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Article

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The Effects of Policy Funds on the Investment and Management Stabilization Financing of Small- and Medium-sized Enterprises *

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This study empirically examines the impacts of policy funds from three different aspects using data on Daegu city's local government loans. First, we estimate the influence of policy funds on mitigating financial constraints affecting the investment decisions of Small- and Medium-sized Enterprises (SMEs), yielding inconclusive results indicating no significant discernible effects of policy funds. Second, we scrutinize the ramifications of policy funds on enterprise's management stability, revealing that these funds contribute to stabilizing the operations of small-scale enterprises. Third, we explore whether policy funds engender an unintended consequence of bolstering distressed enterprises, presenting empirical evidence that suggests a delayed exit of such enterprises.

Keywords: Policy Funds, SMEs, Investment, Management Stability

JEL Classification: G20, G30

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I. Introduction

Small and young enterprises often struggle to prove their creditworthiness due to a lack of financial history or collateral (refer to Cressy, 2002; Lerner, 2002). Policy funds are a kind of public financial supports designed to address the failure of private financial intermediation mainly caused by information asymmetry between fund suppliers and demanders. That is, policy funds that are equipped with more comprehensive evaluation mechanisms can more accurately assess and manage these risks (refer to Lerner, 2002).

In addition, policy funds play a crucial role in fostering industries and maintaining market stability. Policy funds often aim to bridge the gap left by private financial institutions, which might be reluctant to lend to certain industries or smaller enterprises due to perceived risks or lower profit margins. By providing financial resources where the market fails, these funds enable industries and businesses that are essential for economic development and innovation but lack access to traditional financing.

However, the effectiveness of policy funds remains a subject of ongoing debate. Insufficient policy funds can lead to a shortage of long-term funds necessary for industrial development, while excessive supply may hinder the development of financial markets by crowding out funds supply from private financial institutions. Policy funds may have contributed to economic growth by aiding enterprises with growth potential but facing difficulties in obtaining funds from the private sector. However, it is possible for policy funds to delay the exit of distressed enterprises and to incur social costs such as corruption, bureaucratization, and pursuit of personal interests. The conflicting relationships in the provision of policy funds underscore the continuous assessment for the effective management of policy funds systems.

This study empirically analyzes the effects of policy funds from three different aspects. First, we estimate the effects of policy funds on relaxing financial constraints on the investment decisions of Small- and medium-sized enterprises (SMEs) in Korea. We also consider how these effects differ across the size and age of enterprises in order to capture the effects of information asymmetry. Second, we scrutinize the ramifications of policy funds on enterprise's management stability. In general, there are mainly two types of policy funds in Korea. One is designed to promote the investment of SMEs and the other intends to support management stability of SMEs that are temporarily having financial difficulties. Although the proportion of the latter relative to the total amount of public funds is significantly greater than that of the former, studies for estimating the effects of the latter are notably scarce. Finally, we investigate if the latter

type of policy funds generates a side effect of increasing the number of financially distressed enterprises and delaying the exit of such enterprises.

For our empirical analysis, we combine data on Daegu city's local government loans with data from National Information & Credit Evaluation (NICE)'s corporate financial information. Daegu city's policy funds consist of "Start-up Competitiveness Enhancement Funds (SCEFs)" for supporting equipment and facility investment of SMEs and "Management Stabilization Funds (MSFs)" for supporting working capital of SMEs. Although our study is limited to the case of Daegu city, all regions in Korea face very similar situations to Daegu city as shown in Table 1: the proportion of SMEs is very similar across regions and is stable over time. Further, all local governments

Table 1. Proportion of Small- and Medium-sized Enterprises (%)

	2015	2016	2017	2018	2019
Korea	98.98	98.91	98.87	98.86	98.83
Seoul	98.22	98.12	98.04	98.03	97.93
Busan	99.19	99.11	99.06	99.05	99.05
Daegu	99.49	99.47	99.43	99.42	99.42
Inchon	99.15	99.16	99.15	99.17	99.23
Gwangju	99.13	98.97	98.93	98.99	99.02
Daejeon	99.49	99.41	99.45	99.44	99.41
Ulsan	98.99	98.96	98.88	98.86	98.92
Gyeonggi	99.26	99.18	99.15	99.12	99.10
Gangwon	99.51	99.55	99.51	99.47	99.42
Chunbuk	99.13	99.05	99.03	99.02	98.93
Chunnam	98.86	98.86	98.88	98.81	98.86
Jeonbuk	99.47	99.31	99.27	99.28	99.29
Jeonnam	99.36	99.28	99.28	99.26	99.31
Gyeongbuk	99.31	99.31	99.26	99.21	99.21
Gyeonnam	99.30	99.25	99.21	99.22	99.23
Jeju	99.57	99.35	99.42	99.57	99.56

Notes: We calculate the proportions using the numbers of small-sized, medium-sized, large-sized enterprise and excludes the number of micro enterprises for the calculation. SMEs are classified into small-sized and medium-sized enterprises (for small-sized enterprises with an average of annual sales of 1 to 12 billion won or less over the last 3 years, depending on the industry and for medium-sized enterprises with an average of annual sales of 40 to 150 billion won or less over the last 3 years, depending on the industry).

Source: Statistics Korea (2023).

mainly have the two types of policy funds like Daegu city. And the policy funds for management stabilization are much greater than those for promoting investment for most regions in Korea.

The results from our empirical analysis indicate that there are no clear effects of the SCEFs on mitigating financial constraints of SMEs. However, the MSFs are found to stabilize the operations of relatively smaller enterprises of the SMEs in our sample. On the other hand, the MSFs which comprise over 90% of the total policy funds in Daegu city tend to delay the exit of marginal enterprises.

There are few papers empirically studying the effects of policy funds. Lerner (2002) proposed the certification hypothesis which emphasizes the role of public loans in relaxing information gaps between funds demanders and suppliers (See also Cressy, 2002). The hypothesis argues that if public institutions could certify that enterprises have a good prospect by providing public funds, the asymmetric information problems between enterprises and private funds suppliers could be relaxed. Hahn et al. (2017) test this hypothesis by examining the effects of policy funds on the financing constraints faced by SMEs using data from the policy loan programmes of the South Korean Small & Medium Business Corporation for the period of 2001-2011. They find that policy funds reduce investment-cash flow sensitivity of SMEs, and are more effective for small and young enterprises who face more severe information asymmetry in the loan approval process. We also follow the approach of Hahn et al. (2017) for estimating the effects of SCEFs on the financial constraints on the investment decisions of SMEs. But our study for estimating the effects of MSFs as well as their side effects is new.

The composition of this paper is as follows. Section II reviews policy funds system in Korea and the status of Daegu city's policy funds. In particular, the policy funds systems provided to SMEs in the Daegu region are examined. Section III describes empirical models that assess the effects of policy funds. In particular, they assess whether SCEFs alleviate the financial constraints of SMEs and promote their investment. Additionally, they examine whether MSFs actually contribute to improving the stability of enterprise operations and whether there are side effects of delaying the exit of marginal enterprises. Section IV presents the empirical results and Section V concludes.

