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DISTRESSED FIRMS AND LOAN GUARANTEE PROGRAMS DURING THE COVID-19 CRISIS

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ABSTRACT

To mitigate the shocks caused by the pandemic-related restrictions, many governments have implemented extensive enterprise support measures, including the provision of government guaranteed loans to businesses that faced a sharp decline in revenues. In Russia, the introduction of loan guarantee programs has allowed many businesses which never obtained bank loans previously to apply for them under new circumstances. This led to a sharp increase in the number of small loans. At the same time, our estimates show that financially vulnerable companies are less likely to receive loans under loan guarantee programs. Our estimates for the Russian economy show that participation in loan guarantee programs has helped firms in industries hardest hit by the COVID-19 crisis better retain sales and employment levels. On the other hand, our results suggest that if loans are obtained by zombie firms or financially vulnerable companies, a positive effect is either absent or weaker than for financially stable enterprises.

Keywords: firm dynamics, COVID-19, zombie firms.

JEL classification: D22, G38, L25.

INTRODUCTION

To mitigate the shocks caused by the pandemic-related restrictions, many governments have implemented extensive enterprise support measures, especially in industries more severely hit by the pandemic. One of the frequently used measures was the provision of government guaranteed loans to businesses that faced a sharp decline in revenues. The amount of funds channelled through enterprise support programs is quite significant and questions arise about the effectiveness of such programs and their possible impact on economic recovery after the end of the pandemic.

Before the outbreak of the pandemic, the economic literature discussed the problem of zombie financing during the period of zero interest rates in developed countries. The researchers note that the long-term presence in the market of firms that can hardly service their debt and do not invest in development, may slow overall economic growth. Although there is no unequivocal opinion among economists on this issue, some researchers find that the number of zombie enterprises is gradually decreasing after the global financial crisis, while other papers indicate that even if zombie firms manage to shed this status, in the future they show worse performance than other businesses.

During the pandemic, the provision of additional financial resources through government lending programs to businesses hit the hardest by the pandemic could exacerbate the problem of zombie financing and support for vulnerable businesses that would otherwise have to leave the market. Preliminary assessments of the effectiveness of lending programs do not provide unambiguous answers to the question of whether they really help inefficient enterprises stay in the market and contribute to a slowdown in recovery growth after the end of the pandemic.

On the one hand, the severity of the zombie funding problem prior to the outbreak of the pandemic varied across countries. On the other hand, programs to support enterprises and the population during the pandemic have been implemented in different ways. In addition, governments realizing the problems of supporting inefficient enterprises have changed conditions for providing funds through support programs as the shocks from the pandemic subsided. Thus, the results of such programs can vary significantly across countries depending on the initial positions and differences in their implementation.

Thus, assessments of the effectiveness of programs differ. Some researchers find that guaranteed loans have increased the number of zombie firms in the economy, while others do not see a significant impact of business support programs on the survival of low-performing firms in the market. On top of that, we can currently see only short-term effects of support programs. Long-term effects may differ depending on global trends in coping with the pandemic crisis.

The specificity of the Russian situation lies in the fact that, firstly, there have been no long periods of low interest rates in Russia. On the contrary, businesses, especially those competing with other companies in foreign markets, often complained of high interest rates. In general, we have not seen a high proportion of zombie companies in the Russian economy. Rather, we should talk about the problems with the availability of credit for small firms that have recently entered the market. Secondly, the scale of support for enterprises during the lockdown period in Russia was significantly smaller than in developed countries. Lending programs chiefly sought to retain employment at enterprises and covered mainly labour costs without providing funds to cover other types of costs.

Descriptive statistics show that the disbursement of funds through support programs resulted in providing loans to enterprises that had not previously received bank loans. Thus, we can see a double effect from the implementation of loan guarantee programs. On the one hand, loans were obtained by enterprises that faced problems during the crisis. On the other hand, enterprises that could not previously obtain loans on market conditions were granted such loans under the new circumstances.

Thus, new enterprises that received loans were able to smooth out the costs caused by crises. However, those could be more risky enterprises to which banks were reluctant to provide loans without guarantees from the government in pre-pandemic times.

The total of loans at subsidized rates was significantly smaller in 2020 than in 2019. At the same time, the number of such loans increased dramatically. Thus, we are witnessing a sharp increase in very small loans, which will hardly provoke a substantial increase in the volatility of the financial system. The data suggests that vulnerable firms, which became able to obtain guaranteed loans under the program, do not subsequently apply for loans on market conditions, bearing out our conclusion that this will not deteriorate the financial system's stability significantly.

In this study, we combined data on the financial statements of enterprises in 2016-2020 with the credit register data for 2017-2020. In the credit register data, we identified a group of loans that were issued on preferential terms to enterprises during the COVID-19 pandemic in 2020. Using a difference-of-differences approach, we tried to assess whether obtaining concessional loans helped firms maintain sales and employment and stay in the market. In addition, we identified groups of zombie firms and financially vulnerable companies and examined whether the effects of obtaining concessional loans during the first year of pandemic for these groups differ from ordinary companies.

Our estimates show that participation in loan guarantee programs has helped firms in industries hit the hardest by the COVID-19 crisis better maintain sales and employment levels during the first year of the pandemic than firms without concessional loans. In this sense, the main short-term goal of subsidized lending programs has been achieved. On the other hand, our results suggest that loans obtained by zombie firms or financially vulnerable companies have either failed to reduce their employment decline or have had a less positive effect than that enjoyed by financially stable enterprises. Thus, the receipt of funds by financially vulnerable firms diminishes the effectiveness of government support programs.

At the same time, our estimates show that financially vulnerable companies are less likely to receive loans under government support programs during the pandemic. Also, the share of such enterprises is generally not very high, especially for zombie firms. Therefore, the participation of these firms in subsidized lending programs is unlikely to significantly reduce the effectiveness of such programs in the short term.

Thus, the implementation of lending programs in the pandemic does not increase risks to the financial system. However, there remains a problem of access to finance for less efficient enterprises in the post-pandemic period and of how this could affect economic recovery and the retention of employment levels after the pandemic is over.

The paper is organized as follows. Section 2 is devoted to a review of the literature. Section 3 describes the databases used in the study. Section 4 briefly outlines the loan guarantee programs introduced in 2020–2021 in Russia. Section 5 deals with the structure and dynamics

of conventional and subsidised loans during the pandemic. Section 6 provides the results of the difference-of-differences analysis of the effectiveness of government guarantee programs for various groups of firms. Section 7 concludes.

1. LITERATURE REVIEW

The effect of an unanticipated shock in the form of the COVID-19 pandemic on firms' survival and performance has raised strong concerns among policymakers. Amid containment measures, severe demand contractions could potentially generate a substantial number of illiquidities and insolvencies in the non-financial sector (FSB, 2021). In turn, to overcome the so-called hibernation period and be able to confront current business needs, firms have to apply for additional liquidity. At the same time, banks become more reluctant to take higher credit risk by lending in the period of instability at the same risk premia (Didier et al., 2021).

In this setting, government intervention, such as fiscal and monetary support, is essential to mitigate the adverse effects of the crisis on business activity and employment and to prevent even greater economic slowdown. In particular, it is aimed to reduce firm costs, facilitate bank credit supply and encourage lending to viable firms that experience slumping revenues (Hoshi et al., 2022; Banerjee et al., 2021). The financial support measures are primarily designed for small and medium-sized enterprises (SMEs). Gourinchas et al. (2021) and Anderson et al. (2021) point to extreme vulnerability of SMEs given fewer funding opportunities along with smaller cash buffers. This is in line with Belghitar et al. (2021) that reveal SMEs with positive EBITDA have been decreased in number significantly.

The government stimulus has been introduced both in a variety of forms and in different amounts depending on the country. In emerging economies, the fiscal response remained smaller compared with advanced ones but, overall, larger than its historical level (Gourinchas et al., 2021). According to Casanova et al. (2021), to motivate banks to supply the adequate flow of loans in a stressful economic environment, the government may enhance lending capacity of banks and, likewise, incentivise banks to lend more. First, loan guarantee schemes make lending standards less demanding as they transfer the default risk of an enterprise to a public institution (Demmou and Franco, 2021; Hoshi et al., 2022). Other credit support measures may comprise prohibition of foreclosures, loan payments' moratoria (Anderson et al., 2021), and direct fiscal transfers, such as tax deferrals and wage subsidies (Casanova et al., 2021). Second, flexible loan classifications, including redefinition of non-performing loans, are measures that shift the default period and simplify restructuring procedures (Casanova et al., (2021).

