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MORIKAWA, Masayuki
RIETI



Research Institute of Economy, Trade & Industry, IAA

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Morikawa, Masayuki (RIETI, Hitotsubashi University)

Abstract

Based on an original survey of Japanese firms, this study presents an overview of the characteristics of firms that used policy measures to mitigate the negative impacts of the COVID-19 pandemic, with an emphasis on the assessment of pre-pandemic productivity. According to the results, many firms are taking advantage of financial support programs, employment assistance subsidies, and subsidies to sustain businesses. The productivity of firms using these support measures was found to be lower than that of non-user firms prior to the pandemic, suggesting that low-productivity firms have been affected seriously by the crisis. The policy implication is that relief policies under the recent COVID-19 crisis should be temporary and such policies should be modified to enable the smooth reallocation of resources.

Keywords: COVID-19, firm support policies, productivity, cleansing effect, reallocation effect

JEL Classification: D24, H25, L25

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Productivity of Firms Using Relief Policies During the COVID-19 Crisis

1. Introduction

The COVID-19 pandemic has had a serious impact on the global economy. In the case of Japan, real GDP plunged more than that experienced during the previous Global Financial Crisis. Industrial production also fell by approximately 20% because of the decline in global economic activity, but personal services, including restaurant and hotel industries, recorded an extreme decline in sales of more than 50%.¹

Many countries have initiated emergency provisions to mitigate the impact of the pandemic on business activity; Japan is no exception. To relieve firms that are affected seriously, the Japanese government enacted various emergency measures, such as financial assistance from governmental financial agencies, the Subsidy Program for Sustaining Businesses (“Jizokuka subsidy”), and the Employment Assistance Subsidy. Financial assistance programs offering low- or zero-interest loans provided by, for example, the Japan Finance Corporation and the Shoko Chukin Bank, target small- and medium-sized firms experiencing pandemic-related sales declines. The Subsidy Program for Sustaining Businesses began in May 2020, delivering a maximum of two million yen to small- and medium-sized firms with a demonstrated drop in sales of more than 50%. The Employment Assistance Subsidy is a measure that supports firms’ efforts to maintain employment and has been in place since long before the COVID-19 crisis. The difference, in light of the effects of the pandemic, is that the subsidization rate was raised significantly in April 2020 to prevent a significant increase in unemployment. Specifically, for small- and medium-sized firms with sales that declined by more than 5%, the subsidization rate is set to 100% of the maximum. Even for large firms, the maximum subsidy rate is raised to 75%.²

If a firm that could have survived goes bankrupt or goes out of business voluntarily because of a temporary shock, the sunk investments, such as firm-specific human capital, will be lost. For this reason, policies that mitigate the impacts of temporary shocks can be justified. However, it is necessary to acknowledge the risk that such policies may weaken the resource reallocation

¹ The figures are taken from the Indices of Industrial Production and the Indices of Tertiary Industry Activity (Ministry of Economy, Trade and Industry).

² The maximum amount of daily benefits per employee is also raised to 15,000 yen.

mechanism in the market and have a negative impact on medium- to long-term growth potential.

The cleansing effect of recessions, that is, the increased productivity that arises from the exit of unproductive firms from the market during recessions, has been pointed out in the literature (e.g., Caballero and Hammour, 1994). Generally, industry-level or economy-wide productivity growth can be broken down into (1) the within-effect (productivity growth of an individual firm) and (2) the reallocation effect (entry of productive firms, exit of unproductive firms, and reallocation of market share among surviving firms). Various formulas applicable to firm- or establishment-level panel data have been developed and empirical studies employing these decomposition methods generally indicated stronger reallocation effects during recessions (e.g., Davis and Haltiwanger, 1990; Griliches and Regev, 1995; Baily *et al.*, 2001; Foster *et al.*, 2001; Disney *et al.*, 2003; Carreira and Teixeira, 2008).

