Firm liquidity and solvency under the Covid-19 lockdown in France

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We simulate the impact of the Covid-19 crisis on corporate solvency using a sample of around one million French nonfinancial companies, assuming they minimize their production costs in the context of a sharp drop in demand.

We find that the lockdown triggers an unprecedented increase in the share of illiquid and insolvent firms, with the former more than doubling relative to a No-Covid scenario (growing from 3.8% to more than 10%) and insolvencies increasing by 80% (from 1.8% to 3.2%).

The crisis has a heterogeneous effect across sectors, firm size, and region. Sectors such as hotels and restaurants, household services, and construction are the most vulnerable, while wholesale and retail trade, and manufacturing are more resilient. Micro-firms and large businesses are more likely to face solvency issues, whereas SMEs and medium-large firms display lower insolvency rates.

The furlough scheme put forward by the government (*activité partielle*) has been very effective in limiting the number of insolvencies, reducing it by more than 1 percentage point (approximately 12,000 firms in our sample).

This crisis will also have an impact on the overall efficiency of the French economic system, as market selection appears to be less efficient during crisis periods relative to "normal times": in fact, the fraction of very productive firms that are insolvent significantly increases in the aftermath of the lockdown. This provides a rationale for policy interventions aimed at supporting efficient, viable, yet illiquid firms weathering the storm. We evaluate the cost of such a scheme aimed at strengthening firms' financial health to around 8 billion euros.

SciencesPo

1. Introduction

The Covid-19 crisis represents an unprecedented shock to the French and to the world economy. The strict containment measures to limit the pandemic, the subsequent gradual re-opening, and the ensuing fall in consumption and investment represent a simultaneous demand and supply shock.

The fall in GDP during the eight weeks of confinement alone is evaluated by OFCE (2020) to cost 120 billion euros. While the impact on household disposable income is (at least partly) offset by public measures, such as the partial employment scheme and the solidarity fund, which nevertheless will lead to a significant increase of public debt, compensation for loss of business activity is more limited. The loss in added value for non-financial companies is estimated to go beyond 30% of their pre-shock level.

The subject of this policy brief is to study the impact of the recession induced by the Covid-19 pandemic on the French productive system. We simulate the impact of the lockdown on the balance sheet of French non-financial firms, focusing on the emergence of liquidity and solvency issues. Moreover, we document the extent to which market selection is efficient, that is, the proportion of highly productive firms that become illiquid and insolvent.

This study does not capture all the problems associated with the lockdown. The fall in investment in both physical capital and R&D due to uncertainty, or the potential loss of skills through layoffs can permanently reduce potential GDP, irrespective of number of firm exits. Similarly, the reduction in the value of companies can have further negative feedback loops via the financial market. These (longer-term) effects are ignored in this study, but are by no means irrelevant.

Our work is based on a microsimulation of firms' liquidity and solvency position based on confidential balance sheet data contained in the FARE dataset.[1] Using a sample comprising one a million French non-financial firms, we simulate the impact of sectoral demand shocks on firms' balance sheets in order to estimate the share of companies facing liquidity or solvency issues.

1. FARE contains individual accounting data (balance sheet and income statement) coming from companies' tax reports collected by the Ministry of Finance and the French National Statistical Institute (INSEE).

2. Firm bankruptcy and economic growth

2.1. The financial health of French firms

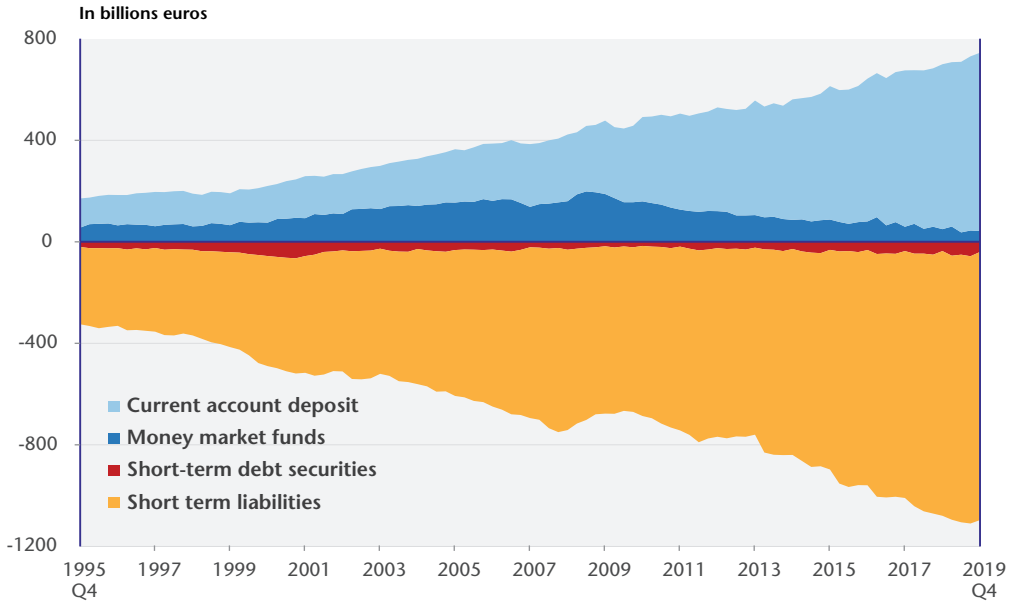
Before simulating the effect of the Covid-19 pandemic on firms' balance sheets, it is worth considering the financial situation of French companies before the crisis. On the one hand, the amount of liquidity (cash, deposits and money market instruments) has increased significantly since 2007, almost doubling over the last decade, and it accounted for more than 700 billion euros at the end of 2019. On the other hand, short-term corporate debt has also increased sharply since the global financial crisis and it now stands at over one trillion euros.

The ratio of short-term assets to short-term liabilities is more than 10 percentage points higher than that before the financial crisis (68% in the last quarter of 2019 compared to 55% in late 2007), suggesting that non-financial corporations have entered the lock-down period with more liquidity than 13 years ago.

This increase in corporate liquidity is common to many countries. The French singularity is the simultaneous increase in debt and cash held by companies. Several reasons have been put forward to understand this phenomenon: from very low interest rates, which reduce the cost of debt, to uncertainty over demand and investment opportunities.[2]

2.
For a review of the literature on the subject, see Cruz, Limura and Sobreiro, "What Do We Know About Corporate Cash Holdings? A Systematic Analysis", *The Journal of Corporate Accounting and Finance*, January 2019 and Cunha and Pollet "Why Do Firms Hold Cash? Evidence from Demographic Demand Shifts", *The Review of Financial Studies*, 2019, for recent analysis.

Figure 1. **Short-term assets and liabilities for French non-financial firms**



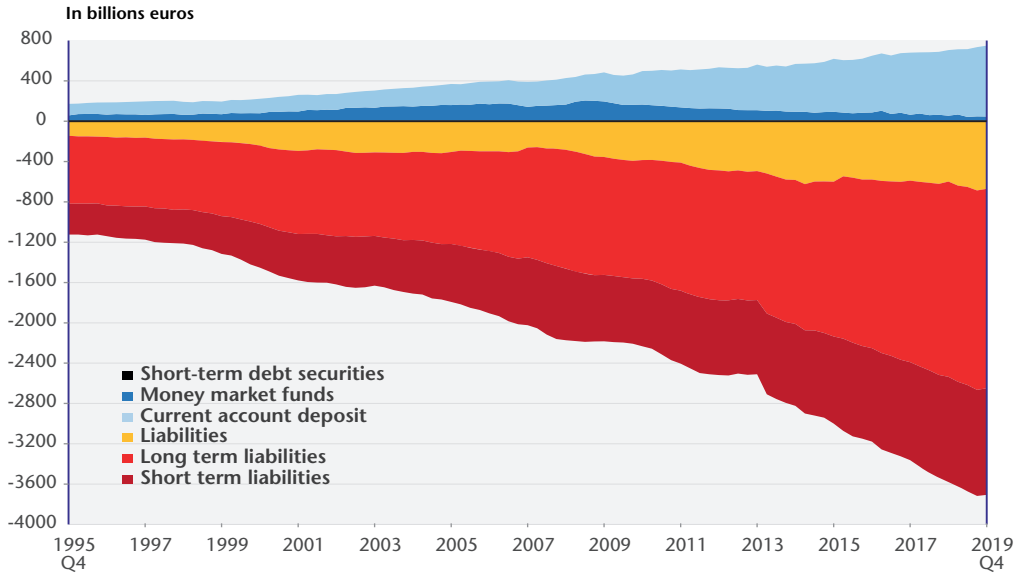
Source: Banque de France.

