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COVID-19 pandemic and debt financing by firms: Unravelling the channels

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ARTICLE INFO

JEL classification:
G11
G21
G32

Keywords:
COVID-19
Pandemic
Bond financing
Syndicated loans
Work-from-home

ABSTRACT

The COVID-19-induced disruptions and the consequent government responses stretched the financial resources of firms. Recent studies document an increase in debt financing by firms during the pandemic. Using firm-level data from 61 countries, we deepen the understanding of the impact of the pandemic by examining the variation in loan and bond financing attributable to COVID-19-specific factors. Indicative of heightened precautionary needs, firms with higher pandemic exposure and those located in countries with stringent lockdowns have a higher propensity to raise debt. Furthermore, firms in industries less amenable to remote working also have a higher propensity to raise debt, but face higher financing costs compared to their peers. Reflective of opportunistic investment motives, firms that hold a relatively positive outlook have a greater likelihood of raising loan financing. The findings draw attention to the role of real-side factors and managerial motives that drive debt financing during a distress episode.

1. Introduction

Governments around the world have undertaken a number of measures to contain the COVID-19 pandemic and mitigate its consequences. The measures taken by governments ranged from lockdowns and containment measures, work-at-home requirements, school closings, to fiscal stimulus (Hale et al., 2020). The lockdowns have created severe business disruptions, resulted in significant loss of business confidence, and generated a negative sentiment about corporate earnings growth (Baker et al., 2020). Firms in countries that had more stringent workplace restrictions and social distancing norms implemented in response to COVID-19 were likely to have experienced a greater impact. However, the financial impact of the restrictions could have been partly assuaged for firms operating in industries that are amenable to remote work. Firms that have the ability to maintain operational continuity during the pandemic, particularly those without a significant need for physical presence of employees and direct customer interactions, were likely to perform better, while sectors such as retail, hospitality, and tourism that require customer interface could have fared worse (Dingel and Neiman, 2020; Koren and Pető, 2020).

The prior literature on firm financing suggests that firms increase debt financing during periods of higher uncertainty and crisis. Halling et al. (2020), Acharya and Steffen (2020), and Li et al. (2020) document that debt financing has increased during the COVID-19 crisis. The heightened debt financing during such times is known to be motivated by precautionary and strategic needs of firms (Alfaro et al., 2018; Boileau and Moyen, 2016; Duong et al., 2020). It is likely that firms in countries with higher stringency and containment measures resort to debt financing to a greater degree relative to their peers. Similarly, firms in industries that are less amenable to business continuity through work-from-home arrangements may expand on their debt financing. The motive for debt financing may vary across firms that differ on the nature of the impact of COVID-19 and the managerial outlook about the impact of the pandemic on the firm.

In our study, we examine the impact of government responses, industry amenability to remote working, and managerial sentiment about the COVID-19 pandemic on the debt financing of firms. Specifically, we examine the cross-sectional impact of these three factors on the propensity of financing obtained by firms through loan and bond markets.
The findings of our study and their implications are as follows. First, we find that overall debt financing rises by about 2 percentage points for firms worldwide during the second and third quarters of 2020, compared to the pre-COVID-19 periods. Our results confirm the findings of earlier studies that examined either bond or loan financing during the pandemic. Second, the observed impact of COVID-19 on debt raising is greater for bond financing than loan financing. The relatively higher impact on bond financing could be linked to the inherent differences in the financial strength of firms that are reliant on bond markets compared to those that are dependent on syndicated bank loans. Firms that access the bond markets have higher credit ratings and therefore are more likely to raise incremental financing for their opportunistic investment needs. On the contrary, bank dependent firms have lower financial flexibility and could be primarily driven by their precautionary needs. The contrast implies that in a difficult credit environment like the COVID-19 crisis, firms with stronger financials are more likely to build strategic reserves from incremental debt financing.

Third, we find that the government responses to the COVID-19 pandemic by way of stringency of the lockdowns had a significant impact on debt financing by firms. For instance, a one unit increase in the lockdown stringency has led to a 5.9 percentage point increase in the propensity for debt financing in the second and third quarters of the year 2020. The finding of increased debt financing propensity associated with lockdown stringency suggests that firms expected greater restrictions on people mobility to adversely impact their short-term liquidity. Several other dimensions, such as the extent of workplace closures, which proxy for the extent of restrictions on work and people mobility are also associated with a greater likelihood of debt financing during the crisis.

Fourth, we observe that the propensity for debt financing during the COVID-19 period is associated with the suitability of industries for remote working. For instance, we find that firms in industries that require greater physical presence show a lower propensity for debt financing. This is a likely outcome of the lower working capital requirements of such firms as the pandemic disrupts their business operations. On the contrary, firms that require greater customer interaction have a higher propensity to raise debt financing. We also find that such firms face a relatively higher cost of financing during the pandemic compared to firms that are more amenable to remote working. The association between the work-from-home amenability of firms and variation in debt financing documents the heterogeneity in the impact of the pandemic across firms in different industries.

Fifth, we find that the borrowing decisions of firms were also strongly impacted by the exposure of firms to COVID-19 and the outlook of the managers towards the impact of the pandemic. Based on measures compiled from textual analysis of earnings call transcripts by Hassan et al. (2020), we find that the propensity for loan and bond financing is greater among firms with higher exposure to the impact of COVID-19. Notably, the subjective outlook of the management towards the likely impact of COVID-19 has a significant impact on their financing decisions. Specifically, a positive sentiment held by the management is associated with a higher likelihood of bond and loan financing. These findings imply that the subjective outlook of the management has a strong influence on their assessment of the need for financing in the face of a pandemic.

Finally, we also examine how the motive for debt financing changes in the COVID-19 period, based on data available for syndicated loans. We observe that a stronger government response in dealing with the pandemic is positively associated with an increase in debt financing for investment motives (capex and acquisitions). On the other hand, for firms with a higher negative managerial sentiment related to COVID-19, the pandemic period has led to greater debt raising for precautionary needs. The results provide insights into the impact of government response and managerial sentiment on the motive for debt financing during the pandemic. Our findings are robust to the inclusion of fixed effects at various levels of aggregation. This helps us to control for the unobserved heterogeneity and seasonality in the debt issuance (Gormley and Matsa, 2014).

Our study makes several contributions to the literature on capital raising by firms during crisis episodes. First, the matched bond-loans-firms database employed in the study allows us to reliably examine the impact of the pandemic specific channels such as government responses, industry vulnerability to the pandemic, and managerial sentiment on debt financing by firms. Furthermore, in contrast to the recent studies that have considered the impact of the pandemic on firms’ reliance on debt financing at a country-level, primarily with a focus on the US (for instance, Acharya and Steffen, 2020; Haddad et al., 2020; Halling et al., 2020), our study, which uses a multi-country database, allows us to draw generalizable conclusions on debt financing of firms during COVID-19. Second, our study differs from the recent research on bond markets during the COVID-19 crisis that have considered yields (for instance, Haddad et al., 2020; Hassan et al., 2021) or transaction costs (Kargar et al., 2020). By contrast, we focus on the extensive margin, the propensity or likelihood of issuing bonds or accessing loans, instead of borrowing costs.

Thirdly, our research complements studies that have considered both bond markets and syndicated loans together. For instance, Arteta and Hale (2008) examine the two markets during sovereign debt crisis episodes and Francis et al. (2014) over the credit cycle. Goel et al. (2020) provide a descriptive analysis of syndicated loans and bond issuance by large and small firms during the COVID-19 crisis. Acharya and Steffen (2020) provide an analysis of the stock market reaction to the reliance of investment grade and sub-investment grade firms on drawdown of credit lines and bond issuance during the COVID-19 crisis. By accounting for the likely differences across countries in the extent of the government responses in the form of lockdowns and containment measures that may affect the broader operating environment for firms, we are able to estimate the heterogeneous impact of such actions on debt financing.

The remaining sections of the paper are organized as follows. The next section discusses the literature on the linkage between crisis and firms’ reliance on capital markets. The empirical approach used in this study is discussed in section 3. This is followed by a description of the results and robustness test in section 4. Finally, section 5 concludes with a discussion of the findings and policy implications.