However, some recent studies indicate weak reallocation effects after the Great Recession. Foster *et al.* (2016), for example, analyzed the extent of the cleansing effect of reallocation dynamics in recessions. They indicated that downturns are indeed periods of accelerated reallocation and are more productivity enhancing than normal times, but the intensity and productivity enhancing effects of reallocation were lower than expected in the Great Recession. Using a sample of manufacturing firms in major European countries, Landini (2020) indicated that the market selection mechanism based on productivity differentials was weak during the Great Recession.

In terms of Japan specifically, Adachi *et al.* (2019), with regard to the manufacturing industry, and Morikawa (2019), with regard to the service industry, presented evidence that during a recession, when aggregated productivity is low, productivity dispersion among firms or establishments increases. These results suggest that pressure on unproductive firms to exit the market intensifies during recessions. Using microdata from the manufacturing industry, Ikeuchi *et al.* (2017) indicated that the economic crises during the “Two Lost Decades” reinforced the efficient allocation of resources within industries through the relative expansion of a share of highly productive establishments. In contrast, using firm-level panel data, Nishimura *et al.* (2005) indicated that efficient firms in terms of total factor productivity (TFP) exited, whereas inefficient firms survived in the banking-crisis period (1990s), signifying a potential malfunction in the natural selection mechanism in the face of severe recession. Fukao (2012) pointed out that the reallocation mechanism did not function well during the long stagnation in Japan since the early 1990s.

The negative impacts of surviving inefficient firms on the overall economy are referred to as a problem known as “Zombie” firms (e.g., Caballero *et al.*, 2008; Kwon *et al.*, 2015; Imai, 2016; Sakai and Uesugi, 2019; Hong *et al.*, 2020). Malfunction of the financial market — banks continuing to keep credit flowing to otherwise insolvent borrowers — is often cited as a primary cause of weak reallocation mechanisms during the long stagnation in Japan. However, the problem of Zombie firms is not specific to Japan. For example, McGowan *et al.* (2018) applied the methodology of Caballero *et al.* (2008) to nine OECD countries, indicating that the prevalence of Zombie firms has risen since the mid-2000s, and the increasing survival of these unproductive firms congests markets and constrains the growth of more productive firms.

The lesson learned from these studies is that firm relief measures resulting from the recent COVID-19 crisis might serve to suppress the function of cleansing or reallocation effects and exert a negative impact on the medium- to long-term productivity performance of the economy. For instance, Barrero *et al.* (2020) analyzed the reallocation of employment and sales under the COVID-19 pandemic in the U.S., cautioning against the excessive use of policies that inhibit resource reallocation, such as unemployment benefit levels that exceed worker earnings, subsidies for employee retention, and regulatory barriers to business formation.

Against the background presented above, this study analyzes the characteristics of firms that have taken advantage of relief policies intended to mitigate the negative impacts of the COVID-19 pandemic, with an emphasis on assessing productivity prior to the pandemic. Although the prospects for such an analysis are limited at this time, we anticipate that further *ex post* evaluation of the benefits and costs of various policy measures during the COVID-19 crisis will be conducted as data accumulate.

The results indicate that a large number of firms made use of the financial assistance offered by governmental financial agencies, the Subsidy Program for Sustaining Businesses, and the Employment Assistance Subsidy.³ It was found that the productivity of the firms that benefited from these relief measures tended to be lower than non-user firms prior to the onset of the COVID-19 crisis, suggesting that low-productivity firms were affected disproportionately by the crisis. The policy implication is that relief measures under the recent COVID-19 crisis should be temporary and such policies should be modified to enable the smooth reallocation of resources.

³ Hereafter, we refer to the Subsidy Program for Sustaining Businesses as the “sustainability subsidy” and the Employment Assistance Subsidy as the “employment subsidy.”

The rest of this paper is organized as follows. Section 2 explains the survey data used in this study and the method of analysis. Section 3 reports the results of the study, examining the characteristics of firms using support policies, focusing on their productivity before the COVID-19 crisis. Section 4 provides the conclusions and discusses policy implications.