As of now, the duration of shock is still uncertain. In addition, geopolitical shocks begin to superimpose on the shocks associated with the pandemic. The preliminary analysis gets complicated because of the data availability as it is not completely released yet and is not itself complete enough to assess the impact of government programmes on the operations of firms that have received state support (Hoshi et al., 2022; Groenewegen et al., 2021). Therefore, simulation models and techniques are applied rather than actual data during the analysis. According to these estimations, immediate strong response has predominantly reached its aim of saving businesses but created new challenges as of either how to gently exit the extensive support programmes or how to prolong them.

Conditioning upon asymmetric information and uncertainty, the most difficult thing is to identify viable firms in need in order to use targeted approach in the distribution of financial help (Groenewegen et al., 2021). Moreover, suggestions regarding pandemic hardest hit sectors may not coincide with the real state of things (Belghitar et al., 2021). Lacking that, policymakers can opt to help all firms indiscriminately.

In practice, policymakers design programmes to optimize benefits against costs, given limited time. Hence, public programmes may either align or distort the market selection process if market cleansing mechanism ceases to work properly (Demmou and Franco, 2021). Then, the government financial regulator may have to change its status to “the loss absorber of last resort” caused by insolvencies of firms (Didier et al., 2021).

Loan guarantees were found to make cash flows accessible to viable firms so as to correct the inefficiency of market selection in the nearest perspective (Demmou and Franco, 2021). Thus, in the short term, an increase in credit prevents insolvency and cash flows could recover to the pre-pandemic levels (Banerjee et al., 2021). Nevertheless, some loan guarantee programmes have ambiguous effect since they positively correlate with firms’ indebtedness and productivity slowdown (Demmou and Franco, 2021). Despite saving firms in the short run, excessive loan guarantees could entail risks to productivity by reducing motivation to develop businesses (Altavilla et al., 2021). As a result, in the long run, the prolonged increase in debt and depressed earnings may make underperforming firms highly dependent on provision of credit. So, support measures that allow lending to nonviable companies boost the number of zombie firms (Beck et al., 2021). Low-productive firms and zombies with market power could be a real barrier to the entry of new firms and crowd out resources that could have been allocated to more productive enterprises that are ready to use innovations in their work (Cella, 2021). Additionally, the use of guaranteed loans may stimulate banks to recklessly replace existing loans by guaranteed ones, transferring default risk from firms to the government and credit risk from banks to taxpayers (Casanova et al., 2021; Altavilla et al., 2021). However, Cascarino et al. (2022) show that additional lending in the form of a public guarantee scheme may not be transferred to more risk-averse firms during the pandemic, and riskier firms managed to replace existing loans with guaranteed ones only to a negligible extent.

The evidence of economic job retention schemes consequences is quite scarce. For instance, initially, Australia’s job retention scheme assisted to save productive but simultaneously financially fragile firms and so fostered aggregate productivity growth. Yet, this scheme was found to be deteriorating over time, i.e., the more the economy recovers, the more it appears to be distortive (Andrews et al., 2021). Yet, in the UK, support programmes have prevented the job loss reasonably good (Belghitar et al., 2021).

Chang et al. (2021) show a higher degree of government intervention raises the probability of becoming a zombie. In turn, zombie firms adversely affect the productivity and output of the rest of firms. So, public-induced survival measures for vulnerable sectors may support unviable firms and zombify the economy (Anderson et al., 2021). Acharya et al. (2021a) detect negative spillovers on non-zombie borrowers, such as lower employment growth and capital expenditure. Such features as high guarantee coverage, long maturities and subsidized fees were found to raise the risk of zombification among Italian and British programmes. Conversely, Germany contained the risk of zombification thanks to the prohibition of debt refinancing, a nonsectoral approach, and the absence of any cost subsidies (Anderson et al., 2021).

There is still no unified opinion in the literature on the current influence of government support programmes. Compared to Favara et al. (2021), which states that zombies do not get any benefits from the implemented policy, Poulson (2021) argues that zombie firms are better off as, due to government bailouts, they still function in the market, and so, this happens at the cost of efficient enterprises which are kept away from accessing the funds and the market. In most cases, loan credits could have provided sustainable flows of liquidity to firms who need

it most, stopping redundant bankruptcies caused by the lack of finance (OECD, 2021). Demmou and Franco (2021) suggest loan aid setting was made to limit the number of zombie credits during the first year of the pandemic, having just a small share of zombies gaining liquidity. Altavilla et al. (2021) also confirms for the Euro zone that guaranteed loans were granted more often to small-sized creditworthy companies in the severely affected sectors. For the Netherlands, for example, public support on average is directed at SMEs that have better management, low expectations and high level of uncertainty in turnover (Groenewegen et al., 2021). In Slovakia, firms that have a higher negative impact on the environment experience lower public financial resources (Lalinsky and Pál, 2021).

According to Gourinchas et al. (2021), however, preventing many business failures, especially in advanced economies, cannot be fully considered as effective targeting since it was mainly due to large size of transfers and indiscriminate rescue of firms. So, the number of bankruptcies among both productive firms and the less efficient ones that were already in distress before the pandemic is lower during the pandemic (Cros et al., 2021). Therefore, the resulted total number of bankruptcies has been fewer during the pandemic (Barnes, 2021; Acharya et al., 2021b). Herewith, the weaker firms may benefit even more compared with the strong ones (Belghitar et al., 2021). Meanwhile, among Swedish firms, the number of vulnerable firms have not dramatically increased during the pandemic with respect to 2019 (Cella, 2021; Banerjee et al., 2020).

Summing up, continuing public policy support programmes may give rise to a zombie problem that suppresses the long-run growth, while an abrupt phasing out may trigger business failures among viable firms with temporary difficulties (Hoshi et al., 2022). Therefore, authorities may need to change their focus from stimulating lending to stopping the debt accumulation by firms. Policymakers could apply a gradual approach that is conditional on the current state of affairs in order to exit with less economic damage from loan guarantee programmes in the aftermath of a crisis.

As a policy implication, governments could try to better target viable firms by redesigning loan regulations. Alongside this, the phasing out policy should be implemented smoothly (Beck et al., 2021): once liquidity needs diminish, loan guarantee schemes could be temporarily frozen (Demmou and Franco, 2021). Insofar, facilitating the market exit of unviable companies and an efficient reallocation of resources to viable firms may still be a challenge for policymakers (FSB, 2021).

2. DATA

In this paper, we combine two datasets. To identify a firm as a zombie and to mark subsidized loans, we employ monthly data from the Russian credit register (Bank of Russia reporting form No. 0409303). This data covers the period from January 2017 to November 2021. For further regression analysis and descriptive statistics, we exclude credit register data after December 2020, because we have no financial information about firm in 2021. For each firm in our sample, we use the annual financial statement information from the SPARK database; the data covers the period from 2016 to 2020.

The Russian credit register contains detailed monthly information about loans: the amount of loans, lending rates, currency, maturity, collateral attached, the amounts of debt repayment, etc. Here we use this dataset in two ways.

- 1) To identify a firm as a *zombie* we collect information about interest payments of loans issued. This database initially consists of 437 168 firms.
- 2) To identify a loan as *subsidized* we collect information about the rate, the issue date and borrower's industry affiliation for each new loan issued. The credit register does not allow a loan to be accurately defined as subsidized or unsubsidized, therefore, for our purposes; we define subsidized loans as those issued at a rate of 2% or less (3% for government programs in 2021). During the pandemic, we also added industry affiliation to the definition of a subsidized loan, according to the official lists of the hardest hit industries and industries that require support for the resumption of operations (see Tables A1 and Table A2 in the Appendix). This database consists of 365 276 firms.

