Liquidity Shortfalls during the COVID-19 Outbreak: Assessment and Policy Responses

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Abstract – The paper investigates the impact of stylised policy measures on the financial vulnerability of non-financial firms during the COVID-19 pandemic crisis. It evaluates the extent to which firms run into a liquidity crisis following the COVID-19 outbreak and the impact of policies to reduce the risks of such a crisis. The analysis relies on: an accounting model, a large dataset reporting firms' balance sheets for 14 countries and data on the magnitude of the shock at the sector level. Results suggest that, without any policy intervention, up to 38% of firms were to face liquidity shortfalls after ten months since the implementation of confinement. Comparing the impact of different policies, the analysis shows that government support to relieve wage bills is the most effective tool, followed by debt moratorium policies. Finally, the paper zooms into labour market policies and compares the cost-efficiency of short-term work and wage subsidies schemes, highlighting how their relative efficiency depends on their design.

JEL Classification: D22, D24, J38, H81
Keywords: COVID-19, liquidity, cash, job retention

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The authors are grateful to Giuseppe Nicoletti for insightful discussions, Alexander Hijzen and Andrea Salvatori for their collaboration in developing section 2.2., and two anonymous referees for valuable suggestions. The authors would also like to thank for helpful comments Christophe André, Sebastian Barnes, Laurence Boone, Sarah Box, Aida Caldera Sánchez, Chiara Criscuolo, Luiz de Mello, Alain de Serres, Vincent Koen, Isabell Koske, Gabriel Machlica, Nigel Pain, Dirk Pilat, Cyrille Schwellnus and Andrew Wyckoff, as well as delegates to OECD Working Parties and participants to the Global Forum on Productivity webinar and the European Commission National Productivity Boards workshop. The views and opinions expressed in the paper are those of the authors only, and not necessarily those of the OECD.

Received in May 2021, accepted in November 2021.
The opinions and analyses presented in this article are those of the author(s) and do not necessarily reflect their institutions' or Insee's views.

Citation: Demmou, L., Franco, G., Calligaris, S. & Dlugosch, D. (2022). Liquidity Shortfalls during the COVID-19 Outbreak: Assessment and Policy Responses. *Economie et Statistique / Economics and Statistics*, 532-33, 47–61 (First published online: March 2022). doi: 10.24187/ecostat.2022.532.2070

The health crisis caused by the COVID-19 outbreak in the beginning of 2020 has led public authorities to take unprecedented measures to contain the propagation of the virus. Administrative business shutdowns, quarantines and restrictions on mobility and social contact have had a severe negative impact on our economies. Annual growth of real GDP in OECD countries in 2020 fell by –4.8%, the largest annual decline of GDP in the history of the OECD (OECD, 2020a). While the economic impact of the COVID-19 pandemic was particularly pronounced in sectors that require close personal contact, e.g. events and recreation and accommodation and food sectors, sales across nearly all sectors plummeted throughout 2020 (OECD, 2020a). Nevertheless, financial commitments with respect to suppliers, employees, lenders and investors remained, depleting liquidity buffers of firms. The large number of firms that were simultaneously affected constituted a major challenge. Some producers, e.g. of intermediate goods or services, experienced a drop in sales even if confinement measures did not require them to shut down. Since several firms along the same supply chains have faced liquidity shortfalls, trade credit losses have increased, further adding to cash flow pressures.

With much less or no incoming revenues for an extended period of time and fewer options to deal with this shortfall, the liquidity crisis could have turned into a solvency crisis, as the viability of a large set of firms would have been at risk absent of policy support. A global corporate solvency crisis would have had dramatic consequences on the real economy and significantly delayed the recovery, dragging down employment, productivity, growth and well-being (Demmou *et al*., 2021). In particular, human and organisational capital would have been eroded and vanished with defaults of firms that prior to the virus outbreak were profitable and with healthy balance sheets. Moreover, corporate defaults of a significant number of firms could have undermined balance sheets of banks and institutional investors, drying up financial markets and feeding a self-reinforcing downside spiral in the corporate sector, in turn increasing the likelihood of a financial crisis.

Awareness of these risks has led governments to adopt a range of emergency measures aimed at supporting firms' liquidity. Aside from monetary measures taken by central banks, fiscal interventions include direct financing of the wage bill through job retention schemes (e.g. short-term work and wage subsidy schemes), support to laid-off workers (e.g. extension of the coverage and increase in the replacement rate of unemployment benefits), tax deferrals, debt moratoria and extension of state loan guarantees.

This paper evaluates the extent to which firms experienced liquidity shortages using a cross-sector sample of almost one million European firms. Additionally, the paper discusses the pros and cons of different kinds of public support measures. The analysis focuses on the first-round effects of containment measures induced by the crisis, abstracting from the potential cascading effects via supply chains, financial interconnections between firms, financial distress in the banking system as well as from the structural adjustments that will be needed in a second phase of the response to the crisis. Based on illustrative assumptions regarding the evolution of sales and elasticities of costs to sales, the paper sheds light on the risk of corporate insolvency.[1] Comparing the share of firms that would turn illiquid under a no-policy change scenario and under policy intervention, results emphasize the key role that policies could have played to avoid massive unnecessary bankruptcies: our model predicts that the share of firms running out of liquidity would have tripled due to the COVID-19 outbreak without any policy intervention and that government support have allowed to bring back this share closer to normal time standards.

The remainder of the paper is organized as follows. Section 1 details the empirical framework employed in the analysis. In Section 2, we present and discuss our findings and provide a wide range of robustness checks. Finally, we present our main conclusions and the key points that can be drawn from our results.

1. An Empirical Assessment of Firms Liquidity Shortages during the COVID-19 Outbreak

1.1. Size and Dynamics of the Economic Shocks

Measures of social distancing and mobility restrictions dramatically affect services involving direct contact between customers and providers, activities gathering people in public and private places, travelling, as well as manufacturing and construction activities involving close physical contact among workers. Activities that can be

1. The methodology is similar to the one used by Schivardi & Romano (2020) for the case of Italy, and is based on a number of assumptions detailed in the remainder of the paper. It is also close in spirit to De Vito & Gomez (2020).

undertaken remotely or automatized are relatively less affected – to the extent that the supply chain is not broken and consumer demand can be maintained, at least in part. It follows that the decline in activity is assumed to be different across sectors but identical across countries.

The analysis covers all manufacturing and non-financial services sectors.[2] The magnitude of the sales shock during confinement months is based on the first-round demand and supply shocks computed at a detailed sectoral level by del Rio-Chanona *et al.* (2020).[3] To quantify the supply shock, the authors classify industries as essential or non-essential and construct a Remote Labour Index, which measures the ability of different occupations to work from home: the supply shock is not binding for essential industries, while non-essential industries remaining production capacity is proportional to the ability to telework. To quantify the demand shock, they exploit a study of the potential impact of a severe influenza epidemic developed by the US Congressional Budget Office. In this article, we identify the resulting sector-specific – but country invariant – shock as the largest between the supply and the demand shock.[4]

Two alternative scenarios are considered with respect to the duration of the shock:

- An "upside" scenario, which foresees a sharp drop in activity lasting two months, followed by progressive but not complete recovery in the remaining part of the year. The recovery path is dependent on the initial shock, so that the most severely hit sectors face a larger absolute decline in revenues also after confinement, but the speed of the recovery is assumed for simplicity to be the same across sectors.

