

FEATURE ARTICLE





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AN EVALUATION OF THE IMPACT OF
ENTERPRISE SINGAPORE'S LOAN SCHEMES

INTRODUCTION

Enterprise Singapore's (ESG) loan schemes complement commercial lending and avail financing to local SMEs through the sharing of the risk of loss on loans. ESG currently partners 16 Participating Financial Institutions to deliver a suite of loan schemes.

Our study focuses on these loan schemes:

**SME Equipment Loan**

supports equipment financing for companies with higher risk profiles

**SME Micro Loan**

is a broad-based scheme that provides working capital financing for micro-enterprises

**SME Enhanced Micro Loan**

provides working capital financing for young micro-enterprises (less than 3 years old) as they often face difficulties in obtaining commercial loans due to a lack of track record and collateral

Between 2008 and 2015, around 1,000, 6,100 and 1,400 firms took up Equipment, Micro and Enhanced Micro Loans respectively.



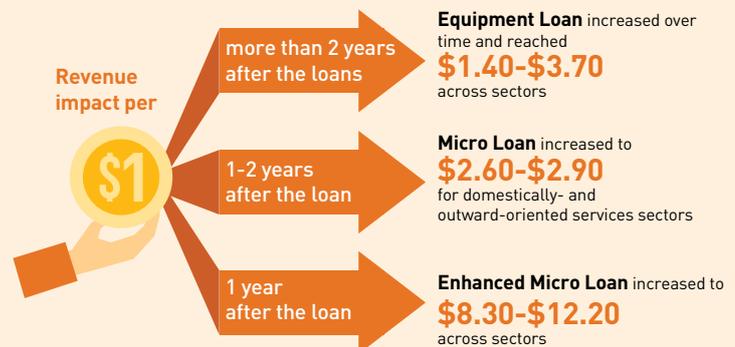
Between 2008 and 2015, around 1,300, 8,000 and 1,400 Equipment, Micro and Enhanced Micro Loans were taken up respectively.



FINDINGS

► FINDING 1

ESG's loans had a positive impact on firms' revenue, possibly by helping them with their working capital needs and hence allowing them to expand sales.



► FINDING 2

ESG's loans did not have a significant impact on the exit rate of firms.



EXECUTIVE SUMMARY

- Enterprise Singapore (ESG)'s loan schemes complement commercial lending and avail financing to local small- and medium-sized enterprises (SMEs)¹ through the sharing of the risk of loss on loans with participating financial institutions. This study evaluates the impact of three ESG loan schemes (viz. Equipment loans, Micro loans and Enhanced Micro loans) on the revenue and exit probability of firms that received loans under these schemes.
- Our findings show that ESG's loans had a positive impact on firms' revenue, possibly by helping them with their working capital needs and hence allowing them to expand sales. We also find that Enhanced Micro loans had the largest impact on the revenue of firms – on average, for each dollar of loan received, the revenue of firms increased by \$8.30 to \$12.20 one year after receiving the loan.
- In terms of exit probability, we find that ESG's loans did not have a significant impact on the exit rate of firms. This suggests that ESG's loans had not inadvertently prevented the exit of firms and inhibited the natural functioning of the market.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry or the Government of Singapore.²

INTRODUCTION

ESG's loan schemes complement commercial lending and avail financing to local small- and medium-sized enterprises (SMEs)¹ through the sharing of the risk of loss on loans with participating financial institutions. Specifically, the schemes encourage lending by financial institutions and assist deserving borrowers to gain access to financing by reducing the risk exposure of the lenders in areas where they are more risk averse or where they see minimal benefit based on the risk profile of borrowers. While ESG offers a suite of loan schemes, our study focuses on the Equipment, Micro and Enhanced Micro loan schemes.³

Equipment loans support equipment financing for companies with higher risk profiles, whereas the Micro loan scheme is a broad-based scheme that provides working capital financing for micro-enterprises.⁴ The Enhanced Micro loan scheme was introduced in 2014 to provide working capital financing for young micro-enterprises (less than 3 years old) as such enterprises often encounter difficulties in obtaining commercial loans due to a lack of track record and collaterals. Please refer to Annex A for the eligibility criteria of the three loan schemes.

Among the firms that received any of the three types of loans, the majority of them took up only one loan between 2008 and 2015 (Exhibit 1).⁵ Over this period, the Micro loan scheme saw the highest take-up at 8,000 loans, compared with 1,300 and 1,400 loans under the Equipment and Enhanced Micro loan schemes respectively (Exhibit 2).⁶

Given that ESG's loan schemes play an important role in addressing potential gaps in the market for loans, this study seeks to evaluate the impact of the schemes on the revenue performance of firms across sectors. Apart from the impact on revenue, the study also examines whether receiving an ESG loan inadvertently affected the probability of firm exit.