II. Policy Funds System

1. Policy Funds System in Korea

Policy funds in Korea can be categorized into “narrowly-defined policy funds” where the central and local governments, government-funded institutions, and the Bank of Korea directly provide funds, and “policy-oriented finance” where government-established policy funds institutions such as Korea Development Bank (KDB) and Industrial Bank of Korea (IBK) independently raise funds from the market to achieve policy goals (see Yoon, 2016).

There are three ways to provide policy funds for SMEs in Korea: direct loans, on-lending, and interest subsidy loans. Each type of loans differs in terms of the funding source, loan conditions, financial institution's profit structure, and post-management. First, direct loans refer to the situation where public institutions directly lend funds to SMEs without intermediation by financial intermediaries. The costs, risks, and interest income incurred during the lending process are all attributed to the institutions. Direct loans allow public institutions to directly select loan recipients and determine loan amounts and interest rates, providing eligible recipients to obtain funds at low-interest rates as much as possible. Some of the policy funds systems operated by the Korea SMEs and Startups Agency, such as venture composite finance and emergency management stabilization financings, fall into this category.

Second, on-lending involves public institutions indirectly supporting SMEs by utilizing financial intermediaries or credit guarantee institutions. Banks bear the losses incurred during the evaluation and lending process, and in return, they receive handling fees (or interest differentials) from policy institutions. Although on-lending may potentially reduce the likelihood of business recipients obtaining sufficient funds compared to direct loans, recipients are not significantly disadvantaged since public institutions specify loan recipients and interest rates in advance. Most government-financed loan projects are conducted in the form of on-lending. Loan programs like Daegu city government's SCEFs, Bank of Korea's financial intermediation support loans, and Korea SMEs and Startups Agency's policy funds support system operate in this manner.

Third, interest subsidy loans involve public institutions subsidizing interest rates or guarantee fees through cooperative lending, with banks raising capital to provide loans. Terms such as the interest rate ceiling, collateral, loan period, and recipient conditions

are determined through contracts between public and private financial institutions. This type of support imposes lending risk on private financial institutions and create an efficient policy funds system that allows private institutions to lend selectively to borrowers who are likely to repay the funds. However, the downside is that interest costs accrued each year through the interest subsidy loans may increase without recovery of principal. Additionally, applicants with insufficient credit ratings may be rejected during the evaluation process, making it difficult to achieve the policy goal.

Table 2. Status and Proportion of Daegu City's Policy Funds by Program (2019)

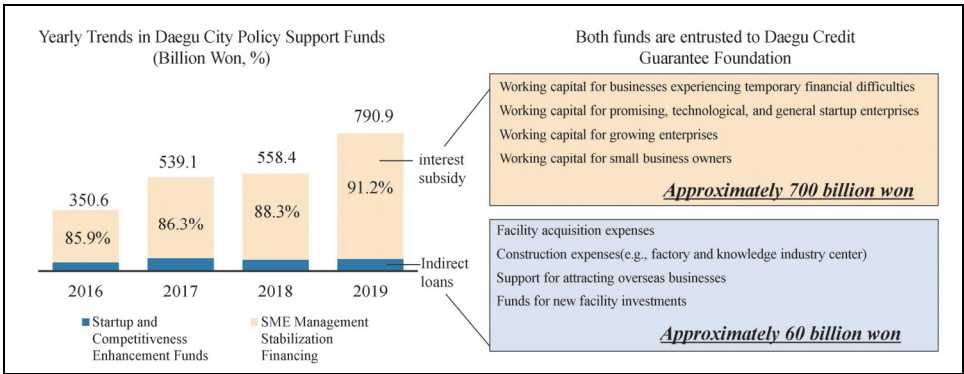
Support Programs	Support Budget (Billion Won)	Proportion (%)	Remarks
SCEFs	69.8	8.8	On-lending
MSFs	721.2	91.2	Interest Subsidy
Total	790.9	100.0	

Source: Internal data of Daegu city. Support programs and budget amounts are based on 2019 data.

2. Policy Funds in Daegu City

Daegu city has policy funds programs to support small- and medium-sized enterprises (SMEs), including SME SCEFs and MSFs. Firstly, SCEFs are allocated indirectly through the Daegu credit Guarantee Foundation, acting as a trustee, for SMEs with establishments in Daegu, with a limit of 2 billion won per enterprise. These funds are intended for the installation and construction of equipment and factories and are distributed through an on-lending method. Secondly, MSFs provide support through an interest subsidy method with a limit of approximately 1 billion won (0.7 billion won for small business owners) for startups, growing enterprises, and small business owners in Daegu. As of 2019, Daegu city's policy support funds amounted to 790.9 billion won, with MSFs accounting for 91.2%, while the proportion of SCEFs was only 8.8% (see Table 2).

Figure 1. Structure of Daegu Metropolitan City’s SMEs Policy Support Funds



Source: Internal data of Daegu city.

The provision of these funds is determined through an evaluation by the Daegu Credit Guarantee Foundation, and of course, there are specific industries and conditions eligible for application. Additionally, the decision for a loan is made after an on-site inspection by evaluation agencies such as the Daegu Credit Guarantee Foundation. After the loan is issued, it is verified whether the funds are used in accordance with the loan purpose, such as verifying actual operations with the operational funds received. There is also a clause for the recovery of funds if the loan purpose is not fulfilled. SMEs in Daegu city can apply for both funds as needed. However, when taking out a loan, the total amount of funds from Daegu city, including both funds, cannot exceed 4 billion won. Moreover, if a company has borrowed more than 10 billion won in facility funds through the central government’s loan system over five years, the loan will be restricted.

Daegu city’s policy funds, as shown in Figure 1 and Table 3, increased from the level of 350.6 billion won in 2016 to 790.9 billion won in 2019. However, the increase in policy funds is mainly the result of the expansion of SME MSFs, while SCEFs have been maintained at levels around 60 to 70 billion won since 2017. In other words, Daegu city is expanding the proportion of policy funds using the interest subsidy method for the purpose of economic stability and employment preservation. This fund management strategy is intensifying in crisis situations such as the COVID-19 pandemic. MSFs reached 1.1 trillion won as of June 2020, accounting for approximately 97% of the total policy funds. Considering factors such as the sharp minimum wage increase in 2018 and the impact of the COVID-19 pandemic in 2020, the continuous

expansion of MSFs is inevitable. However, this trend carries the risk of delaying the exit of businesses that have reached their limits. Unlike SCEFs, which have a clear goal of equipment and facility investment, MSFs with their nature as working capital present very inclusive criteria for support purposes and beneficiary selection.

Table 3. Yearly Trends in Daegu City's SME Policy Support Funds (2016~2019)

Category	Yearly Allocation (Billion Won)				Annual Allocation Ratio (%)			
	2016	2017	2018	2019	2016	2017	2018	2019
Startup and Competitiveness Enhancement Funds	49.5	73.7	65.3	69.8	14.1%	13.7%	11.7%	8.8%
SME Management stabilization financing	301.1	465.4	493.1	721.2	85.9%	86.3%	88.3%	91.2%
Total	350.6	539.1	558.4	790.9	100.0%	100.0%	100.0%	100.0%

Source: Internal data of Daegu city.