2. Conceptual background and hypothesis development

In this section, we discuss the research related to debt financing of firms during crisis episodes and develop the key hypotheses involved in our study. Several papers examine the impact of the financial crisis on debt financing of firms and the heterogeneous responses with bond and loan financing. For instance, Halling et al. (2020) find that bond issuance by investment grade US firms has increased during the COVID-19 crisis. Acharya and Steffen (2020) document that while the AAA-rated firms have issued bonds to supplement their liquidity, the lower-rated firms (BBB rated) firms have largely drawn on their bank credit lines. In related research, Li et al. (2020) document that large firms have resorted to bank borrowing by drawing down their credit lines during the crisis.

The increased debt financing during crises is mainly motivated by the precautionary and strategic needs of firms. Several papers argue that the need for precautionary cash holdings increases with uncertainty (Alfaro et al., 2018; Boileau and Moyen, 2016; Duong et al., 2020). Alfaro et al. (2018) argue that uncertainty leads firms to take a cautious financial position with the accumulation of cash. Duong et al. (2020) find that higher policy uncertainty is associated with greater cash holdings. Boileau and Moyen (2016) find that greater risk exposure of firms is associated with higher cash holdings, with the authors attributing this relationship to precautionary and liquidity motives. It is
well-documented that firms that face higher growth opportunities and volatile operating cash flows, in general, hold greater liquidity (Almeida et al., 2004; Denis and Sibikov, 2010).

The pandemic could magnify the firm-level need to maintain additional liquidity during the crisis. It is likely that the extent of firm-level vulnerability to the COVID-19 crisis, through exposure to demand shocks and operational disruptions, and the potential for opportunistic investments have a significant impact on their need for raising additional debt financing. Therefore, we hypothesize that:

**Hypothesis 1.** The propensity for debt financing by firms significantly increases during the COVID-19 period relative to the pre-COVID-19 period.

Countries around the world have handled the pandemic with varying levels of containment and support measures to mitigate the fallout of the crisis (Hale et al., 2020). Hence, we expect that apart from the firm-level heterogeneity documented by the preceding studies, there could be significant variation in debt financing of firms across countries on account of the government responses to the pandemic. Studies on monetary policy actions during the COVID-19 pandemic suggest the bond markets were assuaged by the actions of the central banks. Falato et al. (2020) examine the impact of the COVID-19 crisis on the bond funds and find that the Federal Reserve intervention has helped to assuage investor concerns about the funds and, consequently, reverse the outflows triggered by the crisis. Kargar et al. (2020) examine the impact of the interventions by the Federal Reserve on corporate bond market liquidity during the COVID-19 crisis and find that liquidity has significantly improved for the eligible bonds.1 While the monetary policy actions of the central banks have been examined in prior studies, the impact of government interventions remains largely unexplored.

The financing decisions of firms could be impacted by government measures that either accentuate or attenuate the financial uncertainty for firms. In related research, Ashraf (2020) find that social distancing measures have a negative impact and income support packages have a positive impact on financial markets.2 It is likely that containment and mobility restrictions taken to control the pandemic increase the uncertainty for firms and exacerbate the financing needs of firms. Therefore, we hypothesize that:

**Hypothesis 2.** The propensity for debt financing by firms is higher in countries with higher containment, stringency and workplace closings imposed by the governments during the COVID-19 period.

It is well documented that the COVID-19 crisis has impacted industries disproportionately on account of the variation in the demand shock and the ability to continue their operations (Dingel and Neiman, 2020; Koren and Pet6, 2020; Uddin et al., 2022). The level of business continuity was significantly determined by the suitability of firms for remote working. In this context, Bai et al. (2020) document that the market value of firms more amenable to work-from-home arrangements remained relatively resilient during the crisis. It is likely that firms that are more amenable to production and service delivery arrangements, despite maintaining social distancing, are less vulnerable to the crisis and therefore have lower borrowing needs. Therefore, we hypothesize that:

**Hypothesis 3.** Firms with higher work from home amenability have lower propensity for debt financing during the COVID-19 period.

It has been documented that subjective managerial beliefs have a significant role in the funding decisions of firms during a crisis. For instance, Malmendier et al. (2010) find that managerial beliefs and personal experience significantly explain corporate finance policies beyond the traditional finance theories. Similarly, Heizer and Rettig (2020) document that the top management optimism significantly influences the financing choice of firms. Therefore, it is likely that the subjective outlook of the managers on the impact of COVID-19 on their firms explains significant variation in their debt financing during the pandemic. Given the uncertainty, firm-level responses (debt raising) may vary dependent on the managerial outlook about the impact of the pandemic on future revenues, cash flows and liabilities of firms. Recent studies have estimated the managerial outlook on COVID-19 pandemic with text-based measures that are based on earnings call transcripts. For instance, Hassan et al. (2020) measure the managerial sentiment towards the COVID-19 pandemic and the extent of exposure of a firm towards COVID-19-induced vulnerabilities. Perceptions about greater exposure of a firm to the COVID-19 crisis may lead to higher financing due to the precautionary needs. Furthermore, positive sentiment about the impact of the pandemic held by the management may result in higher debt financing prompted by investment opportunities. Therefore, we hypothesize that:

**Hypothesis 4a.** Greater exposure to COVID-19 as perceived by the management is associated with higher propensity for debt financing by firms.

**Hypothesis 4b.** A greater positive managerial sentiment about the impact of COVID-19 is associated with higher propensity for debt financing by firms.

3. Data and empirical approach

3.1. Data

The study employs different sources of data. Data on syndicated loans are obtained from the DealScan database of the Loan Pricing Corporation, while data on bond issuances is drawn from the Thomson Reuters Eikon Fixed Income database. Financial data across different countries are taken from the Worldscope database. The sample of firms considered for the study covers all the firms that have accessed syndicated loan and bond markets at least once in the last two decades.

The data on country-level responses to the COVID-19 pandemic are obtained from the Oxford COVID-19 Government Response Tracker (OxCGRT) database (Hale et al., 2020). The OxCGRT data provides country-level measures on various dimensions of response to the pandemic including stringency of lockdowns and workplace closures (Stringency), containment and health policies (Containment), stay-at-home requirements (Stayathome), the extent of fiscal support (FiscalSupport), debt relief to households (DebtRelief), closing of workplaces (WorkPlaceClosing), and the overall government response (GovtResponse). The definitions of these variables are provided in Table 1. These measures had been employed in several papers that examined the impact of country-level responses to the pandemic (Demir and Danisman, 2020; Demirguc-Kunt et al., 2020; Maurin and Pål, 2020).

The firm-level data is spread across 61 developed and developing countries for which information about loan financing, bond financing, firm financials, and government response measures are available (see Table A1 for the country-wise coverage of quarterly observations). Overall, the sample data covers 6919 unique firms that had accessed loan or bond markets in the past two decades. The loan and bond tranches are aggregated at the firm-year-quarter level from the fourth quarter of 2019 to the third quarter of 2020. The final sample includes 25,879 firm-year-quarter observations, of which 3184 observations are for firms that have raised debt financing during the pandemic. These include 1730 observations for borrowing through syndicated loans and 1676 observations for bond issuances. Out of the firm-year-quarter observations for the debt data, the Eurozone and the US comprise about 38% of the sample.

The study also employs data on the extent of business continuity of firms in the face of lockdown measures taken by different countries through the work-from-home amenability of the industries. The
data on work-from-home amenability is adopted from the measures developed by Koren and Petö (2020). These measures capture different dimensions of work in industries that are relatively more amenable to work-from-home by employees on account of teamwork, customer interface, and physical presence. The measures have been employed to examine the impact of firm-level operational flexibility on asset prices (for instance, Pagano et al., 2020). The sample employed for estimations involving industry suitability for remote working has 8319 firms for the debt financing sample, for which firm-level financial information, debt financing, and the measures of Koren and Petö (2020) are available.