¹ Local SME is defined to have at least 30 per cent local shareholding, and not more than S\$100 million in group annual sales turnover or not more than 200 employees under the group.

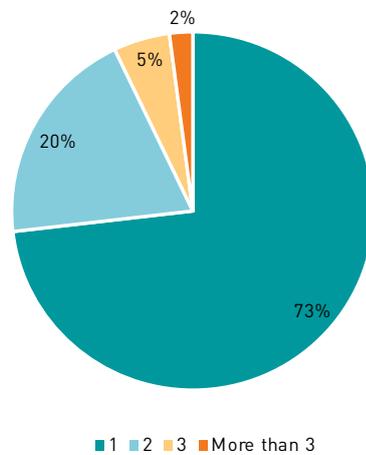
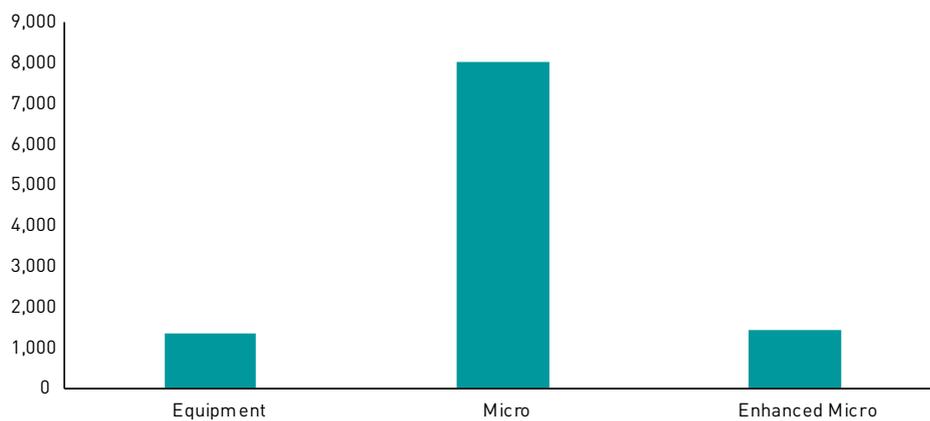
² We would like to thank Yong Yik Wei for her useful suggestions and comments. We are also grateful to Dennis Kuah and his team (Financing Ecosystem, ESG) for their inputs to this study. All remaining errors belong to the authors.

³ Other ESG loan schemes include SME Factory Loan, SME Working Capital Loan, SME Venture Loan, Internationalisation Finance Scheme (IFS) & Bridging Loan – Marine & Offshore Engineering, and Loan Insurance Scheme.

⁴ Micro-enterprises are defined to have not more than S\$1 million in company annual sales turnover or not more than 10 employees under the company.

⁵ Firms can take up multiple loans under the same scheme subject to a cap on the maximum loan quantum per firm.

⁶ As the Enhanced Micro loan was only introduced in 2014, the number of loans under the scheme was observed for only two years in the dataset compared with the eight years of observations for the other two schemes.

Exhibit 1: Distribution of Firms by Number of Loans Taken Up, 2008-2015*Exhibit 2: Number of ESG's Loans Taken by Loan Type, 2008-2015*

LITERATURE REVIEW

International studies on the impact of firm-level assistance programmes have found mixed results. For example, Ottaviano and Sousa (2009) examined the impact of loans by the Brazilian Development Bank and found that the loans had no effect on manufacturing firms' performance. On the other hand, Girma et al (2006) found that government grant provision in the manufacturing sector in Ireland had a positive impact on plant performance. In Singapore, Chua et al (2015) found that the ESG's Capability Development Grant, a financial assistance scheme that aims to help local firms build capabilities and become more competitive, improved firms' revenue by 9.3 per cent on average. Examining the impact of the Infocomm Media Development Authority's (IMDA) iSPRINT scheme, Poh and Li (2016) similarly found that it had a positive effect on the revenue of firms that adopted solutions under the scheme.⁷

⁷ The iSPRINT is a financial assistance scheme administered by IMDA that helps local SMEs to defray the costs of automating their business functions through information technology. The researchers found that for every 1 per cent increase in the project amount incentivised under iSPRINT, firms' revenue rose by 0.03 per cent on average.

DATA AND EMPIRICAL METHODOLOGY

Our study uses an anonymised dataset that tracks individual firms annually from 2008 to 2015. The dataset contains firm-level characteristics, such as the revenue, age and industry of the firm. The dataset also includes data pertaining to ESG's loan schemes,⁸ such as the type of loan taken up by the firm, the year in which the loan was taken, and the loan quantum.