The firm-level data is obtained from the SPARK database, which includes data from firms' financial statements. We exclude firms submitting a simplified form of financial statement. We also exclude firms providing no information about the number of employees. Matching the firm-level database with the firm-bank-level credit data suggests that on average 11% of firms in Russia have had bank loans in recent years. All the ratios and variables used in the analysis are trimmed for outliers (1 and 99 percentiles over a year and narrowly defined industries). For each firm in our sample, we calculate a variable that captures the firm's ability to service its debt and this firm's performance. To identify zombie and vulnerable firms, we calculate the interest coverage ratio as earnings before interest and tax divided by interest payable. Then we classify firms as follows:

1. Zombie firm: $ICR < 1$ for three years and a firm is older than 10 years
2. Almost zombie: $ICR < 1$ for two years
3. Other financially unstable firm: $ICR < 1$

To measure a firm's performance and estimate the real effects of government support in our regression we use the following variables. These variables are used in other papers where the authors estimate subsidized loans, government support programs and zombification process (Cella, 2021; Storz et al., 2017).

- logarithm of sales;
- logarithm of the number of workers;
- return on total assets (profit before tax divided by total assets);
- labour productivity (sales divided by the number of workers);

- exit from the market.

Sales and labour productivity are deflated by the industry-specific producer price index for manufacturing or by the industry-specific value added for the other industries. Here we define firm's exit as the firm was officially liquidated and we have the date of liquidation and the corresponding information in the Unified state register of legal entities (EGRUL).

Regarding different size of firms in our sample, we consider the following four firm size groups (data source – SPARK database):

- large firms: number of workers is larger than 250
- medium firms: number of workers is less than 250 and larger than 100
- small firms: number of workers is less than 100 and larger than 15
- micro firms: number of workers is less than 15

To capture additional heterogeneity due to the different levels of productivity we also include groups of enterprises by productivity (leaders, follower, and laggards). In order to do this we estimate the labour productivity for each firm in our sample, then we calculate the gap between firm's productivity level and the most productive firm's level in industry. We divide our sample into 175 narrow industries, so we can compare different firms in one industry as they have the same production functions. Then we divide firms by 10 productivity deciles for each industry and year, where 10 – the most productive firms, 1 – the least productive firms. Here leaders are 9th and 10th deciles, followers are 6th, 7th and 8th deciles, and laggards are remaining five deciles.

3. LOAN GUARANTEE PROGRAMS

In Russia, government support programs for enterprises began to be introduced almost simultaneously with the imposition of restrictions related to the spread of the COVID-19 pandemic. The programs chiefly sought to retain employment at enterprises in the most affected sectors and covered only enterprises' labour costs. In addition, the cap on the amount of funds received by enterprises was limited by the level of the minimum wage in the region. The main parameters of the three loan guarantee programs introduced in succession in 2020–2021 are presented in the box. The second program (2-percent non-repayable loans for the resumption of operations) was practically a government subsidy to enterprises, since if the condition of retaining employment in the company was met the loan became non-repayable.

The design of loan guarantee programs has evolved over time. On the one hand, the conditions for obtaining loans have become tougher. In other countries, we are also witnessing similar changes in such programs. On the other hand, the range of enterprises meeting the conditions for obtaining preferential loans increased as the list of industries in which enterprises could apply for the participation in government support programs expands.

Box. Design of loan guarantee programs in 2020–2021

0%-salary loans

- For enterprises operating in hardest hit industries.
- The agreement signing period – from 30 March 2020 to 1 October 2020. The subsidy payment period – 6 months.
- The loan amount – the number of employees times the region's minimum wage times the number of subsidy payment months.

2%-non-repayable loans for the resumption of operations

- For enterprises operating in the hardest hit industries or in industries requiring support to resume their activities.
- The agreement signing period – from 1 June 2020 to 1 December 2020. The 2%-loan period – from the agreement signing date to 1 April 2021.
- The loan amount – the number of employees times the region's minimum wage times the number of subsidy payment months.
- If during the November 2020 – March 2021 period, the number of employees equalled or exceeded 90% (80%) of the pre-pandemic level, then 100% (50%) of debt was written off.

3%-loans for the resumption of operations

- For enterprises participating in the 2%-loan program.
- The agreement signing period – from 9 March 2021 to 1 July 2021. The subsidy payment period – 12 months.
- The loan amount – the number of employees times the region's minimum wage times 12 months.
- The number of employees equalled or exceeded 90% of that at the application date.

Our estimates show that loan guarantee programs have indeed helped enterprises cover labour costs during the period of cash flow decline (Table 1 and Source: *authors' calculations*

Table 2), especially for micro-firms and industries with a high share of small businesses.

Table 1. Subsidized loan coverage by industry (%)

Industry	Median coverage	
	Relative to total assets	Relative to labour costs
Manufacturing	18.5	70.3
Hotels and restaurants	27.3	70.4
Transportation	12.0	58.9
Wholesale and retail	16.1	112.3
Other	29.3	55.2

Source: authors' calculations

Table 2. Subsidized loan coverage by firm size (%)

Firms	Median coverage	
	Relative to total assets	Relative to labour costs
Large	19.9	49.1
Medium-sized	17.0	51.2
Small	24.9	67.5
Micro	23.8	87.7

Source: authors' calculations

4. DISTRESSED FIRMS AND ACCESS TO FINANCE BEFORE AND DURING PANDEMIC

We calculated the share of zombie firms and that of vulnerable companies using two data sources:

- 1) enterprises' financial statements and
- 2) credit register data.

The results are presented in

Table 3 and Sources: SPARK, form 0409303 (Bank of Russia)

Table 4. We can see that a significant part of enterprises that show interest payments in their financial statements did not take bank loans. This reflects the widespread practice of loans between enterprises at market rates in Russia. Since our study explores the effectiveness of loan guarantee programs implemented through the banking sector, the analysis further uses the indicators of zombie companies and vulnerable firms based on data from the credit register, i.e., does not take into account firms that took loans outside the banking sector. Then we compute the interest coverage ratio (ICR)

- based on information from financial statements;
- based on information from the credit register.

Table 3. Interest payable from FS

	All firms	Firms with non-missing data on Employment	Firms with loans >0 (FS)	Zombie (ICR<1 for 3 years and firm is older than 10 years)	Almost Zombie (ICR<1 for 2 years)	Other firms with ICR<1
2017	1 732 359	1 527 845	697 024		25 183	46 583
2018	1 744 248	1 582 344	721 364	9 420	17 498	46 244
2019	1 803 369	1 672 393	762 723	9 864	15 674	47 898
2020	1 409 045	1 181 847	1 337 620	8 244	13 416	60 420

Sources: SPARK, form 0409303 (Bank of Russia)

Table 4. Interest payable based on credit register data

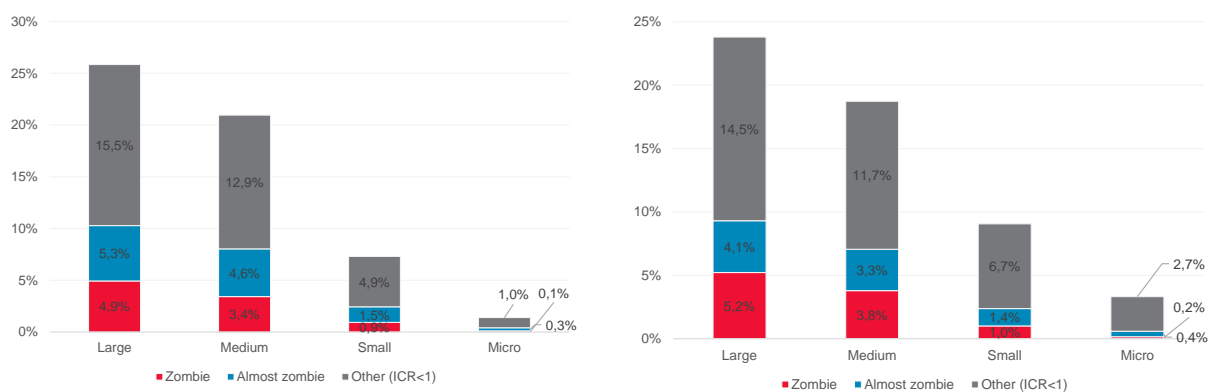
	All firms	Firms with non-missing data on Employment	Firms with loans >0 (credit register)	Zombie (ICR<1 for 3 years and firm is older than 10 years)	Almost Zombie (ICR <1 for 2 years)	Other firms with ICR <1
2017	1 732 359	1 527 845	123 119		4 841	22 697
2018	1 744 248	1 527 845	136 870	1 632	10 189	25 367
2019	1 803 369	1 672 393	164 832	4 553	8 532	27 072
2020	1 409 045	1 181 847	245 595	4 895	8 187	45 665

Sources: SPARK, form 0409303 (Bank of Russia)

Table 3 and Sources: SPARK, form 0409303 (Bank of Russia)

Table 4 shows that in the first year of the pandemic, there was a sharp increase in the number of firms applying for debt finance both from the banking sector and outside of it. The total number of firms with debt finance increased 75%, the number of firms with bank loans rose 48%. At the same time, we do not see a sharp increase in the number of zombie companies. There was an increase in financially vulnerable companies with an interest coverage ratio (ICR) of less than one. Figure 1 shows the distribution of the shares of various groups of financially unstable companies by size. The share of financially vulnerable companies increased, driven by small and micro-enterprises. By contrast, changes were insignificant among large and medium-sized enterprises.