Finally, we also employ data representing the managerial outlook about the perceived ability of their firms to deal with the impact of the crisis. The proxies used in the study correspond to measures of firm-level COVID-19 exposure (COVID Exposure) and negative and positive managerial sentiment towards COVID-19 (COVID_Pos_sent. and COVID_Neg_sent.), developed from textual analysis of earnings call transcripts by Hassan et al. (2020). The sample employed for estimations of the effect of managerial outlook has 3213 unique firms for the debt financing data after excluding firms for which the measures of Hassan et al. (2020) are not available. The summary statistics of the COVID-19 related variables are provided in Table 2.

The summary statistics of the key firm-level variables are given in Table 3. The average firm in our sample has assets of $1.43 billion. The
median firm has a positive EBITDA margin and holds liquid assets of about 9% of its total assets. The median firm has a debt-equity ratio of about 0.8. Based on the characteristics the sample firm is among the large firms in the listed universe.

3.2. Trends in debt financing: pre-COVID-19 and COVID-19 periods

A comparison of the proportion of firms in our sample that raise debt financing in the second and third quarters in the pre-COVID-19 period (normal period) and the COVID-19 period (Q2 and Q3 of the year 2020) is given in Fig. 1. The figure compares the average amount of debt financing for the two periods. The top panel gives the propensity for loan and bond financing and the bottom panel gives the average amount of financing.

We observe an increase in the propensity for loan financing by firms during the COVID-19 period (Q2-2020). For instance, the propensity for financing through loans has increased from an average of 7.1% in the second quarter during the normal period (2017–2019) to 11.4% during the corresponding quarter in 2020. The average loan amount has also significantly jumped in the COVID-19 period. While the average in the normal period is $88.4 million, it increased to $104 million in the second quarter of 2020. We do not observe an elevated propensity for loan raising in the third quarter of 2020.

We also find that the propensity for bond issuance has significantly increased during the pandemic period. The average bond issuance propensity has increased from around 8.5% in the second quarter over the normal period (from 2017 to 2019) to about 13.1% in the second quarter of 2020. We also observe an increase in the average amount of bond issuance in the COVID-19 period relative to the normal period. For instance, the average bond issuance has increased from about $169 million in the normal period to about $289 million during the second quarter of 2020, an increase of about 71%. The jump in the propensity and the amount of bond issuance possibly suggest that the demand for credit was usually higher in the crisis period.

While an increase in bond issuance during the COVID-19 period has been recorded for the US in prior studies (for instance, Halling et al., 2020), in untabulated results, we find the increase in bond issuance is also true for other advanced economies and emerging markets. The propensity for bond issuance has on average increased by about 11.5% for the non-US firms during the second quarter of 2020. We also observe a variation in the propensity for bond financing between the large and small firms for the COVID-19 period. The propensity of large firms (with above-median assets) to issue bonds rises from 12.5% in the second quarter during the pre-COVID-19 period to 20.4% in the second quarter of 2020. In contrast, the average propensity to issue bonds is substantially lower for small firms (with below-median assets) at 4.3% in the second quarter of the normal period, and falls to 3.4% in the second quarter of 2020. In the subsequent sections, we deepen the analysis of the change in the debt financing propensity during the pandemic by...
investigating the role of government responses, business continuity and managerial sentiment.

3.3. Empirical approach

In this section, we present the empirical approach employed to investigate the association between the pandemic and debt financing. We first estimate the impact on the propensity for debt financing on account of COVID-19, while controlling for various firm-level factors and possible time trends in a linear probability model.

\[
\text{Issuance}_{it} = \alpha_0 + \alpha_1 \text{COVID}_{t} + \sum_{s=1}^{5} \alpha_s X_{i,s,y-1} + \alpha_2 (\mu_j \times \text{Quarter}_t) + \epsilon_{it}
\]

The dependent variable \(\text{Issuance}_{it}\) takes a value of 1 if firm \(i\) has raised debt financing (loan or bond financing) during quarter \(t\). \(\text{COVID}_t\) is a dummy variable that takes on the value of 1 for the second and third quarters of the year 2020. A significant coefficient for \(\text{COVID}\) would indicate a change in the propensity for debt financing during the pandemic period. The firm level control variables \(X_{i,s,y-1}\) in the estimation are yearly lagged values (representing the immediate prior year, \(y-1\)) of firm size (\(\text{Log}\text{Asset}\)), the ratio of cash flow to asset (\(\text{EBITDA}/\text{Asset}\)), cash intensity (\(\text{Cash}/\text{Asset}\)), tangibility and leverage, as commonly employed in the research on debt financing.

To ensure that the analysis of COVID-19 induced responses is not driven by changes in the firm characteristics between the pre-COVID-19 and COVID-19 periods, we examine whether there is a significant change in the firm characteristics across the debt issuer firms and non-issuers firms between the two periods. We find that the differences in the firm characteristics between the two groups of firms in the pre-COVID-19 period do not change significantly in the COVID-19 period. The results of this analysis are shown in Table A2.

\(\mu_j \times \text{Quarter}_t\) captures any time-variant quarterly effects at the industry level. These interactive fixed effects subsume any observable and unobservable industry-level factors that could contribute to the debt issuance decisions within an industry. \(\text{Quarter}_t\) also accounts for any seasonality in the propensity to avail debt financing. Standard errors are clustered at the firm level (as suggested by Petersen, 2009). The time trend included in the estimation accounts for the possible increase or decrease in the propensity for debt issuance over time. The equation is estimated from the first quarter of 2017 until the third quarter of 2020 to reliably estimate change on account of COVID-19 relative to the pre-COVID-19 period.

We employ a linear probability model (LPM) in all the estimations to examine the impact on the debt financing propensity of firms (see, for instance Brown et al., 2019). In an empirical setting similar to ours, LPM models have an advantage over non-linear (logit and probit) models, being less susceptible to the incidental parameters problem in a panel data setting with a large number of cross-sectional units (N), small time periods (T), and a large number of fixed effects (Muûls, 2015; Puri et al., 2011). We also examine the robustness of the estimations using a logit model, with the limitation of not controlling for the fixed effects due to the convergence issues in non-linear models.

Next, we investigate the influence of government responses to COVID-19 on the debt financing of firms during the pandemic. The empirical specification examines how the containment and mitigation measures taken by governments during the COVID-19 pandemic period impact loan financing and bond issuance by firms. The estimation equation is as follows:

\[
\text{Issuance}_{it} = \alpha_0 + \alpha_1 \text{ContryResp}_{it} + \sum_{s=1}^{5} \alpha_s X_{i,s,y-1} + \alpha_2 (\mu_j \times \text{Quarter}_t) + \epsilon_{it}
\]

The dependent variable \(\text{Issuance}_{it}\) takes a value of 1 if firm \(i\) has raised debt through any of two sources during the quarter \(t\). In analogous empirical specification employed exclusively for bond issuance and loan financing, the variable takes a value of 1 if a firm that has issued either bonds or loans in the quarter. The variable \(\text{ContryResp}_{it}\) represents one of the specific measures taken in response to COVID-19 in the country \(c\) where firm \(i\) is domiciled. These measures include, in different specifications, Stringency, Containment, Stayathome, FiscalSupport, DebtRelief, WorkplaceClosing, and GovtResponse (the response variables are as defined in Table 1). The coefficient \(\alpha_1\) represents the incremental effect of the government response on debt financing during the COVID-19 pandemic period. This equation, which primarily estimates the impact of the country-level variation in government responses is estimated from the last quarter of 2019, from the very onset of the pandemic, until the third quarter of 2020.

We also estimate equation (2) with an alternative specification which includes interactive firm-year fixed effects. These interactive fixed effects subsume any observable and unobservable firm-level factors that could contribute to the debt issuance decision of firm \(i\) in year \(y\)

We employ the following specification to examine how the variation in the amenability of industries for business continuity through Work-from-home (WFH) impacts debt financing during the COVID-19 crisis compared to the pre-COVID-19 period. The industry-specific measures of WFH employed in the study are drawn from Koren and Petó (2020).

\[
\text{Issuance}_{it} = \alpha_0 + \alpha_1 \text{COVID}_{t} + \alpha_2 (\text{COVID} \times \text{WFHJobs}_t)
\]

The variable \(\text{WFHJobs}_t\) represents one of the three dimensions of WFH amenability of industries, Teamwork, PhysicalPresence, and CustomerInteraction in industry \(j\) (Koren and Petó, 2020). The coefficient of \(\text{COVID} \times \text{WFHJobs}_t\) represents the incremental effect of the indicators of WFH amenability at the industry level on firm-level debt financing during the second and third quarters of 2020 as compared to the pre-COVID-19 period. The time period of the estimation is the same as that employed in Equation (1).

