Will Schumpeter Catch Covid-19?[*]

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This version: November 2021

Abstract

We estimate factors predicting firm failures in the COVID crisis using French firm-level data. Although the number of firms filing for bankruptcy in 2020 was much below its 2019 level (- 36%) the same factors that predicted firm failures (primarily debt, cash holdings, productivity) in the past are at work during the COVID crisis. Morover, in 2020 as in 2019, zombie firms are more likely to fail than other firms. 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. Even for sectors most affected, our empirical estimates suggest that the rise in firm failures should mostly come from a catch-up effect of firms that should have failed in 2020.

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. (2020)) 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 filling 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, over the year 2020 filings are 27% below their 2019 level[2]. In Germany, where the obligation to declare insolvency has been suspended on March 1st, the number of firms filing for bankruptcy has decreased by 15% in 2020 compare to 2019[3]. In both Germany and France, no catching up in the first months of 2021 is observed. In the US, 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[4] have emerged that these policies may create zombies by reducing the exit of non productive firms. The rise of zombies (firms with low profitability and unable to cover debt servicing costs) was a concern before the COVID crisis. For example, Banerjee & Hofmann (2018) find that the prevalence of zombie firms has ratcheted up since the late 1980s, reflecting reduced financial pressure in part due to the effects of lower interest rates. The concern is therefore that the COVID crisis rather than eliminating the least productive firms may increase the number non profitable firms that survive
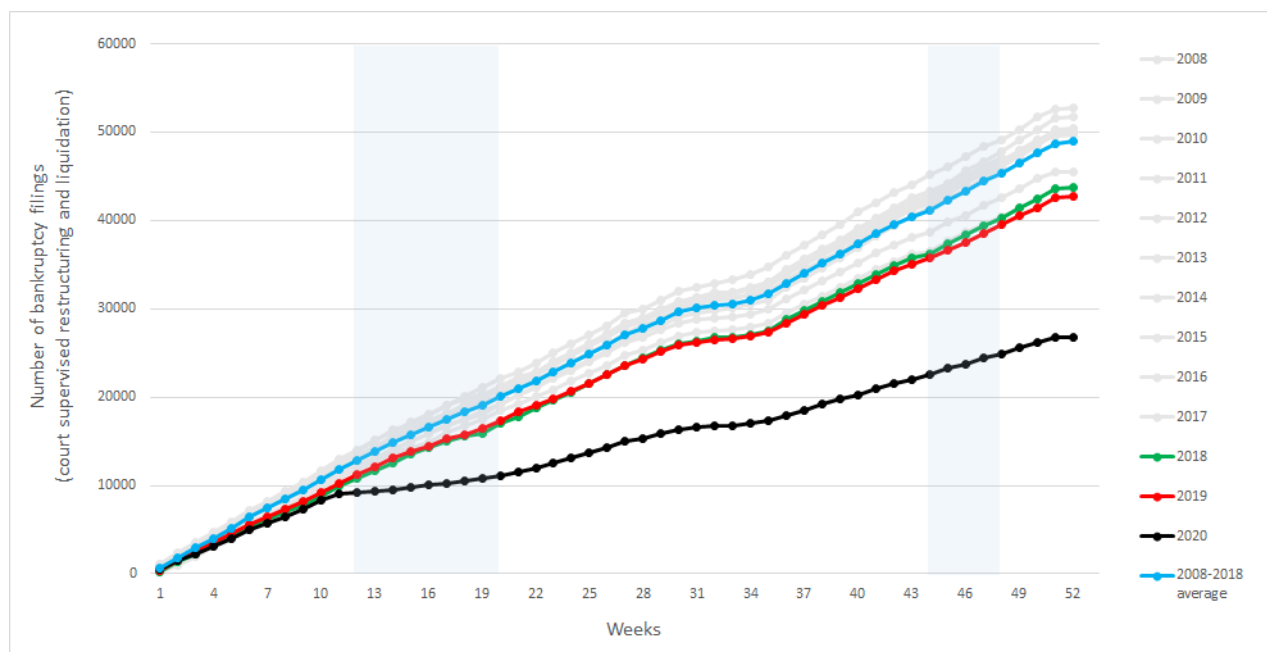
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[2]see *UK Insolvency Service Quarterly* (2021)