III. Empirical Framework

1. Empirical Models

To alleviate financial constraints for SMEs in Daegu, the local government provides support through the SCEFs and MSFs. In this section, we empirically analyze how Daegu city's policy funds have mitigated the financial challenges faced by local SMEs from three perspectives. First, the SCEFs aim to facilitate funding necessary for the installment and construction of equipment and facilities for eligible SMEs, thereby increasing their investments. On the other hand, the MSFs support the capital needs of businesses experiencing temporary management difficulties, with a focus on working capital loans due to the nature of fund usage. Considering the difference in the nature of these two funds, we develop empirical models to separately analyze how much the SCEFs contribute to easing constraints on financing investment for SMEs and how much the MSFs contribute to the management stability of SMEs. Finally, we develop models to analyze a side-effect of the MSFs.

(1) Empirical models for the effect of SCEFs

If all enterprises have equal access to the capital market, the cost of external funds and the opportunity cost of internal funds become equal, resulting in complete substitution between external and internal funds. In other words, if there is a perfect capital market (i.e., if fund suppliers have perfect information about fund demanders — namely, enterprises), investment decisions are made independent of financial conditions¹. However, in the real world, due to factors such as information asymmetry or other reasons, complete substitution between internal and external funds is not possible. Investment decisions are influenced by factors such as the availability of internal funds and the possibility of financing external funds through either new debt or equity issuance. In cases where the capital market is imperfect, the internal cash flow of an enterprise may have a comparative advantage over financing external funds, impacting investment expenditure. This interdependence of investment and financing decisions is particularly prevalent in small or newly established enterprises. For these enterprises, short-run financial factors are crucial because external capitals cannot perfectly substitute internal funds in the short run. On the other hand, larger enterprises with well-known growth prospects are more likely to make investment decisions independent of their financial structure. This difference arises primarily stemming from asymmetric information between fund suppliers and demanders. This information asymmetry makes it costly, and sometimes impossible, for external fund providers to evaluate the investment opportunities of fund demanders accurately.

Lerner (2002) argues that public institutions can mitigate such information gaps by providing policy loans to small and young enterprises with high quality. Hahn et al. (2017) developed an empirical model to test this hypothesis. We develop a similar empirical model to test the hypothesis following Hahn et al. (2017):

$$\ln \frac{K_{it}}{K_{it-1}} = \beta_1 \ln CF_{it} + \beta_2 \ln CF_{it} * P_{it} + \beta_3 \ln CF_{it} * P_{it} * S_i + \beta_4 \ln CF_{it} * P_{it} * Y_i + \gamma X_{it} + \alpha_i + \delta_t + u_{it} \quad (1)$$

where K_{it} denotes the physical capital of the enterprises i at the end of the time t . $\ln \frac{K_{it}}{K_{it-1}} = d \ln K_{it}$ measures the variation in the logarithm of the enterprises i 's

¹ Refer to Modigliani and Miller (1958).

capital between the beginning and end of the time t , interpreted as the log (including depreciation) investment relative to the log capital at the $t - 1$ ². In empirical analysis, tangible assets on the financial statements are used as physical capital. CF_{it} is defined as the ratio of the enterprise i 's cash flow in time t to the tangible capital at the end of the previous year, interpreted as measuring the enterprises i 's cash flow, while controlling for enterprises' size. If the capital market is perfect, the β_1 will be zero as there is no relationship between the enterprises' financial structure and investment decisions.³ In empirical analysis, the cash and cash equivalents on the financial statements are used as cash flow. Some previous studies have used the sum of net income and non-cash deductions, such as depreciation, as the enterprises' cash flow.⁴ This definition also includes dividend payments in cash flow. In this regard, we define the scope of cash flow more rigorously than previous research.⁵

P_{it} is a dummy variable indicating whether an enterprise i receives the policy funds in time t or have received policy funds in the previous year. If the enterprise did not receive policy funds until the time t , the value of P_{it} is zero. On the other hand, from the year an enterprise receives policy funds until the last year of the sample, the value of P_{it} is 1. We predict that the coefficient (β_2) for the term representing the interaction between policy funds and internal cash flows will be negative in that investment decisions are expected to be less sensitive to internal cash flows after the policy funds are received. That is, β_2 is the difference-in-difference (DID) coefficient

² To be specific, the investment of an enterprises (I_t), given time t can be defined as subtracting the capital at the beginning of the time t from the capital at the end of t , and adding the depreciation of the capital at the beginning of the time t : $I_t = K_t - (1 - \delta)K_{t-1}$. Dividing both sides by K_{t-1} , it yields $\frac{I_t}{K_{t-1}} = \frac{K_t}{K_{t-1}} - (1 - \delta)$. We interpret $\frac{K_t}{K_{t-1}}$ as investment.

³ However, the enterprises' investment decisions may be sensitive to internal cash flows in an imperfect capital market. According to the pecking order theory proposed by Myers (1977) and Myers and Majluf (1984), financial constraints and information asymmetry may lead to higher external financing costs for investment, prompting enterprises to prefer internal funds over external financing. Fazzari et al. (1988) tested these hypotheses using data from U.S. manufacturing enterprises. Their empirical analysis suggests that enterprises facing significant financial constraints rely more on the amount of cash flow in making investment decisions, resulting in a predicted positive value.

⁴ For example, Kang and Seo (2006) and Hahn et al. (2017) are referenced. Noh and Kim (2014) measured cash flow using the sum of net income, selling and administrative expenses, and depreciation.

⁵ We conduct a robustness analysis by estimating within the range of cash flows used in previous studies, and the results remained unchanged.

for treatment intensity and captures how much the sensitivity of cash flows to investment decisions differs between the treatment group (those receiving policy funds) and the control group (those not receiving policy funds) before and after policy funds are implemented. In empirical analysis, we consider enterprises receiving loans through the SCEFs as those receiving policy funds.

S_i is a dummy variable representing relatively smaller enterprises of SMEs. This variable is used to identify differences in financial constraints among enterprises: smaller enterprises may face greater constraints in raising external funds compared to larger enterprises due to relatively lower collateral availability and/or information gaps. Therefore, if policy funds have an effect in easing financial constraints, its impact may be relatively greater in smaller enterprises. In other words, as the interaction between policy funds and internal cash flow is expected to be larger in smaller enterprises, β_3 is predicted to be negative. In empirical analysis, the average total asset value for each enterprise is calculated during the sample period. If this value is less than the value at the 25th percentile of the sample, S_i takes a value of 1; otherwise, it takes a value of zero.

