WP/21/278

# IMF Working Paper

## Corporate Sector Resilience in India in the Wake of the COVID-19 Shock

by Lucyna Górnicka, Sumiko Ogawa and TengTeng Xu



INTERNATIONAL MONETARY FUND

**IMF Working Paper**

Asia and Pacific Department

# Corporate Sector Resilience in India in the Wake of the COVID-19 shock

**Prepared by Lucyna Górnicka, Sumiko Ogawa and TengTeng Xu**[1]

Authorized for distribution by Alfred Schipke

November 2021



**Abstract**

To assess the resilience of India's corporate sector against COVID-19-related shocks, we conducted a series of stress tests using firm-level corporate balance sheet data. The results reveal a differential impact across sectors, with the most severe impact on contact-intensive services, construction, and manufacturing sectors, and micro, small, and medium enterprises. On policy impact, the results highlight that temporary policy measures have been particularly effective in supporting firm liquidity, but the impact on solvency is less pronounced. On financial sector balance sheets, we found that public sector banks are more vulnerable to stress in the corporate sector, partly due to their weaker starting capital positions. When considering forward-looking multiperiod growth scenarios, we find that the overall corporate performance will depend on the speed of recovery. A slower pace of recovery could lead to persistently high levels of debt at risk, especially in some services and industrial sectors.

JEL Classification Numbers: C63, G30, G38

Keywords: corporate sector vulnerabilities, stress testing, COVID-19 pandemic

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[1] We thank Faisal Ahmed, Zamid Aligishiev, Elif Arbatli Saxegaard, Xiaodan Ding, Shanaka J. Peiris, Hiroko Oura, Alfred Schipke, Katrien Smuts, Thierry Tressel, Jarkko Turunen, Laura Valderrama, Rui Xu, and seminar participants from the Reserve Bank of India, the Indian Ministry of Finance and IMF's Asia and Pacific Department for useful feedback. Nimarjit Singh provided excellent research assistance. All remaining errors are our own.

# Contents

## I. INTRODUCTION

The COVID pandemic has impacted the corporate sector in India, with contact-intensive services, and micro, small, and medium enterprises (MSMEs) being the most affected. A wide range of policy measures have been introduced to mitigate shocks to the corporate sector, including a moratorium on loan repayments, credit guarantee schemes, and resolution frameworks for distressed assets.

In this paper, we first examine the evolution and current financial performance of the corporate sector in India, focusing on indicators related to profitability, leverage, liquidity, and debt repayment capacity. We then conduct a series of sensitivity analyses and stress tests to assess corporate resilience against COVID-related shocks. Specifically, we consider three single-year scenarios, where the sectoral decline in corporate net sales is proportional to the change in gross value added in FY2020/21 (baseline), 2020Q2 (severely adverse) and their average (moderately adverse), respectively. Second, we use the resulting increase in stressed debts to assess the impact of heightened credit risk in the corporate portfolio on aggregate balance sheets of banks and non-banks. Finally, we consider two forward-looking multi-year scenarios covering a four-year period: one following the 2021 July *World Economic Outlook* projections and another one where the recovery is more protracted. By considering both single-year and multi-year stress scenarios, we hope to capture both the short-term and the medium-term impact of the COVID-19 shock, including through potential future waves of infections.

Our paper is related to three strands of literature on corporate vulnerability. The first strand examines corporate sector stress in India using firm-level data. For example, Oura and Topalova (2009) and Iorgova (2017) review the evolution of financial performances of corporates and assess their sensitivity to various types of shocks (e.g., interest rate, FX and profits). Linder and Jung (2014) find that growth in corporate leverage in India has been associated with a notable increase in the vulnerabilities of firms carrying high interest payment burdens. The second strand of literature considers corporate stress tests in the aftermath of the COVID-19 shock. For example, Tressel and Ding (2021) conduct a cross-country study on the impact of COVID shock on listed companies. Diez et al. (2021) quantify the rise in solvency and liquidity risks among small and medium enterprises for advanced economies. Caceres et al. (2020) assess the solvency risks and liquidity needs facing the U.S. corporate sector associated with the COVID-19 crisis. Bank of Japan (2020 and 2021) examined the liquidity impact of the COVID shock on the corporate sector in Japan, including the impact of policy measures and with a multi-year simulation. Finally, several studies have investigated the impact of policy responses including corporate relief

measures following the pandemic in advanced economies (see, for example, Ebeke et al, 2020; IMF, 2020; Bank of England, 2020; Core and De Marco, 2021; and Elenev et.al., 2020). To our knowledge, our paper is one of the first to examine the impact of COVID-related shocks on corporate resilience in India using a comprehensive firm-level database including MSMEs and to assess quantitatively the role of announced policy measures including moratorium and credit guarantee schemes.

The results from our stress testing exercise reveal that without policy support, the COVID-19 shock could have led to a significant increase in firms with earnings insufficient to cover their debt interest payments (i.e., with an interest coverage ratio (ICR) below 1). The share of corporate debt issued by these firms (debt at risk) rises from 23 to over 36 percent under the baseline scenario and to about 50 percent under the severe adverse scenario. Sectors most affected include construction, manufacturing, and contact-intensive services (i.e., trade, transport, and hospitality). Consistent with their weaker liquidity position prior to the pandemic, the share of MSME debt-at-risk increases more than for large firms under the baseline and two adverse scenarios.

We find that policy support measures provided to firms in 2020 were effective in mitigating the liquidity impact of the COVID shock. For example, debt-at-risk based on ICR in the baseline scenario falls to 26 percent from 36 percent, and the share of debt issued by firms with negative cashflow goes down from around 35 to 8.6 percent. At the same time, the effects of policy measures on corporate solvency are found to be less pronounced, reflecting the focus of the implemented policy measures in supporting corporate liquidity. The results suggest that corporate stress could have a sizable impact on the balance sheets of banks and non-bank financial companies (NBFCs), particularly for public sector banks (PSBs) due to their relatively weak starting capital position, although the policy support measures played an important mitigating role.

Finally, the forward-looking multi-year corporate stress tests suggest that the overall impact of the COVID-19 shock on the corporate sector will crucially depend on the speed of the economic recovery. Under the baseline path, the overall corporate performance improves gradually, with debt-at-risk returning to close to pre-COVID levels by the end of 2023. However, a slower pace of recovery could lead to persistently high levels of debt-at-risk and prolonged scarring, especially in contact-intensive services, construction, and manufacturing sectors.

This paper is organized as follows. Section II discusses the underlying data and provides some indicators of corporate sector performance prior to the pandemic. Section III describes the stress testing methodology used for the single-year analysis and presents results, including the impact of policy measures. Section IV discusses the implication of corporate stress on aggregate balance sheets of banks and NBFCs. Section V presents the methodology and results of the multi-year stress tests. Section VI offers some concluding remarks.

## II. DATA

### A. Data Sources

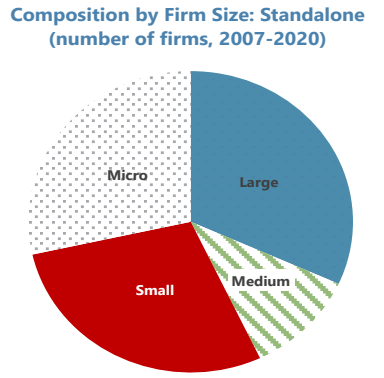
The analysis of corporate vulnerability in this paper uses the Prowess database from the Centre for Monitoring Indian Economy (CMIE). The database covers over 20,000 listed and unlisted non-financial corporates on a standalone basis in India[2]. The database includes information on firm characteristics (e.g., industry, ownership, and the year of establishment) and detailed data on financial performance and balance sheets.

We base our analysis using the annual standalone financial database, given the greater coverage of micro, medium and small enterprises (MSMEs)[3], see Figure 1. Roughly two-thirds of the companies covered by the database for 2007-2020 have sales of less than INR1 billion. By sector, those affected most by the pandemic are well-represented in terms of the share of assets and debt. Manufacturing firms account for around 40 percent and 32 percent of total assets and debts, respectively, followed by trade, hotels, transport, and communication (around 20 percent) and construction (around 10 percent). It should be noted that the share of the utilities sector is relatively high in total debt compared to total assets in the sample (24 percent and 15 percent, respectively), reflecting their high leverage.

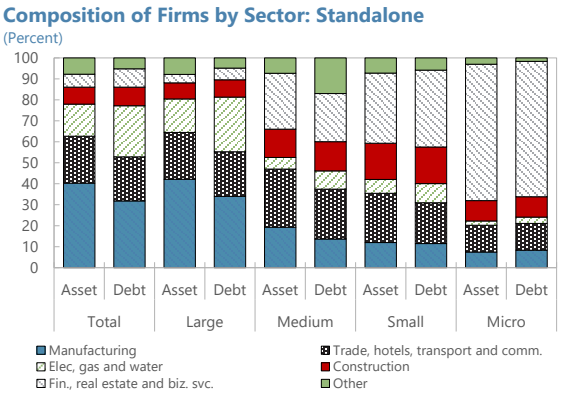
[2] About 4,000 firms are covered in the consolidated database in the Prowess database. The unconsolidated Prowess database has the largest coverage of corporate sector balance sheets in India at a granular level compared with other databases, such as S&P Capital IQ (about 3360 non-financial corporates) and RBI (2608 listed non-government and non-financial corporates by industrial aggregates).