2. Survey Design and Method of Analysis

The data used primarily in this study are from the “Survey of Corporate Management and Economic Policy” (SCMEP). The SCMEP is an original firm survey conducted by the Research Institute of Economy, Trade, and Industry from August to September 2020. The survey questionnaire was sent to 2,498 Japanese firms that had responded to the previous SCMEP in early 2019. As the sample of the SCMEP was selected from the Basic Survey of Japanese Business Structure and Activities (BSJBSA, conducted by the Ministry of Economy, Trade, and Industry), the firms chosen to take part in the SCMEP had at least 50 employees, capital of at least 30 million yen, and belonged to manufacturing, wholesale, retail, and service industries. The number of firms that responded to the current SCMEP is 1,579 (a response rate of about 63%).⁴ The distribution of the firms that responded to this survey by industry included manufacturing, 53.5%; information and communications, 5.3%; wholesale, 17.8%; retail, 10.2%; service, 9.0%; and others, 4.2%.⁵ In terms of firm size (firms of capital over 100 million yen are classified as “large firms”), 34.8% were large firms and 65.2% were small- and medium-sized firms.

The question on the use of relief policy measures was: “Which of the following policies that have been introduced due to COVID-19 has your company used or would like to use in the future?” The seven specific policies listed were (1) financial assistance from governmental financial agencies, (2) the employment subsidy, (3) the sustainability subsidy, (4) the Subsidy Program for Supporting Business Rent, (5) relief funds to firms complying with the shutdown request from the government, (6) exemption of local taxes and social insurance premiums payments, and (7) the reduction of property tax. The three choices to this question are (1) “used,” (2) “want to use,”

⁴ The SCMEP questionnaire in early 2019 was sent to 15,000 firms selected randomly from the registered list of the BSJBSA. The respondents to the SCMEP were the managers themselves or departments that can write their opinions on their behalf.

⁵ “Other industries” include firms with unknown classification.

and (3) “not considering.”

The SCMEP also asked about the industries (six categories) of the firms’ main business, the number of standard and nonstandard employees, and the number of employees by gender. The firm characteristics available from the SCMEP are limited, but more information can be obtained by linking the data with the BSJBSA. In this study, we calculate labor productivity (LP) and TFP for fiscal year 2018 from the BSJBSA and analyze the relationship between the use of relief policies and productivity prior to the COVID-19 crisis. In addition, the detailed industry classification (three-digit JSIC) and the headquarters location (prefecture) are obtained from the BSJBSA. The location of the headquarters is used to calculate the cumulative number of people infected with COVID-19 per population of the prefecture at the end of August 2020.⁶

We calculate firms’ LP as the firms’ value-added, divided by the total hours worked and express the value in logarithmic form, where value-added is the sum of the operating profit, rent, wages, depreciation, and taxes paid. We calculate the total hours of firms as the sum of the number of full-time employees multiplied by their (industry-level) working hours and the number of part-time employees multiplied by their (industry-level) working hours.⁷ We calculate TFP as a cost-share-based index number using value-added, the book value of capital, total hours, and the cost shares of capital and labor.⁸ The index number is the relative productivity level compared with a hypothetical representative firm of the industry. We compute the input and output of the representative firm as the geometric means of these values for all firms in the same three-digit industry, and the cost shares of labor and capital as the arithmetic means.

Using the data set described above, we analyze the characteristics of firms using COVID-19-related relief measures. Specifically, the firm size (log number of employees), industry, composition of the workforce (female and nonstandard employment ratios), and cumulative number of COVID-19-infected people per population of the prefecture are compared with firms that did not use policy measures. Then, we compare the productivity (LP and TFP) of policy users and non-users before the onset of the COVID-19 crisis, which is the main interest of this study.

⁶ It should be noted that some establishments are not necessarily located in the same prefecture as the headquarters in the case of firms possessing multiple establishments.

⁷ Industry-level data on working hours are taken from the Monthly Labor Survey (Ministry of Health, Labor and Welfare).

⁸ Empirical productivity analysis often applies the cost-share-based TFP index to the BSJBSA data (e.g., Nishimura *et al.*, 2005; Fukao and Kwon, 2006; Morikawa, 2015).