Figure 1 shows the aggregate dynamics of the financial position of French companies over the long term. From the graph it is also clear that if the ratio of short-term assets to short-term liabilities has improved, the net financial position has deteriorated, moving from -310 billion euros at the end of 2007 to -350 billion in 2019. As a result, adequate refinancing of short-term loans remains an important operating condition for French non-financial firms.

Another, less favorable, reading of these data suggests that the total debt of French firms has increased by 83% between 2007 and 2019, as shown in Figure 2. This phenomenon, which is more pronounced for large companies, has been taking place at the same time as an increase in the liquidity and capitalization (net equity) of firms. As a result, leverage (defined here as the company's debt on equity) has remained roughly constant in recent years. It is therefore difficult to conclude that there is a general and significant financial fragility in the French economy, although there is surely a strong reliance of the French productive system on short-term bank financing.

These elements are important for understanding the simulations, as the high amount of liquidity held by many French companies has cushioned the effect of the economic slowdown triggered by the pandemic. Yet, highly indebted firms face higher (financial) fixed costs and are thus more likely to suffer liquidity and insolvency issues.

Figure 2. **Short- and long-term assets and liabilities for French non-financial firms**



Source: Banque de France.

2.2. Liquidity and solvency: definitions and measures

Businesses fail when they can no longer cope with payments due, such as wages, financial charges or payments to suppliers. This situation does not necessarily lead to firm exit. Liquidation indicates, instead, a closure of the business. This legal definition of default can span several phenomena, such as short-term liquidity problems or long-term solvency issues. Therefore, following the literature, we adopt two complementary metrics to assess the impact of the lockdown on the economic system.

- A first indicator is the notion of illiquid, that is companies with negative liquidity. These firms are not necessarily in default because short-term financing is still possible. This criterion is used by the OECD and is similar to that of Gourinchas *et al.* (2020), who define illiquid firms as those for which cash holding and operating cash flows are lower than fixed costs.[3]
- The second definition is insolvency, which is defined here as the situation in which net debt is larger than a firm's equity (i.e., when net equity is negative). This last definition technically corresponds to firm bankruptcy.

2.3. On the role of bankruptcy in economic growth

Bankruptcies are part of the functioning of market economies and must be considered the normal outcome of unexpected falls in demand or inadequate entrepreneurial choices (e.g. technology choices among the others). The bankruptcy and business creation processes are indeed essential parts of the Schumpeterian dynamic of creative destruction in capitalistic market economies.

Should a policymaker setup policies against bankruptcies? The literature presents two contrasted arguments. The first argument considers that a government shall not intervene to limit the number of bankruptcies because it is the expression of an efficient market selection process, which screens out inefficient businesses. Bankruptcies free resources, such as capital or skills, to be reallocated towards other, more profitable, businesses.[4] This cleansing effect argument assumes that market mechanisms are effective in identifying insolvent companies and in providing the liquidity necessary for the growth of others.

3. Gourinchas, P. O., Kalemli-Özcan S., Penciakova, V. et N. Sander, 2020, *COVID-19 and Business Failures*, mimeo, june.

4. See Caballero et Hammour, "The Cleansing Effect of Recessions", *American Economic Review*, 84(5), december 1994, pp. 1350-1368, and Osotimehin et Pappada, "Credit Frictions and the Cleansing Effect of Recessions", *Banque de France Working Paper*, n° 583. International comparisons in resource allocation has been analysed in Hsieh et Klenow, "Misallocation and Manufacturing TFP in China and India", *The Quarterly Journal of Economics*, 124(4), November 2009, pp. 1403-1448

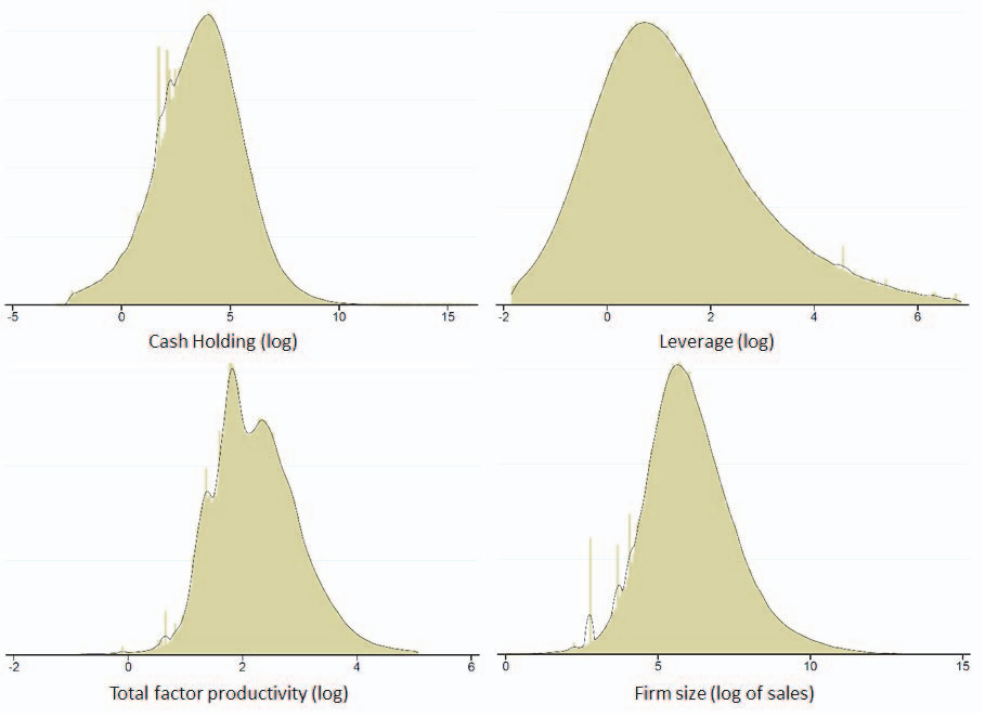
A second approach to bankruptcies during a recession, which we will call new-Keynesian, claims instead that the number of bankruptcies is typically far too high during the recession phases due to market inefficiencies, which prevent the supply of liquidity to solvent, and possibly efficient, companies. A fall in aggregate demand, associated with funding constraints, leads to a sub-optimal number of bankruptcies as they affect businesses that are nevertheless efficient.

This debate is not purely theoretical and, on the contrary, should guide empirical study and recommendations for economic policy. A simple empirical measure of the market efficiency is to measure whether there are productive enterprises that go bankrupt. If the market mechanism works well, only the least productive companies should go bankrupt. If market selection is instead inefficient, the correlation between productivity level and probability of not going bankrupt should be weak and firms exiting the market might also belong to top productivity quartiles.

Figure 3 reproduces four essential distributions characterizing French businesses. Distributions are based on almost a million firms, representing over 80% of the value added of non-financial corporations The area of each distribution is normalized to 1, so that only their shape matters.