[3] The classification of MSMEs follows the turnover threshold defined by Ministry of Micro, Small and Medium Enterprises.

**Figure 1. Composition of Firms by Size and by Sector**




Sources: CMIE Prowess and IMF staff calculations




Sources: CMIE Prowess and IMF staff calculations.

[4] There are several benefits of using the 2019 data instead of 2020 as the starting point. First, the coverage of firms is more comprehensive and representative. The number of firms for 2019 (over 21,000) is in line with previous years, whereas the smaller size for 2020 (around half of previous years as of August 2021) may introduce bias in the sample. Second, the financial performance for 2020 may already be partially affected by the economic impact of the pandemic. Third, we are interested in assessing the mitigating impact of policy measures introduced in 2020, and, therefore, the end-2019 data is more appropriate as a starting point. To focus on viable firms in our analysis, we trimmed the sample by removing the firms that were making losses for the last three consecutive years including 2019.

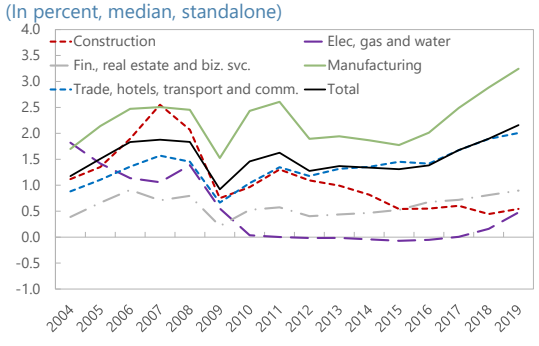
## B. Stylized Facts: Pre-COVID Conditions

The corporate sector in India went through a gradual process of deleveraging with an improvement in profitability prior to the pandemic (Figure 2). The median return on assets improved to 2.2 percent in 2019, from a trough of 0.9 percent following the Global Financial Crisis (GFC) in 2009. The median debt-to-equity ratio (leverage ratio) declined in the past five years, from 1.1 percent in 2015 to 0.8 percent in 2019, possibly reflecting the enhanced resolution under the Insolvency and Bankruptcy Code of 2016. The improvement was most notable in manufacturing and contact-intensive sectors, while the construction and utility sectors continued to see stagnant levels of profitability and elevated leverage. By firm size,

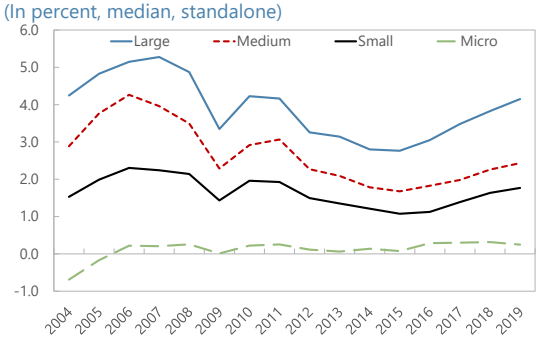
[4] Most firms in the database have fiscal year ending on March 31, i.e., the data used as pre-shock variables are as of end-March 2019.

micro firms (defined as those with sales less than INR50 million) experienced persistent low profitability throughout the sample period, with an uptick in leverage in 2015 followed by a gradual decline in recent years.

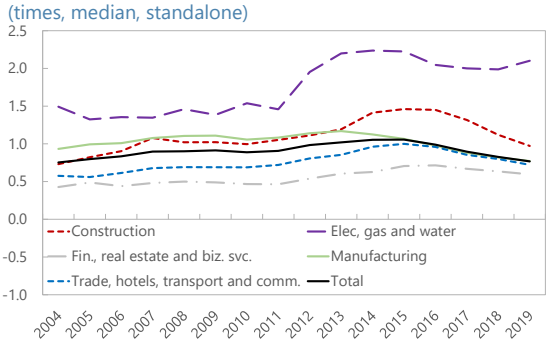
**Figure 2. Profitability and Leverage of Firms by Sector and by Size**



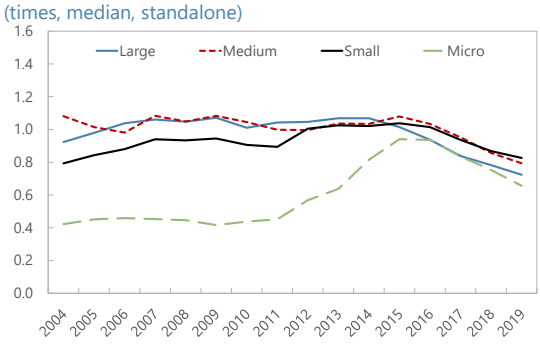

Sources: CMIE Prowess and IMF staff calculations.




Sources: CMIE Prowess and IMF staff calculations.



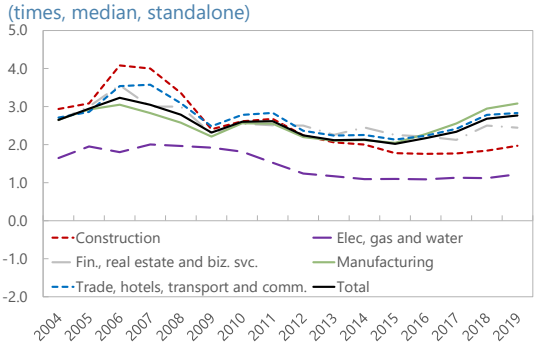

Sources: CMIE Prowess and IMF staff calculations.



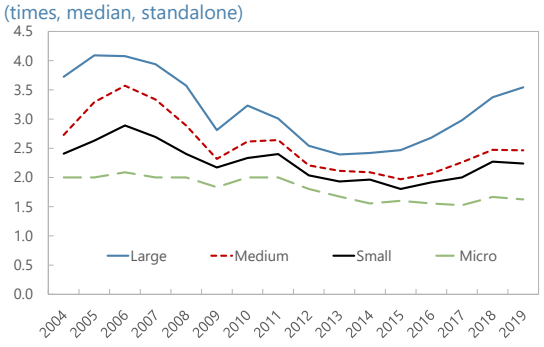

Sources: CMIE Prowess and IMF staff calculations.

Against this backdrop, the median interest coverage ratio (ICR) of the firms in our sample recovered to 2.8 in 2019, close to the pre-GFC levels (Figure 3). The improvement was more pronounced for larger firms and firms in manufacturing and contact-intensive sectors, while micro firms and those in construction and utilities sectors saw limited improvement. Debt-at-risk (defined as the share of debt owed by companies with ICR less than 1) declined to 25 percent in 2019 from a peak of 36 percent in 2016 but remained above the pre-GFC levels. Furthermore, the share of debt of firms with ICR less than 2 stood at around 60 percent compared to around 40 percent prior to the GFC, indicating a decline in the share of firms with large buffers to withstand shocks overtime. By sector, all sectors except wholesale and retail trade saw an increase in the median debt-at-risk in 2015 to 2019 compared with ten years earlier (2005 to 2009). Consistent with the weaker performance as seen in low profitability and high leverage, the debt-at-risk for micro firms stood at around 80 percent, the highest among all segments of firms.

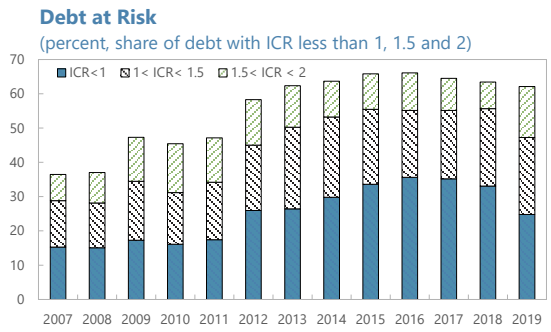
**Figure 3. Interest Coverage and Debt at Risk of Firms by Sector and by Size**



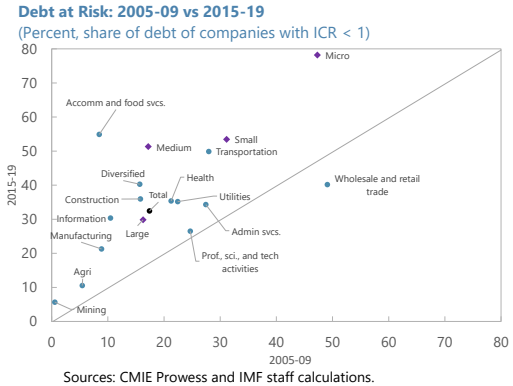

Sources: CMIE Prowess and IMF staff calculations.




Sources: CMIE Prowess and IMF staff calculations.




Sources: CMIE Prowess Database and IMF staff calculations




Sources: CMIE Prowess and IMF staff calculations.