[3]see *Destatis* (2021)

[4]see The-Economist (September 26,2020) or Financial-Times (December 3, 2020)

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

Reading note: At the end of 2020 the cumulative number of bankruptcy filings had reached 26,754, while at the end of 2019, the cumulative number of bankruptcy filings had reached 42,694.
Source: BODACC data up to March 2021

because of public support. 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 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 destruction[5]. This is so even though net entry is a small component of TFP growth volatility[6] . 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. However, Laeven et al. (2020) argue

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[5]see 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.
[6]see Osotimehin (2019)

that "the different nature of the crisis means that many firms that normally would be classified as zombie firms are in fact viable firms".

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 (2017) 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.

To our knowledge, much of the existing literature regarding the impact of the pandemic on firm exit and the effectiveness of government support relies either on survey evidence (Barrero et al. (2020), Bartik et al. (2020), Buffington et al. (2020) amongst others) or empirical/structural predictive exercises (Barrot et al. (2021), Guerini et al. (2020), Gourinchas et al. (2020) and Gourinchas et al. (2021) amongst others). In this paper we use real-time data and past firm-financial data to provide useful insights to the ongoing discussion about the implications of COVID-19 fiscal policy.

At this stage our 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. Both risks may materialise if

government support was concentrated on low-productivity firms. For example, some support was proportional to or conditional on a minimum threshold turnover loss. This may have implied more support to firms or retailers that were not well prepared (for example in terms of digitisation) to react swiftly to the new environment of the pandemic. 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, cash holdings and zombie status 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.

In section 2, we provide an empirical estimate of the determinants of bankruptcies in the French COVID crisis. Section **??** sketches some potential scenarios for 2021-2022 based on these estimates. In section 3, 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 BODACC[7], 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 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), leverage (total debt over total assets), cash holdings as well a 1/0 variable that indicates whether a firm is a zombie firm (or not). For this last variable, we follow the OECD definition (Adalet-McGowan et al. (2018)) and consider a firm to be zombie if its EBITA is lower than its interest payments for at least 3 consecutive years and the firm is at least ten year old.

We are interested in what trigger bankruptcy in SMEs (small and medium-size enterprises) for which there is no public involvement in case of financial fragility. We thus focus on companies with less than 250 employees. Also we consider firms with at least one employee[8]. We exclude from this sample all the companies for which information necessary to compute all variables is not available and 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. The resulting sample consists of 1,100,227 observations in 2013 and has 1,121,610 observations in 2020. This is a large sample that represents 81% of firms with 1 to 249 employees in 2020 80% in 2019. 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

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[7]Bulletin Officiel des Annonces Civiles et Commerciales
[8]Self-employed workers and auto-entrepreneurs are excluded from the sample

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 consists mainly in tax and social security debt is almost 20% of total assets.

Table 1: Summary statistics - 2019 and 2020 samples

	N	Mean	St. Dev.	Median	D1	D9	Min.	Max.
2019 sample								
Bankruptcy (0/1)	1,100,227	0.013	0.113	0.000	0.000	0.000	0.000	1.000
Labour Productivity ('000 euros)	1,100,227	67	50	56	19	130	-100	300
Total debt (/assets)	1,100,227	0.451	0.238	0.427	0.152	0.802	0.000	1.000
Bank debt (/assets)	1,100,227	0.137	0.170	0.072	0.000	0.384	0.000	1.000
Supplier debt (/assets)	1,100,227	0.122	0.126	0.083	0.012	0.285	0.000	1.000
Other debt (/assets)	1,100,227	0.192	0.175	0.135	0.034	0.436	0.000	1.000
Zombie (0/1)	1,100,227	0.018	0.133	0.000	0.000	0.000	0.000	1.000
Age (in years)	1,100,227	15	14	12	3	32	2	119
Nb of employees	1,100,227	8	20	3	1	18	1	249
2020 sample								
Bankruptcy (0/1)	1,121,610	0.008	0.087	0.000	0.000	0.000	0.000	1.000
Labour Productivity ('000 euros)	1,121,610	69	52	57	19	135	-100	300
Total debt (/assets)	1,121,610	0.440	0.238	0.412	0.144	0.792	0.000	1.000
Bank debt (/assets)	1,121,610	0.137	0.170	0.072	0.000	0.384	0.000	1.000
Supplier debt (/assets)	1,121,610	0.119	0.125	0.080	0.010	0.279	0.000	1.000
Other debt (/assets)	1,121,610	0.184	0.174	0.127	0.031	0.423	0.000	1.000
Zombie (0/1)	1,121,610	0.018	0.134	0.000	0.000	0.000	0.000	1.000
Age (in years)	1,121,610	15	14	12	4	32	2	127
Nb of employees	1,121,610	8	20	3	1	18	1	249