Similar to other impact evaluation studies, selection bias is a key empirical concern that our study has to address in order to derive the causal impact of ESG's loan schemes.⁹ According to the data, firms that took up ESG's Equipment, Micro and/or Enhanced Micro loans had lower revenue, value-added¹⁰ and profits on average as compared to non-recipient firms (Exhibit 3).¹¹ Given that firms that received these ESG loans were inherently different from firms that did not, using the latter as a control group to evaluate the impact of ESG's loans would lead to biased results.

Exhibit 3: Characteristics of Firms That Received ESG's Equipment, Micro And Enhanced Micro Loans Compared To Those That Did Not

| Outcome Variable (per firm) | SMEs that did not receive ESG's loans | SMEs that received ESG's loans |
|-----------------------------|---------------------------------------|--------------------------------|
| | Average from 2010-2015 ¹² | Before first loan |
| Revenue (\$ million) | 22.0 | 1.6 |
| Value-added (\$ million) | 1.7 | 0.5 |
| Profits (\$ million) | 1.0 | 0.1 |

To overcome the issue of selection bias, we therefore restrict our sample to the 7,249 firms that had ever received loans from the three ESG loan schemes between 2008 and 2015. We then exploit differences in the timing of when these firms received the loans to evaluate the impact of the loans on their revenue over time. This empirical strategy essentially uses the firms that received ESG's loans later as the control group for those that did so earlier.¹³ By comparing changes in the revenue of the loan recipients after receiving the loan with the changes experienced by firms that had not yet taken up loans over the same period, we are able to isolate the causal impact of ESG's loan schemes.

In order to ensure that other firm-level differences that could affect firms' revenue are controlled for in our analysis, we also include firm fixed-effects as well as time dummies in our regressions. Including firm fixed-effects would remove the impact of time-invariant firm-level characteristics on the revenue of firms, while the inclusion of time dummies would remove the influence of macroeconomic factors.

⁸ Only the ESG loan schemes that existed during the period 2008 to 2015 are covered in our dataset. Besides the Equipment, Micro and Enhanced Micro loans, the dataset includes the SME Factory loans and the Bridging Loan Programme (BLP) loans. The BLP was introduced as a temporary measure during the 2009 Global Financial Crisis.

⁹ See Angrist and Pischke (2009) for a discussion on the selection problem and econometric methods to overcome it.

¹⁰ Value-added is measured as the sum of profits and remuneration in this study.

¹¹ The majority of the loans covered in our dataset are the Micro and Enhanced Micro loans, which are targeted at local micro-SMEs.

¹² This time period is chosen to exclude the impact of the Global Financial Crisis on the performance of firms.

¹³ This is the same empirical strategy adopted in Chua et al's (2015) evaluation of the Capability Development Grant.

Specifically, we adopt the following regression equation to estimate the causal impact of ESG's loans on firms' revenue over time:

$$Y_{it} = \sum_j \alpha_{1j} \text{eqp}_{it} + \sum_j \alpha_{2j} \text{micro}_{it} + \sum_j \alpha_{3j} \text{enhmicro}_{it} + \beta X_{it} + \gamma_i + \theta_t + \varepsilon_{it} \quad (1)$$

Where:

- Y_{it} is the revenue of firm i in time t ;
- X_{it} denotes other firm characteristics, including firm's age, as well as indicators on the receipt of other ESG loans over the period (i.e., Factory loans or Bridging Loan Programme loans);
- eqp_{it} , micro_{it} , enhmicro_{it} are indicator variables that take on a value of 1 once firm i receives the first Equipment, Micro and Enhanced Micro loan respectively;
- α_j are indicator variables for each of the following three time periods: the year that the firm received the loan, one to two years after the loan, and more than two years after the loan;
- γ_i denotes the firm time-invariant fixed effects;
- θ_t is a vector of year dummies that captures effects that are common to all firms in the specific year; and
- ε_{it} is the error term that is assumed to be uncorrelated with the independent variables in all time periods.

The coefficients of interest in the above regression are α_{1j} , α_{2j} and α_{3j} , as they measure the effects of ESG's loan schemes on firms' revenue over time.

To estimate the effect of ESG's loans on firms' exit probability,¹⁴ we further run the following random effects probit regression:

$$\text{Exit}_{it} = P(\text{eqp_sum}_{it}, \text{micro_sum}_{it}, X_{it}, \gamma_i, \theta_t) \quad (2)$$

Where:

- Exit_{it} is a dummy variable that takes on a value of 1 from the year firm i exits;
- eqp_sum_{it} , micro_sum_{it} are the cumulative amounts of Equipment and Micro loans that firm i received up to year t respectively;¹⁵ and
- All other variables are as defined in equation (1).