## III. Single-Year Corporate Stress Tests

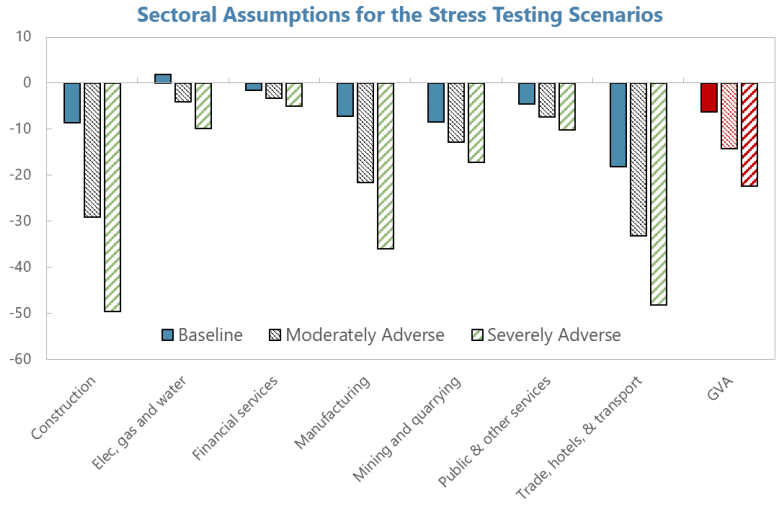
### A. Scenarios

One important objective of our stress testing exercise is to assess the impact of the pandemic on corporate liquidity and solvency. At the time of writing, the COVID-19 pandemic is still ongoing, with the full impact on the corporate sector and the economy yet to fully materialize. The nature of the COVID-19 shock makes the stress testing exercises particularly challenging, since the selection of appropriate stress scenarios is subject to considerable uncertainty.

In the *single-year stress tests*, we consider three scenarios – "baseline", "moderately adverse", and "severely adverse". We calibrate the "baseline" scenario to be the realized outcome in Gross Value Added (GVA) observed in different economic sectors in 2020. The other two single-year scenarios are more severe and are aimed at assessing corporate vulnerability to even larger but plausible negative shocks. The "severely adverse" scenario matches the realization of the sharp GDP contraction in 2020Q2 (extrapolated to the whole year). The "moderately adverse" scenario is a simple average of growth outcomes in the

"baseline" and the "severely adverse" scenarios. Figure 4 presents the sectoral growth assumptions for the single-year stress tests under each of three scenarios.

**Figure 4. Sector Assumptions for Single-Period Stress Test Scenarios (percent)**




We consider shocks to net sales as the main channel through which firms are affected by the economic impact of COVID-19 pandemic. Ideally, we would empirically estimate the relationship between the GVA and changes in the firms' net sales. However, a lack of sufficiently long historical time series makes such an estimation infeasible. We therefore follow the standard approach in the literature by assuming that firms' sales decline by the same rate as GVA at the sectoral level. This approach has been applied frequently in other analyses of corporate balance sheets following the COVID-19 shock (for example, see IMF, 2020). An alternative approach could be to use projections of firms' sales by market analysts (for example, see Tressel and Ding, 2021). However, analysts' projections of sales tend to focus primarily on larger listed corporates (therefore, a smaller subset of firms), while our exercise aims to cover all firms for which data is available, including MSMEs. Furthermore, sales projections for large, listed firms may not be as relevant for those of MSMEs. In our analysis, we conduct robustness checks using alternative assumptions regarding the link between the GVA and net sales (see Section III.C).

## B. Methodology

We conduct two types of liquidity stress tests and one solvency stress test. The liquidity stress tests allow us to consider the impact of the COVID-19 and related shocks on corporate liquidity, measured by the ICR and end-of-period cash flows. The solvency stress test examines the impact of these shocks on firm equity. While the two liquidity tests aim at

capturing the short-term impact of the shocks on firms' ability to generate cash flows and cover expenses, the solvency stress test helps assess the potentially more persistent impact on firms' viability.

**Liquidity Stress Test: ICR Metric**

The first liquidity stress test is based on the concept of the IRC, which is the ratio of earnings before interest and taxes (EBIT) to the interest expenses. Formally, for a firm *i* in year *t,* the ICR is equal to:

$$ICR_{i,t} = \frac{EBIT_{i,t}}{interest\ expenses_{i,t}}, \qquad (1)$$

where:

$$EBIT_{i,t} = net\ sales_{i,t} - \left(material\ costs_{i,t} + wage\ costs_{i,t} + other\ operational\ expenses_{i,t}\right)$$

$$+other\ income_{i,t} + interest\ expenses_{i,t}. \qquad (2)$$

In what follows, we assume that the adverse shock affects a firm's ICR through a decline in net sales, while allowing firms to adjust their wage and material costs in response. The ICR of a firm *i* in period *t+1*, after a shock hits, is equal to:

$$ICR_{i,t+1|shock} = \frac{EBIT_{i,t} + \boldsymbol{x}\%*\left[net\ sales_{i,t} - \boldsymbol{y}\%*material\ costs_{i,t}\right] + \boldsymbol{z}\%*wage\ costs_{i,t}}{interest\ expenses_{i,t+1}}, \quad (3)$$

where $\boldsymbol{x}$ captures a *negative* shock to sales, $\boldsymbol{y}$ captures firms' ability to reduce material costs in response to the sales shock, and $\boldsymbol{z}$ captures firms' ability to reduce wage costs in response to the sales shock.

In the absence of policy interventions, we assume that the interest expense in year t+1 is the same as interest expense in the year before: $interest\ expenses_{i,t+1} = interest\ expenses_{i,t}$. In addition, in absence of shocks to sales and costs, $\boldsymbol{x = y = z = 0.}$

For the pass/fail criteria, we assume that a firm fails the ICR stress test if $ICR_{i,t+1|shock} < 1$. The threshold of one is frequently used in the literature to identify firms with unsustainable debt levels. When reporting the results, we compute the share of total corporate debt issued by firms with a post-shock ICR below one, by economic sector or by firm size. We call this metric "debt at risk", as it captures the share of unsustainable corporate debt in total corporate debt outstanding.

**Liquidity Stress Test: Cash Flow-Based Stress Metric**

The second liquidity stress test captures the ability of a firm to generate positive cash flows following an adverse shock to its net sales, while accounting for principal debt payments and other short-term obligations. At the same time, any cash buffers and easy-to-liquidate current assets are counted towards the firm's ability to repay its debts. Formally:

$$cash\ balance_{i,t+1|shock} = cash\ balance_{i,t} + retained\ earnings_{i,t+1} + current\ assets_{i,t+1} - current\ liabilities_{i,t+1}, \quad (4)$$

where the retained earnings after shock are equal to:

$$retained\ earnings_{i,t+1} = (EBIT_{i,t+1} - interest\ expenses_{i,t+1}) * (1 - tax\ rate_{i,t+1}). \quad (5)$$

The applicable $tax\ rate_{i,t+1}$ is positive if $EBIT_{i,t+1} - interest\ expenses_{i,t+1} > 0$, that is, if the pre-tax earnings are positive. Otherwise, firms do not pay taxes**.** Consistent with the ICR test, the EBIT after the shock is equal to:

$$EBIT_{i,t+1} = EBIT_{i,t} + \boldsymbol{x}\% * [net\ sales_{i,t} - \boldsymbol{y}\% * material\ costs_{i,t}] + \boldsymbol{z}\% * wage\ costs_{i,t}. \quad (6)$$

Finally, in absence of policy intervention, we assume $interest\ expense_{i,t+1} = interest\ expense_{i,t}$. We also assume that $current\ assets_{i,t+1} = current\ assets_{i,t}$ and $current\ liabilities_{i,t+1} = current\ liabilities_{i,t}$.

On pass/fail criteria, a firm fails the cash flow stress test if it has negative cash balance at the end of the stress period, $cash\ balance_{i,t+1|shock} < 0$. A negative cash balance means that a firm has a negative gap between available cash and its liquidity needs. As in the ICR stress test, we summarize results by computing the share of total corporate debt outstanding issued by firms with negative cash balance at the end of the stress period.

**Solvency Stress Test**

The objective of the solvency stress test is to capture a firm's ability to generate positive profits after paying long-term obligations. To measure solvency, we follow the literature and examine the behavior of firm's equity after shock: if firm's equity becomes negative, a firm is assumed to be insolvent. The post-shock equity is computed as:

$$equity_{i,t+1|shock} = equity_{i,t} + retained\ earnings_{i,t+1}, \quad (7)$$

where the retained earnings are given by equation (5). We summarize the results of the solvency stress test by computing the share of corporate debt (by firm size and by sector) issued by firms with negative equity after the shock. The calibration of the parameters and the detailed mapping between the Prowess database and the variables in equations (1) to (7) are presented in Appendix Tables 1 and 2.