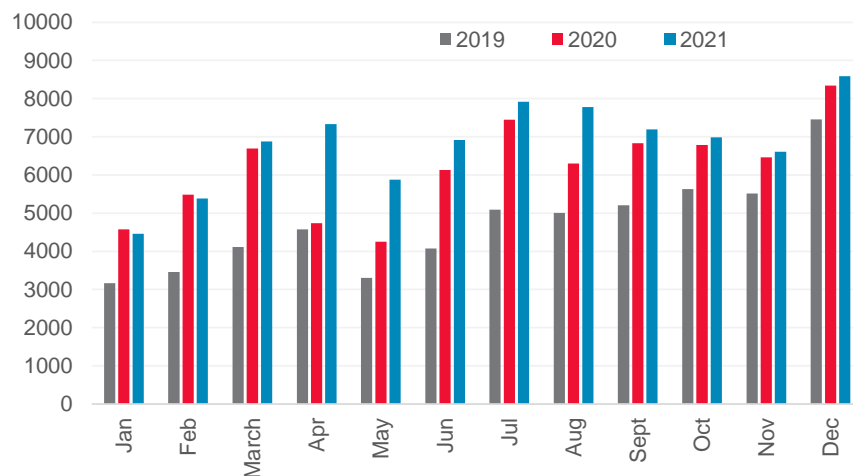
Figure 1. Share of financially vulnerable firms by size group in 2019 and 2020



Sources: SPARK, form 0409303 (Bank of Russia)

If we look at new loans obtained by companies in 2019 and 2021, we can see that totals of new loans did not differ dramatically in 2019 and 2020, although loan guarantee programs were launched in 2020, with monetary policy eased dramatically. In 2021, we see an increase in the total of new loans compared with the first year of the pandemic (Figure 2).

Figure 2. Total of new loans by month (bln RUB)



Source: form 0409303 (Bank of Russia)

At the same time, the trend towards a sharp increase in the number of enterprises obtaining a loan in 2020 did not continue into 2021. On the contrary, we see some decline in the number

of new loans. We also see that the average and median loan increased in 2021 relative to 2020, when there was a sharp drop in these indicators compared with the pre-pandemic period (see Table 5).

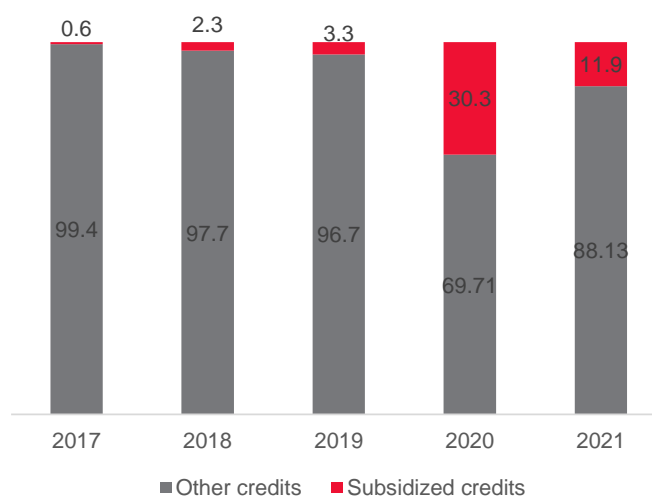
Table 5. New loans in 2019–2020

	2019	2020	2021
Total of new loans, bln rub.	56 584	74 032	81 904
Number of new loans	913 181	1 412 604	1 073 665
Average loan, mln rub.	62	52	76
Median loan, mln rub.	1,59	0,83	1,4

Sources: SPARK, form 0409303 (Bank of Russia)

We also see that the structure of loans changed dramatically in 2020. In our pre-pandemic analysis, we defined subsidized loans as loans at or below 2%. Figure 3 shows that the share of loans at subsidized rates in the number of loans sharply increased.

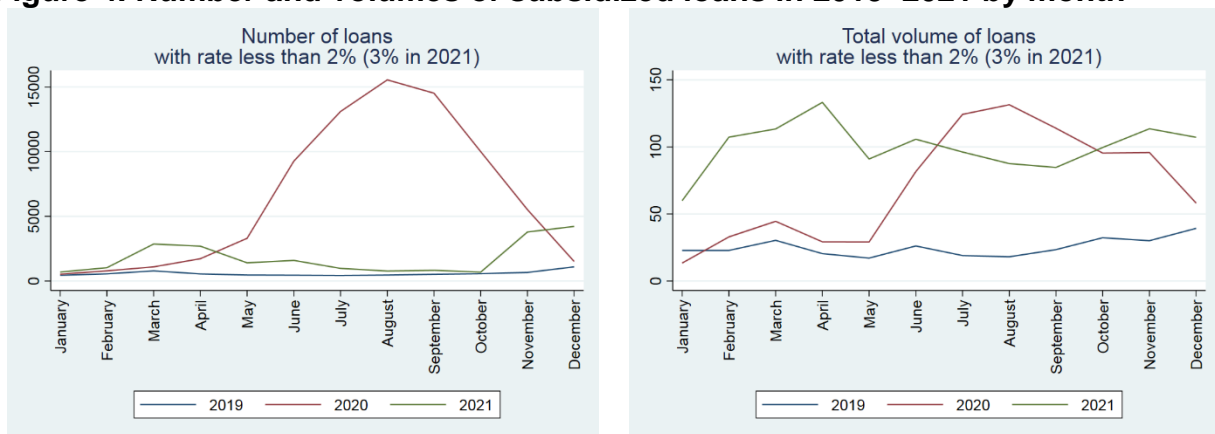
Figure 3. Share of subsidized loan in total number of loans (based on credit register data, %)



Sources: SPARK, form 0409303 (Bank of Russia)

The credit register data shows that the number of loans with subsidized interest rates rose sharply in 2020 (see Figure 4). Before the pandemic, loans at subsidized rates were obtained by enterprises participating in certain programs (for example, government support for export activities). In these cases, a small group of enterprises could receive significant amounts of financial resources through government lending programs. In 2020, the situation with subsidized loans was far different. During the pandemic, a large number of loans at a subsidized interest rate are provided, but the total of loans is significantly smaller, since they are intended to cover only labour costs in the short period of the imposition of the lockdown. In 2021, the pattern of obtaining subsidized loans changed somewhat. Fewer firms obtained them, but the average total of loans increased. Many firms that obtained loans under government guarantee programs in 2020 but did not apply to banks for loans in previous years did not subsequently apply for debt finance, confining themselves to the 2%-loan program which was the most favourable for them, since it allowed writing off a loan subject to retaining the level of employment at the enterprise.