The first distribution is the distribution of businesses' cash holdings (in logarithm for easier reading). The companies with the lowest cash flow are the companies that are in the left tail of the cash distribution. It immediately appears that there are a significant number of companies with low cash flow. The second distribution is that of leverage, defined as the total debt on equity. In this case, the most leveraged companies are the companies with the highest values of leverage, which are therefore in the right tail of the leverage distribution. The third distribution displays that of productivity, measured by total factor productivity (TFP). The least productive firms are the firms in the left tail. The final distribution is the size distribution. We observe that the distribution is very symmetrical with a few threshold effects to the left of the distribution of firm size.

Figure 3. **Distribution of the key dimensions affecting firm solvency**



Source: FARE data.

Empirically, companies combine these various dimensions in a complex way. Highly indebted companies may results from productive inefficiency, which should eventually lead them to market exit. On the contrary, the debt level of a company can be the result of significant investment, therefore of high expected productive efficiency and significant growth in its market share. If the market mechanism works properly, only the least productive firms should show go bankrupt. In this case, the productivity distribution is the only relevant one to predict the long-run survival — or bankruptcy — of a business. If, on the contrary, market selection is inefficient, companies with a low cash flow or a high debt might go bankrupt, regardless of whether or not these are efficient.

Thus, the characterization of the functioning of the market mechanism mentioned in this simulation exercise will be based on the market's ability to select the most productive companies at the expense of the least productive ones, which instead should be filtered out.

3. Impact of the Covid-19 pandemic on firms: main simulation results

This exercise consists in a microsimulation of the impact of the economic shock due to the Covid-19 pandemic on French firms, over a period ranging between March 2020 and April 2021, considering different scenarios. The simulation strategy is described in Box 1 and, more formally, in Appendix 1.

Box 1. **Simulating firm liquidity and solvency**

The exercise consists in providing companies with rules of behavior in the presence of negative or positive demand shocks. Each company then adapts its factors' requirements to meet the new demand.

Two simulation strategies are used in the literature. The first models the behavior of the company by limiting its ability to adapt the use of its resources to the evolution of its sales. In these so-called partial adjustment models (Schivardi and Romano, 2020; OECD, 2020), following the sudden and massive demand shock following the confinement, companies reduce their demand for factors, but the rigidities inherent in factors' markets imply that there is a less than proportional reduction with respect to the fall in sales. These rigidities lead to an inequality between the reduction in revenues from output sales and the reduction in input-related expenditures. Such inequality potentially leads to negative profits. The very simple model is essentially mechanical, and does not model the company's decision in any way.

The second strategy, in the spirit of Gourinchas *et al.* (2020), starts from the opposite hypothesis. Rather than facing an excess of resources, companies are rationed on their labor demand due to confinement, leading them to make sub-optimal allocation choices that penalize their liquidity. This model thus explains the company's choice of factor consumption in an environment very strongly disturbed by three negative shocks: (i) a negative demand shock; (ii) rationing of the labor factor supply due to confinement; (iii) a reduction in productivity following telework.

The model proposed here combines the partial adjustment specific to the first strategy (Schivardi and Romano, 2020; OECD, 2020) with an explicit modeling of the choice of enterprise specific to Gourinchas *et al.* (2020). The model is based on the assumption that in a disturbed environment, the objective of companies is to minimize their production costs while meeting the demand they receive. However, companies can only partially adjust their

Schivardi, F., et G. Romano, 2020, *A simple method to compute liquidity shortfalls during the COVID-19 crisis with an application to Italy*, mimeo.

OCDE, 2020, « Corporate sector vulnerabilities during the Covid-19 outbreak: Assessment and policy responses », *Tackling Coronavirus Series*..

Gourinchas, P. O., Kalemli-Özcan S., Penciakova, V. et N. Sander, 2020, *COVID-19 and Business Failures*, mimeo, june.

factors (as in the partial adjustment model). The model includes the partial employment scheme (see Box 2). The latter allows companies to directly reach the optimal level of work quantity. We therefore make the assumption of a rapid adjustment of the work factor, unlike the intermediate consumptions which, themselves, adjust slowly.

The simulation exercise uses the FARE 2017 database, which amounts to assuming that the accounting statement of French companies in March 2020 corresponds to that of December 2017. FARE 2017 includes more than 4 million companies (4,089,046). We exclude from the analysis companies with incomplete information as well as firms in Agriculture (AZ), Finance and Insurance (KZ) and Public Administration, Education, Human Health and Social Action (OQ) sectors. We also exclude legal persons and organizations subject to administrative law and self-entrepreneurs and craftsmen. This last category deserves special attention, but the rules of decision on the factors of production do not strictly speaking fall within the logic of the model presented. However, the exploited base includes 975,142 companies (or 23.8% of FARE's legal units), concerns 10.8 million jobs (10,857,851 jobs, or 83.6% of FARE jobs), and corresponds to 966 billion euros of added value in 2017 (i.e. 83.2% of FARE and 81.8% of added value of non-financial companies). This simulation work is based on the notion of legal units, and not on profiled companies. In this sense, we do not address the questions of cash transfer between parent companies and subsidiaries capable of modifying the level of liquidity of companies.

We refer the reader to Appendix 1 for a more formal presentation of the model. Appendix 2 presents the sensitivity of the results to the modeling choices.

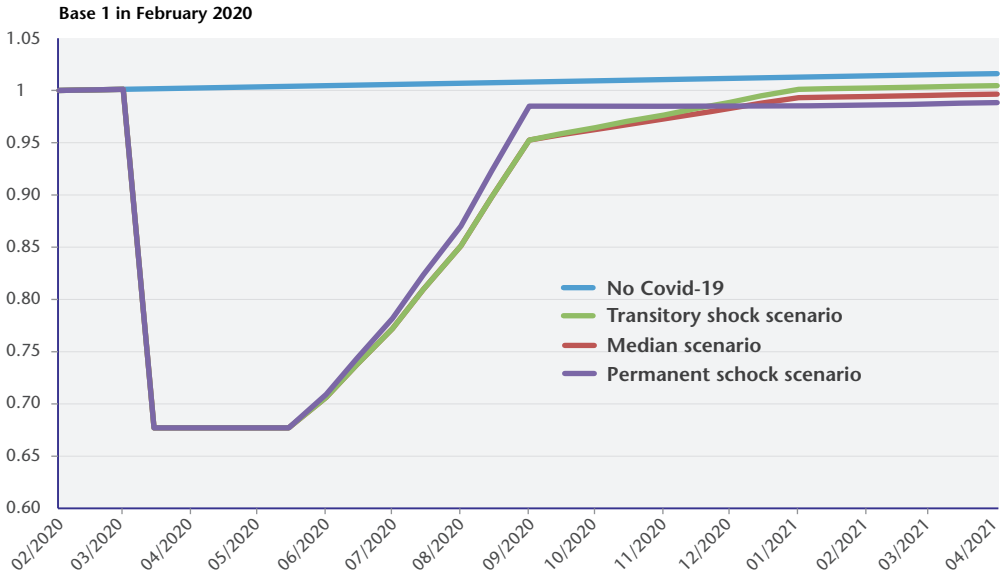
The performance of firms, and the overall response of the French economy to the shock, depends on the macroeconomic scenario prevailing in the coming months. We simulate the dynamics of firm liquidity, and the ensuing solvency issues, using four different assumptions about the post-lockdown phase. Figure 4 displays the time profile of the shock and the return to "normal" economic activity. The first scenario is a No-Covid environment that serves as a counterfactual and is characterized by steady growth (1.5% annualized GDP growth). The other three scenarios differ in terms of the recovery phase: although they seem very close to each other, they lead to very different unemployment rates. A permanent drop in the level of economic activity leads to a fall of almost 3% in the hours worked by the end of 2020, potentially pushing unemployment up by the same amount (unless the partial employment scheme is extended beyond December 2020).