3. Results

Table 1 summarizes the use of the seven policy measures surveyed. Considering the respondent firms as a whole, the policies with a high percentage of users are (1) the employment subsidy (44.1%), (2) financial assistance from governmental financial agencies (25.0%), and (3) the sustainability subsidy (19.3%). Few firms took advantage of the other four policies. Although not reported in this table, however, congruently, the percentages of firms that answered “want to use” in the future are (1) the employment subsidy (18.3%), (2) financial assistance from governmental financial agencies (14.2%), and (3) the sustainability subsidy (13.3%).

By firm size, the percentages of policy users are higher in small- and medium-sized firms than in large firms across a large majority of policies. As many policies are designed to place importance on small- and medium-sized firms, this is a natural result.⁹ By industry, the percentages of users tend to be high in the service and manufacturing industries. In contrast, the percentages are low in the information and telecommunications industry. As the sales of many firms in this industry have not affected or even increased owing to a boost in demand for online equipment and services during the COVID-19 pandemic, the low policy usage in this industry appears to be a natural result. In the following, we limit our attention to the three policies used heavily by the firms.

The SCMEP qualitatively asks about the impact of the COVID-19 on business. The specific question is: “How is the expansion of the COVID-19 pandemic affecting your firm’s sales?” The four choices are “large negative impact,” “negative impact,” “not much impact,” and “positive impact.” According to the tabulation results, more than 80% of firms were affected negatively by the COVID-19 pandemic; the percentages are large negative (30.3%), negative (51.4%), not much (13.4%), and positive (4.9%) impacts. **Table 2** presents the cross-tabulation results. As a matter of course, firms that answered that the impact on sales is large negative tended to use the support measures.

Next, we conduct simple probit estimations to explain the use of policy measures by firm

⁹ Most financial assistance policies during the COVID-19 crisis, including special loan programs provided by the Japan Finance Corporation and the Shoko Chukin Bank, targeted small- and medium-sized firms. The sustainability subsidy is applicable only to small- and medium-sized firms as well as for self-employment.

characteristics available in the SCMEP. The dependent variable is for firms that used a policy measure and zero otherwise. The explanatory variables are the firm size (log number of employees), one-digit industry dummies (reference category: manufacturing), cumulative number of infected people in the prefecture per 1,000 population (as of August 2020), ratio of female employees, and ratio of nonstandard employees. The summary statistics of the variables are presented in **Table 3**.

Table 4 shows the estimation results, wherein the marginal effects are reported. The coefficients for firm size are negative and highly significant for the financial assistance and sustainability subsidy, indicating that smaller firms tend to use these policy measures after controlling for the other factors. On the other hand, there is no significant difference in the use of employment subsidy by firm size. By industry, the coefficients for wholesale and retail industries are negative and significant for all three policy measures and the coefficients for the information and communications industry are negative and significant for the employment subsidy and sustainability subsidies, indicating that firms in these industries are less likely to use these relief policies relative to the manufacturing firms. On the other hand, the coefficient for the service industry is positive for the sustainability subsidy.

The coefficient for the cumulative number of COVID-19-infected people per population is significantly positive only for the employment subsidy, suggesting that firms in such regions faced strong pressure from the market to reduce employment. The coefficient for this variable is insignificant for the financial assistance and sustainability subsidy. The coefficient for nonstandard employees is insignificant for the three policies, but the coefficient is positive and highly significant for the female ratio. This result is consistent with the fact, at the aggregate level, that female workers suffered from the COVID-19 crisis more than male workers.

Next, we analyze the productivity of firms before the COVID-19 pandemic. As explained in section 2, the LP and TFP are calculated from the BSJBSA for fiscal year 2018. **Table 5** presents the mean productivity of firms that used relief policies relative to those that did not use policies with t-test results. For all three policies, the productivity of firms using relief policies is lower and the differences are statistically significant at the 1% level, irrespective of the productivity measures. Quantitatively, the TFP of firms using financial assistance, employment subsidy, and sustainability subsidy are 17.2%, 11.7%, and 11.2% lower, respectively. In short, the productivity of firms that used relief policies was lower than the non-users, even before the onset of the

COVID-19 crisis.¹⁰

Figures 1–3 depict the TFP distributions separately for firms that used relief policies and those that did not use them. The shape of distributions is different by individual policy, but we can visually confirm that the productivity distribution of firms using relief policies is generally located at the lower (left) side. Of course, it should be noted that there is a significant overlap between policy users and non-users, meaning that some of the firms that use relief policies were productive before the COVID-19 crisis and vice versa.