Figure 4. Number and volumes of subsidized loans in 2019–2021 by month



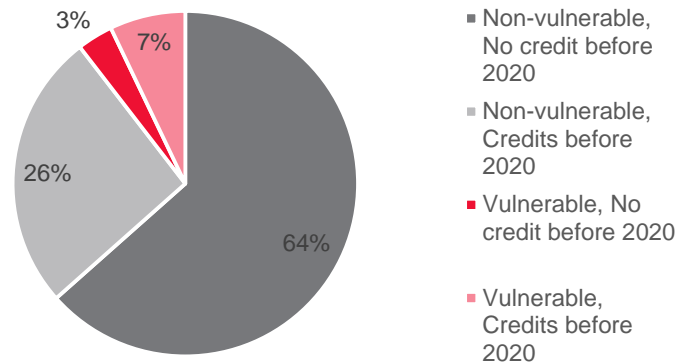
Sources: SPARK, form 0409303 (Bank of Russia)

Combining the balance sheet data of enterprises and the credit registry shows that only 10 percent of enterprises in the Russian economy took bank loans in 2017–2019. The introduction of the program of subsidized loans brought the share of enterprises with bank loans to 17%. Thus, the introduction of the subsidized loan program had a twofold effect. On the one hand, it helped smooth out a sharp decline in cash flows in industries hardest hit by pandemic-related restrictions. On the other hand, we see a rise in demand for debt finance among companies which never took a loan previously, meaning that this rise in demand is to some extent driven by enterprises which were unable to take loans at market rates. Either market lending rates were too high for them before the pandemic or banks regarding these enterprises as riskier ones were not inclined to provide loans to them without government guarantees.

Figure 5 shows that firms that have received loans at subsidized rates are dominated by companies that did not previously take bank loans: they accounted for two-thirds of the total number of companies participating in the loan guarantee program. Only a third of companies with subsidized loans obtained bank loans in 2017–2019 according to credit register data. At the same time, it appears that among firms that participated in loan guarantee programs in 2020, the share of financially vulnerable firms is higher among enterprises that received regular loans previously. Among enterprises that for the first time gained access to bank lending under loan guarantee programs, the share of enterprises with ICR less than one is significantly lower. Thus, we do not see that financially vulnerable enterprises have gained significant access to loan guarantee programs.

Figure 5. Firms with subsidized loans

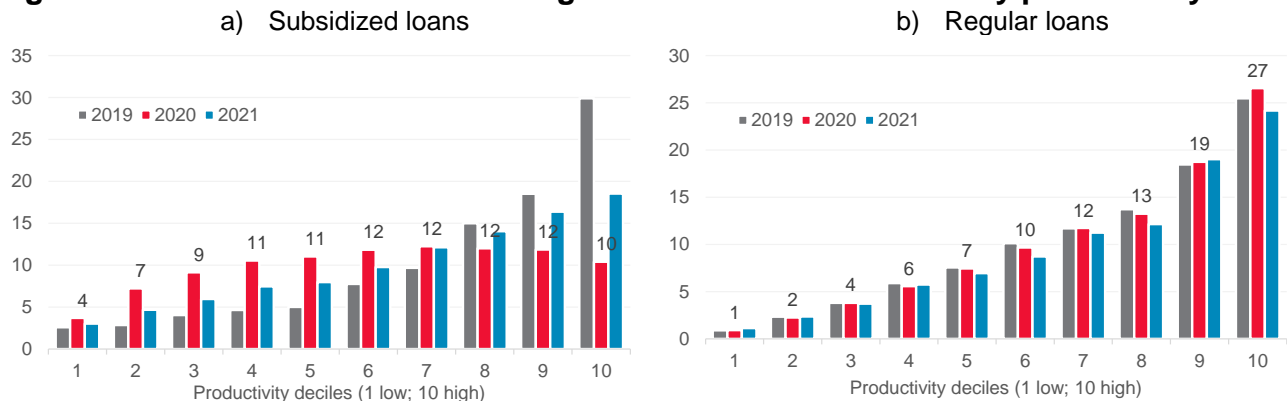
Who got subsidized credits in 2020



Sources: SPARK, form 0409303 (Bank of Russia)

An analysis of the distribution of enterprises with bank loans shows that the distribution of both regular and subsidized loans shifted towards high-performance firms in 2019 (see Figure 6). The top three productivity deciles received almost 60% of all loans. For regular loans, this distribution continued during the pandemic period in 2020–2021 (the 2021 data is only available for January–November). However, the introduction of the loan guarantee programs resulted in a nearly even distribution of subsidized loans across productivity deciles in 2020. That is, low-productivity enterprises gained access to loans at low rates. We can see that in 2021 the distribution of subsidized loans again began to shift somewhat towards more productive companies. This trend may reflect the fact that conditions for obtaining loans under the loan guarantee program were toughened in 2021 and low-productivity enterprises are no longer willing to take them under the new conditions.

Figure 6. Distribution of firms with regular and subsidized loans by productivity decile



Sources: SPARK, form 0409303 (Bank of Russia)

Thus, the introduction of loan guarantee programs led to a sharp increase in the total number of enterprises obtaining loans, with low-productivity enterprises gaining access to subsidized lending. On the other hand, a total volumes of subsidized loans per firm was quite low. Nor do we see that firms which have received bank loans for the first time under loan guarantee programs are more financially unstable than those which have previously received loans at market rates. Overall, we do not see an increase in the financial system volatility due to a surge in firms receiving subsidized loans. It should also be noted that the total amount of

government support provided through loan guarantee programs in Russia has been significantly lower than in developed countries.

5. RESULTS

5.1 Methodology

To estimate the real effects of government support in 2020 we use the standard difference in difference approach

$$Y_{f,t} = \alpha_f + \alpha_t + \beta_1(\text{SubLoan}_f \times \text{Time}_{\{t=2020\}}) + \varepsilon_{f,t} \quad (1)$$

where $Y_{f,t}$ is a measure of a firm's performance:

- (i) log of sales;
- (ii) log number of workers;
- (iii) the profit to total assets ratio;
- (iv) log of labour productivity.

α_f, α_t are firm and year fixed effects, respectively.

SubLoan_f equals 1 if a firm took a loan as part of the government support program in 2020. Two government support programs were launched in 2020; we estimate the model for them separately. For the purposes of this analysis, we consider only firms that could potentially get subsidized loans, i.e. firms from industries included in the official list.

When evaluating these regressions, we used a balanced panel in order to exclude from the control group enterprises for which there is only data in the pre-pandemic period, but no information in 2020, i.e., during the period when loan guarantee programs were introduced. Data on labour productivity is not available for all enterprises; therefore, in specifications with this variable included, the sample size is sharply reduced compared with other specifications.

To estimate the effects of participation in government support program on firms' exits we use the same difference in difference approach, but evaluate probit model in regressions.

$$Y_{f,t} = \alpha_f + \beta_1(\text{SubLoan}_f \times \text{Time}_{\{t=2020\}}) + \varepsilon_{f,t} \quad (2)$$

where $Y_{f,t}$ is a binary variable that reflects the enterprise' exit.

In this section of the study, we do not consider grant loan programs in 2021, since, firstly, we do not yet have data from the balance sheets of enterprises for 2021, and secondly, some programs in 2021 were launched only at the very end of that year and data on loans under these programs is still unavailable.

To estimate separately the effect of loan guarantee programs on zombie firms in comparison with financially stable companies we use the following specification.

$$Y_{f,t} = \alpha_f + \alpha_t + \beta_1(\text{SubLoan}_f \times \text{Time}_{\{t=2020\}}) + \beta_2(\text{SubLoan}_f \times \text{Time}_{\{t=2020\}} \times \text{Zombie}) + \gamma_1(\text{Zombie} \times \text{Time}_{\{t=2020\}}) + \gamma_2(\text{SubLoan}_f \times \text{Zombie}) + \varepsilon_{f,t} \quad (3)$$

where *Zombie* equals 1 if a firm was defined as a zombie company in the pre-pandemic period and 0 otherwise. We also estimated the specification, where instead of a dummy for zombie firms we use a dummy for financially unstable companies with ICR less than 1.

Table 6 shows descriptive statistics of enterprise performance indicators for the treatment and control groups.