Box 2. **Partial employment scheme**

The partial employment scheme (*Dispositif d'activité partielle* in French) is a simple change in working conditions, and does not constitute a modification of the work contract. In this scheme, the employment contract is suspended, but the employee remains an employee of the company and as such, some of his rights are preserved. In order to avoid a rise in unemployment resulting from the drop in activity — as in the context of the Covid-19 pandemic — the partial employment scheme has been substantially modified. The allowance paid by the State is now equal to 70% of the gross salary (84% of the net salary) of employees placed in partial activity, up to 4.5 times the minimum wage. This scheme has been revised downwards to 60% of the gross salary since June 1, 2020.

In our simulation, the partial employment scheme is introduced by allowing firms to directly reach the optimal level of labor, with no partial adjustment costs associated to it.

Figure 4. **Macroeconomic scenarios**



Source: OFCE.

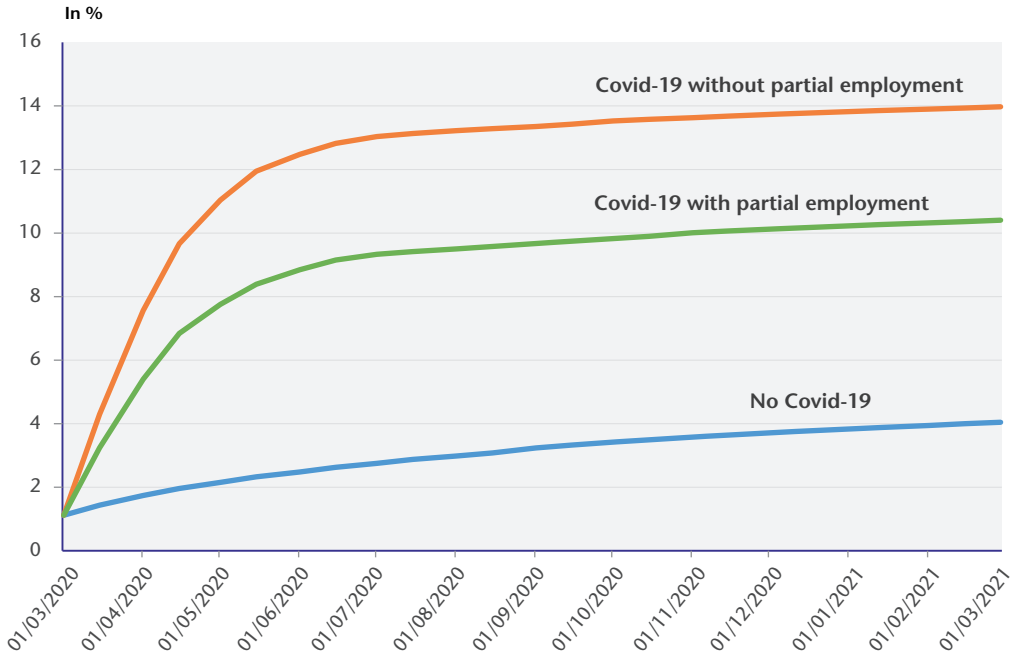
The results discussed below are based on the relatively favorable hypothesis of a "median" transitory shock (red curve in Figure 4). We will not explicitly discuss results for the other scenarios because, even if they significantly affect unemployment, they differ little in terms of the liquidity and solvency of firms. In fact, the partial employment scheme decouples the dynamics of bankruptcies from medium-term macroeconomic fluctuations. Indeed, the bulk of liquidity and solvency issues builds up in the first few weeks after the lockdown.

We start by presenting the broad trends emerging from the simulations, discussing first the dynamic of firm liquidity and then moving to solvency problems.

The pandemic has a sudden, brutal and sizable impact on the liquidity of French companies. The drastic drop in revenues determined by containment measures, the presence of friction in the markets for factors of production and of fixed costs that do not adjust to the level of production (or adjust very slowly, as it is the case for utility bills, rents, financial expenses such as loans or mortgage payments) drain the liquidity of non-financial firms. The fraction of companies experiencing liquidity issues (i.e., a situation where the negative cash flow from current operations completely dries up liquid assets such as cash reserves, deposits and money market instruments) jumps to 7.5% within two weeks, further increases to 12% after two months, and then climbs up to 14% in the first quarter of 2021. This contrasts with a rate of around 4% at the beginning of 2021 under the baseline No-Covid scenario.

Figure 5 provides two additional insights. The first one concerns the impact of the partial employment scheme on firm liquidity, which is large and positive. By relaxing the short-term work contract rigidities, the measure considerably reduces the number of illiquid companies, reducing it from 9.7% to 6.8% in mid-April, and from 13.8% to less than 10.1% at the end of 2020. The second lesson is that a number of firms face liquidity issues irrespective of the pandemic. In fact, 4% of companies experience liquidity problems in the No-Covid scenario, implying that they are unprofitable even when the economy is growing and suggesting they are inefficient. These companies are generally smaller, less productive, more indebted and have a lower level of liquidity than the others.

Figure 5. **Cumulative share of illiquid businesses**



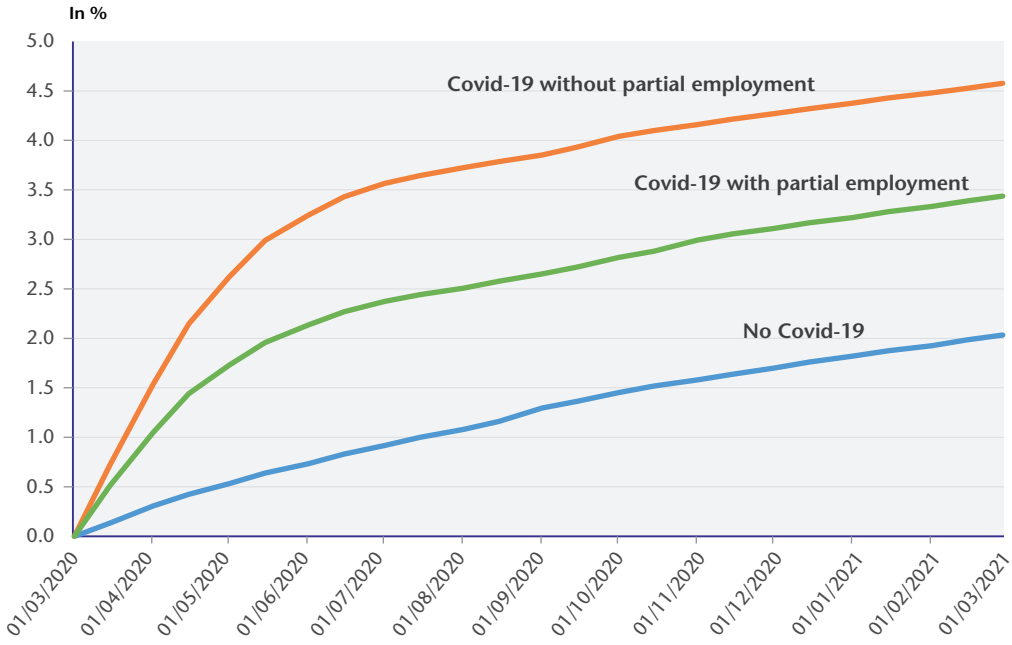
Sources: OFCE simulations, FARE data.

The OECD has recently published a report investigating the impact of the pandemic on the liquidity of firms in 16 European countries. The study predicts that one month after the lockdown, 20% of companies will face liquidity problems; the share would then climb to 30% after two months, and peak at around 38% after three months. There are several explanations for these differences. First of all, the OECD assumes a complete stop to any economic activity in a number of sectors such as transportation equipment, recreation and entertainment, real estate and other services, while we use sectoral forecasts about the French economy provided by OFCE. Secondly, the OECD study employs a sample of French companies that, if it allows for an international comparison, is about 10 times smaller than the number of firms we use. It is very likely that the characteristics of companies differ significantly between the two databases..