**The Impact of Policy Interventions**

In response to the COVID-19 shock, Indian authorities introduced a range of policies aimed at supporting the flow of credit to the economy and at providing relief to borrowers. The policy measures included (i) a broad-based monetary easing, including through sovereign bond purchases; (ii) a 6-month moratorium on loan repayments; and (iii) measures to facilitate funding to corporates, including targeted long-term refinancing operations (TLTRO), credit guarantee schemes for loans to MSMEs, and lending to NBFCs. In addition, the authorities introduced a one-time loan restructuring scheme for retail and small loans, and an extension of a previous loan restructuring scheme for MSMEs.

In our analysis, we consider the impact of the following three policy measures. First, the analysis captures a reduction in lending rates because of monetary easing, including through a reduction in the main policy rate by 115 basis points over 2020. Second, we capture a reduction in the debt repayment burden through the loan moratorium. The six-month moratorium on loan repayments were applied to bank and non-bank loans. As reported in the Reserve Bank of India (RBI)'s "*Report on Trend and Progress of Banking in India 2019-2020*", around 31 percent of corporate customers took advantage of the option to defer loan payments as of end-August 2020. Third, we consider the impact of debt rollover and access to new credit. Under the on-tap TLTRO scheme, banks could borrow up to INR1 trillion at a cost linked to the policy rate to purchase corporate bonds, commercial paper and non-convertible debt issued by companies in specified sectors. Since the program focused on debt issuances, it primarily benefited large companies.[5] Under the Emergency Credit Line Guarantee Schemes 1.0 and 2.0 (ECLGS) totaling INR3 trillion, eligible MSMEs[6] could obtain additional bank loans (capped at 20 percent of the total debt outstanding as of

[5] Earlier LTRO programs have also boosted the overall liquidity in the banking system and have contributed to the easing of financial conditions for corporates.

[6] Eligibility criteria changed over time and included caps on annual turnover and total amount of debt outstanding.

February 2020) with a one-year moratorium on loan repayments that were fully guaranteed by the government.

We incorporate the three policy measures in our stress testing analysis as follows. For ICR and equity stress tests, the channel through which these policies can impact corporate balance sheets is through lower interest expenses. We decompose interest expenses after the shock, $interest\ expenses_{i,t+1,}$ in equations (3) and (5) as follows:

$$interest\ expenses_{i,t+1|shock} = (1 - \boldsymbol{u}\% - \boldsymbol{w}\%) * interest\ expenses_{i,t}, \quad (8)$$

where $\boldsymbol{w}$ captures the impact of loan moratorium on interest payments and $\boldsymbol{u}$ captures a change in interest expenses due to lower interest rates. In our policy analysis, we consider the individual impact of the loan repayments and lower lending rates on firm ICR and equity, as well as their combined impact.

For the cash flow-based liquidity stress test, we also consider the impact of the TLTRO and MSME credit guarantee schemes on debt rollover. We rewrite the cash balance after shock, $cash\ balance_{i,t+1}$ in equation (4) as follows:

$$cash\ balance_{i,t+1|shock} = cash\ balance_{i,t} + retained\ earnings_{i,t+1} + current\ assets_{i,t+1} - current\ liabilities_{i,t+1} + \boldsymbol{w}\% * \left(ST\ borrowing_{i,t+1} + \boldsymbol{s}\% * \left(debt_{i,t+1} - ST\ borrowing_{i,t+1}\right)\right) + \boldsymbol{\eta_L}\% * ST\ borrowing_{i,t+1}\ , \quad (9)$$

where $debt_{i,t+1}$ and $ST\ borrowing_{i,t+1}$ stand for total outstanding debt and short-term (one year or less) debt, respectively. The parameter $\boldsymbol{w}$ captures the impact of the loan moratorium on principal payments, and $\boldsymbol{\eta_L}$ captures debt rollover or additional credit made available through the TLTRO scheme. In the case of MSMEs, we link the amount of credit available through the ECLGS to the total amount of debt outstanding, consistent with the design of the program. In other words, we replace $\boldsymbol{\eta_L}\% * ST\ borrowing_{i,t+1}$ in equation (9) with $\boldsymbol{\eta_{MSME}}\% * debt_{i,t+1}$. Finally, the parameter $\boldsymbol{s}$ captures the share of long-term debt ($debt_{i,t+1} - ST\ borrowing_{i,t+1}$) due in the current period. Note that the loan moratorium and lower interest rates support cash balances also through lower interest expenses (equations (5) and (8)). The detailed calibration of policy-related parameters can be found in Appendix Table 3.

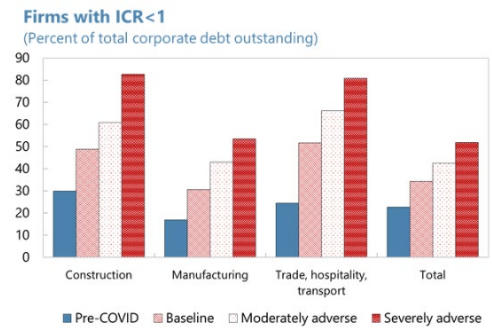
Several caveats apply to our policy analysis. Due to a lack of publicly available granular information, we assume a uniform impact of policies on corporate borrowers in different economic sectors. Arguably, companies in the most affected sectors would be likely to take

most advantage of policy support. We also assume that firms benefit from these policy measures such as moratorium in full, as detailed and granular data on the uptake by borrowers are not publicly available.

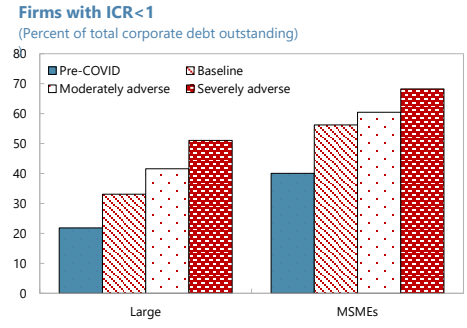
## C. Results

The stress tests highlight that without borrower relief measures and monetary easing, the COVID-19 shock could have led to a sharp increase in debt-at-risk. Based on the ICR stress tests, debt-at-risk could rise from 23 to over 34 percent under the baseline scenario and to about 52 percent under the severely adverse scenario. Sectors most affected include construction, manufacturing, and contact-intensive services (trade, transport, and hospitality). The MSME sector entered the COVID-19 pandemic with a weaker liquidity position, and, under the baseline and both adverse scenarios, the share of MSME debt by firms with ICR below one increases more than for large firms (Figure 5). Similarly, the COVID-19 shock could lead to sharp increases in debt-at-risk based on the cash flow measure in the absence of any policy support measures (Appendix Figure 1). As discussed earlier, we have considered robustness checks based on different relationships between sales growth and gross value added, and our results are robust to alternative specifications (Appendix Figure 2).

**Figure 5: Single Period Stress Test—Impact on ICR by Sector and Size (No Policy)**




Sources: Prowess Database, authors' calculations.




Sources: Prowess Database, authors' calculations

Policies including the borrower relief measures and monetary easing provided to firms in 2020 are found to be effective in mitigating the liquidity impact of the COVID shock. For example, the share of debt-at-risk based on ICR in the baseline scenario falls to 24 percent from 34 percent, close to the pre-COVID level.[7] Similarly. the share of debt issued by firms

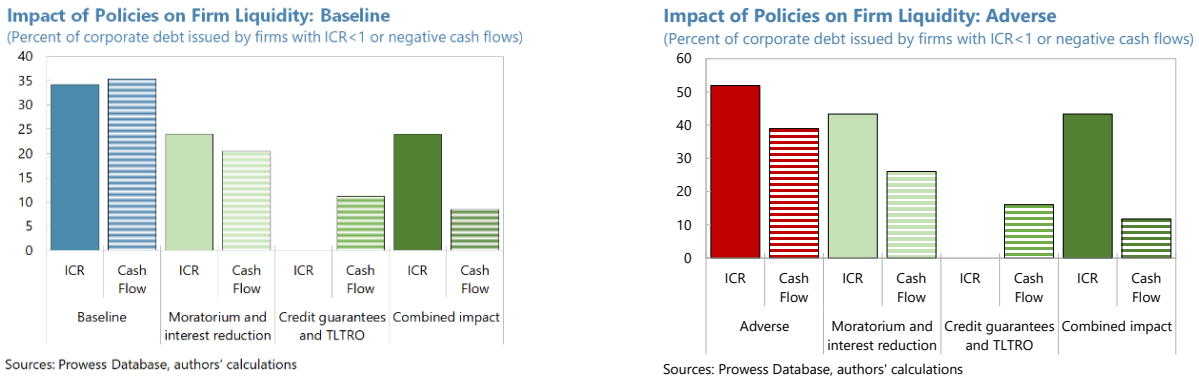
[7] Under the baseline scenario, the medium ICR stands at 1.7 with policies versus 1.3 without policies. This finding on the mitigating impact of policies is broadly consistent with the latest data from the RBI on corporate financial performances, which would reflect the impact of policies. Specifically, the debt repayment capacity of non-government non-financial firms increased from 5.2 in 2020Q4 to 5.5 in 2021Q1 (from 6.6 in 2020Q4 to 7.3 in 2021Q1 for manufacturing firms). Note that the absolute levels of ICR are not comparable between the RBI

(continued…)

with negative cashflows goes down from around 35 percent to 8.6 percent. The policies also substantially mitigate the impact of the firms' ICR and cash flows also in the moderate and adverse scenarios. For example, the share of debt-at-risk declined from 52 percent to 43 percent in the severely adverse scenario based on ICR, and from 39 percent to 12 percent based on cash flows. By type of policy, the loan moratorium and credit guarantee schemes are found to be most effective in supporting firm liquidity (Figure 6 and Appendix Figures 3 and 4).