Source: BODACC, FARE 2017, FARE 2018.

As mentioned in the introduction, bankruptcy filings in 2020 was dramatically lower than in 2019. The annual default rate was 1.28% in 2019 and only 0.77% in 2020 (and down from 1.97% in 2013). 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-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%.

Zombie firms represent around 1.8% of the whole sample and 3% of mature firms in our sample[9] and the bankruptcy rate of these firms is 1.6% in 2020 down from 2.3% in 2019. It is around 3 times higher than that of mature firms that are not zombie (see Table 2) .

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[9]Note that both the share of zombie firms and their bankruptcy rate are probably higher than the ones measured in our sample since our sample does not include firms becoming zombie at time t and failing at time $t + 1$. See Ben-Hassine et al. (2019)

Table 2: Zombie Firms - 2019 and 2020 samples

	% of zombie firms in mature firms	bankruptcy rate	
		zombie firms	other mature firms
2019	3.1%	2.3%	0.8%
2020	3.2%	1.6%	0.5%

Source: BODACC, FARE various years

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 firms) 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

Figure 2: Labour productivity distribution
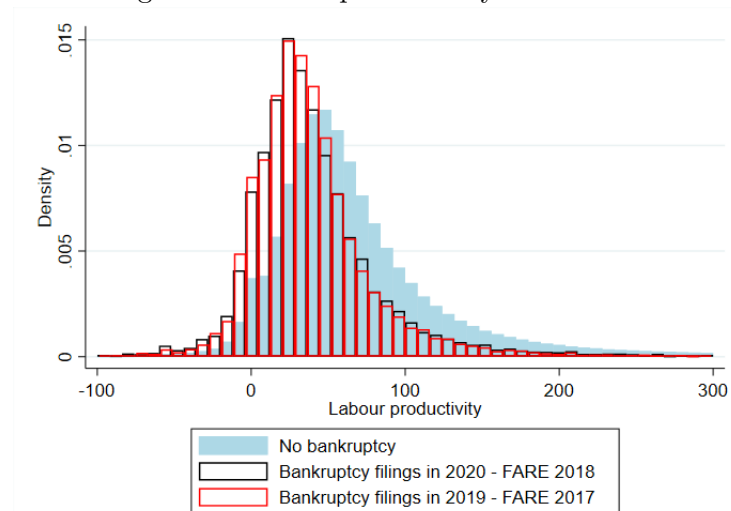
Reading note: The distribution of labour productivity of firs that filed for bankruptcy in 2020 and 2019 is clearly on the left of the distribution for firms that neither filed for bankruptcy in 2020 nor before.