While temporary liquidity shocks can be overcome once economic activity resumes, an extended period of low revenues can ultimately trigger solvency problems. The No-Covid scenario is associated with a very low exit rate, which reaches 1.8% at the end of December 2020. The impact of the pandemic is again very significant, although slightly less brutal than in the case of liquidity. The partial employment scheme considerably reduces the share of insolvent companies: the exit rate is one full percentage point lower after the first two months from the crisis, and this gap persists throughout the simulation. In March 2021, the expected exit rate is 3.4% (compared to 2% for the No-Covid scenario).

Without the partial employment scheme, the story would have been substantially different. The share of companies experiencing solvency problems would quickly reach 0.7% in the immediate aftermath of the crisis, and quickly climb to 3% by mid-May. Failures would reach 4% in September, 4.4% in January 2021 and 4.6% a year after the lockdown, a value more than twice as large as the one expected without the crisis. We estimate that the number of firms that remain solvent thanks to the partial employment scheme amounts to nearly 12,000 (out of the 1 million firms in the sample).

Figure 6. **Cumulative share of insolvent companies**



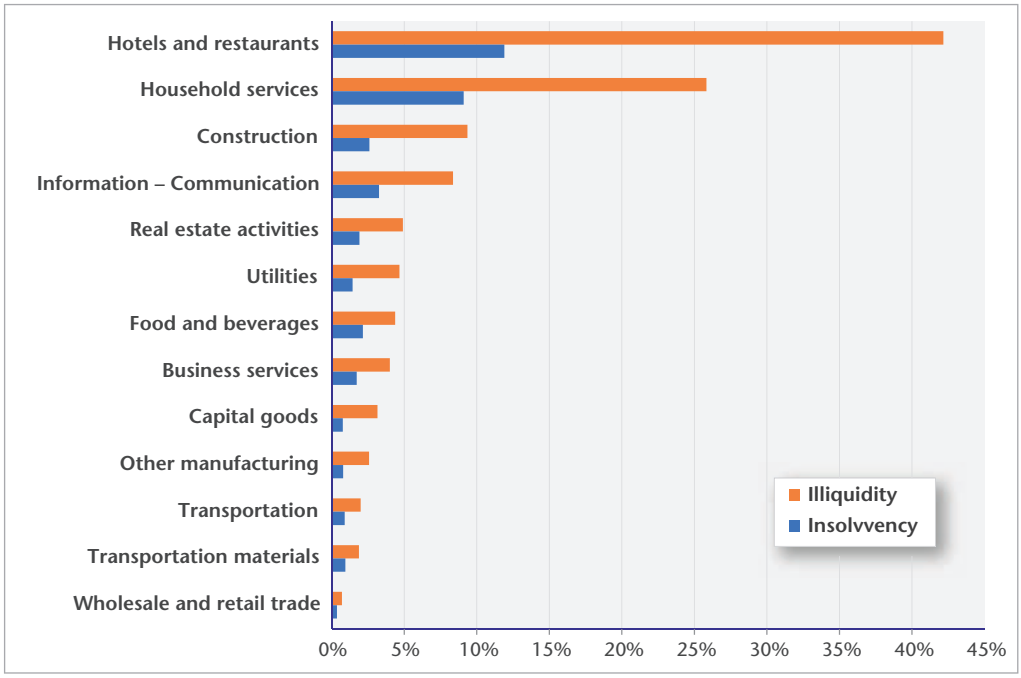
Sources: OFCE simulations, FARE data.

4. Heterogeneous effects of the shock: sectors, firm size and regions

The simulations highlight important heterogeneity in the impact of the shock across sectors and firm categories. Focusing on differences across sectors, Figure 7 shows that companies experiencing liquidity problems (at January 1, 2021) varies between a minimum of 0.7% (commerce) to a maximum of 42% (hotels and restaurants). The two sectors most affected are hotels and restaurants on the one hand and household services on the other hand, the latter featuring almost 26% of illiquid firms at the end of the year. Constructions and information and communication follow with a share of firms facing liquidity issue ranging between 8 and 9%, whereas other sectors (including manufacturing) display rates below 5%. Shifting to solvency problems delivers a very similar classification. Accommodation, food and household services are still at the top of the list, with around 12% and 9% of insolvent firms. Information and communication, and construction follow at a distance, with only 2 or 3% of companies facing solvency problems.

We conclude that exposure to bankruptcy as a result of Covid-19 reflects sector-specific factors. It may be important for public authorities to design actions to support firms according to the sector to which they belong. It is worth noting that liquidity and solvency issues do not simply reflect the magnitude of the shock, but result from the interaction between the latter, other sector characteristics such as technology (which determines the intensity of factors) and firm-specific feature such as initial liquidity and leverage. Indeed, the correlation between the initial shock and the rate of illiquidity and insolvency is positive, but far from one, ranging between 0.64 for illiquidity and 0.48 for insolvency. Furthermore, this correlation fades as the economy returns to its initial level of activity.

Figure 7. **Effets sectoriels du choc de la Covid-19**



Sources: OFCE simulations, FARE data.

To better understand the relationship between the magnitude of the shock and the share of insolvent firms in each sector, we examine the number of insolvent firms in the No-Covid scenario. We observe that certain sectors display a (relatively) large number of companies facing troubles irrespective of the pandemic. This is the case, for example, for household services or the information and communication sector. In fact, this exercise singles out hotels and restaurants, construction and, to a lesser extent, transportation, as the sectors that experience the most significant increase in insolvency (and illiquidity) rates.

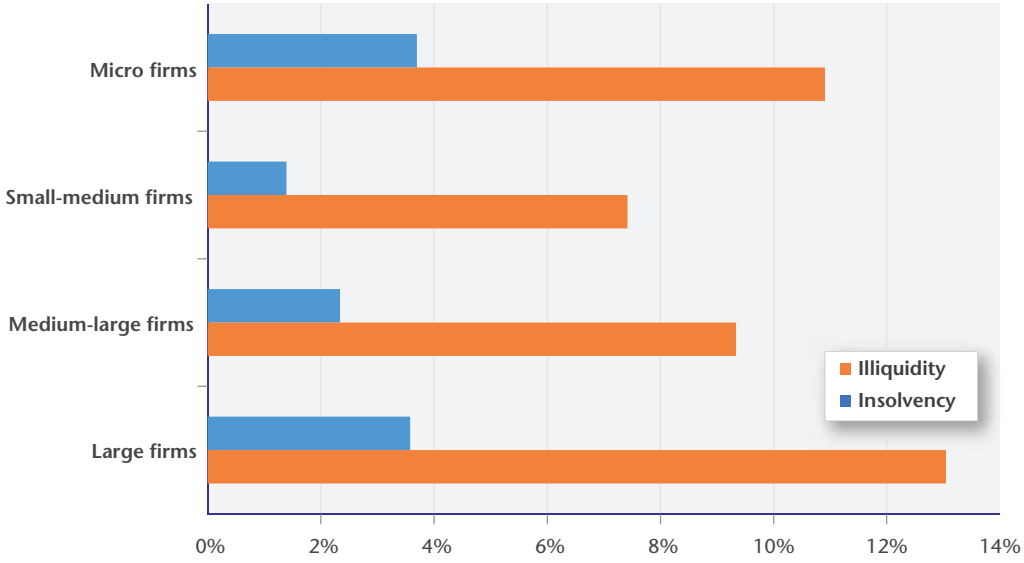
Let us now focus on differences across categories: micro firms, small and medium enterprises, mid-size firms and large firms.[5] Figure 8 shows the share of illiquid and insolvent companies on January 1, 2021. We immediately notice a polarization of the risk of default on small and large companies: approximately 11% and 13% of micro and large firms will face liquidity problems. For SMEs, this number drops to 7%. A similar pattern emerges for insolvency: while around 4% of micro and large firms are insolvent at the end of the year, only 2% of mid-sized firms and 1% of SMEs are likely to become insolvent. This result seems all the more robust since: (i) it is also present in the No-Covid scenario, so that large and micro firms are those with the highest rates of insolvency also without Covid-19; (ii) it does not reflect an disproportionate presence of large companies in highly-impacted sectors.[6]

This "U-shape" is surprising, as one would have expected a concentration of liquidity problems on smaller companies. In fact, when we compare the insolvency rate under the Covid-19 scenario to the one occurring in the No-Covid case, we find that micro firms are the most affected (+83% increase) while the other three categories all experience an increase of around 40%. Thus, one might think that the underlying reasons for insolvency of small and large companies are substantially different: small businesses may go in distress because of scarce liquidity, while large firms because of higher debt levels, or a higher reliance on leverage.