Table 6. Descriptive statistics for treatment and control groups in difference-in-difference regressions

		Mean	Median	St.dev.	Min	Max
Log of sales	<i>Treatment</i>	17.11	17.20	1.52	6.91	23.42
	<i>Control</i>	15.69	15.72	1.95	3.14	24.99
Log of workers	<i>Treatment</i>	2.65	2.71	1.11	0.00	8.37
	<i>Control</i>	1.62	1.39	1.24	0.00	9.14
ROA	<i>Treatment</i>	0.04	0.06	0.97	-38.71	25.92
	<i>Control</i>	0.08	0.08	1.30	-35.89	23.10
Log of labour productivity	<i>Treatment</i>	14.94	14.76	1.18	10.55	20.19
	<i>Control</i>	14.50	14.33	1.34	4.71	21.28

Source: authors' calculations

5.2 Which firms participate in loan guarantee programs

Before evaluating the impact of loan guarantee programs on firm performance in 2020, we analyzed the characteristics of enterprises that participated in these programs. To do this, we estimated the probability of obtaining a subsidized loan using a standard logit model. We used a specification comparing firms that have participated in the program with firms in industries that are eligible to participate in these programs but have not applied for subsidized loans. We estimate logit models separately for 0%- and 2%- loan programs because the list of eligible industries is different for them. Table 7 and Table 8 show the estimates of marginal effects for 0%-salary loans and for 2%-non-repayable loans for the resumption of operations, respectively.

Table 7. 0%-salary loans. Marginal effects

	(1)	(2)	(3)	(4)
Size ⁱ				
Medium-sized	0.028** (0.011)	0.032** (0.015)	0.028** (0.011)	0.028** (0.011)
Small	0.132*** (0.008)	0.117*** (0.013)	0.132*** (0.008)	0.132*** (0.008)
Micro	0.004 (0.008)	-0.000 (0.012)	0.004 (0.008)	0.004 (0.008)
Age ⁱⁱ				
From 3 to 5 years	-0.013*** (0.003)	-0.053*** (0.016)	-0.011*** (0.003)	-0.011*** (0.003)
From 5 to 10 years	-0.018*** (0.003)	-0.066*** (0.014)	-0.016*** (0.003)	-0.016*** (0.003)
Older than 10 years	-0.032*** (0.002)	-0.089*** (0.013)	-0.030*** (0.002)	-0.030*** (0.002)
Pre-pandemic loan dummy	0.116*** (0.003)	0.109*** (0.010)	0.116*** (0.003)	0.118*** (0.003)
Productivity group ⁱⁱⁱ				
Followers		0.040*** (0.009)		
Laggards		0.016* (0.009)		

Zombie dummy			-0.016*	(0.009)
Financially unstable firm dummy				-0.011** (0.005)
Industry dummies	Yes	Yes	yes	yes
Region dummies	Yes	Yes	yes	yes
Observations	106326	8502	104523	104523

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. ⁱLarge is a reference category. ⁱⁱLess than 3 years is a reference category. ⁱⁱⁱLeaders is a reference category.
Source: authors' calculations

Table 8. 2% non-repayable loans for resumption of operations. Marginal effects

	(1)	(2)	(3)	(4)
Size ⁱ				
Medium-sized	0.026*** (0.010)	0.028** (0.012)	0.026*** (0.010)	0.026*** (0.010)
Small	0.116*** (0.007)	0.099*** (0.011)	0.116*** (0.007)	0.116*** (0.007)
Micro	0.004 (0.007)	-0.000 (0.010)	0.004 (0.007)	0.003 (0.007)
Age ⁱⁱ				
From 3 to 5 years	-0.012*** (0.003)	-0.045*** (0.014)	-0.010*** (0.003)	-0.010*** (0.003)
From 5 to 10 years	-0.016*** (0.002)	-0.055*** (0.012)	-0.014*** (0.002)	-0.014*** (0.002)
Older than 10 years	-0.028*** (0.002)	-0.075*** (0.011)	-0.026*** (0.002)	-0.026*** (0.002)
Pre-pandemic loan dummy	0.102*** (0.003)	0.091*** (0.008)	0.102*** (0.003)	0.103*** (0.003)
Productivity group ⁱⁱⁱ				
Followers		0.034*** (0.008)		
Laggards		0.014** (0.007)		
Zombie dummy			-0.014* (0.008)	
Financially unstable firm dummy				-0.009** (0.004)
Industry dummies	yes	Yes	yes	yes
Region dummies	yes	Yes	yes	yes
Observations	120809	10110	118760	118760

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. ⁱLarge is a reference category. ⁱⁱLess than 3 years is a reference category. ⁱⁱⁱLeaders is a reference category.
Source: authors' calculations

The results of the logit model estimates for the two loan guarantee programs in 2020 showed to be very close. The marginal effect estimates for size and age show the expected results. Medium-sized and small enterprises are more likely to receive subsidized loans than large enterprises. At the same time, the probability of obtaining a subsidized loan for micro-enterprises does not statistically differ from that for the group of large enterprises. The probability of obtaining a subsidised loan slightly decreases with the age of the enterprise, i.e., young businesses are more likely to find themselves in an unfavourable situation, which encourages them to apply for subsidized loans. In addition, unlike older firms, young firms have fewer opportunities to obtain regular (non-subsidized) loans.

Firms that received regular loans before the pandemic were 10% more likely to apply for subsidized loans than firms that had no loans in 2017–2019. Thus, we can assume that there may exist a minor effect of conventional lending being crowded out by subsidized loans. Also,

we included groups of enterprises by productivity (leaders, followers, laggards) in one of the specifications. Labour productivity data is not available for all firms, therefore the sample size for this specification is substantially smaller than for the others. As expected, the probability of obtaining a subsidized loan is 4% higher for followers than for leaders. For lagging enterprises, the probability of obtaining a loan is also higher than for leaders, but the difference is less significant in this group. In other words, our results show that low-performing companies have better access to subsidized loans than high-performing ones. On the other hand, if we consider companies classified as zombie firms or financially unstable companies in 2019 ($ICR < 1$), it turns out that such firms are less likely to participate in loan guarantee programs.

Thus, it appears that young and small enterprises, as well as firms from low productivity groups applied for subsidized loans more often. That is, subsidized loans were obtained by rather vulnerable groups of enterprises, which were less likely to apply for finance debt at market rates in better times. But on the other hand, we don't see these companies being any more financially unstable before the onset of the pandemic crisis.

5.3 Impact of loan guarantee programs on firms' performance

In this section, we present the results of difference in difference estimation for two loan guarantee programs conducted in 2020: 0%-salary loans and 2%-non-repayable loans for the resumption of operations. Participation in the loan guarantee programs has a positive effect on sales and employment at enterprises (see Table 9). At the same time, we do not see statistically significant differences in the efficiency indicators – ROA and labour productivity – of enterprises participating in the programs and in the control group. Participation in the loan guarantee programs has a negative effect on the firm's exit rate. That is, following the participation in loan guarantee programs the probability of enterprise's exit decreases. The magnitude of the effect for all variables of interest is very close for both programs.

Table 9. Difference in difference estimations. Base specification

	<i>0%-salary loans</i>				
	(1)	(2)	(3)	(4)	(5)
	Sales (OLS)	Employment (OLS)	ROA (OLS)	Productivity (OLS)	Exits (Probit ME)
SubLoan×TreatmentTime	0.114*** (0.011)	0.125*** (0.007)	0.006 (0.021)	0.010 (0.022)	-0.326*** (0.068)
Observations	286892	284285	113021	11531	71707
Adj. R-squared	0.9	0.9	0.3	0.9	0.0
	<i>2%-non-repayable loans for resumption of operations</i>				
	(1)	(2)	(3)	(4)	(5)
	Sales (OLS)	Employment (OLS)	ROA (OLS)	Productivity (OLS)	Exits (Probit ME)
SubLoan×TreatmentTime	0.097*** (0.010)	0.126*** (0.006)	-0.011 (0.020)	0.005 (0.021)	-0.344*** (0.068)
Observations	325528	322563	129421	25229	81365
Adj. R-squared	0.9	0.9	0.3	0.9	0.0

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For probit model in column (5) marginal effects are reported.

Source: authors' calculations

We tried to assess the difference in the impact of government guarantee programs on enterprises that took and did not take bank loans in the pre-pandemic period (see Table 10). The impact on sales and employment is not significantly different for the two groups of firms and the effect size is close to the estimates in the base specification. However, our estimates show that efficiency in terms of ROA is lower for enterprises that participated in loan guarantee

programs if these enterprises did not obtain bank loans at market rates in the pre-pandemic period.