In the final specification, we employ firm-level measures of managerial sentiment and COVID-19 exposure to examine how perception of firm-specific vulnerability impacts debt raising. The measures of managerial sentiment and COVID-19 exposure are drawn from Hassan et al. (2020) who employ textual analysis of quarterly earnings calls of firms. The empirical methodology given below employs an approach similar to that employed by Hassan et al. (2021) for examining the impact of the exposure and sentiment on loan pricing.

\[
\text{Issuance}_{it} = \alpha_0 + \alpha_1 \text{Sentiment}_{it} + \alpha_2 (\text{COVID} \times \text{Sentiment}_{it})
\]

The variable \(\text{Sentiment}_{it}\) is an index of the negative sentiment or positive sentiment representing the subjective outlook of the management of firm \(i\) towards the impact of COVID-19 based on the earnings calls during quarter \(t\). Since firm-level sentiment proxies can be correlated with observable and unobservable firm characteristics, instead of including firm-level covariates directly, we use \(\gamma_i \times \text{Year}_t\) which capture any time-variant yearly effects at the firm-level in the estimation.

The coefficient of the interaction term \(\text{Sentiment}_{it} \times \text{COVID}\) represents the effect of the management sentiment at the firm level on debt financing during COVID-19. In an alternative specification, we employ a measure of COVID-19 exposure (\(\text{Exposure}_{it}\)) which represents the perception of the management about the exposure of firm \(i\) to COVID-19 as the explanatory variable.
4. Findings on the propensity for debt financing

4.1. Change in propensity for debt financing during COVID-19

The results of the estimations on the propensity for debt financing during COVID-19 relative to earlier periods are provided in Table 4. We find that the coefficient of COVID is positive and significant for all three measures of debt financing employed in the study. For instance, the propensity for debt financing (either loan or bond financing) is higher by about 2 percentage points after accounting for other covariates of debt financing and the possible trend over time (column (1)). Broadly, it confirms the increased propensity for debt financing observed in Fig. 1. Between bond and loan financing, the impact of COVID-19 is greater for bond financing (columns (2) and (3)). The relatively higher increase in bond financing compared to loan financing during the pandemic is in line with that observed during the 2008 global financial crisis (GFC).

From the demand side, it is likely that the pandemic-induced disruptions could motivate the firms with access to the bond markets to seek greater debt financing to shore up resources to opportunistically invest in growth options arising due to the COVID-19 pandemic. The differential impact of COVID-19 on bond financing could be related to the inherent difference in the financial strength of firms that are reliant on bond markets as compared to those that are dependent on syndicated bank loans. Firms that tap the bond markets have higher credit ratings and therefore are more likely to raise additional financing to pursue opportunistic investments. In contrast, bank dependent firms have lower financial flexibility and could be largely driven by their liquidity needs. Therefore, the contrast suggests that financially stronger firms are more likely to raise incremental debt financing to build strategic cash reserves.

It is also possible that the lower impact of COVID-19 on the propensity for bank loans could be partly on account of changes in bank lending behavior. For instance, Adrian et al. (2013) document a sharp increase in bond financing and a decline in bank lending during GFC. Furthermore, Ivashina and Scharfstein (2010) find that the decline in lending during the 2008 GFC was greater for banks that feared greater drawdown of their credit lines. In a related finding, Chava and Puranamand (2011) document that banks reduce the loan supply and increase interest rates during the GFC period.

4.2. Government response to COVID-19 and propensity for debt financing

The results of the investigation of the variation in the debt financing of firms on account of the differences in the country-level response to COVID-19 are given in Table 5. The results for the six country-level response measures - Stringency, Containment, StayatHome, FiscalSupport, WorkPlaceClosing, and GovtResponse - are shown in columns (1)–(6), respectively. The estimation is carried out for the COVID-19 period starting from the last quarter of 2019 until the third quarter of 2020.

The results for the country-level responses in Table 5 suggest that greater restrictions on people’s mobility, WorkPlaceClosing, also indicates an increase in the propensity for loan financing by firms. For instance, a one unit increase in Stringency of the lockdown adopted in a country (on a scale of 0–100) leads to a 5.9 percentage point increase in the propensity for debt financing among firms (column (1)). Similarly, a one unit increase in Containment, a broader measure of the restrictions on mobility that also includes health policies, results in a 5.3 percentage point increase (column (2)) in the propensity for debt financing.

A more direct measure of restrictions on peoples’ mobility, WorkPlaceClosing, also adds an increase in the propensity for loan financing by firms. A one unit increase in the measure WorkPlaceClosing (on a 0–3 scale) is associated with a 5.1 percentage point increase in the likelihood of debt financing. It confirms the direction of the impact on firm-level financing obtained with more general proxies of people mobility restrictions. The overall measure of government response, (GovtResponse in column (6)) is also associated with a greater propensity for debt financing. The robustness of the estimations with a non-linear logit model shown in Table A3 yields results that are broadly consistent with our findings using the linear probability model.

These results show that a greater degree of movement restrictions in a country has prompted firms to raise additional financing, which is a likely attempt by firms to cope with the business disruptions and accompanying cash flow concerns. However, a greater degree of government response is likely to help in stabilizing the long-term impact of the pandemic. This, in turn, could confuse confidence among firms to pursue their investment plans rather than delay or abandon them. Country-level fiscal support measures taken during the COVID-19 crisis are not significantly associated with debt financing. Overall, the results document the impact of government responses to the COVID-19 pandemic on the financing of firms around the world.

We extend the investigation of the impact of the pandemic-induced responses on the debt financing of firms through an analogous estimation separately for bonds and loans. The results are provided in Table 6 for bond financing in Panel A and for loan financing in Panel B. Noticeably, we find that the measures of government response have a relatively greater impact on bond financing as compared to loan financing. For instance, while a one unit increase in the Stringency index is associated with a 3.7 percentage points increase in the propensity for bond financing, it is lower at 2.7 percentage points increase for loan financing. A similar difference in the impact is also observed for the other measures of government responses, including the overall measure (GovtResponse, in column (6)).

The differences in the impact of government responses to COVID-19 on loan and bond financing could be explained by the difference in the strategic need for liquidity of bond issuers. The bond financiers, backed by their higher credit ratings (Denis and Mihov, 2003), are likely to shore up liquidity to pursue opportunistic investments (Campello et al., 2010). On the other hand, firms reliant on bank loans could be raising liquidity for their precautionary needs, which are bound by their operational needs to tide over the pandemic. In addition, bank-dependent firms are also likely to be constrained by the change in the bank lend-

### Table 4

| Overall debt (1) | Bonds (2) | Loans (3) |
|------------------|-----------|-----------|
| COVID            | 0.020***  | 0.018**   | 0.007***  |
| (0.003)          | (0.003)   | (0.003)   |
| Log_Asset        | 0.066*    | 0.019**   | -0.005*   |
| (0.003)          | (0.004)   | (0.003)   |
| EBITDA/Asset     | 0.067***  | 0.086***  | 0.042***  |
| (0.010)          | (0.014)   | (0.011)   |
| Cash/Asset       | -0.016    | -0.043**  | 0.002     |
| (0.012)          | (0.019)   | (0.012)   |
| Tangibility      | 0.057***  | 0.061**   | 0.018     |
| (0.013)          | (0.019)   | (0.012)   |
| Leverage         | 0.000     | 0.000     | 0.001     |
| (0.001)          | (0.001)   | (0.001)   |
| Quarter_trend    | 0.000     | 0.000     | 0.000**   |
| (0.000)          | (0.000)   | (0.000)   |
| Constant         | -0.009    | -0.228*** | 0.096**   |
| (0.044)          | (0.065)   | (0.042)   |

| Oth.     | 153,971  | 94,165   | 125,375  |
|----------|----------|----------|----------|
| Firm fixed effects | Yes      | Yes      | Yes      |
| Industry-Quarter effects | Yes | Yes | Yes |
| Adj.R²  | 0.164    | 0.187    | 0.065    |

The dependent variable in all the estimations is an indicator variable that takes the value of 1 if the firm has availed debt financing (syndicated loans or bonds) and 0 otherwise. The definitions of the variables are given in Table 1. Robust standard errors clustered at the firm- and year-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.
ing behavior (Chava and Purnanandam, 2011; Ivashina and Scharfstein, 2010). Overall, the results of the association between debt financing and COVID-19 containment measures documented above establish a channel through which the pandemic can significantly impact the financing plans of firms.