For both equations (1) and (2), separate regressions are conducted for firms in the manufacturing, construction, domestically- and outward-oriented services sectors.¹⁶

RESULTS AND DISCUSSION

Our findings suggest that receiving an ESG loan has a positive and significant impact on the revenue of firms (Exhibits 4, 5 and 6). This is in line with the policy intent of helping firms with their working capital needs, which would in turn allow the firms to expand their sales.

Specifically, the revenue impact per \$1 of Equipment loan increased over time and reached \$1.40-\$3.70 on average for firms across all sectors more than two years after the receipt of the loan (Exhibit 4).¹⁷ Similarly, the revenue impact per \$1 of Micro loan increased to \$2.60-\$2.90 on average for firms in domestically- and outward-oriented services sectors after one to two years of receiving the loan, before dipping slightly in subsequent years (Exhibit 5). Given that Enhanced Micro loans were only introduced in 2014, we could only study the revenue impact of Enhanced Micro loans up to one year after the receipt of the loan (Exhibit 6). We find that the revenue impact per \$1 of Enhanced Micro loan increased to \$8.30-\$12.20 for firms across all sectors after one year, significantly larger compared to the impact of the other two loan schemes.

¹⁴ Firms are assumed to have exited if they were not observed in the last two years in our dataset.

¹⁵ Enhanced Micro loan was not included in this analysis as it was only introduced in 2014.

¹⁶ Domestically-oriented services sectors refer to construction, retail trade, food services, other business services, and other services industries.

Outward-oriented services sectors refer to manufacturing, wholesale trade, transportation & storage, accommodation, information & communications, finance & insurance, and professional services.

¹⁷ Regression coefficients were converted to per dollar terms by dividing the coefficients for each loan type by the average loan amounts in the respective sectors.

Exhibit 4: Revenue Impact Per Dollar of Equipment Loan Over Time, by Sector

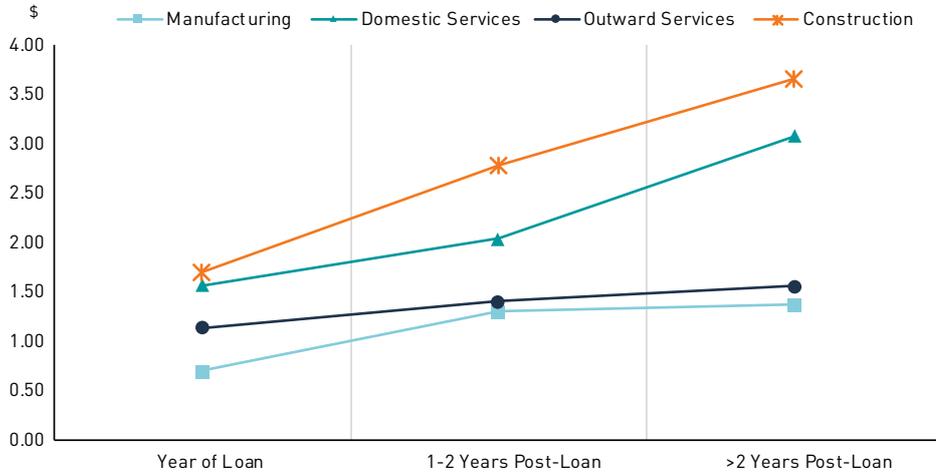
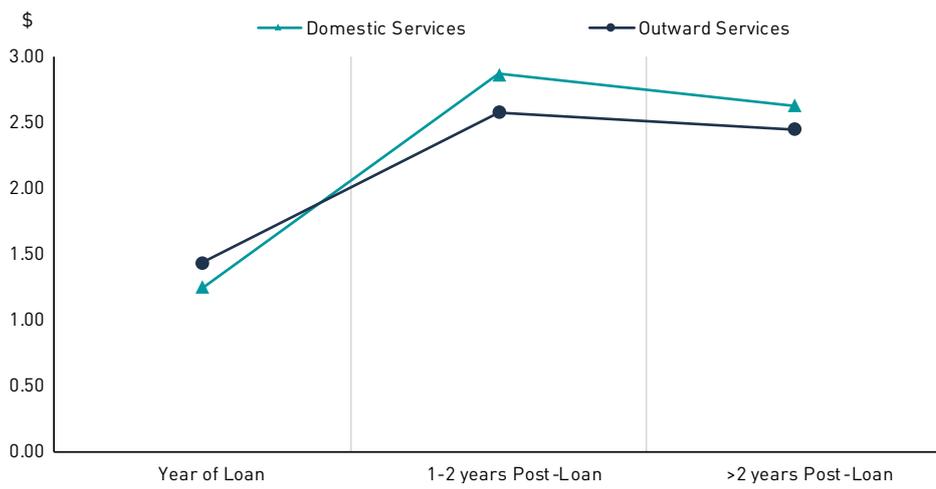
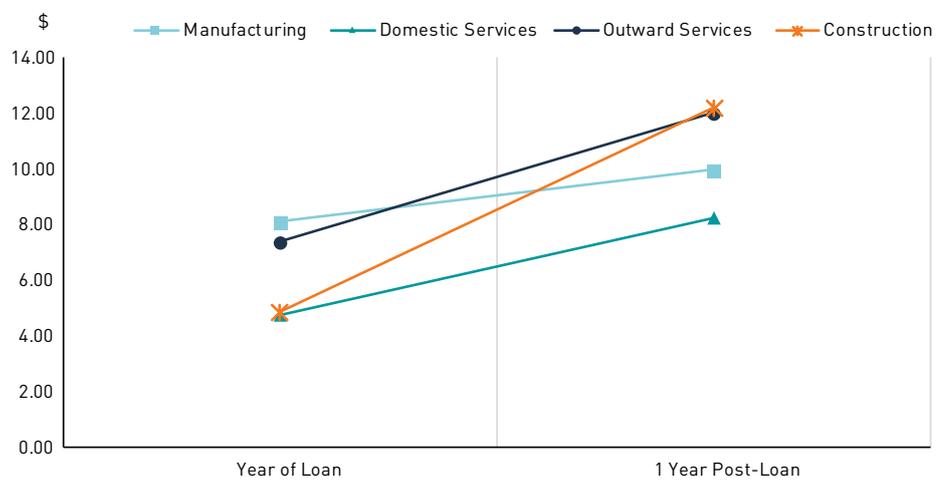