- A "downside" scenario, which overlaps with the "upside" scenario for the first seven months, but then embeds a second, relatively smaller outbreak from the eighth month onwards, accompanied by more limited lockdowns.[5]

The developments of the pandemic, characterized by localised outbreaks (at the time of writing), suggest that the recession may have been even deeper than modelled in the upside scenario but not as severe as in the downside scenario. It follows that the two scenarios could be more generally interpreted as a lower and an upper bound with respect to the magnitude of the shock. For the sake of exposition, the "downside" scenario is used as a baseline throughout the paper. In line with the projections for the Euro area provided in the OECD Economic Outlook 2021, the economic activity is modelled to remain below its pre-pandemic level by the end of 2020.

1.2. Methodology to Evaluate Firms' Liquidity Position during the COVID-19 Crisis

The approach relies on financial statements of non-financial corporations from the Orbis database, provided by the consulting firm Moody's Analytics, which collects balance sheets data on both listed and unlisted firms worldwide. To ensure firms' comparability across countries and sectors, the data are treated according to Gal (2013) and Kalemli-Ozcan *et al.* (2015). The data also exclude very small firms – those having less than 3 employee – to avoid concerns related to the quality of the data. The final sample consists of 859,299 unique firms, operating in manufacturing but also non-financial business services industries.[6]

At present, Orbis is the largest cross-country firm-level dataset available and accessible for economic and financial research. However, it does not cover the universe of firms, and the extent of the coverage varies considerably across countries.[7] To deal with these limitations, we focus on 14 relatively well-covered European countries, and purposely avoid cross-country comparisons, as well as the provision of absolute numbers on the aggregate depth of the shortfall.[8] Moreover, firms in Orbis are on average disproportionately larger, older and more productive than in the population, even within each size class. As these firms are on average healthier than their smaller, younger and less productive counterparts, the

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2. More specifically, it covers all economic sectors except the followings (Nace Rev.2 classification): agriculture (VA), mining (VB), financial (VK), public administration (VO), education (VP), human health (VQ) and activities of households and organizations (VT and VU).

3. The full dataset on the confinement shock provided by del Rio-Chanona et al. *(2020) can be found here: https://zenodo.org/record/3746661#.Xx7VATYUmhc.*

4. To see why this is the case, consider the following example. Due to confinement measures, a firm is able to produce 50% of its normal time output (supply shock). If the demand shock, due to changes in consumers' preferences, implies a 60% reduction in demand for the products of the firm, the firm will produce only what it is able to sell – 40% of its normal time output – and the demand shock will be binding. On the contrary, if the reduction in consumers' demand is expected to be lower (e.g. 20%), the firm will still produce at its maximum capacity during confinement and the supply shock will be binding.

5. See Appendix, Table A-1 for the detailed dynamic of each scenario. The implications of the second outbreak characterizing the "downside" scenario are assumed to be smaller than those of the initial confinement period, taking into consideration that the rise in infections and the death toll are assumed to be less than in the earlier outbreak (e.g. increased hospital capacity and workers protection, better targeted social distancing measures).

6. See Appendix, Table A-3 for firm-level basic descriptive statistics.

7. For a detailed discussion of Orbis coverage and representativeness, see Bajgar et al. *(2020).*

8. Countries included in the sample are: Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Poland, Portugal, Romania, Spain, Sweden and the United Kingdom. See Table A-2 in Appendix for details on the number of firms by country.

analysis is expected to deliver a lower bound for the liquidity shortages potentially affecting non-financial corporations.

The study assumes that the last available data for each firm (end of 2018) represent its financial situation in normal times with respect to its average revenue, operating expenses, debt payment and taxes.[9] The economic shock from measures of social distancing is modelled as a change in firms' operating cash flow, resulting from the decline in sales and firms' limited ability to fully adjust their operating expenses. To reflect this adjustment capacity, elasticities of intermediate costs to sales and of the wage bill to sales are estimated by assuming, for simplicity, that they are identical and constant across countries and sectors. Each month, firms' shock-adjusted cash-flow (assuming zero investment spending) is determined as follows:

$$\begin{aligned} &CashFlow_{it} = \\ &(1 - s_{st}) * Revenues_i - (1 - c * s_{st}) * \\ &Intermediates_i - (1 - w * s_{st}) * \\ &WageBill_i - Taxes_i - DebtPayments_i \end{aligned} \quad (1)$$

where s_{st}, c, w refer, respectively, to the size of the shock in sector s in month t, the elasticity of intermediates cost to sales, and the elasticity of wage bill to sales. Firms' sales, intermediate costs, wage bill, taxes and debt payments are annual values divided by 12 in order to obtain average monthly values. The counterfactual scenario where COVID-19 would not have happened is simulated by setting the revenue shock (s_{st}) to zero and thus using 2018 data as representative of normal times.

The elasticities of intermediate inputs and of the wage bill to sales are estimated through a panel regression analysis based on yearly data.[10] The former is close to unity, while the latter is estimated around 0.4. As expected, these estimates reflect that firms have a higher ability to adjust their consumption of intermediary goods than their workforce. To take into account the fact that the ability to adjust is lower when looking at monthly rather than at an annual frequency, in the spirit of Schivardi & Romano (2020), both elasticities are conservatively reduced to 0.8 and 0.2, respectively.

Next, the liquidity available to each firm is calculated month by month as the sum of the liquidity buffer held at the beginning of the period and the shock-adjusted cash-flow:

$$Liquidity_{it} = Liquidity_{i,(t-1)} + CashFlow_{it} \quad (2)$$

where $Liquidity_{i,(t-1)}$ refers to the liquidity remaining from the previous month and is equal to a firm's cash holdings in the first period.

Firms face liquidity shortages when they run out of cash and are unable to cover operating expenses, taxes due and costs of existing debt. By running this exercise month by month, we evaluate the share of firms that may have entered a liquidity crisis following the introduction of confinement measures. Importantly, this approach relies on the additional assumption that firms are not able to tap into external sources of working capital (e.g. short-term bank loans, trade credit) when facing a liquidity shortfall.

1.3. Simulation Results

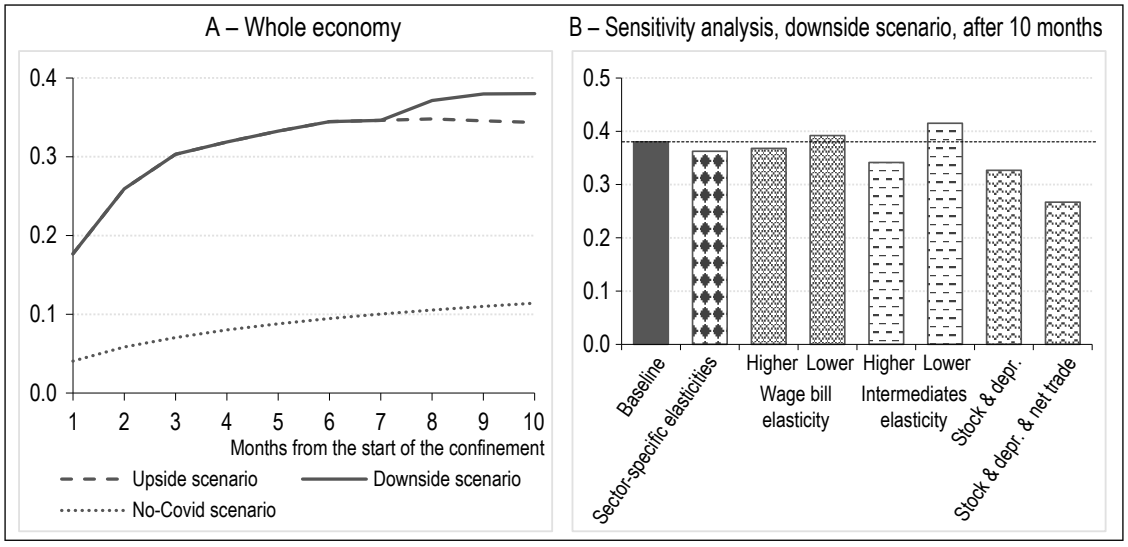
1.3.1. The risk of Liquidity Shortages is High for a Large Portion of Firms