Table 10. Difference in difference estimation by firms with and without loans in pre-pandemic period.

<i>0% salary loans. Firms with loans before 2020</i>				
	(1)	(2)	(3)	(4)
	Sales	Employment	ROA	Productivity
SubLoan×TreatmentTime	0.098*** (0.018)	0.145*** (0.012)	0.027 (0.023)	0.023 (0.029)
Observations	44380	44194	21718	5612
Adj. R-squared	0.9	0.9	0.2	0.9
<i>0% salary loans. Firms without loans before 2020</i>				
	(1)	(2)	(3)	(4)
	Sales	Employment	ROA	Productivity
SubLoan×TreatmentTime	0.099*** (0.014)	0.115*** (0.008)	-0.055* (0.033)	-0.029 (0.035)
Observations	242512	240091	91303	15817
Adj. R-squared	0.9	0.9	0.3	0.9
<i>2% non-payable loans for resumption of operations. Firms with loans before 2020</i>				
	(1)	(2)	(3)	(4)
	Sales	Employment	ROA	Productivity
SubLoan×TreatmentTime	0.075*** (0.017)	0.139*** (0.011)	0.007 (0.021)	0.020 (0.027)
Observations	52744	52517	26202	7107
Adj. R-squared	0.9	0.9	0.2	0.9
<i>2% non-repayable loans for resumption of operations. Firms without loans before 2020</i>				
	(1)	(2)	(3)	(4)
	Sales	Employment	ROA	Productivity
SubLoan×TreatmentTime	0.081*** (0.013)	0.117*** (0.008)	-0.071** (0.032)	-0.037 (0.034)
Observations	272784	270046	103219	18122
Adj. R-squared	0.9	0.9	0.3	0.9

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: authors' calculations

Participation in loan guarantee programs depends on the firm size, therefore, we separately considered the impact of lending programs on size groups (see Tables 11 and 12). The positive effect on the retention of employment at enterprises holds for all size groups, with the exception of large enterprises. For large enterprises, participation in lending programs has practically no effect on financial performance, with the exception of ROA, for which the coefficients in the 0%-salary loan program prove to be positive and significant. Although we do not see the effect of participation in the programs of large enterprises on sales and employment, it is possible that the program introduced by the government during first wave of pandemic restrictions has somewhat reduced a fall in profits during the time of the largest production decline in the hardest hit industries. An unexpected result was obtained for small enterprises. On the one hand, participation in loan guarantee programs allows employment at be retained at these enterprises, although the economic effect is not very large. On the other hand, we see that the enterprises participating in the program have a larger decline in sales and ROA. For micro-firms, which have been major participants in subsidized loan programs in many industries, there are positive effects on sales and employment. At the same time, we do not see significant effects on the efficiency indicators (ROA and labour productivity) for micro-firms.

For exits we obtain a negative and significant coefficient for micro enterprises. For small firms the effect is also negative, but not statistically significant. At the same time, there are no exits in groups of large and medium firms. This result indicates that loan programs could help small and micro firms to stay in the market.

Table 11. Difference in difference estimation by firms' size. 0%-salary loans

<i>0%-salary loans. Large firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	-0.056 (0.071)	0.005 (0.045)	0.045** (0.023)	0.026 (0.074)	n/a
Observations	1906	1906	1904	1124	449
Adj. R-squared	0.9	0.9	0.5	0.9	0.0
<i>0%-salary loans. Medium-sized firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.069 (0.046)	0.071*** (0.023)	0.053* (0.032)	0.011 (0.050)	n/a
Observations	2976	2976	2907	2275	701
Adj. R-squared	0.9	0.8	0.4	0.9	-0.0
<i>0%-salary loans. Small firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	-0.053*** (0.011)	0.036*** (0.006)	-0.044* (0.024)	-0.011 (0.023)	-0.142 (0.099)
Observations	49388	49388	24727	7922	12315
Adj. R-squared	0.9	0.8	0.3	0.9	0.0
<i>0%-salary loans. Micro-firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.082*** (0.017)	0.116*** (0.009)	-0.002 (0.041)	-0.034 (0.053)	-0.410*** (0.102)
Observations	227002	224390	80277	9056	58119
Adj. R-squared	0.8	0.8	0.3	0.9	0.0

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For probit model in column (5) marginal effects are reported.

Source: authors' calculations

Table 12. Difference in difference estimation. By firm size. 2%-non-repayable loans for resumption of operations

<i>2%-non-repayable loans for resumption of operations. Large firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	-0.087 (0.069)	0.017 (0.044)	0.017 (0.021)	0.039 (0.072)	n/a
Observations	2529	2529	2523	1584	613
Adj. R-squared	0.9	0.9	0.5	0.9	0.0
<i>2% non-repayable loans for resumption of operations. Medium-sized firms</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.012 (0.046)	0.059*** (0.022)	0.036 (0.029)	-0.011 (0.048)	n/a

Observations	4062	4062	3960	3149	999
Adj. R-squared	0.9	0.8	0.4	0.9	0.0
<i>2%-non-repayable loans for resumption of operations. Small firms</i>					
	(1)	(2)	(3)	(4)	
	Sales (OLS)	Employment (OLS)	ROA (OLS)	Productivity (OLS)	Exits (Probit ME)
SubLoan×TreatmentTime	-0.085*** (0.011)	0.033*** (0.006)	-0.059*** (0.022)	-0.013 (0.022)	-0.098 (0.098)
Observations	59035	59035	29061	8947	14694
Adj. R-squared	0.9	0.8	0.3	0.9	0.0
<i>2%-non-repayable loans for resumption of operations. Micro-firms</i>					
	(1)	(2)	(3)	(4)	
	Sales (OLS)	Employment (OLS)	ROA (OLS)	Productivity (OLS)	Exits (Probit ME)
SubLoan×TreatmentTime	0.071*** (0.016)	0.118*** (0.009)	-0.020 (0.039)	-0.027 (0.054)	-0.436*** (0.101)
Observations	253321	250352	90067	10265	64932
Adj. R-squared	0.8	0.8	0.3	0.9	0.0

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For probit model in column (5) marginal effects are reported.

Source: authors' calculations

5.4 Loan guarantee programs and zombie firms

We examine the impact of subsidized loans on the performance of enterprises, isolating enterprises that in 2019 belonged to the group of zombie firms or had ICR less than one. Table 13 and Table 14 contain the results of specification (3) estimations. The results show that the participation of zombie companies (Table 13) in loan guarantee programs does not lead to an increase in sales and employment in these enterprises compared with the control group. In part, the lack of statistically significant results may be due to the fact that a very small proportion of zombie firms participated in these programs. In considering a broader group of enterprises (Table 14) that can be classified as financially unstable companies we see a positive effect from participation in programs in it, but for employment the positive effect is lower than in the group of financially stable enterprises. Thus, both loan guarantee programs have a positive effect on slowing down a decline in sales and employment among program participants. However, if funds go to financially vulnerable companies this effect may be lower or even absent. The receipt of funds by a financially unstable company decreases the effectiveness of government support. However, the share of such companies among firms that received subsidized loans is not very significant, therefore the participation of vulnerable firms is unlikely to significantly reduce the effectiveness of loan guarantee programs.

For the specification with firm's exit as a dependent variable, we also did not obtain a significant coefficient on the triple interaction (Table 13). This means that, the participation of zombie companies in government support programs does not lead to decrease the probability of exit compared with the control group. If we consider zombie companies as a broader group of financially unstable firms with $ICR < 1$, we again do not see any evidence of positive effect on the firms' staying on the market (Table 14). We see the only significant coefficient for 2%-program in the group of financially unstable firms. However, as we mentioned earlier, the share of such companies among firms that received subsidized loans is not large, therefore the less probability of exits for these firms should not lead to significant increase of the zombification of the economy.