Exhibit 5: Revenue Impact Per Dollar of Micro Loan Over Time, by Sector*



* For firms in the manufacturing and construction sectors, the revenue impact of the Micro loan was positive but statistically insignificant.

Exhibit 6: Revenue Impact Per Dollar of Enhanced Micro Loan Over Time, by Sector



In terms of the effect of ESG's loans on the probability of firms' exit, we find that Equipment loans and Micro loans did not have a significant impact on the exit probability of firms across all sectors. This suggests that ESG's loans had not inadvertently prevented the exit of firms and thus inhibited the natural functioning of the market.

CONCLUDING REMARKS

In summary, this study finds that ESG's loans (specifically the Equipment, Micro and Enhanced Micro loans) had a positive impact on firms' revenue, possibly by helping them with their working capital needs and hence allowing them to increase sales. Enhanced Micro loans had a significantly larger impact on firms than the other two loan schemes one year after the receipt of the loans. This suggests that the Enhanced Micro loans are an important source of support for young micro-enterprises, which may require the additional credit to expand sales as they traditionally face greater difficulties in obtaining commercial loans. In terms of the revenue impact over time, Equipment loans were found to have a more sustained longer-term effect on firms as compared to Micro loans, suggesting that the additional fixed capital acquired had enabled firms to generate a revenue stream over time. Finally, our findings show that ESG's loans did not have a significant impact on the exit rate of firms.

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ANNEX A: ELIGIBILITY CRITERIA FOR ESG'S LOAN SCHEMES COVERED IN STUDY

| Loan Terms | | | | | |
|---------------------|---|---------------|------------------|--------------------------------|-------------------------------|
| Loan Type | Firm Size | Loan Tenure | Risk Sharing | Max Loan Quantum (Per Company) | Additional Criteria |
| Enhanced Micro Loan | <10 employees or annual sales < \$1 million | Up to 4 years | 70% Gov; 30% PFI | \$100,000 | Must be less than 3 years old |
| Micro Loan | <10 employees or annual sales < \$1 million | Up to 4 years | 50% Gov; 50% PFI | \$100,000 | - |
| Equipment Loan | Full SME criteria | Up to 8 years | 50% Gov; 50% PFI | \$15 million | Up to 90% financing ratio |

Note: The following SME Criteria are applicable for ESG's loan schemes:

1) Incorporated & operating in Singapore; and

2) At least 30 per cent Local Shareholding; and

3) Company's Group Annual Sales of not more than S\$100 million or company's Group Employment Size of not more than 200 staff.