Finally, **Table 6** reports the ordinary least squares (OLS) regression coefficients for policy users, wherein the firm size and three-digit industry are controlled. The coefficients for the use of relief policies are all negative and statistically significant at the 1% level. In the case of the LP, the absolute sizes of the coefficients are slightly smaller than the figures presented in **Table 5**, but the sizes are almost unchanged in the case of the TFP. Overall, these results indicate that various support measures may have the aspect of bailing out not only firms with suddenly deteriorating business performance due to the COVID-19 pandemic but also firms that had low-productivity prior to the pandemic.¹¹

As mentioned in the introduction, productivity dispersion tends to increase during recessions and there is a cleansing effect in which the exit of inefficient firms and the expansion of efficient firms' market share contribute to the aggregate productivity through the reallocation of resources. Temporary relief policies to support affected firms can be justified, but the results of this study caution against the potential negative side effects of excessive or overly prolonged relief policies.

4. Conclusion

Using data from a survey of Japanese firms, this study presents an overview of the characteristics of firms that have used relief policies to mitigate negative impacts from the COVID-19 pandemic, with an emphasis on their productivity. The results indicate that smaller

¹⁰ Using survey data of German firms, Buchheim *et al.* (2020) indicate that firms that were relatively weak prior the COVID-19 crisis (fourth quarter of 2019) are hit harder, and that they expect more difficulties for their businesses going forward and tend to cut employment and investment. Although they do not analyze productivity, their results are similar to our findings for Japanese firms.

¹¹ While we report results for productivity, similar results are obtained for average wages.

firms and firms in the manufacturing industry tend to use these programs. Importantly, the productivity of firms that use relief policies is lower before the onset of the COVID-19 pandemic than non-user firms.

These results suggest that emergency measures, such as financial assistance and employment subsidies, if prolonged excessively, may negatively affect the long-term productivity performance of the economy. As it will take some time to end the COVID-19 pandemic and the industrial structure after the crisis will undoubtedly be different from that before the pandemic, a gradual downsizing of the relief policies and restructuring policy measures toward supporting growing sectors are desirable approaches.

While this study presents unique evidence on Japanese firms' use of relief policies during the COVID-19 pandemic, we should be careful in interpreting the results, because the number of observations used in this study is limited to only about 1,500 firms and very small firms were not covered in the survey. In addition, we observe the productivity distribution of firms only before the COVID-19 crisis. Evaluating the *ex post* performance of firms that used relief policies and the productivity dynamics of the economy is recommended for future research.

References

- Adachi, Yusuke, Hikaru Ogawa, and Masafumi Tsubuku (2019), “Productivity Dynamics during Major Crises in Japan: A Quantile Approach,” RIETI Discussion Paper, 19-E-015.
- Baily, Martin Neil, Eric J. Bartelsman, and John Haltiwanger (2001), “Labor Productivity: Structural Change and Cyclical Dynamics,” *Review of Economics and Statistics*, 83(3), 420–433.
- Barrero, Jose Maria, Nicholas Bloom, and Steven J. Davis (2020), “COVID-19 Is Also a Reallocation Shock,” NBER Working Paper, No. 27137.
- Buchheim, Lukas, Jonas Dovern, Carla Krolage, and Sebastian Link (2020), “Firm-Level Expectations and Behavior in Response to the COVID-19 Crisis,” *IZA Discussion Papers*, 13253.
- Caballero, Richard J. and Mohamad L. Hammour (1994), “The Cleansing Effect of Recessions,” *American Economic Review*, 84(5), 1350–1368.
- Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap (2008), “Zombie Lending and Depressed Restructuring in Japan,” *American Economic Review*, 98(5), 1943–1977.
- Carreira, Carlos and Paulino Teixeira (2008), “Internal and External Restructuring over the Cycle: A Firm-Based Analysis of Gross Flows and Productivity Growth in Portugal,” *Journal of Productivity Analysis*, 29(3), 211–220.
- Davis, Steven J. and John Haltiwanger (1990), “Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications,” in *NBER Macroeconomics Annual* O. Blanchard and S. Fischer eds., Cambridge: MIT Press, 5, 123–168.
- Disney, Richard, Jonathan Haskel, and Ylva Heden (2003), “Restructuring and Productivity Growth in UK Manufacturing,” *Economic Journal*, 113(489), 666–694.
- Foster, Lucia, John Hultiwanger, and C. J. Krizan (2001), “Aggregate Productivity Growth: Lessons from Microeconomic Evidence,” in Charles R. Hulten, Edwin R. Dean, and Michael J. Harper eds. *New Developments in Productivity Analysis*, Chicago: University of Chicago Press, 303–363.
- Foster, Lucia, Cheryl Grim, and John Haltiwanger (2016), “Reallocation in the Great Recession: Cleansing or Not?” *Journal of Labor Economics*, 34(S1), S293–S331.
- Fukao, Kyoji (2012), *The Two Lost Decades and the Japanese Economy*, Nikkei Publishing, Inc. (in Japanese).