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 filed for bankruptcy 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 [10]), the cash over total debt (a dummy for each decile of that ratio and a special class for firms with no debt), a dummy 1/0 for the zombie status, 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

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[10]Note that we do not have the information regarding the maturity of the debt so we cannot distinguish short term debt from long term debt

Figure 3: Debt ratio distribution
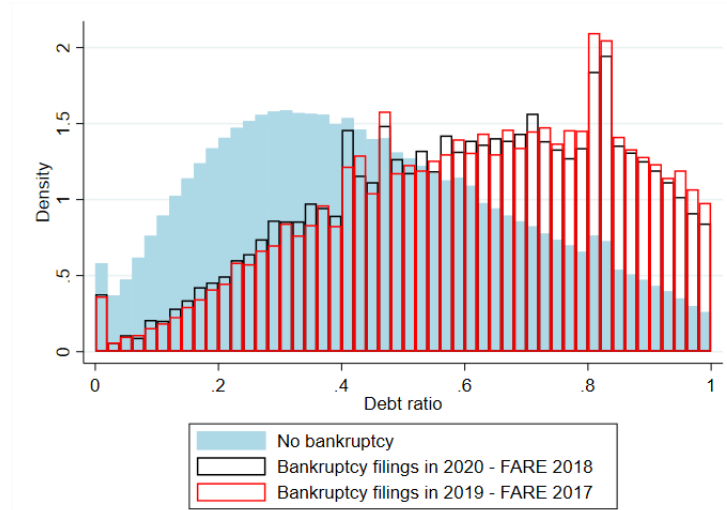
Reading note: The distribution of debt ratios of firms that files for bankruptcy in 2019 and 2020 is clearly to the right of that of firms that didn't filed for bankruptcy in 2020 nor before.

dummies).

The equation is the following:

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

where μ_s is the industry fixed effect and X_{it-2} contains all other firm characteristics. There is no time fixed effect as we estimate this equation for each year separately from 2017 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 2017 on the firm sample described above. Results of these year by year estimations are reported in Tables 3 and 4, 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).

The ability of the model to explain the individual heterogeneity in bankruptcy is - not surprisingly - low but the AUROC is always above 77%. The Pseudo-R2 varies between 0.103 in 2016 and 0.067 in 2020. The lower explanation power in the year 2020 model suggests that the usual bankruptcy predictors (size, age, productivity, leverage, cash) 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.

Table 3: Predictors of the bankruptcy probability 2017 -2020

	2017	2018	2019	2020
Labour Productivity	-0.0141***	-0.0107***	-0.00915***	-0.00798***
	(0.000335)	(0.000284)	(0.000238)	(0.000283)
Debt / Assets	1.852***	1.795***	1.488***	1.536***
	(0.0511)	(0.0477)	(0.0441)	(0.0558)
Zombie	0.497***	0.578***	0.612***	0.729***
	(0.0502)	(0.0501)	(0.0514)	(0.0607)
ln(Number of employees)	-0.0982***	-0.0864***	-0.217***	-0.206***
	(0.00984)	(0.00934)	(0.00844)	(0.0107)
Constant	-3.231***	-3.868***	-3.382***	-3.857***
	(0.268)	(0.309)	(0.274)	(0.323)
Sector FE	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes
Cash/debt class FE	Yes	Yes	Yes	Yes
Pseudo-R2	0.119	0.117	0.102	0.0860
AUROC	0.804	0.800	0.788	0.777
Observations	849,435	927,614	1,100,227	1,121,610
Bankruptcy rate	0.0137	0.0141	0.0128	0.00768

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

Table 4: Predictors of the bankruptcy probability 2017 - 2020 Alternative specification

	2017	2018	2019	2020
Labour Productivity	-0.0134***	-0.00998***	-0.00849***	-0.00741***
	(0.000341)	(0.000288)	(0.000241)	(0.000286)
Bank debt / Assets	0.733***	0.687***	0.257***	0.438***
	(0.0678)	(0.0637)	(0.0620)	(0.0777)
Supplier debt / Assets	2.300***	2.182***	2.000***	2.088***
	(0.0683)	(0.0637)	(0.0607)	(0.0767)
Other debt / Assets	2.120***	2.056***	1.732***	1.710***
	(0.0575)	(0.0531)	(0.0500)	(0.0633)
Zombie	0.551***	0.623***	0.656***	0.777***
	(0.0502)	(0.0501)	(0.0514)	(0.0607)
ln(Number of employees)	-0.0954***	-0.0806***	-0.206***	-0.201***
	(0.00987)	(0.00938)	(0.00851)	(0.0108)
Constant	-3.108***	-3.766***	-3.226***	-3.736***
	(0.268)	(0.309)	(0.274)	(0.324)
Sector FE	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes
Cash/debt class FE	Yes	Yes	Yes	Yes
Pseudo-R2	0.125	0.123	0.109	0.0909
AUROC	0.811	0.807	0.796	0.786
Observations	849,435	927,614	1,100,227	1,121,610
Bankruptcy rate	0.0137	0.0141	0.0128	0.00768