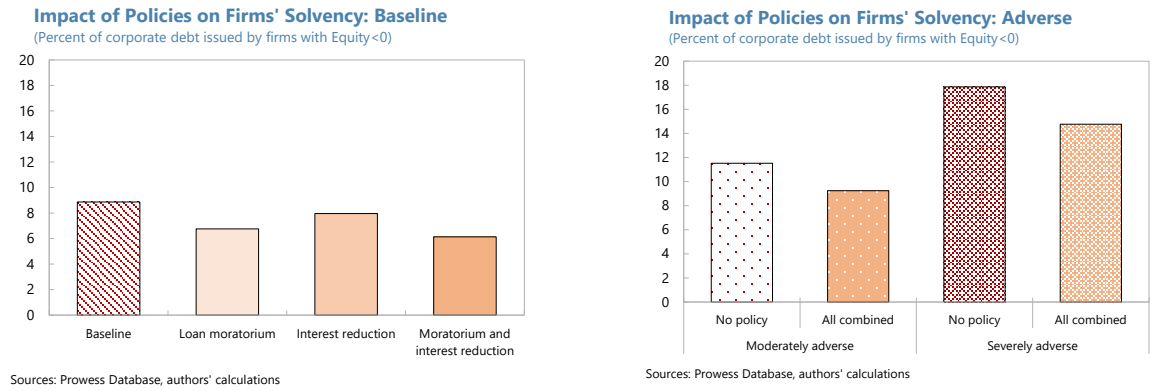
**Figure 6: Single Period Stress Test – Impact of Policies on Corporate Liquidity**

(Baseline and Severely Adverse Scenarios)




At the same time, the effects of policy measures on corporate solvency are found to be less pronounced, reflecting the focus of the implemented policy measures on supporting corporate liquidity. For example, the share of debt-at-risk declined from 9 percent to 6 percent under the baseline scenario and from 18 percent to 15 percent in the severely adverse scenario (Figure 7).

**Figure 7: Single Period Stress Test – Impact of Policies on Corporate Solvency**




database and our results (based on the Prowess database) due to differences in sample size, coverage, and aggregation method (aggregate v.s. median).

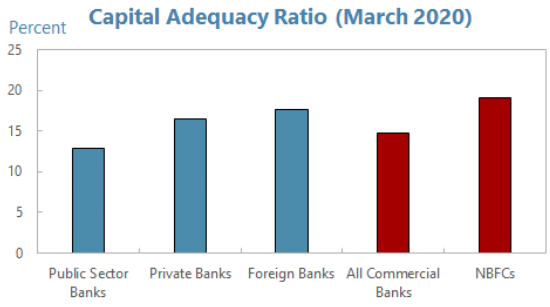
# IV. Financial Sector Impact

## A. Data

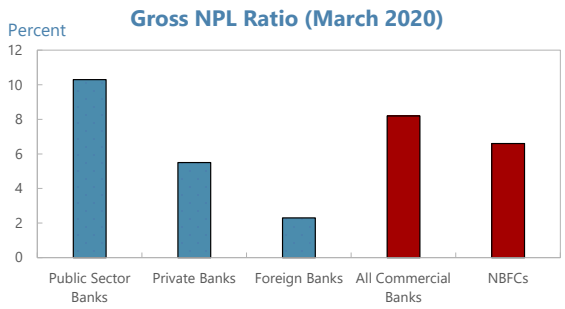
In this section, we analyze how increased credit risk from the corporate loan portfolios could affect the balance sheets of scheduled commercial banks (SCBs) and NBFCs. For this purpose, we apply the results of the three stress scenarios discussed in the previous section on aggregate balance sheets of SCBs and NBFCs available from the RBI as of end-March 2020. We further disaggregate the impact on the SCBs by bank type using the aggregate balance sheets of public sector banks, private banks and foreign banks. The balance sheet information we use includes 1) the share of the corporate loan book in the total loan advances; 2) total risk-weighted assets (RWA), capital adequacy ratio (CAR), and total equity capital; and 3) gross non-performing loans (NPAs) and total provisions.

Figure 8 shows the aggregate CAR ratios and the gross NPA ratio by bank type as of March 2020. Prior to the pandemic, public sector banks tended to have weaker asset quality compared with other segments of the financial sector with a relatively high gross NPL ratio of around 10 percent. While having been strengthened with the government's capital injections in previous years, public sector banks had a weaker solvency position as of end-March 2020 with a relatively lower capital adequacy ratio of around 13 percent compared with around 15 percent for the banking sector as a whole and 19 percent for NBFCs. The share of corporate loans in the total loan books was around 60 percent for public sector banks and private banks, 87 percent for foreign banks, and 69 percent for NBFCs.

**Figure 8. Banks and NBFC balance sheets pre-COVID**




Source: Reserve Bank of India.



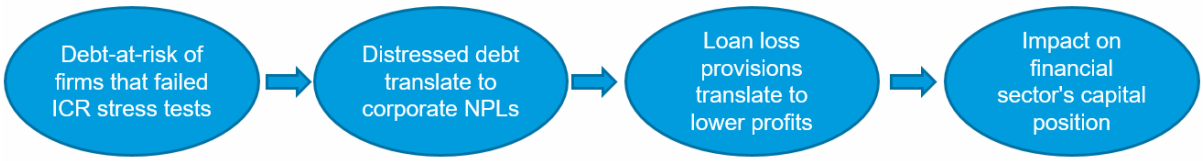

Source: Reserve Bank of India.

## B. Methodology

To map corporate stress to financial sector stress, we consider a sensitivity analysis that focuses on the credit risk stemming from the corporate credit portfolio to bank and NBFC balance sheets. Our methodology is as follows. First, we compute the debt-at-risk for firms

that failed the ICR stress tests, that is, the share of debt of firms with an ICR below one. We then compare the after-shock debt-at-risk with the pre-shock debt-at-risk. The change in distressed debt can then be translated into an increase in corporate NPAs based on the historical relationship between debt-at-risk and NPA for banks and NBFCs. Specifically, the historical correlation between the annual changes in debt-at-risk and the annual changes in the aggregate NPA ratio imply that about 40 percent of the increase in debt-at-risk could potentially translate into NPAs. The loan loss provisions for the NPAs imply lower profits for banks and NBFCs, which in turn leads to a reduction in their after-shock capital ratios (Figure 9). The hurdle rate used in our analysis is the regulatory minimum of nine percent. In other words, if the capital ratio were to be fall below nine percent, then the regulatory minimum would be breached. Our approach is consistent with other approaches that examine the impact of corporate stress on financial sector balance sheets, including earlier studies on India, such as Oura and Topalova (2009).

**Figure 9: Mapping Corporate Stress to Financial Sector Balance Sheets**

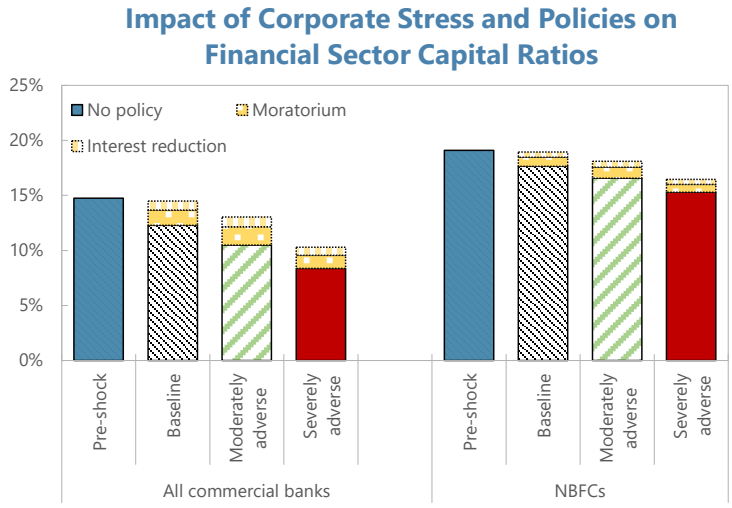



Two key caveats apply. First, our analysis is based on publicly available data due to a lack of access to confidential supervisory information. While we account for the different composition of corporate and retail exposures for each lender type as an aggregate, there is limited public data on the difference in banks' exposures to various economic sectors by bank type. Similarly, there is no publicly available information on lenders' exposures by firm size or concentration of loans to large borrowers as this data is highly confidential. For example, NBFCs could be more exposed to corporates in the severely hit industries and/or smaller firms, which would imply that the impact on their balance sheets from corporate stress could be higher than reflected. Second, we focus on the results of the ICR stress tests in analyzing the impact on financial balance sheets. ICR is our preferred measure compared with solvency and cash flows because we can estimate and interpret the historical relationship of the NPA ratios more directly. It should be noted that alternative assumptions regarding the distressed debt and NPAs should not matter for the *relative* impact of the shocks on bank and non-bank balance sheets (e.g. by bank type). As a robustness check, we also consider alternative mappings between an increase in debt-at-risk and NPAs in our analysis.