The main results suggest that, in the absence of government intervention, firms in our sample would have run out of liquidity relatively quickly: after one month, 18% of firms would have depleted liquidity buffers, 26% after two months, and 30% after three months (Figure I-A). The share of firms facing liquidity shortfalls could have even lifted to 34-38% by the end of 2020. To reflect the decision of most governments to provide cross-cutting support to firms in the first stage of the crisis, the simulations include also firms that would have faced liquidity shortfalls even in the absence of the COVID-19 epidemic, approximately 11% of the sample over a ten months period. It follows that the COVID-19 crisis would imply a three-fold increase in the share of firms experiencing liquidity shortages after ten months. These findings are thus in line with the burgeoning literature on the topic (Guerini *et al.*, 2020; Ebeke *et al.*, 2021; Gourinchas *et al.*, 2021): while the share of illiquid firms absent policy support varies across studies depending on specific modelling assumptions, most papers found an increase of between two and three times compared to a No-COVID-19 scenario.

Next, we test the sensitivity of our results to changes of the main assumptions of the simulation model (Figure I-B).[11] First, using a (sector invariant) higher or lower wage bill elasticity (0.3 and 0.1 instead of 0.2) as well as a higher or lower intermediate costs elasticity (0.9 and 0.7 instead of 0.8) also provides findings in the same ballpark; the ability to adjust intermediate

9. Findings are unchanged if using 2017 instead of 2018 as the benchmark normal time year.
10. More specifically, we regress the growth in revenues on either the growth of intermediates cost or the growth of the wage bill, controlling for all shocks at the country-sector level and for firms' time-invariant characteristics (i.e., by including country by sector by year and firm fixed effects).
11. Results based on the "upside" scenario are not explicitly reported when they are quantitatively very similar, but are available upon request.

Figure I – **Share of firms facing liquidity shortfalls without government intervention**



Sources: OECD calculations based on Orbis® data.

costs appears more effective to reduce liquidity shortages. Second, considering that some firms and industries could have different ability and opportunity to adjust to an adverse shock (Buchetti *et al.*, 2021), we re-estimate elasticities of costs to sales allowing them to vary at the sectoral level (2-digits NACE Rev.2) and obtain very similar outcomes. Third, we tentatively expand our model to account for the potential role of inventories, depreciation and net trade credit. The share of illiquid firms is notably reduced when assuming that firms can use their inventories as liquid assets – proportionally to the monthly shock – and clear their trade credits and debits. However, the main message of the analysis remains valid as the share of firms facing liquidity shortages more than doubles also in this setting. We chose a simpler modelling in the baseline setting for three reasons:

(i) Inventories are difficult to model:

- The two main accounting standards (US GAAP and IFRS) allow for different methods in valuing inventories. Further, even within the same accounting regime, firms have leeway in valuation. Consequently, the value of inventories sold, which affects the income statement, and the stock of inventories, which is part of the balance sheet, can vary across and within standards, making any meaningful comparison across firms challenging.
- The extent to which they could be transformed quickly into cash during a crisis is questionable. Rather than monetising their inventories, some firms built buffers during the crisis to face supply chains disruptions. Consistent with this, aggregate statistics do not provide clear evidence on the role played by inventories during the crisis and suggest large cross-country and over time variations (Andersson *et al.*, 2020).

(ii) Trade credits and debits are also hard to be accounted for as the lack of data on cross-firm linkages does not allow to properly model the probability of payment conditional on the shock and firms' health. Preliminary evidence suggest that delays in clearing has increased substantially (Gonzalez, 2021). As a consequence, our baseline model assuming implicitly that trade credit payments are frozen may be more realistic than assuming a full clearance, especially when looking at a short time frame.

(iii) Finally, increasing the number of variables in the model implies a 25% reduction in the sample due to data availability. In particular, as reporting tends to be higher for larger firms, the reduction may prevalently concern small firms which have been particularly hit by the COVID-19 crisis.

Overall, given that running into a liquidity shortfall may trigger bankruptcy of otherwise profitable firms, our findings emphasize that the COVID-19 shock could have had large and permanent adverse effects on the corporate sector.

1.3.2. Heterogeneity across Sectors

The impact of the COVID-19 outbreak on firms' liquidity is heterogeneous across sectors. Without policy intervention, more than half of firms are predicted to experience liquidity shortages in the "Accommodation and food service activities", "Transports" and "Arts, entertainment

and recreation" sectors; by contrast, the "Utilities", "Information and communication" and "Professional services" sectors display a share of illiquid firms consistently below 20% in our sample (Figure II-A). Moreover, as shown in Figure II-B, firms in intangible-intensive or low external finance dependent sectors appear better positioned to weather the crisis compared to those in sectors intensive in tangible assets or highly dependent on external financing. This is consistent with their specific financial structure, often characterized by larger cash buffers in normal time, as well as with the higher ability of intangible-intensive firms to rely on innovative technologies and teleworking arrangements, thus being exposed to a less severe sales shock.

1.3.3. Heterogeneity across Firms

Solvency, Collateral Availability and Indebtedness

Firms run into a liquidity shortfall if their assets are not liquid enough to cover current expenses. However, they may still be solvent if the value of their assets is larger than the value of their liabilities or, equivalently, if they have collateral to pledge in order to obtain additional bank financing (Figure III-A).[12] Only a relatively small share of firms (around 11%) among those expected to face liquidity shortfalls would be close to insolvency when evaluating their overall net worth. Even though solvent, they could still have difficulties in accessing new bank financing: around 27% of firms turning illiquid during the confinement would lack the collateral to tap into additional debt financing (Figure III-A).[13]

Firms with higher debt tend to be more exposed to liquidity shortfalls (Figure III-B). While only around 25% firms with low debt run out of liquidity after 10 months, roughly 60% of the firms with high levels of debt face a liquidity shortfall over the same time horizon. Everything else equal, firms with higher levels of debt face higher interest payments and larger amounts of principal repayment, thus depleting any existing liquidity buffers faster.