It is possible that the result of our estimations could be influenced by potential substitution among different sources of financing, particularly between debt and equity. Given that growth expectations were adversely impacted by the pandemic-induced disruptions, firms would be reluctant to issue external equity at lower valuations. Studies suggest that equity issuance slowed considerably compared to debt financing during the pandemic period. For instance, Halling et al. (2020) find that capital raising during the initial stage of COVID-19 via equity issues was only about 5% of bond financing. Hence, the relevance of debt financing would be expected to increase during the pandemic. Furthermore, our empirically set up partially accounts for the impact of potential substitution in our estimations. For instance, we include firm-level characteristics that control for the capacity of the firm to generate internal sources of funds such as operating profits and also for the level of liquidity such as cash holdings. In addition, in a robustness test shown in Table A4, we include firm-year dummies to capture any unobserved time-varying heterogeneity at the firm-level including the propensity to issue external equity during 2020. The results are largely consistent with our baseline findings.

4.3. COVID-19, work-from-home amenability and industry-level differences in debt financing

The results of the estimation of the impact of the ability of firms to continue their operations through work-from-home arrangements during the COVID-19 crisis on debt financing are provided in Table 7. The indices developed by Koren and Pető (2020) which measures the extent to which different industry sectors are suitable for work-from-home arrangements are interacted with a dummy for COVID-19 shock (COVID).

We find that firms in industries where the physical presence of employees or teamwork is required have a lower propensity to raise debt financing in the second and third quarters of 2020, the early phase of the COVID-19 crisis (columns (1) and (4)). This is mostly a result of reduced loan financing (columns (3) and (7)), while bond financing was largely unaffected. The finding suggests that firms that are more vulnerable to pandemic-induced operational disruptions have temporarily lowered their financing requirements.

In contrast, firms that require higher customer interaction have a greater propensity to raise funding through loans (see columns (7) and (9)). The contrast between the two dimensions of work-from-amenability, physical presence and customer interaction, could be arising out of the difference in their impact on the cash flows of a firm. While the requirement of physical presence disrupts business operations, the disruptions in customer interactions have the potential to directly impact revenue flows. Therefore, the impact of the latter would be more severe prompting the firms to raise additional liquidity to meet the unexpected shortfall.

Earlier research on COVID-19 also finds that firms in industries that are more suitable for work-from-home arrangements have a lower impact on their equity market value (see for instance, Bai et al., 2020). The lower adverse impact on their market value has been linked to the lower degree of discontinuity in their operations. Our results complement their findings by documenting the variation in debt financing of firms that differ by their remote working amenability.

4.4. Impact of managerial sentiment and COVID-19 exposure on debt financing

In this section, we estimate how the debt financing propensity is related to the exposure of firms to COVID-19 and the outlook of the
management towards the likely impact of COVID-19, revealed through their sentiment. We employ the two text-based measures of COVID-19 exposure and managerial sentiment developed by Hassan et al. (2020) to examine the impact. The results for the COVID-19 exposure and managerial sentiment about COVID-19 are presented in Table 8.

We observe that a higher perception of COVID-19 exposure is associated with a greater propensity for raising finances through loans and bonds in the second and third quarters of 2020. For instance, a one-unit increase in the perceived exposure to COVID-19 (on a scale of 0–13.4) is associated with an increase in the propensity for debt financing by 1.4 percentage points (column (1)). The finding implies that firm-level exposure as assessed by the management about the immediate impact of COVID-19 has been followed up with incremental financing, as a precautionary measure to deal with the likely liquidity stress. The increase in propensity for debt financing observed here complements Hasan et al. (2021) who document that loan spreads have significantly increased for firms that score high on COVID-19 exposure.

We also estimate how positive and negative sentiment held by the management about the likely impact of COVID-19 is associated with the debt financing of firms. The impact of the negative sentiment of the management about the likely fallout of COVID-19 on the firm is largely positive for loan financing (column (6)), likely related to the precautionary and liquidity motives discussed above. However, greater negative sentiment is associated with lower bond financing. This could be expected as a subjective assessment of a higher impact of the pandemic on future earnings would lead to a more risky assessment of the firm by the bond market. The inverse relationship between COVID-19 negative sentiment and the additional bond financing could be an outcome of the disinclination of managers with negative sentiment to raise additional resources during the crisis. By contrast, positive managerial sentiment is related to higher debt financing (both bonds and loans) in general. This may be linked to the desire of firms to opportunistically take advantage of undervalued assets during the pandemic.

The significant influence of managerial sentiment about the likely impact of COVID-19 shows that managerial expectations have a significant role in the firm-level response. Our findings are in line with that of Campello et al. (2010), who document that the subjective outlook of CFOs had a strong role in the firm-level financing and payout decisions during the 2008 Global Financial Crisis.

### 4.5 Changes in the end-use of debt financing during COVID-19

While our emphasis has been to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, it is interesting to understand how the debt financing decision of firms was affected by COVID-19, 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Table 7
Work-from-Home amenability during COVID-19 and the propensity for debt financing by firms.

|                  | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          | (7)          | (8)          | (9)          |
|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| COVID            | 0.023***     | 0.013*       | 0.026***     | 0.026***     | 0.020***     | 0.016***     | 0.012***     | 0.019***     | 0.000        |
|                  | (0.007)      | (0.007)      | (0.006)      | (0.004)      | (0.004)      | (0.004)      | (0.004)      | (0.004)      | (0.003)      |
| COVID × Teamwork | −0.008       | 0.034        | −0.068***    | 0.026***     | 0.020***     | 0.016***     | 0.012***     | 0.019***     | 0.000        |
|                  | (0.027)      | (0.028)      | (0.025)      | (0.006)      | (0.004)      | (0.004)      | (0.004)      | (0.004)      | (0.003)      |
| COVID × PhysicalPresence | −0.033*      | 0.004        | −0.037**     | 0.000        | 0.000        | 0.000        | 0.000        | 0.000        | 0.000        |
|                  | (0.019)      | (0.021)      | (0.018)      | (0.020)      | (0.018)      | (0.020)      | (0.018)      | (0.020)      | (0.018)      |
| Constant         | 0.001        | −0.259***    | 0.148***     | 0.004        | −0.260***    | 0.154***     | 0.008        | −0.258***    | 0.160***     |
|                  | (0.057)      | (0.084)      | (0.056)      | (0.057)      | (0.084)      | (0.056)      | (0.057)      | (0.084)      | (0.056)      |
| Firm-level controls | Yes         | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |
| Obs.             | 117,929      | 74,769       | 97,081       | 117,929      | 74,769       | 97,081       | 117,929      | 74,769       | 97,081       |
| Firm fixed effects | Yes         | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |
| Industry-Quarter effects | Yes        | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |
| Adj. $R^2$       | 0.167        | 0.188        | 0.06         | 0.167        | 0.188        | 0.06         | 0.167        | 0.188        | 0.06         |

The dependent variable in all the estimations is an indicator variable that takes the value of 1 if the firm has raised debt financing (syndicated loans or bonds) (columns (1), (4) & (7)), bonds (columns (2), (5), & (8)), and syndicated loans (columns (3), (6) & (9)) and 0 otherwise. The definitions of the variables are given in Table 1. Robust standard errors clustered at the firm- and year-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.

