Is There any Relationship between Subsidies and Performance of Small Start-ups?

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Abstract

Using the panel data of small start-ups, this paper examines differences in startups' performance improvement from 2020 to 2021, between startups that received subsidies and those that did not receive any public support. We found that the performance of startups that received subsidies improved more than those that did not receive any public support. In particular, the relationship between subsidies and startups' performance tends to be clearer when startups are smaller.

1. Introduction

In this paper, we examine the impact of subsidies on the performance of small enterprises just after start-ups.

The COVID-19 pandemic shocked not only people's health but also economic activity. Governments provided public support for individuals and businesses to ease economic shock. Total fiscal measures against the pandemic in Japan were the second largest among G20 countries as of September 2021 (IMF, 2021). Like other countries, the presence of small and medium enterprises (SMEs) in Japan is very large. SMEs account for 99.7% of all enterprises in number, about 70% in terms of the labor force, and about 50% in terms of value added in Japan as of 2016. To support SMEs damaged by the pandemic, the government prepared various kinds of subsidies, loans, and other support.

In general, the smaller the size of enterprises and the fewer their management resources, the more the probability to be affected by external shocks and the greater the impact of shocks when affected. Furthermore, SMEs that have operated for a short period tend to have less resilience against external shocks than older enterprises, because their relationships with banks are weaker and they sometimes have difficulty in borrowing from banks. Many surveys revealed that the COVID-19 pandemic especially shocked small, young SMEs (Bartik et al., 2020; Tokyo Shoko Research, 2020a, 2020b).

However, according to the literature, the effects of public support sometimes appear and sometimes do not. Bartlett III and Morse (2020) showed that the medium-run survival probability of SMEs increased by 20.5%, when they successfully applied the Paycheck Protection Program, analyzing SME data with less than 50 employees in Oakland, U.S. They also pointed out that the effect appeared only when SMEs had less than about 19 employees. In Japan, Honda et al. (2023) found that public loans and subsidies eased cash flow restriction and made no effect on profitability, using the

data of SMEs with 71 employees on average. Kawaguchi et al. (2021) found that managers' prospects for survival improved by 19.8% when their prospects of procuring subsidies went from 0% to 100%, utilizing data on small enterprises with less than 20 employees and with 3 employees on average.

These differences in results might come from the size of the SMEs analyzed. In addition, they do not consider SMEs' age. As already mentioned, SMEs' resilience to external shocks tends to become weaker, when they are small and young. Also, such enterprises sometimes fail to procure loans from banks. The effects of public support must be comparably larger for small and young enterprises. Hence, we focus on small start-ups in this paper.

We examine the impact of government support on the performance of small enterprises just after starting businesses, using the unique panel data set of start-ups in Japan, which was made up of two questionnaire surveys. The average staff size of the businesses was 3.2 members when they started[1]. There are several types of public support: loans, subsidies, and others. Here, we focus on subsidies and empirically analyze differences in performance improvement from 2020 to 2021, between enterprises that receive subsidies and those that did not receive any public support.

The analysis yields the following results. First, enterprises that received subsidies were less likely to be in deficit for two consecutive years than those that did not receive any public support. The relationship between subsidy procurement and performance tends to be clearer when enterprise size is smaller. Second, subsidies likely led to a sales increase for small start-ups, as well. These results indicate that subsidies were more likely to support smaller start-ups in maintaining their performance.

2. Data and method of analysis

We utilize the panel data of the "Follow-up Survey of Business Start-ups," which combines microdata of the "Survey on Business Start-ups in Japan" conducted in July 2020 and the "Follow-up

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[1] "Staff" includes employees and the entrepreneur/CEO.

Survey on the Impact of COVID-19 on Start-up Enterprises" conducted in July 2021[2]. Both were questionnaire surveys by Japan Finance Corporation Research Institute, targeting enterprises that received start-up loans from Japan Finance Corporation during April and September in 2019. Most of them started operation by the end of 2019, before COVID-19 spread in Japan. Their average staff size was 3.2 members at the time of start-up.

We empirically analyze differences in performance improvement from 2020 to 2021, between the enterprises that received any subsidies and those that did not receive any public support. The model estimation formula is as follows:

$$Performance\_2021_{i,2021}=\alpha+\beta_1 Subsidy_{i,2021}+\beta_2 Performance\_2020_{i,2020}$$

$$+\beta_3 Performance\_2020_{i,2020}\times Subsidy_{i,2021}+\beta_4 ln(staff)_{i,2021}$$

$$+\gamma Industry_{i,2021}+\delta Region_{i,2021}+\varepsilon_{i,2021}$$

where i represents enterprises, 2020 represents responses in 2020, and 2021 in 2021.

Performance_2020 and Performance_2021 are deficit dummy (Deficit_2020, Deficit_2021), and monthly sales (Sales_2020, Sales_2021). deficit dummies take "1" if the enterprises respond "in deficit", and "0" if not. Monthly sales are natural log values.