The variable Y_i is a dummy variable representing young enterprises. This variable is also utilized to identify differences in financing constraints among enterprises: Enterprises with an early period of entrepreneurship and business activities may face greater constraints in external financing compared to those with a longer period. Therefore, if policy funds have a mitigating effect on funding constraints, the effect may be relatively more pronounced in enterprises with limited business experience. In other words, as the interaction between policy funds and internal cash flow is expected to be larger in enterprises with limited business experience, β_4 is predicted to be negative. In empirical analysis, the average business experience for each enterprise is calculated during the sample period, and if this value is less than the value at the 25th percentile of the sample, the variable Y_i takes a value of 1; otherwise, it takes a value of zero.

X_{it} includes control variables that affect the enterprise's investment: log total asset profitability, log the proportion of debt to assets, log total assets of the enterprise, log business experience of the enterprise, and sales growth rate. Tobin's q , an important variable determining investment decisions, is not included in the regression equation due to data constraints. Instead, following Forbes (2007), the sales growth rate is included in the regression equation. Total asset profitability is a ratio of an enterprise's net profit to total assets, serving as one of the indicators of the enterprise's profitability.

The higher this ratio, the higher the enterprise's profitability, so it is predicted that enterprises with higher profitability will have increased investment. The proportion of debt to assets measures the enterprise's leverage, calculated as total debt divided by total assets. The total assets of the enterprise control the impact of the enterprise's size on investment. The business experience of the enterprise measures the duration of business activities from the entry to the present, controlling for the impact of the duration of business activities on investment.

Next, to explicitly test how policy funds mitigates the impact of information asymmetry, we estimate equation (2) following Hahn et al. (2017):

$$\ln \frac{K_{it}}{K_{it-1}} = \beta_1 \ln CF_{it} + \beta_2 \ln CF_{it} * P_{it} + \beta_3 \ln CF_{it} * P_{it} * ILow_i + \beta_4 \ln CF_{it} * P_{it} * IHigh_i + \gamma X_{it} + \alpha_i + \delta_t + u_{it} \quad (2)$$

where $ILow_i = (1 - S_i) * (1 - Y_i)$ representing enterprises with low information asymmetry. We assume that larger enterprises with longer business experience have lower information asymmetry compared to other enterprises.⁶ $IHigh_i = S_i * Y_i$ representing enterprises with high information asymmetry. If these two variables effectively identify information asymmetry, the effect of policy funds is expected to be more pronounced for enterprises with high information asymmetry. In other words, the coefficient for β_4 would be negative, and for β_3 , it would be 0.

Equations (1) and (2) include dummy variables generated using the median values of enterprises size and age to identify information asymmetry. However, economic theory does not provide any information about threshold values that distinguish between larger and smaller enterprises. Moreover, it does not offer insights into threshold values that differentiate enterprises with short and long business experience. Therefore, in empirical analysis, these threshold values are arbitrarily determined. If the results of the analysis are sensitive to these thresholds, the classification could be problematic. Considering this, the following model estimates the interaction between policy funds and enterprises' cash flow based on continuous variables for enterprises' size and business experience:

⁶ See, for example, Fazzari et al. (1988) and Cressy (2002).

$$\ln \frac{K_{it}}{K_{it-1}} = \beta_1 \ln CF_{it} + \beta_2 \ln CF_{it} * P_{it} + \beta_3 \ln CF_{it} * P_{it} * \ln Age_i + \beta_4 \ln CF_{it} * P_{it} * \ln TA_i + \gamma X_{it} + \alpha_i + \delta_t + u_{it} \quad (3)$$

where $\ln Age_i$ denotes the average of an enterprise's age during the sample period and $\ln TA_i$ represents the average total assets of the enterprise during the sample period. Equation (3) reflects that the effect of policy funds may vary nonlinearly depending on the size and age of the enterprise.

Equations (1)-(3) assume a log-log model to estimate the relationship between investment and cash flow. Generally, previous research has estimated the sensitivity of investment and cash flow using linear models. Economic theory does not provide information on whether linear models or log-log models should be used to estimate the relationship between investment and cash flow. In this sense, our empirical analysis will provide additional evidence on the relationship. Another reason for using the log-log model is to obtain estimation results that are less sensitive to outliers. Empirical analyses related to this topic remove outliers that deviate from the realistic standards in data on the ratio of investment to tangible assets (K_{it}/K_{it-1}) and the ratio of cash flow to tangible assets (CF_{it}). However, economic theory does not provide criteria for outlier removal, and the criteria used in empirical analyses vary from study to study. Therefore, arbitrarily removing outliers may introduce bias into the estimates, as outliers may reflect an enterprise's economic activity. More importantly, if the estimation results are influenced by the criteria for removing outliers, the choice of criteria becomes a crucial issue. In particular, many of the enterprises used in the empirical analysis are small, and the volatility of investment is very high. Taking this into consideration, we do not arbitrarily remove outliers. Instead, the log-log model is used in the empirical analysis, considering that if there are outliers, the estimates of the linear model are relatively more sensitive than those of the log-log model.⁷

⁷ For the robustness of the analysis, linear models are estimated, but the main results remained unchanged.

(2) Empirical models for the effect of MCFs

We employ the interest coverage ratio as a variable to measure an enterprise's management stability.⁸ The interest coverage ratio is defined as the ratio of operating profit to interest expense, indicating how well operating profit can cover interest costs. If this ratio is less than 1, it signifies that the operating profit cannot cover the interest costs, indicating a significant deterioration in the enterprise's debt repayment capability. The larger the ratio, the more stable the enterprise's operational activities. The following model is the baseline model estimating the impact of policy funds on the interest coverage ratio:

$$\ln ICR_{it} = \beta_1 P_{it} + \beta_2 P_{it} * S_i + \beta_3 P_{it} * Y_i + \gamma X_{it} + \alpha_i + \delta_t + u_{it} \quad (4)$$

where ICR_{it} represents the interest coverage ratio of the enterprises i in time t , defined as the ratio of net profit to interest expenses. In the empirical analysis, the interest coverage ratio is calculated using the net profit and interest expenses from the income statement. P_{it} is a dummy variable indicating whether the enterprises i received policy funds at time t or had received it in the previous year — the construction of the variable is the same as described in equation (1). Since policy funds generally have lower interest rates than private funds, they can directly contribute to increasing the interest coverage ratio, and enterprises receiving policy funds may indirectly increase the interest coverage ratio by improving temporary management distress and increasing operating profit. Therefore, if there is an effect of policy funds on management stability, β_1 is expected to be greater than 0.

Similar to equation (1), S_i is a dummy variable representing relatively smaller enterprises of SMEs and Y_i is a dummy variable representing enterprises with a young age. As mentioned earlier, smaller enterprises or those in their early stages of establishment may face relatively more constraints in obtaining external funds. Therefore, the effect of working capital received by enterprises experiencing temporary management distress may vary depending on the size or age of enterprises: policy funds may be more effective for enterprises with greater financing constraints, thus predicting that β_2 and β_3 are greater than 0, respectively.

⁸ Considering that working capital support in Daegu city is prioritized for enterprises aiming to maintain or sustain employment, the variable of workforce size could be considered as a measure of management stability. However, due to data constraints, the interest coverage ratio is used.