Table 8
Firm-level COVID-19 exposure & sentiment and the propensity for debt financing by firms.

|                  | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          | (7)          | (8)          | (9)          |
|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| COVID_Exposure   | −0.017***    | −0.002**     | −0.014***    | −0.024       | 0.016***     | −0.028***    | 0.003        | −0.017***    | −0.009***    |
|                  | (0.000)      | (0.000)      | (0.000)      | (0.012)      | (0.000)      | (0.000)      | (0.012)      | (0.036)      | (0.000)      |
| COVID_Exposure × COVID | 0.014***     | 0.001**      | 0.011***     | 0.033        | −0.010***    | 0.040**      | 0.034        | 0.035***     | 0.007***     |
|                  | (0.000)      | (0.000)      | (0.000)      | (0.012)      | (0.000)      | (0.000)      | (0.012)      | (0.034)      | (0.000)      |
| COVID_Neg_sent.  | 0.155***     | 0.072***     | 0.101***     | 0.152***     | 0.071***     | 0.098***     | 0.150***     | 0.071***     | 0.099***     |
|                  | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.001)      | (0.001)      | (0.000)      |
| COVID_Pos_sent.  | 0.155***     | 0.072***     | 0.101***     | 0.152***     | 0.071***     | 0.098***     | 0.150***     | 0.071***     | 0.099***     |
|                  | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.001)      | (0.001)      | (0.000)      |
| Constant         | 0.034        | 0.035***     | 0.007***     | 0.034        | 0.035***     | 0.007***     | 0.034        | 0.035***     | 0.007***     |
|                  | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      | (0.000)      |
| Obs.             | 17,346       | 16,842       | 17,269       | 17,957       | 16,842       | 17,269       | 17,957       | 16,842       | 17,269       |
| Firm-year fixed effects | Yes         | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |
| Industry-Quarter effects | Yes        | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          | Yes          |
| Adj. $R^2$       | 0.11         | 0.156        | 0.009        | 0.126        | 0.156        | 0.009        | 0.126        | 0.156        | 0.008        |

The dependent variable in all the estimations is an indicator variable that takes the value of 1 if the firm has raised debt financing (syndicated loans or bonds) (columns (1), (4) & (7)), bonds (columns (2), (5), & (8)), and syndicated loans (columns (3), (6) & (9)) and 0 otherwise. Variable definitions are shown in Table 1. Robust standard errors clustered at the firm- and year-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.
stand how the motive of the financing decisions is changing during the pandemic phase of COVID-19. Specifically, we ask whether the debt financing decisions are tilted more towards precautionary motives such as liquidity and refinancing as against strategic motives such as capital expenditure or acquisitions. Furthermore, we also investigate whether the debt financing motives are driven by the pandemic-specific variables employed in the study such as government response and managerial sentiment.

To understand the purpose of relying on debt financing during the pandemic, we explore the declared primary purpose of the syndicated loans obtained by the firms. As the data of the end-use is not reported in detail for bonds, we restrict the analysis to syndicated loans. Hence, it limits our ability to compare the motives of the firms that have sought bond and loan financing. Nevertheless, the analysis helps to deepen the understanding of the association between various pandemic-specific channels and the purpose of debt financing.

The trends shown in Table A5 suggest that liquidity and refinancing motives took precedence over growth motives early in the pandemic period, particularly in the second quarter. The reported growth motives (sum of Acquisition and Capex categories) declined from 35.2% in the first quarter of 2020 to 25.5% in the second quarter of 2020. In comparison, the liquidity and refinancing motives (sum of Operations and Refinancing categories) increased from 64.6% in the first quarter of 2020 to 74.1% in the second quarter of 2020. This suggests a pickup in the investment motives of firms as the uncertainty surrounding the COVID-19 crisis subsides with more information on the characteristics of the pandemic as well as advances in vaccine development. The demand for funds targeted at acquisitions in the third quarter of 2020 suggests a rise in the proportion of firms with a sound balance sheet to opportunistic acquire weaker and undervalued assets.

The results of the estimation of the impact of the pandemic on debt financing motives are given in Table 9. We observe that a higher overall government response in dealing with the pandemic is associated with debt financing for investment motives (Capex and acquisitions). This is likely as greater involvement of the government in dealing with a public health crisis is more likely to protect the business environment in the medium term, despite the short-term disruption that it may create, through measures such as social distancing and containment. In contrast, a higher level of negative managerial sentiment related to COVID-19 is associated with greater debt financing for operational needs and it is negatively related to the investment needs of firms. The significance of the precautionary motive associated with negative managerial outlook to COVID-19 is a likely outcome of the conservative approach taken by the management of such firms on their liquidity needs. The finding is similar to Alfaro et al. (2018) and Boileau and Moyen (2016) who observe that uncertainty is associated with higher cash holdings by firms.

### 4.6. Impact of pandemic-induced changes on cost of financing

While our analysis so far has focused on the propensity for obtaining debt financing for firms during the COVID-19 pandemic, it is important to examine whether the real-side factors impact the cost of financing of firms. The uncertainty brought about by the pandemic in the bond markets is likely to impact the bond yields. For instance, Kim et al. (2021) find that bond yields on account of an increase in uncertainty are greater for firms in countries with higher fiscal deficits and current account deficits. In this analysis, we examine whether pandemic-linked real-side factors have impacted bond yields during the COVID-19 period relative to the prior period. The analysis involves the remote working amenability of firms, as data on this dimension is available for both the pre-pandemic and the pandemic periods.

The results of the estimations are shown in Table A6. Column (1) indicates that the overall bond yields have reduced during the COVID-19 period (see coefficient of COVID). This is in line with the credit market changes as a consequence of the monetary interventions during the pandemic across countries. In columns (2) to (4), we examine whether the pandemic-induced changes to the mode of working have an impact on the cost of financing raised by firms. We find that firms that require higher customer interaction, which lowers the remote working amenability, face a relatively higher cost of debt financing than other firms during the COVID-19 period compared to the pre-pandemic period. Given that such jobs with higher human interaction are directly affected by the pandemic-induced uncertainty, the debt market would likely demand a premium for the additional risk in such industries. However, we do not find any significant impact on the cost of financing for firms in industries that require higher team work or physical presence in the premises. The contrast could be attributed to the fact that customer interaction is related to the demand-side impact of the pandemic on firms, whereas, both team work and physical presence are

### Table 9

End-use of loans.

|                | (1)         | (2)         | (3)         | (4)         |
|----------------|-------------|-------------|-------------|-------------|
| **GovtResponse** | –0.004***   | 0.001***    | –0.012**    |
| **COVID_Neg_sent.** | 0.007***    | (0.000)     | –0.012**    |
| **Constant**    | 0.854***    | 0.791***    | 0.093***    |
| **Adj,R²**      | 0.745       | 0.669       | 0.702       | 0.606       |

The dependent variable in columns (1) and (2) is an indicator variable that takes the value of 1 if the firm has raised debt financing for ‘Operations’ and 0 otherwise. The ‘Operations’ category includes General Purpose, Working capital, Trade finance, Employee stock ownership plan, Debtor-in-possession, Credit Enhancement, Receivables Program, Guarantee, Pre-Export and Dividend or Distribution to Shareholders. The dependent variable in columns (3) and (4) is an indicator variable that takes the value of 1 if the firm has raised debt financing for investment motives and 0 otherwise. The ‘Capex’ category includes Project Finance, Real estate loan, Aircraft & Ship finance, Capital expenditure, Lease financing, Ship finance, Spinoff, Equipment Upgrade/Construction, Purchase of Software/Services, Purchase of Hardware, Telecom Buildout, and Infrastructure. Variable definitions are shown in Table 1. Robust standard errors clustered at the firm- and year-level are shown in parenthesis. ‘***’ denote the 1%, 5% and 10% significance levels.
internal to the firm and can be managed to a greater extent through alternative work arrangements.