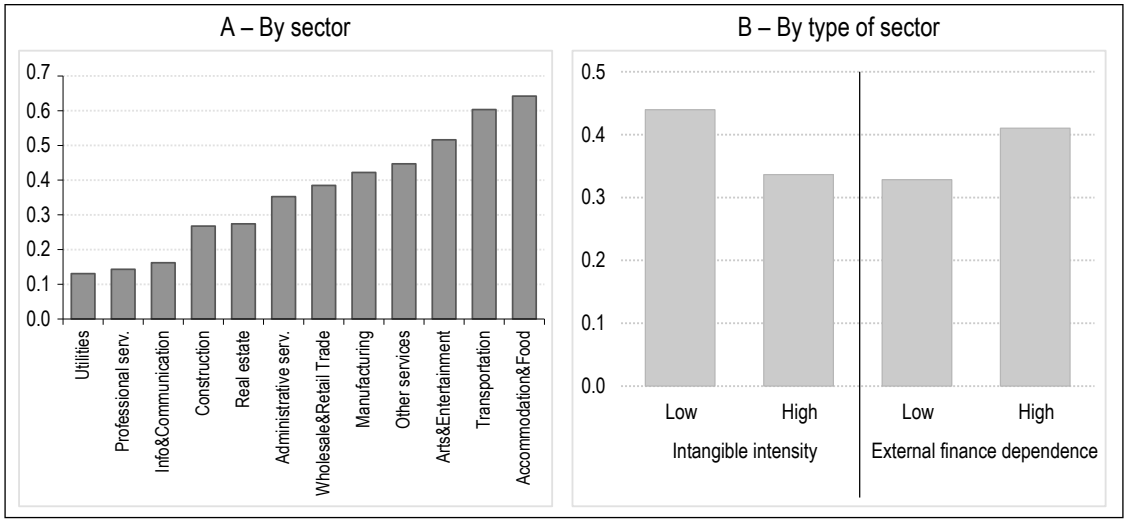
Type of Ownership

Firms could also differ in their reaction to an adverse shock depending on their ultimate owner. A stream of literature supports the view that the longer planning horizon of family firms could lead to more stable and longer lasting relationships with stakeholders, e.g. banks (De Massis & Rondi, 2020). This could indeed affect firms' capacity to adjust independent of firm-level observed financial data, for example by lowering agency costs resulting from asymmetric information. Similarly, family firms may find it easier to adjust their wage bills than widely

12. Collateral is proxied by the difference between fixed assets and long-term liabilities.

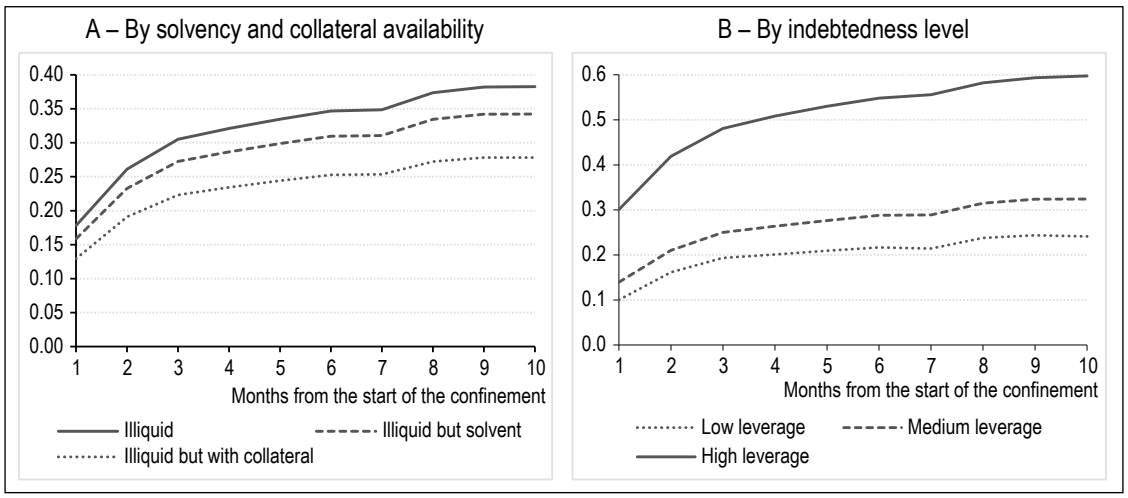
13. Access to financing options and lending conditions for bank loans also depend on the country-level degree of financial development. Firms operating in high financial development countries may alleviate liquidity shortages more easily due to i) *lower interest rates and higher availability of bank credit,* ii) *the possibility to tap capital markets to issue new equity or debt,* iii) *a more efficient deployment of policies involving financial intermediaries in the implementation phase. Our framework does not allow to model firms external financing options, but part of cross-country differences are implicitly taken into account in the cash flow equation through the magnitude of interest payments. Furthermore, the vast majority of the firms in the sample are relatively small and thus unlikely to have access to international equity or bond markets.*

Figure II – **Share of firms facing liquidity shortfalls without government intervention, by sector and by type of sector in terms of share of intangible assets and financial dependence, downside scenario after 10 months**



Note: Sectoral intangible intensity and external finance dependence are computed following Demmou *et al.* (2019).
Sources: OECD calculations based on Orbis® data.

Figure III – **Share of firms facing liquidity shortfalls without government intervention by solvency, collateral availability and indebtedness, downside scenario**



Note: Illiquid firms are said "solvent" if the value of their assets is larger than the value of the liabilities, while they are defined "with collateral" if the value of their fixed assets is larger than the value of their long-term liabilities. Low leverage corresponds to firms belonging to the lowest 1/3 of the leverage distribution within each sector; medium-leverage to firms belonging to the middle 1/3 of the leverage distribution within each sector and high-leverage to firms belonging to the highest 1/3 of the leverage distribution within each sector. Leverage is measured as the ratio between financial debt (short- plus long-term debt) and total assets.
Source: OECD calculations based on Orbis® data.

held firms (Mullins & Schoar, 2016). Empirical evidence based on weekly stock returns before and after the onset of the COVID-19 pandemic shows that share prices of family-owned firms indeed declined less than those of widely held firms (Amore *et al.*, 2021; Ding *et al.*, 2021).

The ownership data available through Orbis allows to disentangle the type of firms' global ultimate owners.[14] The most prevalent types are non-financial firms, financial firms (e.g. banks or asset management companies) and individuals or families. Firms owned by individuals or families tend to have higher cash holdings and lower financial debt, but also lower profitability and equity (Figure IV-A). Across all sectors, firms owned by individuals or families tend to be more exposed to a liquidity shortfall, though the differences with firms owned by non-financial or financial firms are not overly large (Figure IV-B). The higher share of firms owned by individuals or families running out of liquidity appears surprising, given that these firms tend to have higher liquidity buffers and face lower interest payments due to lower debt. However, their lower profitability, implying higher costs for the same amount of revenue, attenuates to some extent the effect of cash and debt. Nevertheless, it seems unlikely that financial data alone can explain the aggregate share of firms facing a liquidity shortfall by type of owner. Instead, it seems likely that ownership is not distributed uniformly across sectors. In particular, family firms tend to be more prevalent in the most hit sectors, e.g. food and accommodation sectors, and less in manufacturing sectors (e.g. Andersson *et al.*, 2018). Results by sector and type of owner confirm this intuition (Figure IV-B). In conclusion, it appears unlikely that a channel operating solely through ownership would significantly alter the share of firms facing liquidity problems.

2. Public Policies to Reduce Liquidity Shortages and Curb Bankruptcy Risk

While the above findings are based on several assumptions and must be interpreted with some caution, they underline the importance of swift and decisive public intervention to avoid potential bankruptcies of otherwise healthy companies. Such intervention has been crucial to prevent a more widespread corporate crisis, with serious consequences for the shape of the recovery and long-run growth prospects.