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

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. Moreover, the coefficient associated with the zombie status does not decrease from 2019 to 2020, meaning that in 2020 the exit process has not been distorted in favour of shielding zombie firms.

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 the 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 5. For the year 2020, there are 378,041 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 was 0.73% in 2020, while it was 1.19% in 2019, a drop of nearly 39% in business bankruptcies.

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 sectors[11] 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 6).

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[11]Although 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 click-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.

Table 5: Retail sector - Summary statistics 2019 and 2020

	N	Mean	St. Dev.	Median	D1	D9	Min.	Max.
2019 sample								
Bankruptcy (0/1)	375,784	0.012	0.108	0.000	0.000	0.000	0.0	1.0
Labour Productivity ('000 euros)	375,784	58	41	49	19	109	-100	300
Total debt (/assets)	375,784	0.471	0.247	0.449	0.156	0.824	0.0	1.0
Bank debt (/assets)	375,784	0.179	0.194	0.113	0.000	0.476	0.0	1.0
Supplier debt (/assets)	375,784	0.116	0.114	0.082	0.018	0.257	0.0	1.0
Other debt (/assets)	375,784	0.176	0.173	0.112	0.031	0.421	0.0	1.0
Zombie (0/1)	375,784	0.014	0.117	0.000	0.000	0.000	0.0	1.0
Age (in years)	375,784	15	12	11	3	31	2	119
Nb of employees	375,784	6	14	2	1	11	1	249
2020 sample								
Bankruptcy (0/1)	378,041	0.007	0.085	0.000	0.000	0.000	0.0	1.0
Labour Productivity ('000 euros)	378,041	60	44	50	18	113	-100	300
Total debt (/assets)	378,041	0.459	0.247	0.434	0.146	0.822	0.0	1.0
Bank debt (/assets)	378,041	0.177	0.194	0.111	0.000	0.473	0.0	1.0
Supplier debt (/assets)	378,041	0.113	0.113	0.079	0.017	0.251	0.0	0.985
Other debt (/assets)	378,041	0.168	0.171	0.105	0.028	0.406	0.0	1.0
Zombie (0/1)	378,041	0.014	0.116	0.000	0.000	0.000	0.0	1.0
Age (in years)	378,041	15	12	11	4	31	2	120
Nb of employees	378,041	6	15	2	1	11	1	249

Source: BODACC, FARE 2018.

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 above[12]. Results are shown in Table 7.

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 7 shows a slight increase in the model accuracy (the pseudo-R2 increased by 0.012). 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, cash, 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

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[12]Summary statistics for this subsample the year 2020 are presented in Table

Table 6: 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

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.

Table 7: Predictors of the bankruptcy probability + credit card shock (2018-2020) - Retail

	2018	2019	2020	2020 + Shock
Credit card shock				1.170*** (0.196)
Labour Productivity	-0.0149*** (0.000634)	-0.0124*** (0.000531)	-0.0125*** (0.000645)	-0.0121*** (0.000648)
Other debt / Assets	1.463*** (0.101)	1.705*** (0.0937)	1.563*** (0.117)	1.544*** (0.117)
Supplier debt / Assets	3.023*** (0.121)	3.235*** (0.113)	2.900*** (0.143)	2.914*** (0.143)
Bank debt / Assets	0.943*** (0.104)	0.970*** (0.101)	0.899*** (0.127)	0.907*** (0.127)
Zombie	0.621*** (0.0888)	0.595*** (0.0934)	0.628*** (0.111)	0.611*** (0.111)
ln(Number of employees)	-0.297*** (0.0204)	-0.349*** (0.0184)	-0.346*** (0.0232)	-0.345*** (0.0232)
Constant	-2.697*** (0.1000)	-3.078*** (0.0964)	-3.758*** (0.127)	-3.590*** (0.130)
Sector FE	Yes	Yes	Yes	Yes
Age class FE	Yes	Yes	Yes	Yes
Cash/debt class FE	Yes	Yes	Yes	Yes
Pseudo-R2	0.118	0.111	0.0925	0.0936
AUROC	0.808	0.800	0.790	0.791
Observations	325,287	375,784	378,041	378,041
Bankruptcy rate	1.22%	1.19 %	0.73%	0.73%