5. Conclusion

The COVID-19 pandemic has severely impacted firms around the world. As a response to the unprecedented crisis, firms have raised a significantly greater amount of financing. There is also a large cross-sectional variation in the extent of fund raising by firms during the pandemic. We examine how the firms worldwide vary in their reliance on debt financing through syndicated loans and bond issuance by investigating factors that are uniquely associated with the pandemic. Specifically, the paper studies the role of the variation in country-level responses to COVID-19, remote working amenability of the industries, and the firm-level outlook on the impact of the crisis, to explain the variation in debt financing of firms. We employ a matched bond-loan-firm dataset across the developing and advanced economies in the study.

We find that the stringency of the lockdown adopted by countries had a significant impact on the extent of debt financing by firms during the crisis. Our results are also consistent with other measures of the degree of restrictions on people mobility such as the degree of workplace closures across countries. The positive association between stringency and debt financing suggests that firms in countries that adopted more stringent lockdowns to contain the pandemic had to increasingly worry about its impact on their liquidity requirements. It is also likely that a greater degree of government response helps to alleviate the uncertainty in the business and investment environment. Consequently, firms in such countries may raise additional capital to pursue opportunistic investments, given the steep correction in the market valuation of their competitors. Broadly, the findings imply that the extent of financing needs of firms is strongly associated with the degree of containment measures adopted by governments.

We also document that the impact of government responses is greater for financing through bonds relative to loans. The heightened impact on bond financing is likely an outcome of the intention of bond issuers to mobilize capital for opportunistic investment. Firms that are reliant on bank loans, on the other hand, are more likely to meet their liquidity needs through incremental debt financing during the pandemic. Furthermore, our research documents significant heterogeneity in the level of debt financing by firms brought about by the differences across industries in organising their work remotely. We find that firms within industries that have greater suitability for work-from-home arrangements have a lower propensity for debt raising during the pandemic. The role of the remote working amenability in offering an explanation for debt funding is indicative of the increased liquidity needs of firms with lower operating flexibility during the pandemic.

In addition to the role of the country-level measures and amenability of various industries for remote working, the paper also documents significant variation in debt financing on account of firm-level exposure to COVID-19 and the subjective managerial outlook towards the ability of their firm to face the crisis. We find that the extent of debt financing increases with firm-level exposure to COVID-19, indicative of the greater preparedness of the management of such firms to deal with the likely fallout of the crisis. On the contrary, the propensity for bond financing declines with an increase in the negative sentiment of the management towards COVID-19. However, we find that positive managerial sentiment is associated with a higher propensity for debt financing. The increased debt financing could be linked to the desire of management to seek valuable investment opportunities in a market characterized by unexpectedly low valuations. The association between management sentiment and debt financing propensity suggests that even during a crisis, the personal beliefs of managers have a strong role in explaining their financing decisions. Finally, through the analysis of the end-use of syndicated bank loans, we find that a greater government response to the pandemic and a less negative managerial outlook are associated with a higher share of financing for investment motives. The findings suggest that firms in such an environment exhibit a greater inclination to pursue opportunistic investments.

Overall, the paper documents several important channels at the country, industry, and firm levels that emerge as a consequence of the pandemic and its impact on the debt financing of firms around the world. The research complements studies that investigate the fallout of various crises including the current pandemic on firm-level financing by unearthing the role of certain pandemic specific channels. Future research could extend the paper by investigating the impact of government responses and amenability to remote working on the financing costs and other features of debt financing raised by firms during the pandemic.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

A. Appendix

| Table A1 |
|----------|
| Country-wise observations: Baseline sample. |
| Country | Obs. | Country | Obs. |
|-----------------|-------|----------|------|
| Argentina | 120 | Luxembourg | 20 |
| Australia | 772 | Macau | 15 |
| Austria | 97 | Malaysia | 547 |
| Bangladesh | 20 | Mexico | 236 |
| Belgium | 128 | Netherlands | 32 |
| Brazil | 355 | Nigeria | 3 |
| Cambodia | 3 | Oman | 24 |
| Canada | 858 | Pakistan | 134 |
| Chile | 155 | Peru | 4 |
| China | 2964 | Philippines | 95 |
| Colombia | 61 | Poland | 144 |
| Croatia | 31 | Poland | 117 |
| Cyprus | 4 | Russian Federation | 266 |
| Czech Republic | 12 | Saudi Arabia | 151 |

(continued on next page)
Table A1 (continued)

| Country     | Obs. | Country     | Obs. |
|-------------|------|-------------|------|
| Denmark     | 89   | Senegal     | 3    |
| Egypt       | 23   | Singapore   | 12   |
| Finland     | 198  | Slovenia    | 15   |
| France      | 683  | South Africa| 163  |
| Germany     | 628  | Spain       | 242  |
| Greece      | 86   | Sri Lanka   | 14   |
| Hong Kong   | 858  | Sweden      | 317  |
| Iceland     | 12   | Switzerland | 295  |
| India       | 1407 | Thailand    | 577  |
| Indonesia   | 545  | Turkey      | 128  |
| Ireland     | 124  | Ukraine     | 4    |
| Italy       | 276  | United Arab Emirates | 62 |
| Japan       | 3305 | United Kingdom | 1186 |
| Jordan      | 11   | United States | 7133 |
| Kazakhstan  | 8    | Venezuela   | 4    |
| Kuwait      | 36   | Vietnam     | 51   |
| Lithuania   | 16   |             |      |

The table shows the country-quarter observations for the baseline sample employed in Table 5 and in Table 6.

Table A2

Test of parallel trend assumption for firm characteristics.

|                  | Difference in pre-COVID period | Incremental difference during COVID-19 |
|------------------|--------------------------------|----------------------------------------|
|                  | (1)                           | (2)                                    |
| Log Asset        | 1.424***                      | 0.215                                  |
|                  | (0.078)                       | (0.103)                                |
| EBITDA/Asset     | 0.024***                      | 0.005                                  |
|                  | (0.002)                       | (0.005)                                |
| Cash/Asset       | −0.025***                     | −0.003                                 |
|                  | (0.004)                       | (0.005)                                |
| Tangibility      | 0.007***                      | 0.004                                  |
|                  | (0.000)                       | (0.004)                                |
| Leverage         | 0.134*                       | 0.016                                  |
|                  | (0.042)                       | (0.043)                                |

Quarterly dummies are included. Standard errors clustered at the quarter-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.

Table A3

Country responses to COVID-19 and propensity for debt financing by firms - Logit estimation.

|                  | (1)                           | (2)                           | (3)                           | (4)                           | (5)                           | (6)                           |
|------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Stringency       | 0.315***                      | (0.094)                       |                               |                               |                               |                               |
| Containment      | 0.304***                      | (0.097)                       |                               |                               |                               |                               |
| Stayathome       |                               |                               |                               |                               |                               | 1.549 (2.922)                 |
| FiscalSupport    |                               |                               |                               |                               |                               | 0.020*** (0.003)             |
| WorkPlaceClosing|                               |                               |                               |                               |                               | 0.037 (3.550)                |
| GovtResponse     |                               |                               |                               |                               |                               | 0.282*** (0.095)             |
| Log_Asset        | 0.467***                      | (0.014)                       | 0.467***                      | (0.014)                       | 0.467***                      | (0.014)                       |
|                  | (0.014)                       | (0.014)                       | (0.014)                       | (0.014)                       | (0.014)                       | (0.014)                       |
| EBITDA/Asset     | 1.216***                      | (0.227)                       | 1.197***                      | (0.226)                       | 1.221***                      | (0.227)                       |
|                  | (0.347)                       | (0.227)                       | (0.347)                       | (0.226)                       | (0.346)                       | (0.227)                       |
| Cash/Asset       | −1.165***                     | (0.227)                       | −1.169***                     | (0.226)                       | −1.186***                     | (0.227)                       |
|                  | (0.347)                       | (0.227)                       | (0.347)                       | (0.226)                       | (0.346)                       | (0.227)                       |
| Tangibility      | −0.045                        | (0.022)                       | −0.046                        | (0.022)                       | −0.052                        | (0.022)                       |
|                  | (0.122)                       | (0.022)                       | (0.122)                       | (0.022)                       | (0.123)                       | (0.022)                       |
| Leverage         | 0.067***                      | (0.022)                       | 0.067***                      | (0.022)                       | 0.069***                      | (0.022)                       |
|                  | (0.022)                       | (0.022)                       | (0.022)                       | (0.022)                       | (0.022)                       | (0.022)                       |
| Constant         | −10.402***                    | (0.712)                       | −10.399***                    | (0.712)                       | −10.393***                    | (0.712)                       |
|                  | (0.89)                        | (0.712)                       | (0.89)                        | (0.712)                       | (0.89)                        | (0.712)                       |