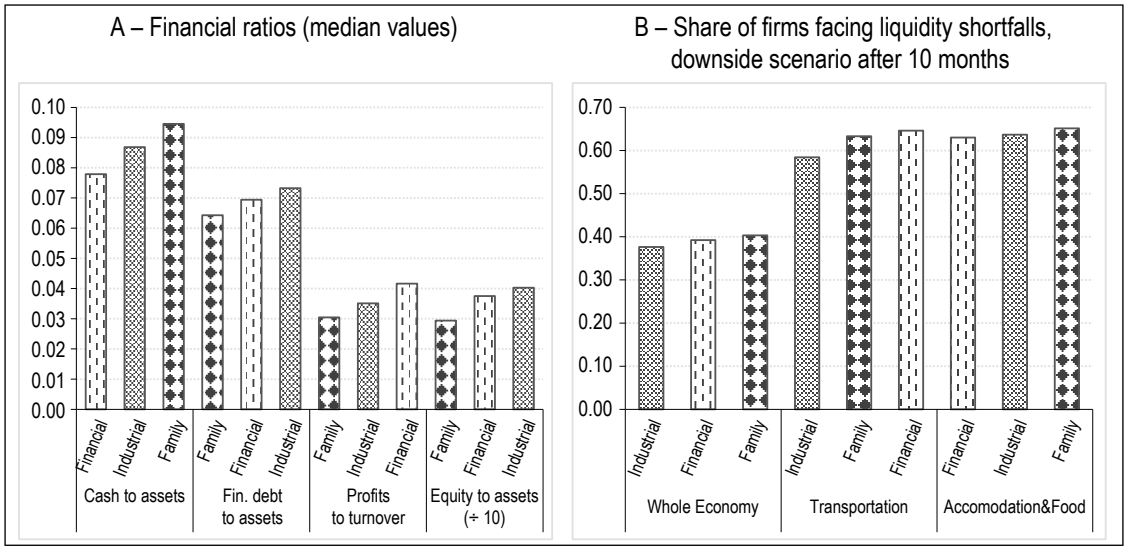
2.1. A Stylized Comparison of Policies Impact

Countries have introduced a wide range of measures to help firms dealing with the disruptions associated with COVID-19 (Box 1). The simple accounting model described above is used to shed light on the impact of stylised policy interventions in three areas:

- Tax deferrals. To support business during the epidemic, several countries have introduced

14. A global ultimate owner is the entity or individual at the top of the corporate ownership structure.

Figure IV – **Liquidity shortfalls without government intervention, by type of owner**



Note: Compared to the baseline simulations, the sample is restricted to firms with available ownership data.
Sources: OECD calculations based on Orbis® data.

tax deferrals. The tax deferral is modelled as the moratorium of the (hypothetical) monthly tax payments for the entire period considered (10 months).[15]

- Financial support for debt repayment. A large number of countries have also established legislative frameworks that temporarily allow firms to postpone their debt payments or, alternatively, that offer State guarantees to facilitate access to short-term debt facilities. The potential impact of such policies is modelled as a moratorium on short-term debt over the whole period in all sectors facing an initial sales shock larger than 20% during the first months of confinement.

- Temporary support to wage payments. A critical response to avoid widespread liquidity shortfalls consisted of relaxing firms' financial commitments vis-à-vis their employees. Schemes such as a shortening of working time, wage subsidies, temporary lay-offs and sick leave have been introduced across countries, though in different combinations. All these measures reduce the wage bill firms have to pay. The support is modelled in two alternative ways: as an unconditional reduction of the monthly wage bill by 80% in all sectors facing a sales shock larger than 20% in the given month (wage subsidy scheme);[16] as a support adjusted to the sectoral size of the shock and modelled through an increase to 0.8 of the elasticity of wage bill to sales (short-term work scheme).[17] Notice that, under these assumptions, the two schemes entail different fiscal costs, with the short-term work scheme being less costly. Further, it is

15. It is worth noting that the deferral of tax might not have a large impact in a period where sales and profits are expected to be limited. Moreover, due to data availability, the analysis does not allow distinguishing different types of taxes.

16. According to the OECD tracker the amount of labour subsidy varies across countries between 60 to 100% of gross wage, with a great majority of countries providing a support ranging from 70% to 90%. This is the case for instance of Canada, Denmark, France, Netherland, Norway, Sweden and Japan.

17. Indeed, in some countries the support is targeted only to firms experiencing a sizeable shock in their activity. The elasticity implies that the support is ranging from 40% to 80% depending on the size of the sectoral shock.

Box 1 – **Measures Adopted in OECD Countries to Support Workers and Firms in the Wake of the COVID-19 crisis**

This box provides some examples of concrete measures OECD economies have implemented to support workers and companies at the beginning of the COVID-19 crisis.

Many OECD countries subsidise temporary reductions of hours worked in firms impacted by confinement measures. Austrian authorities, for example, support wages of workers in all sectors (except public service) of up to 70%, in some exceptions up to 90%, of the net salary in the phase 3 of their short-time working scheme (November 2020). The scheme allows to temporarily reduce the number of hours worked to zero, however, workers are required to work at least 20% of the working-time calculated over the full period in which the firms receives support through the short-time working scheme. The maximum period of support through short-term work is of six months (at the time of writing of this article). The total amount taken over by the government varies with the gross salary. ➔

Box 1 – *(contd.)*

Another set of measures consists of financial support for debt repayment. The Business Credit Availability Program (BCAP) in Canada, for example, supports access to financing during the COVID-19 crises in various ways for firms across all sectors. Small businesses with up to CAD 1.5 million in total payroll costs in 2019 can receive interest-free loans up to CAD 40 000 to cover operating costs (e.g. utilities, payroll, rent, debt service). These loans are fully guaranteed by the public. One fourth of the loan is forgiven if it is repaid by the end of 2022. If not, the loan will be automatically converted to three year loan at 5 per cent interest. Larger businesses can tap additional bank-based debt financing up to a total loan amount of CAD 6.25 Million, guaranteed to up to 80% by the public. These loans comprise only operating costs and cannot be used to fund dividend payments, share repurchases and other shareholder payments, increases in the compensation of executives or to refinance or repay existing debt.

Besides guaranteed loans, a couple of OECD countries directly subsidize firms' operating costs. Norway, for example, compensates Norwegian firms that suffered significant losses of turnover due to the COVID-19 crisis. All taxable registered companies in most sectors (except oil and gas, financial industry, utilities) in Norway are eligible for this compensation under the condition that they were not already in financial distress before the crisis.

Temporary reductions in tax rate or deferrals of tax or social security payments constitute a further possibility to prevent liquidity shortfalls in the short-term. Korea has introduced a temporary special tax reduction for SMEs located in Corona-related disaster areas until the end of 2020. VAT payments by small businesses, i.e. businesses with less than KRW 80 million in annual revenues, are reduced as well until the end of 2020. Small businesses can further defer taxes up to 1 year and social security contributions up to three months.

Several OECD economies have complemented subsidies, loan guarantees and tax-related measures with "soft" tools to ensure repayments and to safeguard operating cash flow. In France, for example, authorities actively support mediation over credit conflicts between private parties with a free, fast and reactive mediation service. French SMEs can also mobilise credit mediation if they experience difficulties with one or more financial institutions. Furthermore, the Ministry of Economy and Finance has set up a crisis unit dedicated at inter-company credits to monitor the use of trade credit.

assumed that firms receiving support maintain unaltered workers earnings (i.e. firm top-up, see Box 2).

Figure V and Figure VI illustrate, respectively under the downside scenario and the upside scenario, the extent to which each measure is expected to curb the risk of a liquidity crisis compared to the no-policy intervention scenario. Both figures look at the two alternative temporary supports to wage payments. Tax deferral has the lowest impact on firms' liquidity positions, followed by debt moratorium policies. Overall, subsidies to the wage bill seem to be the most powerful measures (yet potentially costly), in line with the fact that wages and salaries are often the most relevant component of operating expenses. Adding up the three different measures, public intervention after two months, for instance, would decrease the number of firms running out of liquidity from 26% to 7% when assuming a wage subsidy scheme that implies a reduction of the wage bill by 80% in all sectors facing a sales shock larger than 20% (left panel), and from 26% to 13% when assuming a short-term work scheme, which is conditional on the shock's size (right panel).