- Fukao, Kyoji and Hyeog Ug Kwon (2006). “Why Did Japan’s TFP Growth Slowed Down in the Lost Decade? An Empirical Analysis Based on Firm-Level Data of Manufacturing Firms,” *Japanese Economic Review*, 57(2), 195–228.
- Griliches, Zvi and Haim Regev (1995), “Firm Productivity in Israeli Industry: 1979–1988,” *Journal of Econometrics*, 65(1), 175–203.
- Hong, Gee Hee, Arata Ito, Yukiko Saito, and Thi-Ngoc Anh Nguyen (2020), “Structural Changes in Japanese SMEs: Business Dynamism in Aging Society and Inter-Firm Transaction Network,” RIETI Policy Discussion Paper, 20-P-003.
- Ikeuchi, Kenta, YoungGak Kim, Hyeog Ug Kwon, and Kyoji Fukao (2017), “Effects of Economic Crises on Employment and Productivity Dynamics in Japan,” RIETI Discussion Paper, 17-J-017. (in Japanese).
- Imai, Kentaro (2016), “A Panel Study of Zombie SMEs in Japan: Identification, Borrowing and Investment Behavior,” *Journal of the Japanese and International Economies*, 39(March), 91–107.
- Kwon, Hyeog Ug, Futoshi Narita, and Machiko Narita (2015), “Resource Reallocation and Zombie Lending in Japan in the 1990s,” *Review of Economic Dynamics*, 18(4), 709–732.
- Landini, Fabio (2020), “Distortions in Firm Selection during Recessions: A Comparison across European Countries,” *Industrial and Corporate Change*, 29(3), 683–712.
- McGowan, Müge Adalet, Dan Andrews, and Valentine Millot (2018), “The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries,” *Economic Policy*, 96, 687–736.
- Morikawa, Masayuki (2015), “Are Large Headquarters Unproductive?” *Journal of Economic Behavior and Organization*, 119, 422–436.
- Morikawa, Masayuki (2019), “Dispersion and Volatility of TFPQ and TFPR: Findings from Three Service Industries,” *Industrial and Corporate Change*, 28(6), 1515–1531.
- Nishimura, Kiyohiko G., Takanobu Nakajima, and Kozo Kiyota (2005), “Does the Natural Selection Mechanism Still Work in Severe Recessions? Examination of the Japanese Economy in the 1990s,” *Journal of Economic Behavior and Organization*, 58(1), 53–78.
- Sakai, Koji and Ichiro Uesugi (2019), “Credit Reallocation, Firm Size, and Productivity,” RIETI Discussion Paper, 19-E-004.

Table 1. The percentages of firms using relief policies.