X_{it} includes control variables affecting the enterprise's interest coverage ratio: the ratio of debt to total assets, log total assets of the enterprise, log age of the enterprise, sales growth rate, log asset turnover, log labor intensity, and log cash flow to tangible assets. The ratio of debt to total assets is the value obtained by dividing total debt by total assets. As the enterprise's debt increases, the enterprise's interest expenses will increase, so the interest coverage ratio is expected to decrease. Asset turnover is defined as the proportion of sales to total assets and measures the productivity of capital. Enterprises with high asset turnover are more productive in capital, so operating profit may increase, leading to an increase in the interest coverage ratio. Labor intensity is defined as the proportion of labor costs (wages) to sales and measures the relative degree of labor intensity in the use of production factors. As labor intensity increases, labor productivity is likely to decrease, so the enterprise's operating profit may decrease, leading to a decrease in the interest coverage ratio. The larger the enterprise's cash flow, the higher the interest coverage ratio is expected to increase. X_{it} includes variables that are associated with the interest coverage ratio but are difficult to identify causally. For example, rather than exogenously affecting the interest coverage ratio, cash flow and the interest coverage ratio are likely to be simultaneously determined by a third factor. In this case, estimates of cash flow for the interest coverage ratio may contain biases. However, by including this variable in the regression equation, we can more accurately estimate the impact of policy funds on the interest coverage ratio as long as policy funds and cash flows are correlated.

To explicitly test how policy funds mitigates the impact of information asymmetry, the following model is used for estimation:

$$\ln ICR_{it} = \beta_1 P_{it} + \beta_2 P_{it} * ILow_i + \beta_3 P_{it} * IHigh_i + \gamma X_{it} + \alpha_i + \delta_t + u_{it} \quad (5)$$

The construction of both $ILow_i$ and $IHigh_i$ is identical to equation (2). If these two variables effectively identify information asymmetry, the impact of policy funds on managerial stability is expected to be more pronounced in enterprises with high information asymmetry. In other words, the value of β_3 will be positive, and β_2 will be 0.

(3) Models for the effects of MCFs on distressed enterprises

We have analyzed the extent to which policy funds in the Daegu region contribute to correcting inefficiencies or market failures caused by information asymmetry between fund demanders and suppliers in the financial market. We now examine a side effect of policy funds. In particular, we investigate whether the MSFs, originally intended to meet the urgent funding needs of enterprises experiencing temporary management difficulties, lead to the creation of marginal enterprises that rely on policy funds to sustain their business activities.

Generally, marginal enterprises refer to enterprises with a high likelihood of exit but are sustained through financial support. In general, such enterprises are defined as those with an interest coverage ratio less than 1 for three consecutive years. However, due to the data availability, we define enterprises as “distressed” if their interest coverage ratio is less than 1 for each year. The following is the basic model estimating the impact of MSFs on the probability of the occurrence of such enterprises:

$$\begin{aligned}
 MF &= 1, MF_{it}^* < 1 \\
 MF &= 0, MF_{it}^* \geq 1 \\
 MF_{it}^* &= \beta_1 P_{it} + \beta_2 P_{it} * S_i + \beta_3 P_{it} * Y_i + \gamma X_{it} + \delta_t + u_{it}
 \end{aligned} \tag{6}$$

where MF_{it} is a dummy variable that assigns a value of 1 if an enterprise i 's interest coverage (MF_{it}^*) is less than 1 at time t ; otherwise, it assigns a value of 0. Descriptions for the remaining variables are the same as in regression equation (4). The error term u_{it} is assumed to follow a logistic distribution.

2. Data

For empirical analysis, we constructed an enterprises-level panel dataset by combining data from the city of Daegu and NICE Credit Rating Agency. Daegu city government provided on-lending to SMEs in the region requiring funds for facility improvements and automation equipment investments through the SCEFs. Additionally, Daegu city supported enterprises in urgent need of operating funds, such as securing liquidity, through the MSFs. We received a list of enterprises that obtained loans through these two funds from Daegu city for the period between 2016 and 2018.

However, this list only included information about the business registration numbers of the enterprises, loan amounts, and interest rates related to the SCEFs or the MSFs. To conduct empirical analysis, we extracted additional financial statement and income statement data for these enterprises from the NICE Credit Rating Agency's database. Subsequently, we combined the two datasets using the enterprises' business registration numbers. The sample period for the dataset created by combining these two databases spans from 2014 to 2018. The sample includes only those enterprises that received policy funds from Daegu city at least once between 2016 and 2018 and for which financial statement data is available. Note that the year of receiving policy funds is different for each enterprise in our samples. We exploit this fact for the DID analysis.

Two samples are utilized in the empirical analysis: Sample 1 comprises enterprises that received loans through the SCEFs from Daegu city between 2016 and 2018, while the other includes enterprises that received loans through the MSFs during the same period.

Table 4. Summary Statistics for SCEFs

Variables	Mean	Std. dev.	Minimum	Maximum
2015				
K_t/K_{t-1}	1.937	3.558	0.545	26.105
CF	0.585	2.033	0.000	16.331
ROA	0.070	0.079	-0.071	0.422
Debt/Asset	0.652	0.174	0.014	1.027
size	15.458	1.432	11.761	18.702
age	11.538	9.054	0.000	39.000
d log sales	1.134	0.681	0.212	3.763
2017				
K_t/K_{t-1}	3.762	12.123	0.037	106.262
CF	0.283	0.982	0.000	9.488
ROA	0.050	0.086	-0.080	0.717
Debt/Asset	0.665	0.175	0.139	0.989
size	15.795	1.227	12.314	18.776
age	12.762	9.291	1.000	38.000
d log sales	0.821	0.553	0.012	4.281
Policy	0.779	0.417	0.000	1.000

Sources: Daegu city, NICE Credit Rating. Refer to the main text for variable descriptions.

Table 4 presents summary statistics for enterprises in Sample 1 for the years 2015 and 2017. Specifically, the average ratio of cash flow to tangible assets in 2015 is relatively high at 0.585. The average leverage, measured as total debt to total assets in 2015, is 0.652, indicating good financial soundness for the enterprises. However, this may also reflect a situation where external funding is not easily accessible. The average enterprise age in 2015 is 11.54 years, with some enterprises established in that year, and the longest-standing enterprise had been active for 39 years. The average sales growth rate from 2014 to 2015 is remarkably high, with a large standard deviation. The mean ratio of tangible assets in 2017 to tangible assets in 2016, representing the enterprises' investment, is 3.762 which is much greater than the mean value in 2015. Conversely, cash flow in 2017 experiences a substantial decrease compared to 2015.

Table 5 shows summary statistics for enterprises in Sample 2 for the same years. Compared to Table 4 with SCEFs sample, variation of the variables is much greater.