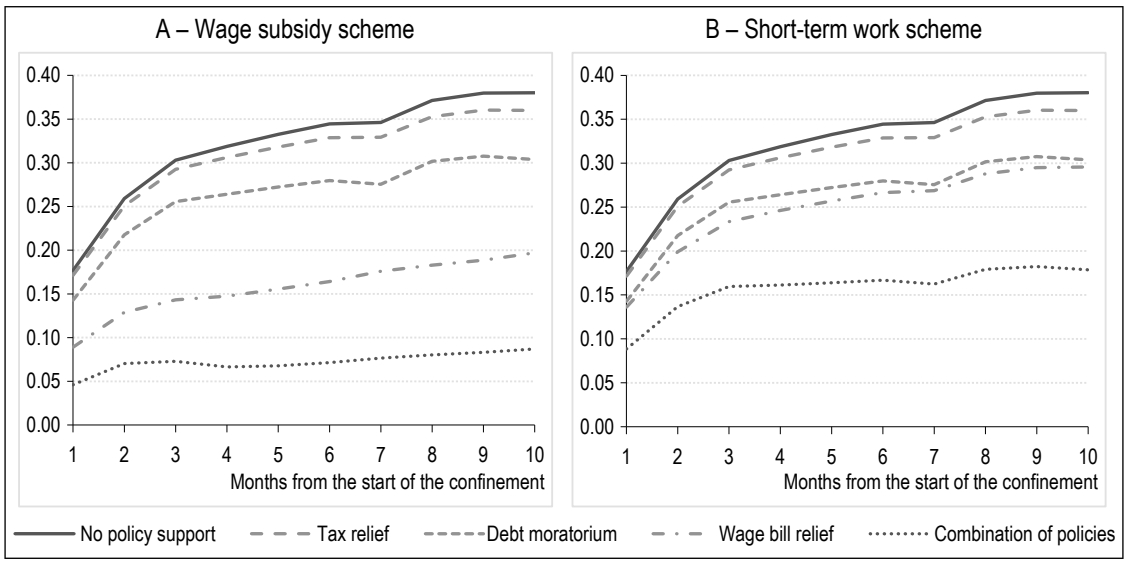
2.2. Zooming in on the Effects of Labour Market Policies on the Share of Firms Facing Liquidity Shortfalls

In this section, the model outlined in Section 2 is extended to evaluate the relative effectiveness of job retention schemes at reducing the share of firms facing liquidity shortages. In particular, the analysis focuses on the cost-effectiveness of two frequently employed schemes, the Short-Term Work scheme (STW) and the Wage Subsidy (WS) scheme.[18] To do so, we impose fiscal neutrality between the two schemes, which is achieved by ensuring that the surface under the cost curves for the government is identical under the various schemes. In particular, a 40% wage subsidy comes at a similar cost to the government as the STW scheme based on a replacement rate of 80% for hours not worked, but under the assumption that government support is uniformly distributed across firms experiencing a decline in revenues above a certain threshold (i.e. 20% as in previous section settings). It is further assumed that reductions in sales translate one-to-one in reductions in working time, while employment remains constant.

The likelihood that a firm becomes illiquid is affected by the way the burden of the adjustment of working hours is shared between government, firms and workers. An increase in the government support or a decline in wages both contribute to reduce the risk of a liquidity shortage. By contrast, the payment of a non-worked hours has the reverse effect. To disentangle the direct effect of the government support on the share of firms

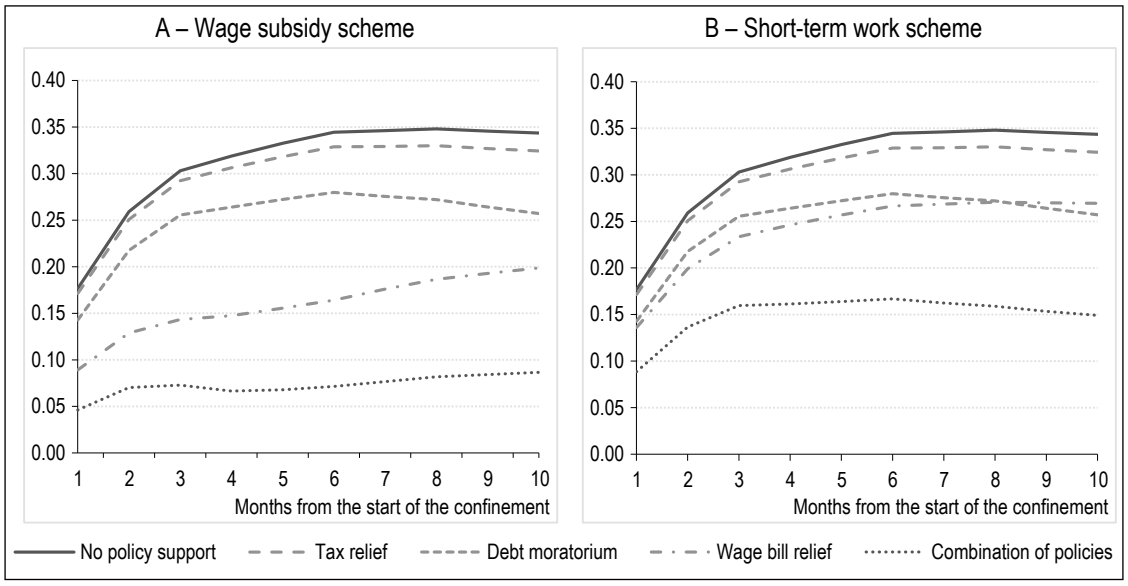
18. In this section, we ignore the effect of debt moratorium and tax deferral to focus on labour market policies.

Figure V – **Impact of support policies on the share of firms facing liquidity shortfalls under two schemes of wage bill relief, downside scenario**



Note: The wage subsidy scheme, implies a reduction of the wage bill by 80% in all sectors facing a sales shock larger than 20%; the short-term work scheme is conditional on the sectoral size of the shock and modelled through an increase to 0.8 of the elasticity of wage bill to sales.
Sources: OECD calculations based on Orbis® data.

Figure VI – **Impact of support policies on the share of firms facing liquidity shortfalls under two schemes of wage bill relief, upside scenario**



Note: See Fig. V.
Sources: OECD calculations based on Orbis® data.

with liquidity problems from the indirect effect that is due to the adjustment in worker earnings, two sets of simulations are conducted:

- Firms fully top up subsidies to maintain worker earnings despite a reduction in working time. Under this scenario, wages do not adjust, allowing to isolate the direct effect of government support in reducing the share of illiquid firms.

- Firms do not top up subsidies in the case of reduced working hours, implying that workers get paid only for hours worked or, alternatively, the subsidy if earnings are too low. Under this scenario, the share of illiquid firms is further reduced by the extent of the worker adjustment.

Box 2 provides details and explanations about the adjustments related to not worked hours by government, firms and workers in our stylised STW and WS schemes.