Subsidy is a dummy variable taking "1" if the enterprise receives any subsidies, and "0" if not. Here, to analyze the subsidies' effect more precisely, enterprises that receive public support other than subsidies are excluded from the sample. Then, we compare enterprises that receive subsidies with enterprises that receive no public support. In addition, staff size (ln (staff)), industry dummy (Industry), and region dummy (Region) are set as control variables. We utilize probit models for deficit dummy models and OLS for monthly sales models.

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[2] The summary result was reported on Fukanuma et al. (2022).

3. Results

First, enterprises that received subsidies were less likely to be in deficit for two consecutive years than those that did not receive any public support. As shown on Table-1 (1), when the dependent valuable is Deficit_2021, the coefficient of Subsidy is positive and not statistically significant, whereas Deficit_2020 is positive and significant. Also, the coefficient of the cross term of Subsidy and Deficit_2020 is negative and significant. Start-ups that were not profitable in 2020 tended to be not profitable in 2021; however, the probability of remaining in deficit reduces when they received subsidies. In addition, we analyze subsamples divided by staff size. The signs and significances of Subsidy and Deficit_2020 of each estimation are as same as Table-1 (1). However, the coefficient of the cross term of Subsidy and Deficit_2020 is significantly negative only when a start-up has 1 staff member (Table-1 (2)).

Second, subsidies likely led to sales increase for small start-ups. When the dependent valuable is Sales_2021, the coefficient of Subsidy is positive and not significant, whereas the coefficient of Sales_2020 is positive and significant (Table-2 (1)). The coefficient of the cross term of Subsidy and Sales_2020 is also negative and not statistically significant. As for subsamples, the analysis for start-ups with 2 or 3 staff members shows that the coefficient of Subsidy is positive and significant, and the coefficient of the cross term of Subsidy and Sales_2020 is negative and significant (Table-2 (4)). For start-ups with 2 or 3 staff members, subsidies positively affect sales; however, their marginal effect decreases when sales in the previous year were larger. The subsidies' effect on sales is larger for businesses with low sales.

Overall, these results indicate that subsidies were more likely to support start-ups with smaller staff in maintaining their performance. They suggest that subsidies eased cash flow restriction at SMEs, and helped with their operation, especially when they are small and young. Our estimation results are not matched with Honda et al. (2023), which found a negative effect of public support on the

Table-1 Effects on Deficit_2021

VARIABLES	(1) all		(2) Staff =1		(3) Staff ≧ 2		(4) Staff =2or3		(5) Staff ≧ 4	
Subsidies	0.479	(1.435)	1.048	(1.432)	0.172	(0.435)	0.257	(0.412)	0.425	(0.659)
Deficit_2020×Subsidies	-1.198**	(-2.346)	-3.158***	(-2.881)	-0.387	(-0.612)	-0.630	(-0.604)	-1.083	(-1.092)
Deficit_2020	2.975***	(6.704)	5.249***	(5.057)	2.158***	(3.965)	2.520***	(2.810)	2.651***	(3.167)
Staff size	Yes		No		No		No		No	
Industry	Yes		Yes		Yes		Yes		Yes	
Region	Yes		Yes		Yes		Yes		Yes	
Observations	522		199		323		148		164	
Pseudo R2	0.221		0.326		0.192		0.251		0.220	

Notes: Dependent variable is Deficit_2021, and (1) - (5) indicate the results of probit model analysis of each firm size sample. "Staff" includes employees and the entrepreneur / CEO. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table-2 Effects on Sales_2021

VARIABLES	(1) all		(2) Staff =1		(3) Staff ≧ 2		(4) Staff =2or3		(5) Staff ≧ 4	
Subsidies	0.166	(0.661)	-0.508	(-1.120)	0.543	(1.449)	1.755***	(3.576)	0.080	(0.133)
Sales_2020×Subsidies	-0.050	(-0.962)	0.122	(1.072)	-0.122*	(-1.715)	-0.361***	(-3.602)	-0.035	(-0.324)
Sales_2020	0.741***	(16.861)	0.701***	(7.754)	0.845***	(14.836)	0.968***	(11.833)	0.733***	(9.101)
Staff size	Yes		No		No		No		No	
Industry	Yes		Yes		Yes		Yes		Yes	
Region	Yes		Yes		Yes		Yes		Yes	
Observations	502		186		316		153		163	
Adjusted R2	0.719		0.541		0.665		0.715		0.539	

Notes: Dependent variable is Sales_2021, and (1) - (5) indicate the results of OLS model analysis of each firm size sample. "Staff" includes employees and the entrepreneur / CEO. t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

performance of SMEs. This is because they utilized a sample including rather large and old enterprises, whereas we analyzed small start-ups. Subsidies are an important method of financing for small start-ups under the COVID-19 pandemic, because they tend to have difficulty in borrowing from banks even under no pandemic.

4. Conclusion

Using the panel data of small start-ups, we showed that there is a positive relationship between subsidy utilization and performance of small and young enterprises. Also, we found that the relationship tends to be clearer when enterprise size is smaller. Because of the data limitation, these results only show a short-term relationship between public subsidies and the performance of SMEs, and do not consider long-term ones. The results may differ when the analysis period is longer. Analysis

using long-term data and verification of causal relationships are left for future studies.

Acknowledgements

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