5. Firm types are defined in terms of the number of employees, turnover, and total assets. For more information, please refer to the website of the French National Statistical Institute (INSEE) https://www.insee.fr/fr/information/1730869#:~:text=Le%20d%C3%A9cret%202008%2D1354%20de,interm %C3%A9diaire% 20et% 20les% 20grandes%20entreprises.

6. In the sectors hotels and restaurants and household services, large companies represent 0.4 and 0.3% of firms respectively, whereas they account for almost 4% of firm population in less exposed sectors such as manufacturing of transport equipment.

Figure 8. **Effect of the Covid-19 shock by size of business**



Sources: OFCE simulations, FARE data.

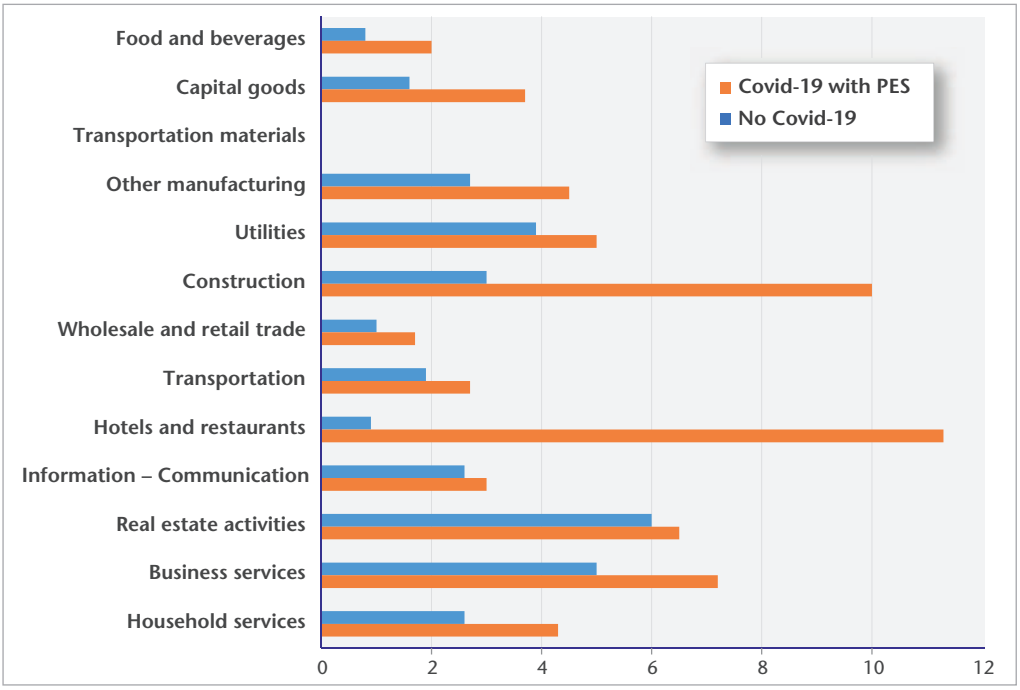
5. Market selection

When analyzing the impact of lockdown measures on firm liquidity and solvency, which may lead to an increase in exits, an important question relates to the ability of the market to properly select firms, pushing only the least productive out of the market. After all, if selection operates correctly, a chief policy recommendation would be to foster creative destruction by promoting the reallocation of (human, technical, financial) resources towards more profitable activities. On the contrary, if the selection mechanism performs poorly by pushing viable and efficient companies out of the market, policy makers may wish to support efficient businesses afloat.

Figures 9 and 10 show the share of insolvent firms (by sector and firm type) coming from the top quartile of the TFP distribution, comparing the baseline No-Covid scenario with a situation where the shock hits and firms can resort to the partial employment scheme. If market selection works properly, this share should be close to zero.

We see that selection works well in a situation of regular growth (No-Covid). For most sectors (Figure 9), the share of insolvent firms in the top productivity quartile remains below 3%, with the exception of real estate and business services. After the lockdown, on the other hand, the selection mechanism is much less efficient and we observe a systematic increase in the share of productive companies among those facing solvency issues. This increase can be seen in the hotel and restaurant industry, where the share is multiplied by 10, and in construction, where efficient companies represent 10% of insolvent companies. In other words, among the businesses exposed to bankruptcy risk there are economically viable businesses, whose fragility most probably depends on high leverage, which results in large fixed (financial) costs, or on low cash holdings before the crisis.

Figure 9. **Share of insolvent firms in the top quartile of productivity (by sector)**



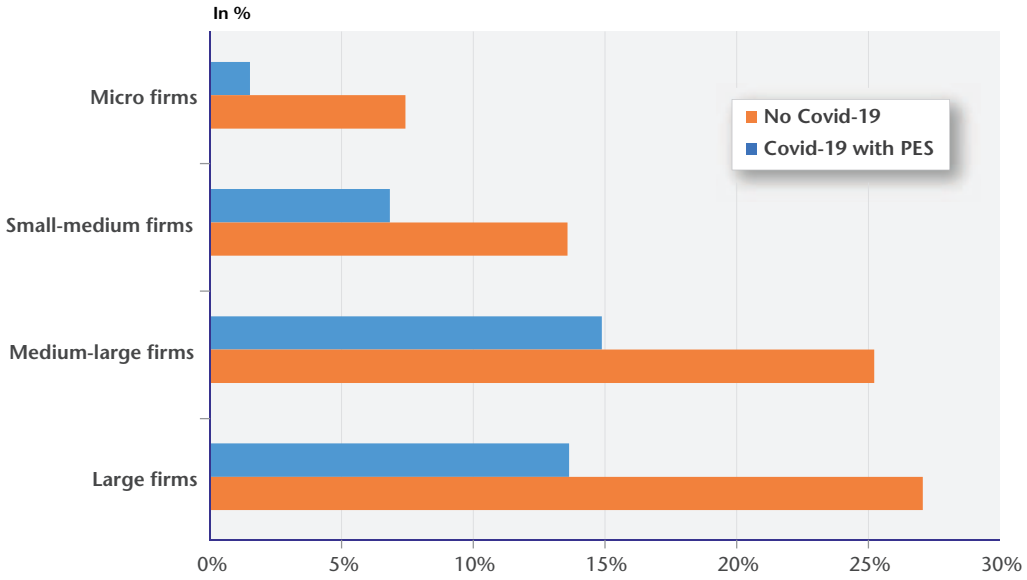
Sources: OFCE simulations, FARE data.