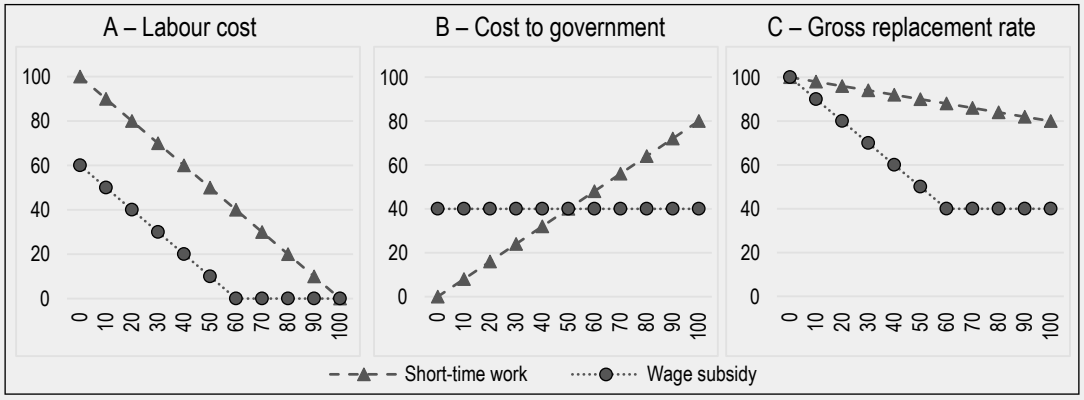
When firms top-up the subsidy in order to compensate for any wage decline, STW and

Box 2 – **A stylised comparison of STW and WS schemes**

In the stylised STW scheme, workers receive a compensation of 80% of their wage for any hour not worked. Absent of top-ups by firms, employers bear the full costs of any hours worked, but none of the costs of hours not worked. Consequently, labour costs decline towards zero at the same rate as hours worked (see Figure, Panel A), while the cost of this subsidy for the government increases (Panel B). Total earnings for workers decline (Panel C) with the number of hours not worked. If firms top-up the subsidy in order to avoid any wage losses for workers, earnings are unaffected by the reduction in working time, while firms have to contribute 20% of the cost of hours not worked.

Under the WS scheme, it is assumed that employers receive a subsidy equal to 40% of usual wage bill, irrespective of the reduction working time (Panel B). In the absence of firm top-ups, the reduction in labour costs for firms is equal to the subsidy (Panel A); firms' labour costs are zero if working hours are reduced by more than 60%. Employees do not receive any compensation for hours not worked unless earnings for hours worked fall below the level of the subsidy (Panel C). With full top-ups, workers earnings are unaffected by the reduction in working time, while firms cover the costs of hours reductions beyond 60%.

Figure – **Firms' labour cost, replacement rates, fiscal costs of stylized STW and WS in the absence of top-ups by firms**



Note: The x-axis represents the % of hours not worked; the y-axis variable is indicated in the title of each panel.
Sources: OECD (2020b).

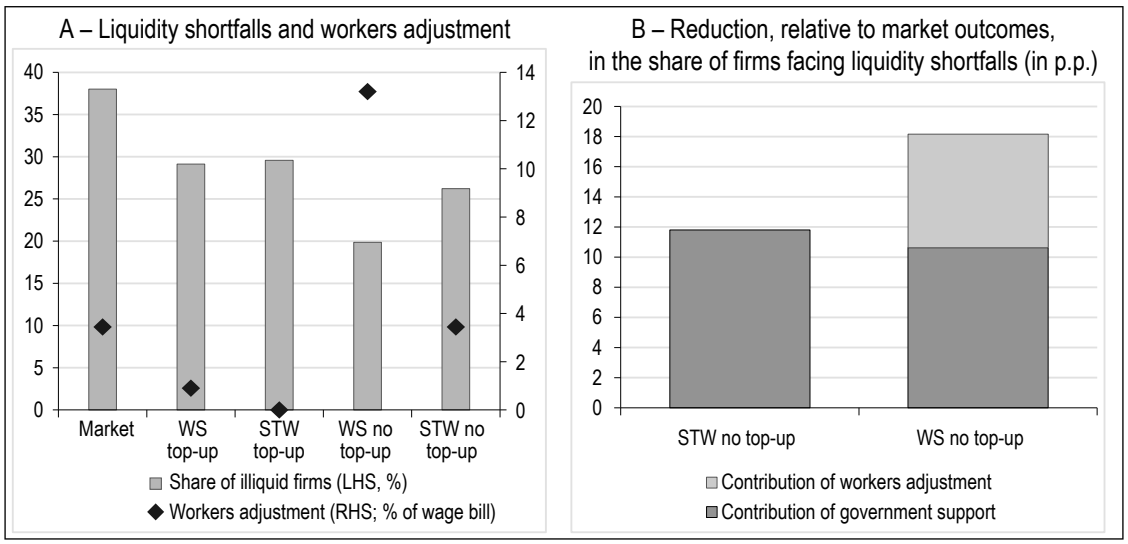
WS schemes subsidies are found to be similarly effective at addressing firms' liquidity shortages (see Figure VII-A). This is mainly because granting a wage subsidy to firms experiencing a large decline in sales ensures that government support is not too largely dispersed and broadly targets the same set of firms benefitting from STW; indeed, the removal of the threshold to access WS schemes would make STW relatively more cost-effective.[19]

In the absence of top-up by employers, WS schemes potentially allow for larger reductions in labour costs for firms compared to STW, at the cost of providing weaker income protection for workers on reduced working hours (Figure VII-A). Indeed, the share of firms facing liquidity shortfalls decreases considerably more under the WS stylised scheme (e.g. around 18 percentage points (p.p.)) rather than under the STW scheme (e.g. up to 12 p.p.). However, these estimates capture both the direct effect of the support and the indirect adjustments to workers earnings. Figure VII-B further illustrates how the burden of the adjustment is distributed between workers and government compared to a market adjustment scenario. The STW scheme envisages the same worker adjustment as in the market scenario and thus the 12 p.p. reduction in the share of illiquid firms is fully driven by the contribution of government support; on the contrary, government contributes only for 10.5 p.p. in the reduction associated with the WS schemes and the remaining 7.5 p.p. are due to worker adjustment. As a result, in the absence of firms top-up, STW work schemes appear slightly more cost-effective.[20]

19. Detailed calculations available upon request. Under the WS scheme with firms top up and no threshold, the share of firms facing liquidity shortages would rise to 32% compared to the 29%. Indeed, the lower the threshold, the higher the number of eligible firms and lower the level of the wage subsidy for each firm at a given overall fiscal cost.

20. It is worth noticing that the exercise is stylized in nature and aims at illustrating the adjustment mechanisms related to STW and WS schemes; the several ways in which STW and WS could be designed may have a relevant impact on their cost-effectiveness (e.g. extent of wage adjustment, eligibility thresholds). Moreover, the stylised comparison and the simulations below abstract from the difference in labour costs for firms and gross wage for workers due to the presence of employer social security contributions.

Figure VII – **Simulated reduction in the share of firms facing liquidity shortfalls with the STW and WS schemes, downside scenario at 10 months**



Sources: OECD calculations based on Orbis® data.

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This paper examines the vulnerability of non-financial corporations in the context of the COVID-19 crisis. Without any policy intervention, our model predicts that corporate liquidity buffers would have run out quickly: 18% of the firms in our sample would have run out of liquidity after one month, 26% after two months, 30% after three months and 38% after ten months. The impact of the shock is highly heterogeneous across sectors and type of sectors, while firms facing a high risk of experiencing liquidity shortfalls appear to be mostly profitable and viable companies. However, a sizeable share of these firms does not have enough collateral to bridge a shortfall in liquidity with additional debt and/or is too highly leveraged to bridge the crisis through further bank loans.

