it may be interpreted as a policy failure rather than a return to normal. The policy challenge will therefore be to continue support to productive and viable firms (but with potentially high debt due to the COVID shock) while at the same time progressively discontinue support to firms that are not viable.

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5 Appendix

Economic support measures for companies during Covid-19 crisis

- **State-guaranteed loan (SGL):** it allows firms to ask for a credit to commercial banks that is guaranteed from 70% up to 90% by the French public investment bank (BPIFrance) in case of default. All companies are eligible since May and they can ask for a SGL until June, 30th of 2021 with low interest rates going from 1% to 2.5% according to the duration of the repayment (from 1 to 5 years). The amount obtained cannot exceed 25% of the 2019 sales of the company or two years of payroll. Firms have been granted access to such loans 638 034 times since the beginning of this aid, for a total amount of 130 040 million euros credited until now. For firms that do not find any bank willing to lend, some loans can directly be granted by the state. The idea behind such an economic measure is that SGL provides incentive to banks to lend and allows to enhance access to credit for financially distressed firms and to smooth the shock on liquidity, avoiding chain defaults.
- **Short time work measures:** it offers firms the possibility to a subsidy for temporary reductions in the number of hours worked in case the activity of the company is subject to temporary closure, significant decrease or difficulties to supply access or impossibility to prevent the employees from being exposed to the virus. This support mechanism allows that the employee to receive 70% of his gross wage (85% of net salary), and the firm receives an amount of 85% of the employee cost, up to an amount equivalent to 4.5 minimum wages. In some sectors (tourism, hotels, restaurants, sports, culture, air transport and entertainment), the firm could receive full compensation. An overall number of 189 455 requests have been compensated, accounting for 936 960 employees and more than 49 million hours.
- **Solidarity fund:** This fund changed several times since the beginning of the crisis. It is aimed at supporting small businesses, micro-entrepreneurs and self-employed workers particularly affected by the economic consequences of Covid-19. Initially, only companies below 10 employees could request this fund up to a 1500€ threshold whenever they justified administrative closure or decrease in sales of more than 50%. However, it evolved by increasing the employee threshold up to 20 employees first and 50 then for some sectors, while also raising the amount possibly received from 1500 up to 10 000 and 200 000 at the group level. Although the eligibility requirements is sector dependent, the support is a transfer without any need to be paid back for all the beneficiaries. Until now, the overall amount of the aid account for 11 870 million euros given to more than 1.9 million businesses.
- **Deferrals of payment of social and/or fiscal charges:** this deferral of employer contributions was available for all self-employed workers and auto-entrepreneurs belonging to sectors considered to be affected by the crisis according to a list defined by the URSSAF, companies of less than 250 employees in sectors highly affected, and to companies in other sectors employing less than 10 people but that were forced to close. The conditions for eligibility were then loosened in October. In addition, other fiscal contributions also benefited from deferrals such as the property tax, or corporate income tax, or value-added tax credits. The deferral of payment amounted to 3 199 million euros by January 13th, 2021.

Table 9: Change in credit card receipts par sub-sector in retail

Sector	change in CB receipts
Activities of travel agencies	-61%
Passenger transportation by cab	-48%
Beauty care	-40%
Retail sales of leather goods and travel goods	-29%
Body maintenance	-28%
Hotels and similar accomodation	-26%
Retail sale of fuel in sepcialized stores	-23%
Laundry and dry cleaning	-23%
Fast food restoration	-21%
Traditional catering	-18%
Retail sales of clothing in specialized stores	-16%
Retail sale of perfume and cosmetics in specialized stores	-15%
Haidressing	-15%
Repair of shoes and leather goods	-14%
Catering services	-12%
Retail sale of watches, clocks and jewelry in specialized stores	-11%
Foowear retailing	-9%
Repair of watches and jewelry items	-7%
Motor vehicle maintenance and repair	-2%
Retail sale of automotive equipment	-1%
Campground and parks for caravans or recreational vehicles	1%
Repair ofof househod appliance and equipment for home and garden	2%
Beverage outlets	2%
Repair of consumer electronic products	2%
Trade and repair of motorcycles	2%
Retail sale of books in specialized stores	3%
Retail sale of other household equipment in specialized store	3%
Retail sale of of beverages in specialized stores	4%
Trade in motor vehiccles	4%
Retail sale of flowers, plants, seeds, fertilizers, pets and pet food in specialized stores	6%
Optical retail business	9%
Repair of computers an peripheral equipment	10%
Retail sale of information and communication equipment in specialized stores	12%
Retail of pharmaceutical producy in specialized stores	13%
Retail sale in non-specialized stores	15%
Retail sale of bread, pastry and confectionnery in speciaized stores	16%
Funeral services	17%
Other food retailing in specialized stores	18%
Retail sale of tobacco products in specialized stores	23%
Retail sale of medical and orthopaedic articles in sepcialized stores	24%
Retail sale of newspapers and stationery in specialized stores	28%

Reading note: according to credit card data, the funeral services has increased its sales by 17% in 2020.

Source: Groupement Cartes Bancaires CB, authors' calculations