Figure 10 corroborates these findings about a systematic deterioration of the quality of market selection in times of crisis, and it also shows that the impact is different by firm size.[7] For microenterprises, and to a lesser extent SMEs, the market largely selects on the basis of productivity. In the No-Covid scenario, the share of highly productive microenterprises among the insolvent ones is 1.5%, while 85% of firms in default come from the bottom quartile of productivity. In times of crisis this selection weakens but remains by and large operational. For mid-sized and large firms, on the other hand, selection seems to operate on other criteria, since the share of productive but insolvent companies reaches almost 15% in the No-Covid scenario, and jumps to 25% during the Covid-19 crisis. This difference in treatment between small and large companies can be attributed to imperfect financial markets that, by limiting small firms' ability to access external resources such as bank loans, make them less vulnerable to the sort of problems that are modeled in the simulation. In addition, the short-termism of lenders and financial markets may reward short-run performance over longer-term efficiency, with negative effects on the overall competitiveness of the economic system. Likewise, many large firms facing solvency issues comes from the top quartile of productivity suggests that selection is not only based on efficiency but may reflect market power in the factor or product markets.

This crisis will therefore also have an impact on the overall efficiency of the French economic system, possibly leading to a hysteresis effect. The weakening of market selection provides a rationale for public intervention aimed at sustaining viable but illiquid/insolvent firms during the crisis. The practical difficulties come from the fact that policymakers may not be better equipped than the market to discriminate among "good" and "bad" firms.

7. These observations echo the results by Bellone *et al.*, 2008, and suggest the existence of a dual market structure, whereby competition between large firms penalizes the productive efficiency of young firms. See Bellone, F., Musso, P., Quéré, M. and L. Nesta, 2008, "Market Selection Along the Firm Life Cycle", *Industrial and Corporate Change*, 17(4): 753-777.

Figure 10. **Share of insolvent businesses in the top quartile of productivity (by business category)**



Sources: OFCE simulations, FARE data.

6. Which public policies?

The unprecedented shock to the economic activity of the Covid-19 crisis was in part absorbed by the partial employment scheme since the number of insolvent companies would have increased in 2020 from 3.2% to 4.5% without this policy. However, this system is not well-suited for the forthcoming dynamics as it may also reduce the firms' incentives to return to full employment.

The targeting of the policy for companies shall be based on two contradicting principles: (i) the aim of the device must not be to protect business owners unconditionally from the entrepreneurial risk; (ii) the provision of public financial resources must be targeted to efficient firms exclusively. A too broad targeting can transfer resources to companies that do not need them, increasing the cost to the state. Likewise, a broad targeting can unduly help companies which would have gone bankrupt due to inappropriate technical choices, if the market would have been efficient. Conversely, and as the simulations reveal, a lack of aid leads to failures of productive enterprises and an increase in unemployment, due to the poor functioning of market mechanisms.

A first strategy is to consider sectoral policies, capable of identifying large companies in difficulty and of estimating effective financing conditions. However, this first strategy, which is necessary, leaves smaller but efficient companies with a smaller bargaining power with the public authorities (vis-à-vis the large ones).

Therefore, a mechanism that is both transversal and targeted, with explicit criteria of eligibility for companies, must be considered. Germany, for example, has chosen to contribute to the financing of fixed costs. An amount of 25 billion euros has been dedicated to this scope. Until August 2020, each company whose income has fallen by more than 60% compared to the 2019 level of activity can receive a contribution for

the financing of 70% of its fixed costs, with a maximum of 150,000 euros per company.[8] In Italy, two measures contribute to the financing of companies. The first is the suspension of the transfer of VAT from companies to the Italian State before a rescheduling on 5 payments. This suspension is conditional on a drop in activity of 33% for small businesses and of 50% for large ones. Then, a moratorium was put in place on interest charges from mid-March to mid-September, for SMEs that have not experienced payment incidents. These last two measures are limited due to the constrained Italian budgetary environment. They target the liquidity of companies without improving their solvency.

By qualifying the solvency of companies according to the scenarios envisaged, our analysis distinguishes companies whose failure is due to the lockdown from those which, even in a hypothetical growth scenario (the No-Covid), were doomed to exit the market. Considering the companies failing uniquely because of the current pandemic crisis (around 14,000 companies in our sample), we find that refinancing their equity would represent a cost of around 3 billion euro. In the absence of additional information on the viability of the companies, this amount represents a lower bound, and probably an inaccessible minimum, since the real identification of these companies remains very difficult.

Another strategy would be to contribute to the equity of all insolvent companies, regardless of their viability (around 31,000 companies). In that case the cost estimate would amount instead to 8 billion euros. This cost represents the amount necessary to refinance companies' equity on September 1, 2020, avoiding all bankruptcies. But this policy can be described as a policy of partial discrimination. It discriminates in the sense that, rather than allocating unconditional aid to more companies, it identifies the companies that really need more equity. But it remains partial insofar as it does not allow, without additional procedures, distinguishing viable companies (at least in the medium term), from those which will in any case be forced to exit the market quickly. Such a mechanism can be decentralized by the existence of a public office where companies could justify their capital requirements on September 1, 2020 (before the first financings in order to avoid strategic behavior) and, for example, the absence of payment incidents in 2019 to justify their good health before the shock. ■

8. A presentation of such a mechanism for France is given in the *OFCE Blog* "Covid-19 et entreprises : Comment éviter le pire" by Mathieu Plane, 29 May 2020.

APPENDIX 1. The model

The exercise consists in providing companies with rules of behavior in the face of negative or positive demand shocks. Faced with these shocks, the company adapts the use of its factors of production to meet demand. We thus deduce a dynamic of the liquidity of companies as follows

$$L_t = L_{t-1} + S_t - CV_t - CF \quad (1)$$

where L represents the liquidity of the company at time t and $t-1$, S indicates the sales of the company, CV and CF respectively represent the variable (ie the wage bill and intermediate consumption) and the fixed costs of the business. Equation (1) simply means that the level of liquidity of a company at a given time depends on its level at the start of the period, the inflows (sales) and expenses linked to its current operations, and the fixed costs which they are independent and constant for each period. Fixed costs include the financial charges, the repayment of the principal as well as the corporate taxes. The time t can represent weeks or months. In our simulation, each period corresponds to half a month, a year is thus composed of 24 periods. For each period, we establish two diagnoses. A company is said to be illiquid when its cash flow becomes negative, that is to say that the availability on current accounts and the sale of its liquid assets are no longer sufficient to finance total costs. Likewise, a company is said to be insolvent if its equity is lower than its debts, that is to say if the current liabilities exceed the available assets.

Equation (1) shows that what will determine the dynamics of liquidity, following a demand shock, are the level of variable and fixed costs. We can identify two simulation strategies in the literature. The first strategy models the behavior of the company by limiting its ability to adapt the use of its resources to the evolution of its sales. In these so-called partial adjustment models (Schivardi and Romano, 2020; OECD, 2020), following the sudden and massive demand shock during the lockdown, companies reduce their demand for factors, but rigidities inherent in factor markets imply a less than proportional reduction. These rigidities lead to an inequality between the reduction in sales and the reduction in the expenditure linked to the resources mobilized, potentially leading to negative gross operating profits. The model is essentially mechanical and does not model the company's decision. The second strategy, in the spirit of Gourinchas *et al.* (2020), starts from an opposite hypothesis. Rather than facing an excess of resources, companies are rationed on their labor demand due to lockdown of workers. This leads hem to sub-optimal allocation choices that penalize their liquidity. This model thus explains the company's choice of factor consumption in an environment very strongly disturbed by three negative shocks: (i) a negative demand shock; (ii) a rationing of the labor factor supply, due to confinement; (iii) a reduction in productivity following the telework.