Policy makers have taken a wide range of actions to mitigate the risk of a liquidity crisis, including job retention schemes, debt moratoria and tax deferrals, but also a set of complementary policies to bridge remaining liquidity needs (e.g. loan guarantee programmes and direct support). Adding up different policy measures (tax deferral, a debt-moratorium and wage subsidies), our simulation suggests that government interventions brought back the share of firms running out of liquidity to normal time levels, offsetting the shock on sales for the average firm. Further, among the wide range of measures introduced across OECD countries, direct and indirect support to wage payments seems to have been a pivotal policy to curb the liquidity crisis, given the high share of wage costs in total spending. Imposing an identical fiscal cost for governments, the effectiveness of short-term work (STW) and wage subsidy (WS) schemes in limiting firms' liquidity shortages depends on their design. In the absence of an eligibility threshold, STW schemes appear more cost-effective than WS. The higher the eligibility threshold, the more STW and WS schemes are found to achieve similar outcomes. Moreover, WS schemes can reduce even further the share of firms facing liquidity shortfalls, but at the cost of lower income protection for workers.

While economic growth has picked up in 2021, helped by strong policy support, the deployment of effective vaccines and the resumption of many economic activities, several challenges potentially undermining the strength of the recovery should be closely monitored:

- An effective exit strategy from policy support packages is needed to maximize their benefits as long as possible and to reduce their drawbacks. While firms have already gone through the hardest part of the crisis, liquidity shortages may persist as social distancing measures in hard-hit sectors may still apply and it may take time for firms to generate again the stream of profits needed to meet their financial commitments. SMEs, which have been the most hit during the crisis, may in particular not be able to exploit fully the international recovery, as for instance their larger competitors are doing. As a consequence, support programmes may need to remain active in the short-term to avoid that a premature withdrawal may induce a collapse of credit flows (FSB, 2021).

- The shock could still translate into a wave of corporate insolvencies. While the swift and decisive response of policy makers has been effective to keep a lid on bankruptcies in 2020 (Djankov & Zhang, 2021; OECD, 2021), the number of non-financial corporations in distress has likely increased worldwide as the shock diminished sales and profits, thereby putting downward pressure on the value of firms' assets (Carletti *et al.*, 2020; Guerini *et al.*, 2020; Hadjibeyli *et al.*, 2021). Similarly, the use of debt instruments to cover liquidity shortages has led to a surge of indebtedness in segments of the corporate sector. Hence, one challenge for over-indebted but viable firms consists in restoring equity buffers and ensuring the sustainability of pandemic-induced debt.

- The consequences of the crisis and of the large policy support on productivity are still largely unknown. The crisis may have cleansing or scarring effects on productivity, depending on the productivity of firms that are forced to exit the market and on the dynamism of business formation. By affecting the type of firms "saved" over the productivity distribution and the barriers to enter the market, policy support has the potential to alter the market selection process and thereby aggregate productivity performance. Preliminary analyses suggest that policies have contributed to an hibernation of the corporate sector rather than a zombification, thus being beneficial also from a productivity standpoint (Cros *et al.*, 2021; Laeven *et al.*, 2020). A progressive phasing out and targeting of policy support toward viable firms, as well as incentives to facilitate the entrance of new firms in the market, are important to design productivity-friendly policy packages and to favour the reallocation of resources across firms and sectors when needed.

- Governments will face different policy challenges depending on the severity of the shock and the choice of the policy mix. While the range of policy tools used by public authorities to support the corporate sector has been broadly similar, they were implemented in different combinations. Where policies aimed at smoothing financial obligations over time (e.g. tax deferral, extending loan maturities, loan guarantee programmes) have been prevalent compared to direct support policies involving a mutualisation of losses (e.g. liquidity injections, direct subsidies), public debt is predicted to augment less, but firms' leverage ratios are expected to increase more, potentially leading to debt overhang in the corporate sector. Symmetrically, the prevalence of direct support will leave firms with a lower debt burden, but would rather increase public debt, hence entailing future fiscal policy challenges. □

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APPENDIX

Table A-1 – **Detailed dynamic of the three alternative revenues shock scenarios**

Months from the start of the confinement		1	2	3	4	5	6	7	8	9	10
Size of the shock	Upside scenario	S	S	S*0.75	S*0.4	S*0.4	S*0.4	S*0.2	S*0.2	S*0.1	S*0.1
	Downside scenario	S	S	S*0.75	S*0.4	S*0.4	S*0.4	S*0.2	S*0.75	S*0.4	S*0.2

Note: The table shows the detailed dynamic underpinning each of the alternative scenarios. The revenues shock (S) is sector specific and calculated each month with respect to normal time revenues.

Table A-2 – **Number of firms by country**

Country	Total number of firms	% of the sample
BEL	12,037	1.40
DEU	2,801	0.33
DNK	1,840	0.21
ESP	202,731	23.59
FIN	17,670	2.06
FRA	52,614	6.12
GBR	18,999	2.21
HUN	82,821	9.64
IRL	1,473	0.17
ITA	288,091	33.53
POL	22,526	2.62
PRT	108,638	12.64
ROU	5,499	0.64
SWE	41,559	4.84
Total	859,299	100

Sources: OECD calculations based on Orbis® data.

Table A-3 – **Firm-level descriptive statistics**

	p5	p25	p50	mean	p75	p95
Number of employees	3	5	8	38	19	106
Gross revenues	113,306	380,421	985,592	10,800,000	3,149,000	26,100,000
Value added	39,191	128,364	307,468	2,293,000	871,795	6,137,000
Intermediates	46,000	203,669	597,060	8,481,000	2,125,000	19,400,000
Cash Flow	–21,634	11,850	46,843	775,265	179,690	1,607,000
Ebitda	–20,355	16,963	62,582	827,842	226,270	1,910,000
Total Assets	56,700	245,835	731,839	6,567,000	2,539,000	20,900,000
Fixed Assets	2,117	29,407	134,781	4,927,000	615,528	6,652,000
Cash Holdings	1,368	15,269	62,429	515,844	243,048	1,900,000
Current Assets	31,348	153,291	475,153	5,271,000	1,643,000	13,100,000
Total Liabilities	25,305	131,880	419,238	6,191,000	1,479,000	12,200,000
Current Liabilities	16,398	90,118	291,689	4,056,000	1,046,000	8,870,000
Short-term financial debt	0	0	0	601,248	58,366	1,410,000
Non-Current Liabilities	0	3,533	57,657	2,102,000	285,000	2,582,000
Long-Term financial debt	0	0	8,830	1,461,000	142,138	1,677,000
Fixed Assets over Total Assets	0.01	0.08	0.22	0.29	0.46	0.82
Fixed Assets over Wage Bill	0.02	0.17	0.59	3.76	1.73	8.24
Cash Holdings over Total Assets	0.00	0.03	0.10	0.18	0.26	0.60
Cash Flow over Total Assets	–0.06	0.03	0.07	0.09	0.14	0.33
Total Liabilities over Total Assets	0.14	0.41	0.65	0.68	0.85	1.03
Financial Debt over Total Assets	0.00	0.00	0.07	0.16	0.26	0.57
Current Liabilities over Revenues	0.06	0.16	0.27	0.45	0.46	1.11
Interest Coverage Ratio	–8.17	4.60	15.70	2567	66.40	1312
Net worth (total assets - total liabilities)	–4,755	53,195	209,915	2,535,000	876,364	8,361,000
Fixed Assets minus Non-Current Liabilities	–267,533	0	46,558	1,395,000	308,069	4,137,000

Note: Monetary values are in EUR current (2018) prices.
Sources: OECD calculations based on Orbis® data.