Table 5. Summary Statistics for MSFs

Variables	Mean	Std. dev.	Minimum	Maximum
2015				
K_t/K_{t-1}	5.689	78.713	0.014	2278.444
CF	313.722	6359.740	-0.145	154348
ROA	0.104	0.223	-4.185	1.694
Debt/Asset	0.599	0.322	0.001	4.834
size	14.048	1.528	9.645	18.181
age	9.518	7.895	0.000	47.000
d log sales	1.869	1.692	0.067	15.254
2017				
K_t/K_{t-1}	3.101	13.794	0.004	294.951
CF	166.900	2778.055	0.000	63192
ROA	0.084	0.243	-2.032	5.093
Debt/Asset	0.647	0.328	0.002	4.945
size	14.144	1.484	8.505	18.356
age	9.119	7.806	0.000	49.000
d log sales	1.908	3.112	0.015	80.267
Policy	0.698	0.460	0.000	1.000

Sources: Daegu city, NICE Credit Rating. Refer to the main text for variable descriptions.

This is attributed to the fact that the MSFs primarily provided funds to relatively smaller-sized enterprises. Additionally, notable outliers were observed in the ratio of current tangible assets to previous year tangible assets and the ratio of current cash flow to previous year tangible assets.

3. Estimation

We estimate regression equations (1)-(5) using the fixed effects estimation method, which controls for enterprise-specific fixed effects and year fixed effects. Enterprises in each sample received policy funds from Daegu city at least once between 2016 and 2018. However, the sample period extends from 2014 to 2018. Therefore, equations (1)-(3) can identify changes in the relationship between cash flow and investment decisions before and after an enterprise receives policy funds. For example, if an enterprise received policy funds in 2016, the fixed effects model can be used to estimate and compare the relationship between cash flow and investment decisions before receiving policy funds (from 2014 to 2015) and after receiving policy funds (from 2016 to 2018). Similarly, if an enterprise received policy funds for the first time in 2017, the fixed effects model can be used to estimate and compare the relationship between cash flow and investment decisions before receiving policy funds (from 2014 to 2016) and after receiving policy funds (from 2017 to 2018). In this regard, our fixed effects estimation reflects the spirit of the traditional DID approach.

We can estimate equation (6) either a fixed effects or random effects logistic regression method. However, when using a fixed effects logistic regression model, a drawback is that enterprises with a constant value of 1 or 0 for MF_{it}^* throughout the sample period are excluded from the estimation. In other words, enterprises with interest coverage ratio less than 1 or greater than 1 all the time throughout the sample period are excluded from the estimation. As approximately 3/4 of the enterprises in the sample satisfy these conditions, using a fixed effects logistic regression model has the drawback of having too few enterprises for estimation. Considering this, we estimate equation (6) using the random effects logistic regression method.

IV. Empirical Results

1. SCEFs and Investment Decision

Table 6 to Table 8 present the results estimated using the fixed effects model for the SCEFs sample, which includes enterprises that received policy funds through SCEFs.

Table 6. Impact of SCEFs on Financial Constraints of SMEs

	[i]	[ii]	[iii]	[iv]	[v]
log CF	0.246*** (0.063)	0.224*** (0.065)	0.213*** (0.062)	0.229*** (0.068)	0.217*** (0.065)
log CF*Policy		0.040 (0.043)	0.016 (0.041)	0.056 (0.042)	0.029 (0.034)
log CF*Policy*Small			0.109* (0.059)		0.108* (0.057)
log CF*Policy*Young				-0.026 (0.067)	-0.023 (0.058)
log ROA	-1.326 (1.025)	-1.231 (1.023)	-1.086 (0.993)	-1.239 (1.030)	-1.094 (0.999)
log Debt/Asset	0.411 (0.351)	0.434 (0.347)	0.519 (0.329)	0.416 (0.342)	0.504 (0.323)
log size	1.115*** (0.281)	1.094*** (0.273)	1.070*** (0.272)	1.102*** (0.281)	1.077*** (0.280)
log age	-0.160 (1.061)	-0.165 (1.064)	0.345 (1.178)	-0.515 (1.338)	0.037 (1.390)
d log sales	-0.183 (0.214)	-0.169 (0.216)	-0.160 (0.221)	-0.176 (0.218)	-0.166 (0.223)
Enterprises Fixed Effects	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y
Observations	436	436	436	436	436
R-squared	0.334	0.339	0.355	0.340	0.355
F-statistic		14.81	19.19	13.40	18.99
Prob > F		0.000	0.000	0.000	0.000

Notes: Refer to the main text for variable explanations. The F-value in [ii] tests the constraint $CF + CF * Policy = 0$, the F-value in [iii] tests the constraint $CF + CF * Policy + CF * Policy * small = 0$, the F-value in [iv] tests the constraint $CF + CF * Policy + CF * Policy * young = 0$, and the F-value in [v] tests the constraint $CF + CF * Policy + CF * Policy * small + CF * Policy * young = 0$.

Overall, we found that an increase in an enterprise's cash flow leads to an increase in investment, even after controlling for other impacts on the enterprise's investment.

This suggests that the enterprise's investment decision is significantly influenced by its financial structure. Furthermore, we obtained results indicating that the SCEFs from Daegu city do not have a substantial effect on mitigating the sensitivity of investment to cash flow.

Specifically, the estimates for the relationship between an enterprise's cash flow and its investment are positive and statistically significant at the 1% level in all specifications (see Table 6). However, the estimates for the interaction effect of cash flow and policy funds are close to zero and statistically insignificant, suggesting that SCEFs do not contribute to reducing the sensitivity of investment to cash flow. Additionally, the estimated coefficient β_4 for the interaction effect between cash flow and policy funds for young enterprises is negative, but it is close to zero and not statistically significant (see [iv]-[v]), implying that the effects of SCEFs on reducing the sensitivity of investment to cash flow are not much different between young and the other enterprises. On the other hand, the estimate for β_3 for the interaction effect between cash flow and policy funds for small enterprises is positive and statistically significant at the 10% level (see [iii] and [v]), implying that the effects of SCEFs on reducing the sensitivity of investment to cash flow are even worse for small enterprises than for the other ones.

The sensitivity of cash flow to investment decisions when an enterprise receives policy funds can be measured as the sum of the estimates of β_1 and β_2 . The sum of these two estimates is 0.264, and it is statistically significant at the 1% level (refer to the F-test results at the bottom of [ii]). These results indicate that SCEFs do not significantly reduce the sensitivity of investment to cash flow. Further, when young enterprises receive policy funds, the sensitivity of cash flow to investment decisions can be measured as the sum of the estimates of β_1 , β_2 , and β_4 . The sum of these estimates is also positive and statistically significant at the 1% level (refer to the F-test results at the bottom of model [iv]). We obtain similar results for small enterprises as shown in model [iii].