Table 13. Difference in difference in difference estimation. Zombie firms

0% salary loans

	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.114*** (0.011)	0.125*** (0.007)	0.003 (0.021)	0.010 (0.023)	-0.323*** (0.068)
SubLoan×TrTime×Zombie	-0.041 (0.086)	-0.015 (0.050)	0.012 (0.029)	-0.016 (0.119)	-0.303 (0.343)
Observations	286892	284512	151137	23432	71650
Adj. R-squared	0.1	0.0	0.0	0.0	0.0
<i>2%-non-repayable loans for resumption of operations</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.097*** (0.010)	0.127*** (0.007)	-0.014 (0.020)	0.005 (0.022)	-0.342*** (0.068)
SubLoan×TrTime×Zombie	-0.023 (0.084)	0.005 (0.050)	0.020 (0.028)	-0.044 (0.076)	-0.380 (0.335)
Observations	325528	322821	172364	27542	81306

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For probit model in column (5) marginal effects are reported.

Source: authors' calculations

Table 14. Difference in difference in difference estimation. Financially unstable firms (ICR<1)

<i>0%-salary loans</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.110*** (0.011)	0.124*** (0.007)	-0.007 (0.023)	0.001 (0.024)	-0.312*** (0.068)
SubLoan×TrTime× Financially Unstable Firm	0.101* (0.056)	0.075** (0.035)	0.023 (0.036)	-0.007 (0.057)	-0.235 (0.144)
Observations	286892	284512	151137	23432	71418
Adj. R-squared	0.1	0.0	0.0	0.0	0.0
<i>2%-non-repayable loans for resumption of operations</i>					
	(1) Sales (OLS)	(2) Employment (OLS)	(3) ROA (OLS)	(4) Productivity (OLS)	(5) Exits (Probit ME)
SubLoan×TreatmentTime	0.093*** (0.011)	0.125*** (0.007)	-0.024 (0.022)	-0.005 (0.024)	-0.331*** (0.068)
SubLoan×TrTime× Financially Unstable Firm	0.091* (0.052)	0.061* (0.034)	0.029 (0.033)	0.011 (0.052)	-0.320** (0.140)
Observations	325528	322821	172364	27542	81067

Notes: Standard errors are clustered at the firm level and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. For probit model in column (5) marginal effects are reported.

Source: authors' calculations

6. CONCLUSION

Firms that do not experience significant liquidity problems and have a low leverage are more likely to be crisis-resilient and able to improve their market position as the economy recovers. In this regard, it is important that temporary liquidity problems for high-performance firms do not escalate into more severe problems with their financial stability and solvency, which in the long term may lead to a slowdown in economic growth in the economy at large.

The volume of market lending outside guaranteed loans in 2020 showed to be higher than in 2019. Bank of Russia policy played an important role in maintaining market lending activity:

the easing of monetary policy led to a decrease in interest rates on loans, and regulatory measures allowed banks to retain capital and use it to increase lending activity. It is important to note that the structure of conventional lending in terms of company productivity did not change significantly compared with 2019: banks continue to prefer lending to high-performing companies.

Under the 2020–2021 programs of guaranteed loans, banks issued a significant number of loans at subsidized interest rates, but the average total of such loans was relatively small. Thus, a large number of enterprises facing a lack of liquidity received support at the time of a significant downturn in economic activity. At the same time, the total of guaranteed loans showed to be small relative to total lending in the economy.

In general, zombie firms and financially vulnerable firms do not receive more extensive government support in 2020. At the same time, firms which never obtained loans in the pre-pandemic period were able to take subsidized loans. Thus, it appears that young and small enterprises, as well as firms from low productivity groups obtained subsidized loans more often. This trend is of some concern, but overall, we do not see an increase in the financial system's volatility due to the surge in firms receiving subsidized loans.

In general, our results show that loan guarantee programs have a positive effect on growth of sales and employment among program participants compared to businesses that also operated in industries hardest hit by the pandemic but did not apply for subsidized loans. In this sense, it can be argued that the main goal of the program, that of retaining employment at enterprises in the short term, has been achieved. However, if funds go to financially vulnerable companies, this effect may be lower or even lacking. Thus, the participation of financially vulnerable companies diminishes the effectiveness of government support. However, the share of such companies among firms that received subsidized loans is not large, so the reduction in program effectiveness is unlikely to be significant.

APPENDIX

Table A1. List of the hardest hit industries.

Industry	Industry Code (OKVED 2)
Transportation	
	49.10.1
Other passenger land transport	49.3
Freight transport by road and removal services	49.4
Sea and coastal passenger water transport	50.1
Inland passenger water transport	50.3
Passenger air transport	51.1
Service activities incidental to land transportation	51.21
Bus station activities	52.21.21
Service activities incidental to air transportation	52.23
Culture, organization of leisure and entertainment	
Creative, arts and entertainment activities	90
Motion picture projection activities	59.14
Museums activities	91.02
Zoological gardens activities	91.04.1
Manufacturing of folk art crafts	32.99.8
Physical culture and health-improving activities and sports	
Sports activities and amusement and recreation activities	93
Physical well-being activities	96.04
Health resort activities	86.90.4
Tourism and services	
Travel agency, tour operator reservation service and related activities	79
Hotels and restaurants	
Accommodation	55
Food and beverage service activities	56
Additional education, non-state educational institutions	
Post-secondary non-tertiary education	85.41
Child day-care activities	88.91
Organization of conventions and trade shows	82.3
Domestic services	
Repair of computers and personal and household goods	95
Washing and (dry-)cleaning of textile and fur products	96.01
Hairdressing and other beauty treatment	96.02
Health services	
Dental practice activities	86.23
Retail trade of non-food products	
Sale of cars and light motor vehicles in specialized stores	45.11.2
Sale of cars and light motor vehicles in other stores	45.11.3
Sale of other motor vehicles in specialized stores	45.19.2
Sale of other motor vehicles in other stores	45.19.3
Retail trade of motor vehicle parts and accessories	45.32
Sale, maintenance and repair of motorcycles and related parts and accessories in specialized stores	45.40.2
Sale, maintenance and repair of motorcycles and related parts and accessories in other stores	45.40.3
Other retail sale in non-specialized stores	47.19
Retail sale of information and communication equipment in specialized stores	47.4
Retail sale of other household equipment in specialized stores	47.5
Retail sale of cultural and recreation goods in specialized stores	47.6
Retail sale of other goods in specialized stores	47.7
Retail sale via stalls and markets of textiles, clothing and footwear	47.82
Retail sale via stalls and markets of other goods	47.89

Retail sale via machines	47.99.2
Media and print production	
Programming and broadcasting activities	60
Web portals	63.12.1
News agency activities	63.91
Printing of newspapers	18.11
Book publishing	58.11
Publishing of newspapers	58.13
Publishing of journals and periodicals	58.14

Table A2. List of industries that require support for the resumption of operations

Industry	Industry Code (OKVED 2)
Manufacture of wearing apparel	14
Manufacture of furniture	31
Manufacture of textiles	13
Publishing of books, periodicals and other publishing activities	58.1
Manufacture of leather and related products	15
Manufacture of perfumes and toilet preparations	20.42
Manufacture of electric domestic appliances	27.51
Manufacture of consumer electronics	26.4
Manufacture of metal products for bathrooms and kitchens	25.99.1
Manufacture of games and toys	32.4
Manufacture of sports goods	32.3
Manufacture of ceramic household and other ornamental articles	23.41
Manufacture of watches and clocks	26.52
Manufacture of non-electric domestic appliances	27.52
Manufacture of statuettes, photograph frames, pictures, mirrors and other decorative articles of base metals	25.99.24
Manufacture of accessories from base metals for clothing, footwear, leather goods and other products, including hooks, buckles, eyelets, rings, tubular and split rivets	25.99.25
Manufacture of bicycles	30.92.1
Manufacture of umbrellas, walking sticks, buttons, zippers	32.99.3
Manufacture of finished metal products for household purposes according to the individual orders	25.99.3
Manufacture of clothing including gloves from plastics	22.29.1
Manufacture of wheelchairs	30.92.2
Manufacture of articles for festivals, carnivals and other entertainment activities	32.99.6
Manufacture of clothes and accessories made of vulcanized rubber	22.19.6
Manufacture of baby strollers and their parts	30.92.4
Manufacture of tableware and kitchen utensils made of hollow glass	23.13.3
Manufacture of interior decorations and similar articles of hollow glass	23.13.5

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