## C. Results

Corporate stress could have a sizable impact on bank and NBFC balance sheets, especially in the two adverse scenarios. In the absence of policy support, for banks, the pre-shock capital adequacy ratio of 14.7 percent could decline to 12.3 percent in the baseline scenario, to 10.3 percent in the moderately adverse scenario, and to 8.4 percent in the severely adverse scenario. Similarly, for NBFCs, the capital ratio would decline from the relatively higher starting level of 19.1 percent to 17.6 percent in the baseline, to 16.6 percent in the moderately adverse scenario, and to 15.3 percent in the severely adverse scenario (Figure 10). As mentioned earlier, given a lack of access to confidential supervisory data on the structure of corporate loans, the better performance of the NBFC sector compared with banks is largely driven by their stronger starting capital position.

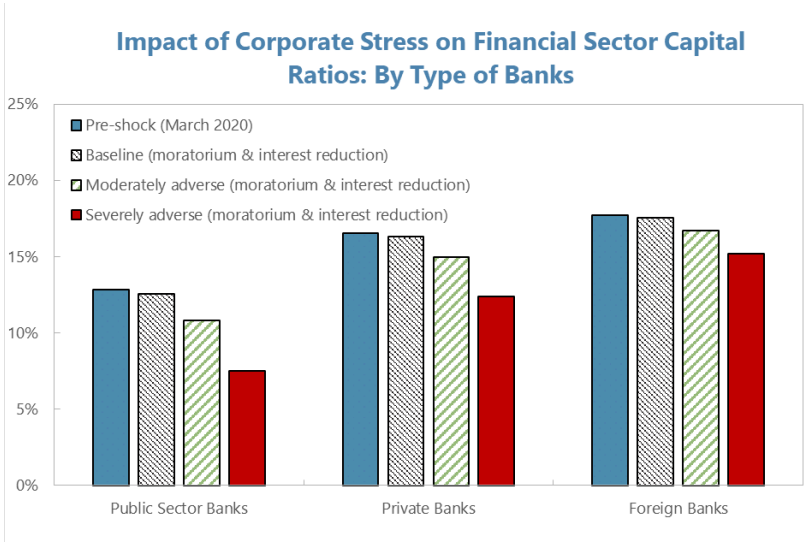
**Figure 10: The impact of Corporate Stress and Policies on Financial Sector Balance Sheets**




As we have seen earlier in the corporate stress test results, the moratorium is highly effective in cushioning the corporate liquidity stress. Similarly, these policy measures have also provided some buffer to bank and NBFC solvency positions. With policy support, for the banking sector, the capital ratio would only decline to 14.5 percent under the baseline scenario, and to 10.3 percent under the most adverse scenario, which is above the regulatory minimum. Similarly, the capital adequacy for the NBFC sector would only decline to 16.4 percent in the most adverse scenario. Overall, with policy support, the system-wide CAR for the banking sector would remain above the regulatory requirement in the baseline and the most adverse scenario (Figure 10). As mentioned earlier, we consider different mappings between an increase in debt-at-risk and NPAs as a robustness check and find that our results are robust to alternative specifications (Appendix Figure 5).

We also consider the impact of corporate stress on different segments of the banking sector. Here we present the results with policy support, but the relative performance of the three types of banks is similar in the case without policy support. Under the baseline scenario, all three segments of the banking sector would meet the regulatory minimum with or without policy support. Under the most adverse scenario, public sector banks would not meet the regulatory minimum even with policy support, with the capital adequacy ratio declining from 12.9 percent to 7.5 percent (Figure 11). The weaker performance of the public sector banks (PSBs) is in part driven by their weaker starting position compared with private banks and foreign banks (Figure 8).

**Figure 11: The impact of Corporate Stress on Bank Balance Sheets by Bank Type**




## V. Multi-Year Corporate Stress Test

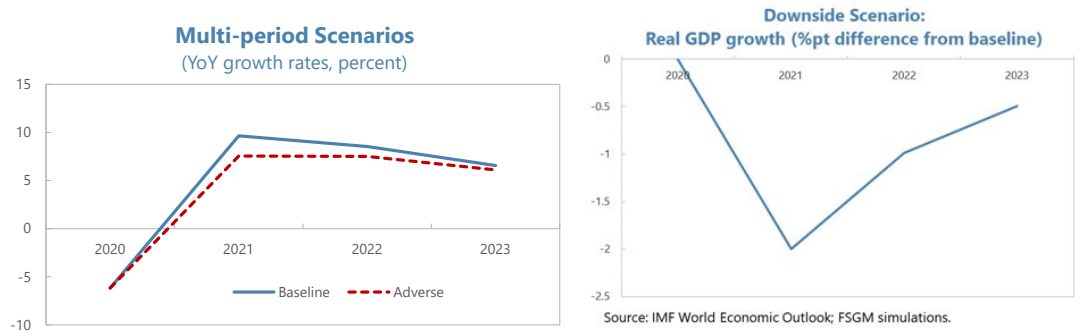
### A. Scenarios

In the *multi-year stress tests,* we consider two scenarios (by economic sector) over the period 2020-2023. The baseline scenario follows the 2021 July *World Economic Outlook* projections. The adverse scenario reflects a more protracted recovery, where the economy experiences persistent low growth for a few years after the initial impact of the pandemic, driven by future waves of the pandemic and consequently a slow recovery in services and industrial sectors.

Figure 12 presents the aggregate GDP growth path under the multi-period baseline and adverse scenarios. The difference between the two growth paths is largest in 2021, when

GDP growth experiences a rebound of around 9.5 percent under the baseline scenario versus only 7.5 percent under the adverse path. The two scenarios gradually converge in subsequent years, with growth at around 1 and 0.5 percentage points lower in 2022 and 2023, respectively, under the adverse scenario. At the sectoral level, we assume that the lower growth in the adverse scenario is driven by a slow recovery in services and industrial sectors, particularly in contact-intensive services, construction, and manufacturing sectors.

**Figure 12. Growth paths in multi-period scenarios**




## B. Methodology

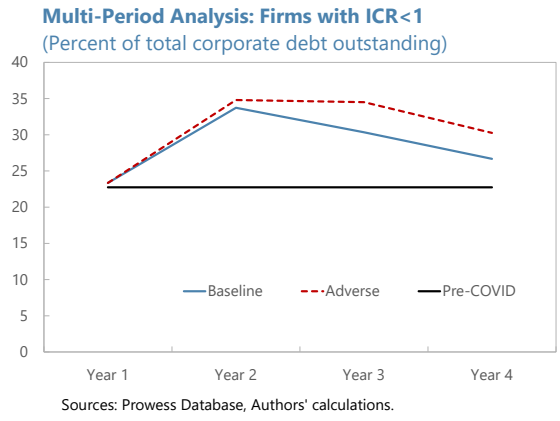
We apply the ICR and equity stress tests described in Section III.B and adjust to the multi-year setting by applying sectoral GDP growth as sales shocks for each year in a cumulative manner. We assume that the temporary policy measures, including loan moratorium and interest rate reduction, are reflected in the first year (2020) in both the baseline and adverse scenarios, and a gradual tapering of policy measures in subsequent years. Specifically, we assume that policy measures to ease funding conditions (TLTRO and credit guarantee schemes for MSMEs) are withdrawn after the first year, together with an expiration of loan repayment moratorium, and a normalization of policy rates gradually over the period of the analysis. The end-of-year metric for the first year would, therefore, be the same as the results for the single-year stress tests under the baseline scenario with all policies.

For years 2021-2023, we compute the end-of-year ICR and equity using formulas (3) and (7), but using the values computed for the preceding year for $EBIT_{i,t}$, $retained\ earnings_{i,t}$ and $equity_{i,t}$. We assume that all borrower-support policies, such as the loan moratorium, have expired by then and have not been re-introduced. Regarding the path of the interest rates, we assume a gradual normalization of interest rates under both the baseline and the adverse scenarios.