Table 7 shows that SCEFs do not have a significant effect in alleviating financial constraints due to information asymmetry. The estimates of β_3 for the interaction effect of SCEFs with cash flow and small and young enterprises are close to zero and not statistically significant (see model [i] and [iii]). Additionally, the estimates for the interaction effect of SCEFs with cash flow and large and old enterprises are also close

to zero and not statistically significant (see model [ii] and [iii]). These results indicate that there is no significant difference in the impact of policy funds on the sensitivity of investment and cash flow between small and young enterprises, which are known to

Table 7. SCEFs and Information Asymmetry

	[i]	[ii]	[iii]
log CF	0.222*** (0.064)	0.208*** (0.065)	0.207*** (0.065)
log CF*Policy	0.033 (0.043)	0.064 (0.061)	0.057 (0.064)
log CF*Policy*Small*Young	0.046 (0.056)		0.036 (0.061)
log CF*Policy*Large *Old		-0.072 (0.057)	-0.066 (0.059)
log ROA	-1.159 (1.033)	-1.225 (1.013)	-1.170 (1.022)
log Debt/Asset	0.488 (0.339)	0.455 (0.343)	0.495 (0.333)
log size	1.075*** (0.270)	1.088*** (0.266)	1.074*** (0.263)
log age	0.134 (1.187)	0.668 (1.314)	0.831 (1.349)
d log sales	-0.169 (0.217)	-0.144 (0.219)	-0.146 (0.220)
Enterprises Fixed Effects	Y	Y	Y
Time Fixed Effects	Y	Y	Y
Observations	436	436	436
R-squared	0.341	0.344	0.345
F-statistic	15.68	10.58	15.46
Prob > F	0.000	0.001	0.000
F-statistic			10.35
Prob > F			0.002

Notes: Refer to the main text for variable explanations. The F-value in [i] tests the constraint $CF+CF*Policy + CF*Policy*small*young=0$, the F-value in [ii] tests the constraint $CF+CF*Policy + CF*Policy*old*large=0$, and the two F-values in [iii] test the constraints of [i] and [ii], respectively.

Table 8. The Impact of SCEFs on Financial Constraints: Continuous Variables

	[i]	[ii]	[iii]	[iv]
log CF	0.216*** (0.065)	0.202*** (0.063)	0.199*** (0.063)	0.204*** (0.064)
log CF*Policy	0.253 (0.226)	0.969*** (0.281)	1.016*** (0.316)	0.340* (0.173)
log CF*Policy*log age	-0.077 (0.070)		-0.032 (0.072)	
log CF*Policy*log size		-0.058*** (0.017)	-0.055*** (0.018)	
log CF*Policy*log age*log size				-0.007** (0.003)
log ROA	-1.208 (1.045)	-0.767 (0.988)	-0.778 (0.990)	-1.058 (1.045)
log Debt/Asset	0.459 (0.353)	0.644** (0.299)	0.645** (0.303)	0.531 (0.336)
log size	1.083*** (0.266)	1.150*** (0.255)	1.142*** (0.257)	1.096*** (0.255)
log age	0.990 (1.478)	0.593 (1.133)	1.040 (1.487)	1.694 (1.407)
d log sales	-0.154 (0.218)	-0.173 (0.207)	-0.167 (0.209)	-0.148 (0.215)
Enterprises Fixed Effects	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y
Observations	436	436	436	436
R-squared	0.344	0.367	0.368	0.355
Number of Enterprises	143	143	143	143
F-values (1)	12.36	18.57	15.59	13.87
Prob > F	0.001	0.000	0.000	0.000
F-values (2)	14	15.56	15.20	13.85
Prob > F	0.000	0.000	0.000	0.000
F-values (3)	11.34	12.65	10.91	10.38
Prob > F	0.001	0.001	0.001	0.002

Notes: The four F-tests were conducted for each model. An enterprise's age values used in the F-tests were 5, 10, 15, and 20 years, while the enterprise's asset size values were 2.5, 5, 10, and 20 billion won. Model [iii] tests the constraint $CF + CF*Policy + CF*Policy*log\ age + CF*Policy*log\ size = 0$, and model [iv] tests the constraint $CF + CF*Policy + CF*Policy*log\ age*log\ size = 0$. Models [iii] and [iv] utilize the enterprise's age values and asset size from models [i] and [ii] in their respective F-tests.

be relatively vulnerable to information asymmetry, and large and old enterprises, which are known to be less vulnerable to information asymmetry.

Table 8 presents the estimation results on equation (3) using continuous variables measuring the size and age of enterprises. Overall, the results are qualitatively similar to those in Table 6 and Table 7. Specifically, the estimate of β_3 for the interaction between cash flow, SCEFs, and age are negative, but close to zero and statistically insignificant (see model [i]). The extent to which the sensitivity of cash flow and investment decisions of enterprises receiving SCEFs varies with age can be measured by $\widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_3 \ln Age$. The values calculated by substituting the 1/4, 2/4, and 3/4 quantiles of log enterprise age ($\ln Age$) into $\widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_3 \ln Age$ are all positive and statistically significant. (Refer to the F-test results at the bottom of [i]). The estimate of β_4 for the interaction between cash flow, SCEFs, and enterprise size are also negative and statistically significant at the 1% level (see model [ii]). $\widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_4 \ln Size$ can be used to measure the extent to which the sensitivity of cash flow and investment decisions of enterprises receiving policy funds varies with enterprise size. The values calculated by substituting the 1/4, 2/4, and 3/4 quantiles of log enterprise size ($\ln Size$) into $\widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_4 \ln Size$ are all positive and statistically significant. (Refer to the F-test results at the bottom of [ii]). These results confirm the robustness of the findings presented in Table 6 and Table 7.

2. MSFs and Interest Coverage Ratio

Table 9 and Table 10 present the estimation results using a fixed-effects model for the MSFs sample that include enterprises receiving support from Daegu city's MSFs. Table 9 shows the results of estimating equation (4), while Table 10 shows the results of estimating equation (5). Overall, we find that MSFs improve the interest coverage ratio of small enterprises (those enterprises with $S_i = 1$).

Specifically, the estimates for the effects of MSFs on the interest coverage ratio are nearly zero and statistically insignificant in all specifications of Table 9. However, the interest coverage ratio for small enterprises receiving MSFs increased by 26.7% compared to non-recipient enterprises, and this estimate is statistically significant at the 5% level (refer to model [iii]). Additionally, although the MSFs improves the interest coverage ratio for young enterprises, the estimate is not statistically significant (refer to models [iv] and [v]). These results suggest that MSFs contribute to enhancing the financial stability of small enterprises.

Table 9. The Impact of MSFs on the Interest Coverage Ratio of SMEs

	[i]	[ii]	[iii]	[iv]	[v]
Policy		0.090 (0.078)	0.001 (0.081)	0.017 (0.093)	-0.044 (0.096)
Small*Policy			0.267** (0.126)		0.254** (0.126)
Young*Policy				0.159 (0.143)	0.106 (0.142)
log CF	0.107*** (0.026)	0.106*** (0.026)	0.102*** (0.026)	0.106*** (0.026)	0.102*** (0.026)
log Turn Over	1.028*** (0.337)	1.038*** (0.337)	1.005*** (0.334)	1.047*** (0.338)	1.013*** (0.335)
log Labor Intensive	-0.284* (0.151)	-0.283* (0.151)	-0.294* (0.155)	-0.286* (0.152)	-0.296* (0.156)
log Debt/Asset	-0.729*** (0.158)	-0.735*** (0.161)	-0.754*** (0.163)	-0.731*** (0.160)	-0.750*** (0.163)
log size	0.232 (0.182)	0.229 (0.182)	0.251 (0.180)	0.224 (0.183)	0.246 (0.181)
log age	-2.254** (0.911)	-2.249** (0.912)	-2.500*** (0.908)	-2.901*** (1.072)	-2.922*** (1.065)
d log sales	0.395*** (0.091)	0.399*** (0.091)	0.406*** (0.090)	0.396*** (0.091)	0.404*** (0.090)
Enterprises Fixed Effects	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y
Observations	2,078	2,078	2,078	2,078	2,078
R-squared	0.259	0.260	0.264	0.261	0.265

Sources: Daegu city and NICE Credit Rating.