	Financial assistance	Employment subsidy	Sustainability subsidy	Rent subsidy	Relief funds for shutdown	Exemption of local taxes and social insurance	Reduction of property tax
All firms	25.0%	44.1%	19.3%	6.0%	5.1%	3.5%	1.7%
Large	10.5%	37.7%	14.8%	4.2%	3.3%	3.5%	2.1%
Small & medium	32.6%	47.4%	21.7%	7.0%	6.2%	3.5%	1.5%
Manufacturing	26.9%	50.5%	21.1%	6.0%	2.3%	2.7%	1.6%
I&C	18.5%	22.0%	5.0%	1.3%	0.0%	0.0%	0.0%
Wholesale	21.4%	31.5%	10.6%	4.2%	4.2%	1.5%	0.8%
Retail	17.5%	34.4%	16.3%	6.0%	11.8%	4.6%	2.0%
Service	30.6%	55.1%	36.8%	13.3%	15.8%	9.0%	3.0%
Other	23.9%	37.5%	19.1%	4.3%	8.5%	10.6%	4.3%

Notes: Calculated from the SCMEP. N=1,579. I&C stands for information and communications.

Table 2. Impact of COVID-19 crisis on sales and the use of relief policies.

Impact on sales	(1) Financial assistance	(2) Employment Subsidy	(3) Sustainability Subsidy	N
Large negative	38.9%	70.4%	39.6%	476
Negative	23.9%	40.5%	12.6%	808
Not much	6.2%	10.6%	6.3%	211
Positive	2.7%	9.6%	1.4%	77

Note: Calculated from the SCMEP.

Table 3. Summary statistics.

	Obs.	Mean	Std. Dev.	Min	Max
Firm size (ln employees)	1,561	4.973	0.879	0.000	11.789
Cumulated infection rate	1,579	0.567	0.501	0.015	1.495
Female ratio	1,561	0.311	0.196	0.000	1.000
Nonstandard ratio	1,552	0.234	0.240	0.000	1.000
LP	1,465	1.310	0.487	-1.020	3.213
TFP	1,457	-0.097	0.406	-2.164	2.003

Table 4. Probability of using relief policies.

	(1) Financial assistance	(2) Employment subsidy	(3) Sustainability subsidy
Firm size	-0.0784 *** (0.0140)	-0.0029 (0.0160)	-0.0388 *** (0.0125)
I&C	-0.0705 (0.0426)	-0.2747 *** (0.0424)	-0.1326 *** (0.0252)
Wholesale	-0.0731 ** (0.0268)	-0.2217 *** (0.0313)	-0.1111 *** (0.0205)
Retail	-0.0842 ** (0.0340)	-0.2088 *** (0.0392)	-0.0608 * (0.0280)
Service	0.0016 (0.0398)	-0.0205 (0.0465)	0.1018 *** (0.0394)
Other industries	-0.0440 (0.0575)	-0.1532 ** (0.0626)	-0.0286 (0.0477)
Infection rate	0.0168 (0.0225)	0.0547 ** (0.0268)	-0.0169 (0.0204)
Female ratio	0.2147 *** (0.0693)	0.4941 *** (0.0843)	0.2780 *** (0.0595)
Nonstandard ratio	0.0369 (0.0567)	-0.0918 (0.0713)	-0.0158 (0.0496)
Nobs.	1,537	1,537	1,537
Pseudo R ²	0.0323	0.0515	0.0654

Notes: Probit estimations with robust standard errors in parentheses. The figures indicate marginal effect. ***p<0.01; **p<0.05; *p<0.1. The reference category of industry dummies is the manufacturing industry. I&C stands for information and communications.

Table 5. Mean productivity of firms using relief policies.

	(1) LP	(2) TFP
Financial assistance	-0.2703 ***	-0.1888 ***
Employment subsidy	-0.2015 ***	-0.1239 ***
Sustainability subsidy	-0.2055 ***	-0.1185 ***

Notes: The figures indicate the difference of firms not using relief policies. ***p<0.01 (t-test). Both the LP and TFP expressed in logarithm are for fiscal year 2018.

Table 6. Regression results on the productivity of firms using relief policies.

	(1) LP	(2) TFP
Financial assistance	-0.1949 *** (0.0264)	-0.1853 *** (0.0263)
Employment subsidy	-0.1603 *** (0.0239)	-0.1467 *** (0.0239)
Sustainability subsidy	-0.1159 *** (0.0316)	-0.1188 *** (0.0315)
Nobs.	1,465	1,457

Notes: OLS estimations with robust standard errors in parentheses. *** $p < 0.01$. The explanatory variables include the firm size (log employees) and three-digit industry dummies.