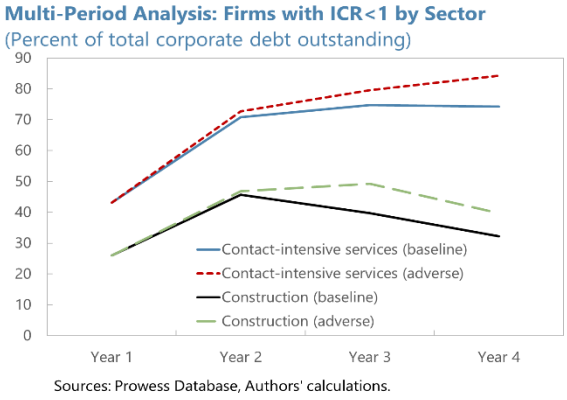
## C. Results

The forward-looking multi-period corporate stress tests suggest that the impact of the COVID-19 shock will depend crucially on the speed of the economic recovery. Under the baseline scenario, overall corporate performance deteriorates in the second year before improving gradually to close to pre-COVID levels by the end of 2023. Specifically, the share of total corporate debt outstanding with an ICR below one increased from 22.7 percent to about 33.7 percent in the second year under the baseline scenario, before moderating to 26.7 percent by the end of 2023. However, a slower pace of recovery could lead to persistently high levels of debt at risk and a prolonged impact in services and industrial sectors. For example, the share of debt-at-risk would remain at around 30.3 percent by the end of 2023 under the adverse scenario, with more persistent impact on sectors such as contact-intensive services and construction sectors (Figure 13).

**Figure 13: Multi-Period Analysis – Impact on Corporate Liquidity**



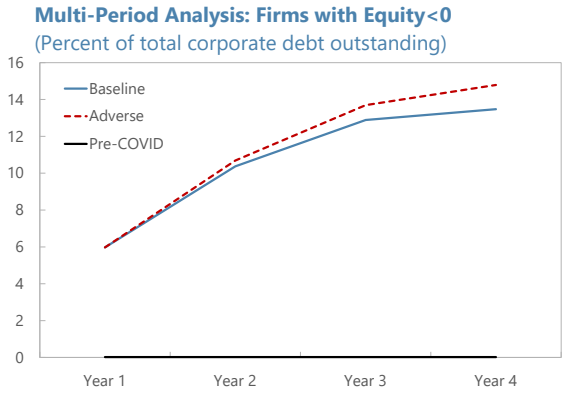

Sources: Prowess Database, Authors' calculations.



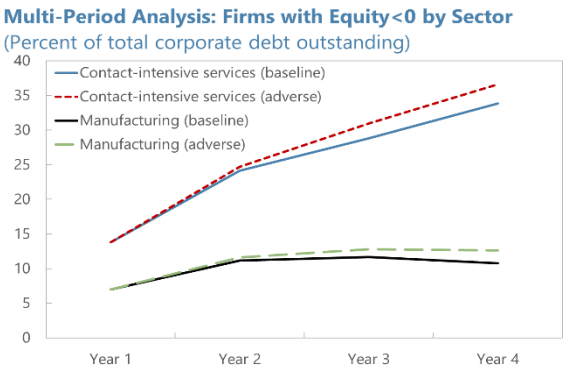

Sources: Prowess Database, Authors' calculations.

For the equity stress test, the share of total corporate debt outstanding with an ICR below one would rise in both the baseline and adverse scenarios by the end of four-year horizon. The impact on equity is quite persistent, even in the baseline scenario, as it takes time to offset an initial large negative earnings shock on firm equity. It should be noted that those policy measures are intended to provide temporary support to firm liquidity, and, therefore, their mitigating impact on firm equity is quite muted. Under the adverse scenario, the debt-at-risk would rise to about 14.8 percent by the end of the four years. By sector, contact-intensive services, and industrial sectors such as manufacturing are also among the most affected sectors (Figure 14).

**Figure 14: Multi-Period Analysis – Impact on Corporate Solvency**




Sources: Prowess Database, Authors' calculations.




Sources: Prowess Database, Authors' calculations.

## VI. Conclusions

In this paper, we conduct a series of stress tests to assess the resilience of India's corporate sector against COVID-19-related shocks. The corporate stress test results reveal a differential impact across sectors with the most severe impact on contact-intensive services, construction, and manufacturing sectors, and MSMEs. Temporary policy measures have been particularly effective in supporting firm liquidity, but the impact on solvency is less pronounced, in part reflecting the focus of these measures on liquidity relief. On financial sector balance sheets, we found that public sector banks are more vulnerable to stress in the corporate sector, partly due to their weaker starting positions. Our results also show that the impact of the COVID-19 shock on the corporate sector will depend on the speed of recovery. Persistent low growth could exacerbate scarring from the pandemic, especially in services and industrial sectors.

These results point to several important policy implications. On corporate sector policies, targeted support to viable corporate sectors should continue, particularly with the heightened uncertainty regarding the future course of the pandemic. Additional targeted support to viable firms in the most vulnerable sectors could be considered, including through additional relief measures. To ensure lenders follow appropriate standards when assessing borrowers' viability, supervisors should apply enhanced monitoring, including collection of more granular data and analyses of a broad range of corporate performance indicators.

At the same time, policies facilitating the exit of non-viable firms are also warranted. The authorities should work proactively in developing a contingency plan to address a potential increase in insolvency cases. Reforms in the existing framework are needed to reduce costs and the time of exit for non-viable firms. For example, introducing hybrid restructuring

schemes and a simpler out-of-court restructuring process for MSMEs could facilitate timely resolution of stressed assets. Structural issues, such as existing gaps in access to finance for MSMEs, may need to be addressed in the medium term to minimize scarring, thus enabling a robust recovery.

Financial sector policies need to shift to encourage banks to build capital buffers and to recognize problem loans. To avoid loan evergreening, financial regulators should ensure that the loans benefiting from COVID-related restructuring schemes continue to be closely monitored and have proper provisioning. In addition, it would be important to ensure adequate capitalization in the financial system, particularly in public sector banks, to deal with a potential rise in corporate insolvencies.

## APPENDIX I: DATA AND CALIBRATION OF PARAMETERS

**Appendix Table 1. Variables from the Prowess Database used in stress tests**

| Variable | Proxy in Prowess | Comments |
|---|---|---|
| $EBIT_{i,t}$ | *interest_cover*total_interest_exp* | We derive the EBIT variable from the ICR ratio (*interest_cover*) reported in Prowess by multiplying it by total interest expense (*total_interest_exp*). |
| $net\ sales_{i,t}$ | *net_sales* | |
| $material\ costs_{i,t}$ | *cost_of_goods_sold - 0.7*compensation_to_employees* | We compute the material costs from the *cost_of_goods_sold* variable, which according to the data definition also includes 70 percent of compensation costs. |
| $wage\ costs_{i,t}$ | *compensation_to_employees* | |
| $interest\ expense_{i,t}$ | *total_interest_exp* | |
| $cash\ balance_{i,t}$ | *cash_bal* | |
| $current\ assets_{i,t}$ | *current_assets_incl_st_invest* | |
| $current\ liabilities_{i,t}$ | *current_liabilities* | |
| $equity_{i,t}$ | *total_capital* | |
| $tax\ rate_{i,t+1}$ | *exp_total_taxes/(pbit-total_interest_exp)* | We compute the median effective tax rate in the sample as the ratio of total tax expenditure to earnings before taxes but after interest expenses. The value we obtain is equal to 27.5 percent. |
| $ST\ borrowing_{i,t}$ | *short_term_borrowings* | Short-term debt: used in policy analysis, see next section |
| $debt_{i,t}$ | *debt* | Total debt outstanding: used in policy analysis, see next section |

## Appendix Table 2. Key parameters

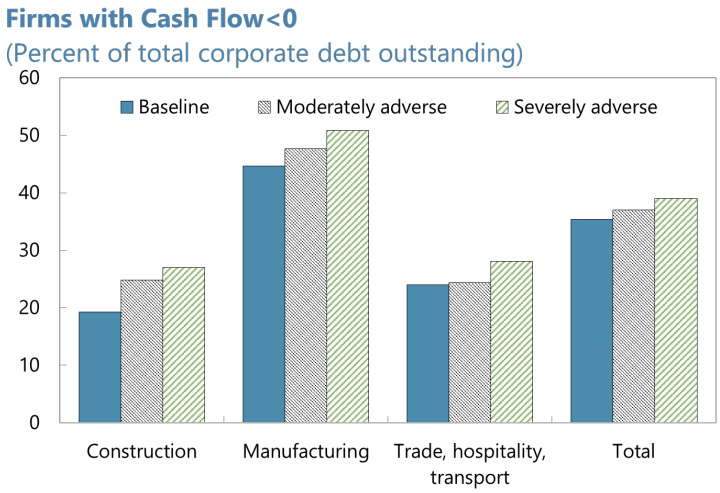
| Parameter | Value in percent | | | Comments |
|---|---|---|---|---|
| | Baseline | Moderate | Adverse | |
| *x* | sector-specific | sector-specific | sector-specific | Calibration of the shocks to net sales in each scenario is reported in Figure 4. |
| *y* | 90 | 100 | 100 | In the baseline scenario, we assume that firms treat the shock as transitory and adjust spending on material costs by less than the decline in net sales. In the moderately adverse and severely adverse scenarios, a decline in material costs is assumed to be proportional to the decline in net sales. |
| *z* | 0 | 12.5 | 25 | In the baseline scenario, we assume that firms treat the shock as transitory and do not reduce wages or lay off workers. In the moderately adverse and severely adverse scenarios, compensation costs are assumed to decline by 12.5 and 25 percent, respectively. |