Overall, the impact of control variables on the interest coverage ratio is consistent with the predictions. In all specifications, an increase in debt relative to assets led to a significant decrease in the interest coverage ratio. For instance, when the debt-to-asset ratio increases by 1%, the interest coverage ratio decreases by 0.729% to 0.750%, and these estimates are statistically significant at the 1% level. This suggests that as debt

increases while other factors remain constant, the interest cost rises, leading to a reduction in the enterprise's debt repayment ability and a potential deterioration in financial stability. We find that the interest coverage ratio improves as the enterprise's cash flow or sales revenue increases. Additionally, a higher asset turnover ratio, indicating increased capital productivity, is associated with a substantial increase in

Table 10. The Impact of MSFs on ICR for SMEs (Information Asymmetry)

	[i]	[ii]	[iii]
Policy	0.023 (0.077)	0.176* (0.100)	0.090 (0.101)
Small*Young*Policy	0.301* (0.162)		0.262 (0.166)
Large*Old*Policy		-0.201 (0.126)	-0.136 (0.129)
log CF	0.104*** (0.026)	0.105*** (0.026)	0.103*** (0.026)
log Turn Over	1.002*** (0.332)	1.049*** (0.338)	1.014*** (0.333)
log Labor Intensive	-0.290* (0.154)	-0.290* (0.154)	-0.295* (0.155)
log Debt/Asset	-0.745*** (0.161)	-0.737*** (0.161)	-0.745*** (0.161)
log size	0.240 (0.180)	0.231 (0.183)	0.240 (0.181)
log age	-2.724*** (0.939)	-2.944*** (0.982)	-3.130*** (0.991)
d log sales	0.405*** (0.090)	0.397*** (0.091)	0.403*** (0.090)
Enterprises Fixed Effects	Y	Y	Y
Time Fixed Effects	Y	Y	Y
Observations	2,078	2,078	2,078
R-squared	0.264	0.262	0.264
Number of Enterprises	923	923	923

Notes: Refer to the main text for variable explanations.

the interest coverage ratio. For example, in all specifications, a 1% increase in the asset turnover ratio leads to approximately a 1% increase in the interest coverage ratio, and these estimates are statistically significant at the 1% level. Conversely, enterprises with higher labor intensity experience a decrease in the interest coverage ratio. For instance, in all models, a 1% increase in the proportion of labor costs to revenue results in a decrease in the interest coverage ratio by approximately 0.283% to 0.296%, and these estimates are statistically significant at the 10% level. These results indicate that businesses with a relatively high labor intensity may face challenges in maintaining financial stability.

Table 10 presents the estimation results of how much MSFs mitigate the problems due to asymmetric information. Overall, smaller enterprises and young enterprises, which experience relatively more information asymmetry, improved their interest coverage ratios through the support of MSFs (see model [i]). On the other hand, large-scale enterprises and old ones receiving MSFs experienced a decrease in their interest coverage ratios (refer to model [ii]). Model [ii] also indicates that, excluding enterprises with relatively low information asymmetry, MSFs improved the interest coverage ratios of others. These results suggest that MSFs have a positive impact on the interest coverage ratios for small and young enterprises.

3. MSFs and Distressed Enterprises

Table 11 presents the results of estimating the random-effects logistic regression equation (6) using the maximum likelihood method for the MSFs sample. Overall, MSFs have an effect of increasing the probability of enterprises that depend on policy funds to sustain their operation. Specifically, enterprises receiving MSFs have a higher likelihood of becoming distressed enterprises compared to those that do not, and these estimates are statistically significant at the 10% level. Additionally, when small enterprises receive MSFs, there is an increase in the probability of becoming distressed enterprises, although the estimates are not statistically significant.

Table 11. The Impact of MSFs on the Probability of Distressed Enterprise Occurrence

	[i]	[ii]	[iii]	[iv]	[v]
Policy		0.494* (0.272)	0.434 (0.286)	0.650** (0.307)	0.593* (0.313)
Small*Policy			0.234 (0.355)		0.335 (0.363)
Young*Policy				-0.360 (0.331)	-0.428 (0.339)
log CF	-0.211*** (0.051)	-0.215*** (0.051)	-0.218*** (0.051)	-0.215*** (0.051)	-0.218*** (0.051)
log Turn Over	-2.026*** (0.418)	-2.012*** (0.417)	-2.028*** (0.418)	-1.998*** (0.416)	-2.018*** (0.417)
log Labor Intensive	1.309*** (0.199)	1.314*** (0.199)	1.310*** (0.199)	1.311*** (0.199)	1.305*** (0.199)
log Debt/Asset	3.028*** (0.391)	2.991*** (0.391)	2.972*** (0.391)	3.006*** (0.392)	2.983*** (0.392)
log size	0.524*** (0.115)	0.517*** (0.114)	0.549*** (0.125)	0.514*** (0.115)	0.560*** (0.125)
log age	-0.565** (0.260)	-0.505* (0.261)	-0.495* (0.261)	-0.655** (0.296)	-0.670** (0.296)
d log sales	-1.142*** (0.212)	-1.104*** (0.212)	-1.096*** (0.212)	-1.120*** (0.212)	-1.111*** (0.212)
Enterprises Fixed Effects	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y
Observations	2,346	2,346	2,346	2,346	2,346
Number of Enterprises	989	989	989	989	989

Note: The equation (6) is estimated using a logistic regression model with random effects. Refer to the main text for variable explanations.

V. Conclusion

Our study is a rare attempt to empirically assess the effects of policy funds at the enterprise level using local government's loan data. To do this, we first examine the policy funds system and its current status. Subsequently, our study constructs a panel data based on loan information provided by Daegu city and combining it with corporate financial information from NICE credit rating agency. We then investigate the effects of Daegu city's SCEFs and MSFs on enterprises' investment and management stability, respectively. Our empirical analysis shows that SCEFs do not much contribute to alleviating financial constraints of SMEs in the Daegu region. However, MSFs contribute to improving management stabilization of relatively smaller and young enterprises of SMEs. On the other hand, our analysis identifies a potential side effect of MSFs prolonging the survival period of distressed enterprises.

Our empirical analysis is limited to enterprises that received support from Daegu city's policy funds. Nevertheless, it revitalizes the need for related research and can serve as a reference for future research on regional policy funds operations. In particular, it underscores the need for ongoing evaluations and research on the allocation and effects of regional policy funds in situations when the effectiveness of policy funds is uncertain.

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