Obs. 25848 25848 25848 25848 25848 25848
Industry fixed effects Yes Yes Yes Yes Yes Yes
Year effects Yes Yes Yes Yes Yes Yes
Pseudo R² 0.112 0.112 0.111 0.114 0.111 0.111

The dependent variable in all the estimations is an indicator variable that takes the value of 1 if the firm has availed debt financing (syndicated loans or bonds) and 0 otherwise. The definitions of the variables are given in Table 1. Standard errors clustered at the firm-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.
Country responses to COVID-19 and propensity for financing by firms.

|                      | All debt | Bonds | Loans |
|----------------------|----------|-------|-------|
|                      | (1)      | (2)   | (3)   |
| Stringency           | 0.057*** (0.022) |       |       |
|                      | 0.019    |       |       |
|                      | 0.038** (0.017) |       |       |
| Containment           | 0.073*** (0.023) |       |       |
|                      | 0.011    |       |       |
|                      | 0.067*** (0.019) |       |       |
| Stayathome            | -0.567 (0.447) | 0.357 (0.320) | -0.911** (0.385) |
| FiscalSupport         | 0.000 (0.000) | 0.001* (0.000) | -0.001 (0.000) |
| WorkplaceClosing      | 0.019*** (0.524) | 0.009** (0.436) | 0.015*** (0.414) |
| GovtResponse          | 0.095*** (0.011) | 0.087*** (0.026) | 0.018 (0.021) |
|                      | 0.134** (0.007) | 0.081*** (0.013) | 0.076*** (0.020) |
| Constant              | 0.058** (0.008) | 0.064** (0.005) | 0.062** (0.004) |
|                      | 0.063*** (0.010) | 0.063*** (0.004) | 0.076** (0.004) |
|                      | 0.050*** (0.011) | 0.050*** (0.011) | 0.050*** (0.011) |
|                      | 0.045*** (0.006) | 0.045*** (0.004) | 0.030*** (0.010) |
| Obs.                  | 20,757   | 23,919 | 23,919 |
| Firm-Year fixed effects | Yes     | Yes   | Yes   |
| Industry-Quarter effects   | Yes     | Yes   | Yes   |

The dependent variable in all the estimations is an indicator variable that takes the value of 1 if the firm has raised debt financing (syndicated loans or bonds) (columns (1)-(6)), bonds (columns (7)-(12)), and syndicated loans (columns (13)-(18)) and 0 otherwise. Variable definitions are shown in Table 1. Robust standard errors clustered at the firm- and year-level are shown in parenthesis. ***, **, * denote the 1%, 5% and 10% significance levels.
Table A5
End-use of loans.

|                | 2019     |     |     |     | 2020     |     |     |
|----------------|----------|-----|-----|-----|----------|-----|-----|
|                | Q1       | Q2  | Q3  | Q4  | Q1       | Q2  | Q3  |
| No. of loan tranches |          |     |     |     |          |     |     |
| Acquisition    | 982      | 1114| 1164| 1138| 945      | 477 | 541 |
| Capex          | 1013     | 969 | 1020| 1171| 1037     | 677 | 671 |
| Operations     | 2897     | 3034| 2974| 2891| 3148     | 2889| 1794|
| Refinancing    | 474      | 506 | 497 | 464 | 492      | 466 | 578 |
| Restructuring  | 11       | 7   | 11  | 9   | 16       | 8   |     |
| Total          | 5377     | 5630| 5666| 5675| 5632     | 4525| 3592|
| Percentage of loans |        |     |     |     |          |     |     |
| Acquisition    | 18.3%    | 19.8%| 2.5%| 2.1%| 16.8%    | 1.5%| 15.1%|
| Capex          | 18.8%    | 17.2%| 18.5%| 2.6%| 18.4%    | 15.5%| 18.7%|
| Operations     | 53.9%    | 53.9%| 52.5%| 5.9%| 55.9%    | 63.8%| 49.9%|
| Refinancing    | 8.8%     | 9.4% | 8.8%| 8.2%| 8.7%     | 1.3%| 16.1%|
| Restructuring  | 0.2%     | 0.1% | 0.2%| 0.2%| 0.2%     | 0.4%| 0.2%|

The classification of the aggregated five end-use fields based on the primary purpose captured in the LPC Dealscan database is as follows. Primary purposes captured as Takeover, Acquisition, Merger, Leveraged Buyout, Management Buyout, and Sponsored Buyout are categorized under ‘Acquisition’. Primary purpose captured as Project Finance, Real estate loan, Aircraft & Ship finance, Capital expenditure, Lease financing, Ship finance, Spinningoff, Equipment Upgrade/Construction, Purchase of Software/Services, Purchase of Hardware, Telecom Buildout, and Infrastructure are categorized under ‘Capex’. Primary purpose captured as General Purpose, Working capital, Trade finance, Employee stock ownership plan, Debtor-in-possession, Credit Enhancement, Receivables Program, Guarantee, Pre-Export and Dividend or Distribution to Shareholders are categorized under ‘Operations’. Primary purpose captured as General Purpose/Refinance, Commercial paper backup, Recapitalization, IPO Related Financing, Exit financing, Collateralized Debt Obligation (CDO) and Dividend Recapitalization are categorized under ‘Refinancing’. Primary purpose captured as Stock Repurchase, General Purpose/Stock Repurchase, Standby takeover defense and Restructuring are categorized under ‘Restructuring’.

Table A6
Impact of work-from-home amenability and COVID-19 on yield to maturity of bond financing.

|                | (1)     | (2)   | (3)   | (4)   |
|----------------|---------|-------|-------|-------|
| COVID          | −0.516*** | −0.184| −0.324*** | −0.536*** |
|                | (0.076) | (0.191) | (0.098) | (0.092) |
| COVID × Teamwork | −0.951  |       |       |       |
|                | (0.746) |       |       |       |
| COVID × Physical Presence |       | −0.581 |       |       |
|                | (0.516) |       |       |       |
| COVID × Customer Interaction |       |       |       | 0.847* |
|                |         |       |       | (0.456) |
| Quarter_trends | 0.016*** |       |       |       |
|                | (0.005) |       |       |       |
| Log_Asset      | 0.254   | 0.326* | 0.303 | 0.308 |
|                | (0.160) | (0.189) | (0.190) | (0.190) |
| EBITDA/Asset   | −1.375  | −0.56 | −0.64 | −0.628 |
|                | (1.181) | (1.494) | (1.481) | (1.479) |
| Cash/Asset     | −0.132  | −0.265| −0.178| −0.266 |
|                | (0.764) | (0.902) | (0.907) | (0.907) |
| Tangibility    | 0.944   | −0.763| −0.698| −0.875 |
|                | (0.674) | (0.692) | (0.684) | (0.694) |
| Leverage       | 0.240***| 0.240***| 0.233***| 0.236***|
|                | (0.075) | (0.081) | (0.080) | (0.081) |
| Constant       | −2.288  | −1.231| −0.865| −0.692 |
|                | (2.468) | (3.111) | (3.118) | (3.125) |
| Obs.           | 3810    | 2812  | 2812  | 2812  |
| Firm fixed effects | Yes     | Yes   | Yes   | Yes   |
| Industry-Quarter effects | Yes     | Yes   | Yes   | Yes   |
| Adj. R²        | 0.847   | 0.853 | 0.853 | 0.853 |

The dependent variable in all the estimations is the yield to maturity on the bonds issued by firms. The definitions of the variables are given in Table 1. Robust standard errors clustered at the firm-level are shown in parenthesis. ‘***’, ‘**’, ‘*’ denote the 1%, 5% and 10% significance levels.
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