Figure 1. TFP distributions of users and non-users of financial assistance from governmental financial agencies.

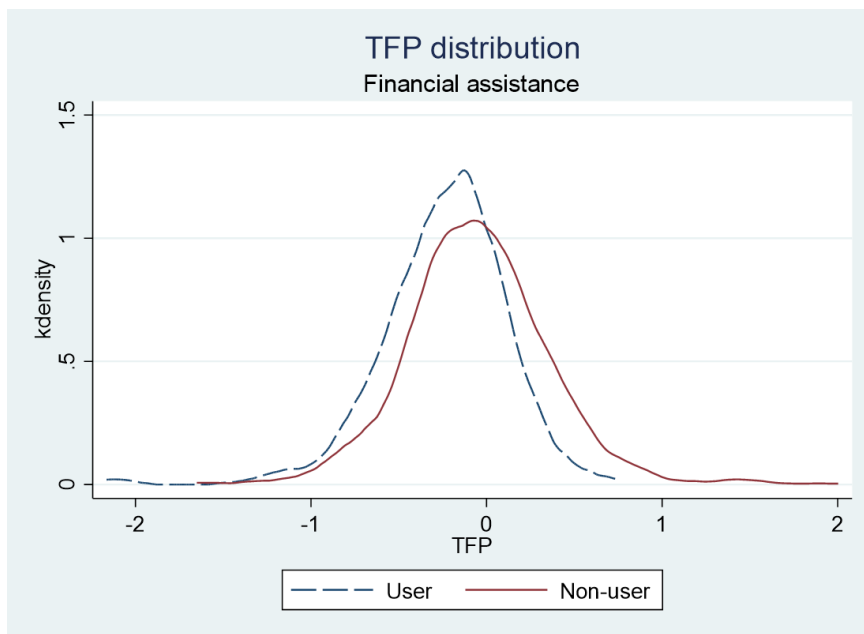


Figure 2. TFP distributions of users and non-users of the Employment Assistance Subsidy.

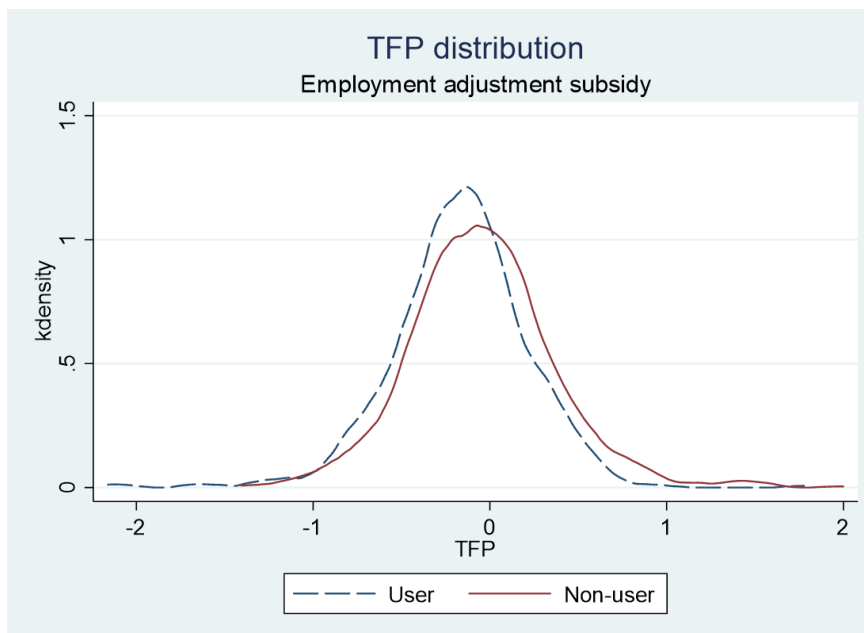


Figure 3. TFP distributions of users and non-users of the Subsidy Program for Sustaining Businesses.