**Appendix Table 3. Key policy-related parameters**

| Parameter | Value in percent | | | Comments |
|---|---|---|---|---|
| | Baseline | Moderate | Adverse | |
| $u$ | (0.64*115bp)/*(total_interest_exp/debt)* | | | The decline in interest expenses is proportional to the decline in the effective interest rate (equal to *total_interest_exp/debt*) due to the reduction in the RBI policy rate (115bp), where we additionally assume that 1) only 80% of the policy rate reduction was passed to lending rates, 2) the share of variable rate loans, i.e. loans that could benefit from the interest reduction, is 80%. |
| $w$ | 15 | | | The share of firm debt and interest payments that could be delayed due to the loan moratorium. We assume that approximately 30% of corporates used moratorium and that it applied to half of annual debt and interest payments, since the moratorium lasted for half a year. |
| $s$ | 25 | | | The share of long-term debt due in the current year, based on the average maturity of long-term debt of the firms in the Prowess Database. |
| $\eta_L$ | 100 | 90 | 80 | The share of large corporates' short-term borrowings that can be rolled over. In the baseline scenario large corporates can extend all debt payments due, reflecting easy financial conditions thanks to RBI interventions, and only 80% in the adverse scenario, reflecting a negative risk-aversion shock and flight to safety despite policy measures. |
| $\eta_{MSME}$ | 20 | | | The size of the new lending under the credit guarantee scheme for MSMEs, in percent of the total debt outstanding. We also incorporate an eligibility criterion based on total debt outstanding, which should not exceed INR 500 million. |

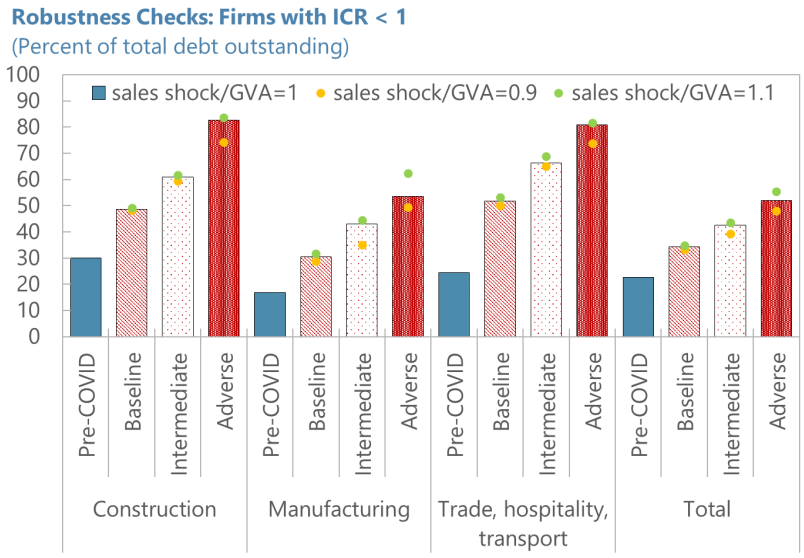
# APPENDIX II: ADDITIONAL RESULTS AND ROBUSTNESS CHECKS

## Appendix Figure 1. Single Period Stress Test—Impact on Cash Flow by Sector



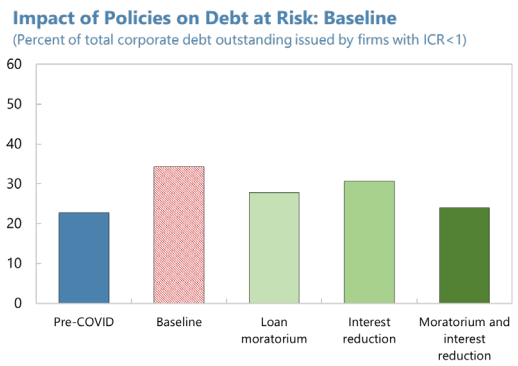

Sources: Prowess Database, authors' calculations.

## Appendix Figure 2. Robustness Checks (Alternative Assumptions on Sales Shocks)

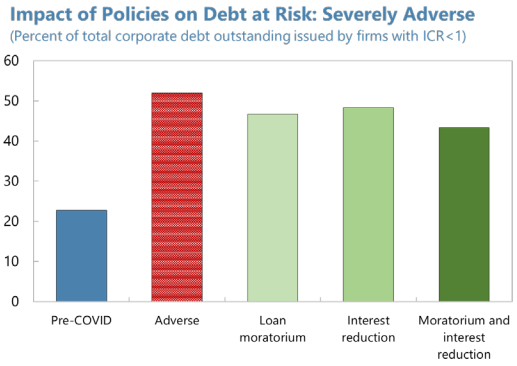



Sources: Prowess Database, authors' calculations.

## Appendix Figure 3. Single Period Stress Test – Detailed Impact of Policies on the ICR

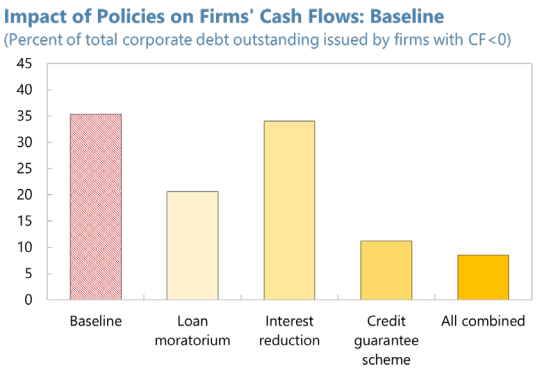



Sources: Prowess Database, authors' calculations

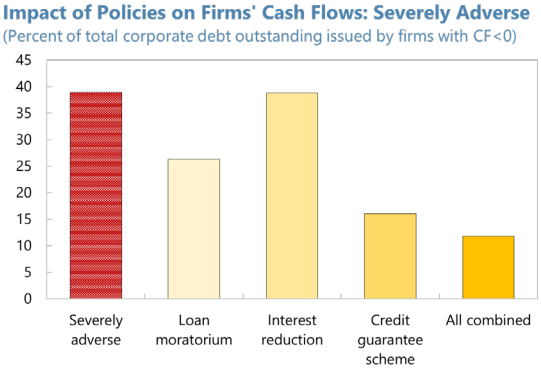



Sources: Prowess Database, authors' calculations

## Appendix Figure 4. Single Period Stress Test – Detailed Impact of Policies on Cash Flows

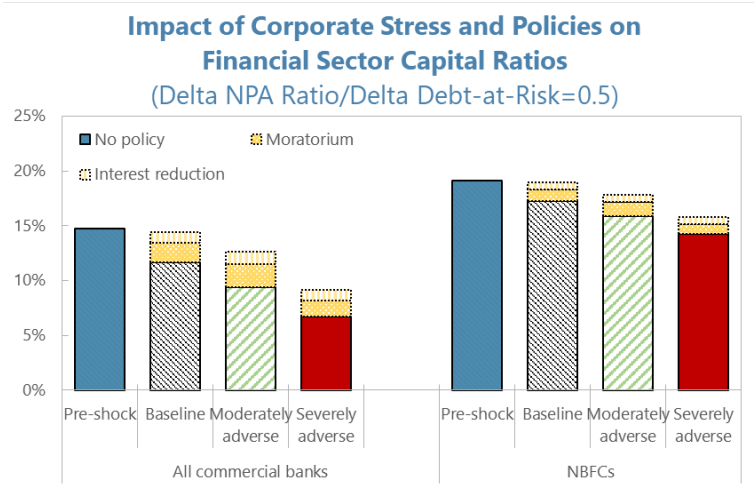


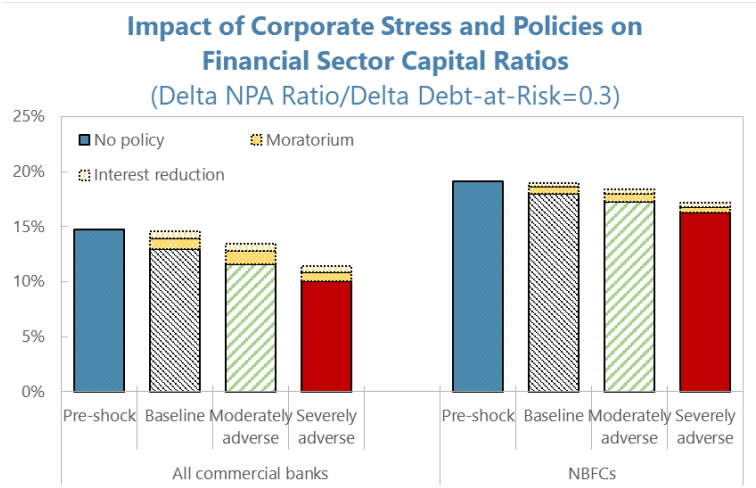

Sources: Prowess Database, authors' calculations




Sources: Prowess Database, authors' calculations

## Appendix Figure 5. Robustness Checks (Alternative Assumptions on NPA Increase)



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