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

Figure 4: Contributions of different predictors to bankruptcy risk in 2019 and 2020
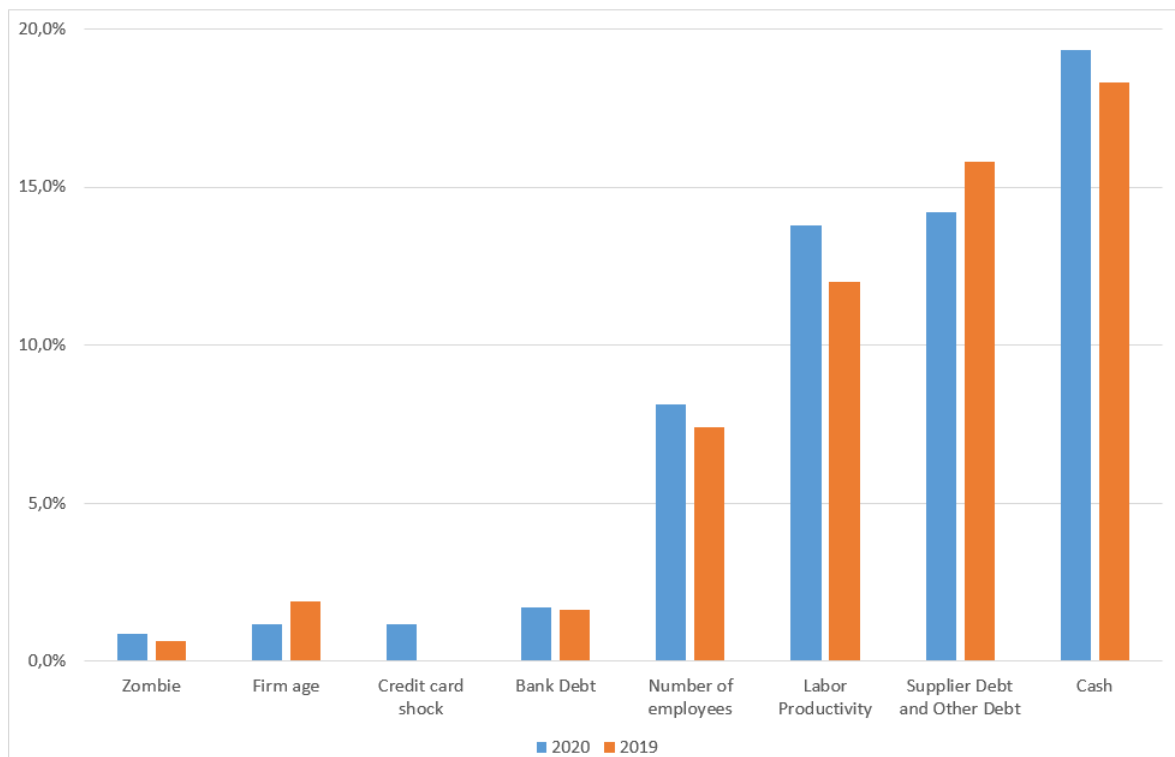
Reading note: In 2019, including the ratio of bank debt to corporate assets among the explanatory variables for default increases the explanatory performance of the econometric model by 13,8% compared to a model where all the other variables listed here are present, as well as sector fixed effects.

3 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 catched 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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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.