The model proposed here combines the partial adjustment specific to the first strategy (Schivardi and Morone, 2020; OECD, 2020) with an explicit modeling of the choice of enterprise specific to Gourinchas *et al.* (2020). The model is based on the assumption that in a highly disturbed environment, the objective of companies is to minimize their production costs:

$$\mathcal{L} = p_L L + p_M M + rK + \lambda(Q - F(K, L, M)) \quad (2)$$

where $F(K; L, M) = AK^{\beta K}L^{\beta L}M^{\beta M}$ et $A = \theta e^{ui}$. is the Cobb-Douglas production function. We don't make any assumption about market imperfections, but we assume fixed prices in such a short-term time span. We deduce that the optimal demands for factors are:

$$L^* = \left[K^{-\beta_K}\frac{Q}{A}\left(\frac{p_M}{p_L}\frac{\beta_L}{\beta_M}\right)^{\beta_M}\right]^{\frac{1}{\beta_L+\beta_M}}$$

$$M^* = \left[K^{-\beta_K}\frac{Q}{A}\left(\frac{p_L}{p_M}\frac{\beta_M}{\beta_L}\right)^{\beta_L}\right]^{\frac{1}{\beta_L+\beta_M}}$$

We alsop take into account that companies can only partially adjust their quantity of factors (partial adjustment model) according to the following equation:

$$\hat{X}_t = X_{t-1} + \gamma(X_t^* - X_{t-1})$$

where $X = \{L, M\}$. The parameter vector $\gamma(0 < \gamma_L, \gamma_{LM} < 1)$ describes the speed of adjustment of the quantity of factors. If $\gamma = 1$, there is an immediate adjustment so that L and M correspond to the optimal choices. If, on the contrary, $\gamma = 0$, the adjustment is zero and the company chooses quantities of factors corresponding to those of the previous period. We consider the adjustment to be imperfect, that is, not zero or immediate. This partial adjustment reflects the rigidity of contracts, market imperfections such as information asymmetries or even the fixed costs linked to the use of L and M factors, which we do not understand much in the data. We choose $\gamma_M = 0{,}25$.

The partial employment scheme is a device that allows companies to directly reach the optimal level of work quantity. In the model, this amounts to putting $\gamma_L = 1$. For the establishment of an alternative scenario without a partial employment scheme, we set $\gamma_L = 0{,}1$. At this level, the company would take almost a year to review 90% of its employment contracts. The equation for the dynamics of liquidity therefore becomes:

$$L_t = L_{t-1} + p_Q Q - p_L L^* - p_M \hat{M} - CF$$

To summarize, the simulation includes the following decisions: (i) For each period, the company observes the level of demand[9] $Q_t^D = (1 - g_t)Q_{t-1}^D$; (ii) the company determines the optimal amount of factors (L^*, M^*) ; (iii) the company is forced on its adjustment and determines the quantities $(L^*, \hat{M})$; and produces $Q_t^S = F(K, L_t^*, \hat{M}_t)$ with its Cobb-Douglas technology and partial employment scheme, or $Q_t^S = F(K; \hat{L}, \hat{M})$ without the partial employment policy device; (iv) the company collects its sales and ensures the settlement of its factors and fixed costs; (v) the company's cash flow is updated according to the equation $L_t = L_{t-1} + S_t - CV_t - CF$.

9. The initial shock was taken from the *OFCE Policy brief*, n ° 65, table 1.

APPENDIX 2. **Sensitivity analysis**

This appendix describes the sensitivity of the results to the modeling choices. In fact, any simulation includes modeling choices, and the results presented depend on the behavioral assumptions and the underlying simulation parameters. In our case, the critical parameter is the one determining the speed at which the company adjusts its intermediate consumption. Due to frictions on this market resulting from contractual rigidities, information imperfections and unobserved fixed costs, a reduction in the level of production does not lead to a proportional drop in intermediate consumption. While the partial employment scheme allows companies to optimize the desired level of employment, no similar measure exists for intermediate consumption. Table A2 shows the sensitivity of the results with respect to this parameter, detailing the cumulative share of illiquid and insolvent companies on January 1, 2021, the variations in the level of employment compared to original employment, and the liquidity lost for companies compared to what they would hold in a regular growth scenario.

Table A2. **Sensitivity analysis of the results with respect to the speed of adjustment of intermediate goods consumption (the γ_M paraeter)**

En %

Speed of adjustment γ_M	1/10	1/6	1/5	1/4	1/3	1/2	1	Hors Covid
Time implied to revise 90% of contracts	11 months	6 months	5 months	4 months	3 months	< 2 months	0	—
Illiquidity	15.3	12.7	11.6	10.2	8.5	6.3	4.2	3.8
Insolvency	5.4	4.1	3.7	3.2	2.7	2.2	1.9	1.8
Employment variation	-3.5	-2.9	-2.7	-2.5	-2.3	-2.1	-2.0	+1.5
Liquidity variation	-27.7	-25.3	-24.5	-23.5	-22.3	-20.9	-19.2	0.0

Note: Statistics on January 1, 2021. Scenario with a reminder on January 1, 2021 being 95% of the initial shock. The "Off-Covid" scenario is carried out on the basis of an annual growth rate of 1.5%. The variations in employment sum the jobs destroyed due to the insolvency of companies then the jobs in partial employment scheme device, because of the very weak subsequent job creation induced.

We observe that by varying γ_M between a tenth and the unit, the results differ considerably. In the case of an immediate adjustment ($\gamma_M = 1$), the share of illiquid and insolvent companies is very close to that which we would have observed in a growth scenario. The adjustment takes place more in the factor market. Firms adjusting instantly, in this case we would observe a significant decrease in the level of employment (-400,000 jobs out of the 11 million in the database) and a drastic reduction in intermediate inputs. In this scenario, with a rate of insolvent businesses at 1.9 rather than 1.8%, the vast majority of businesses would survive but in a reduced production environment. Conversely, with a very slow adjustment speed ($\gamma_M = 0{,}1$), the number of insolvent businesses would increase to 5.4%, exactly 3 times more than regular growth, with equally disastrous consequences for the level of business liquidity and employment.

How then can we infer a realistic level of this parameter? We selected an adjustment speed $\gamma_M = 0{,}25$ as a central hypothesis. This implies that companies take around 4 months to revise 90% of their contracts and produce a share of illiquid and insolvent

companies of 10.2 and 3.2% respectively. To select this value, we start from the observation that in 2009, the French economy suffered a 3% drop in GDP, associated with a 20% increase in the default rate (which peaked at 1.85% compared to at a long-term average of 1.55%). Comparing this with the benchmark share of insolvent companies in the non-Covid-19 scenario (1.8%), this would lead us to $\gamma_M = 0{,}5$. Given that the expected reduction in GDP for 2020 is much larger (recent OFCE publications forecast -11% for France) and more sudden and therefore less anticipated by economic agents, we consider that the scenarios where the speed of adjustment γ_M is between 0,2 et 0,33 are the most plausible, with $\gamma_M = 0{,}25$ taken as central value.

In addition, a useful benchmark for our results is the 2017 Banque de France report on business failures.[10] This work shows an average of 55,000 failing companies each year over the 1990-2016 period, with peaks beyond 60,000 in 1993, 2009 and 2015. As a proportion of active companies, failures vary from a minimum of 1.3% (in 2015) to a value larger than 1.8% in 2009. These figures are in line with the scenario excluding Covid-19, where about 2% of companies encounter solvency problems during the year. On this basis, and taking into account the values of the adjustment parameter (γ) is between 0.2 and 0.3, we can predict that by the end of the year, the pandemic would cause between 25,000 and 60,000 more failures, with 40,000 more failures as the central scenario compared to the 55,000 failures observed each year. Without the partial employment scheme, the simulations indicate a much greater growth in failures ranging between 55,000 and 100,000 in addition to those expected in the regular growth scenario excluding Covid-19, with 77,000 additional failures as the central scenario. Again, the partial employment scheme plays a major role in the survival of companies.

10.
B. Bureau, T. Libert, 2016, "Enjeux économiques des défaillances d'entreprises en France", Banque de France, Direction des Entreprises, Observatoire des Entreprises, *Bulletin de la Banque de France*, n° 208, novembre-décembre.

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