FEATURE ARTICLE

IMPACT EVALUATION OF SPRING'S CAPABILITY DEVELOPMENT GRANT SCHEME

BACKGROUND

The Capability Development Grant (CDG) scheme supports SMEs in building their capabilities and enhancing their competitiveness...

BUILDING CAPABILITIES

ENHANCING COMPETITIVENESS

... by defraying up to 70% of qualifying project costs for initiatives in 10 project areas

Brand & Marketing Strategy Development

Business Excellence

Business Strategy Innovation

Financial Management

Productivity Improvement

Service Excellence

Technology Innovation

Enhancing Quality & Standards

Intellectual Property & Franchising

Human Capital Development

Between 2005 and 2012, around 1,200 firms have tapped on the CDG to complete 1,904 projects

around **1,200** firms

1,904 projects

HAVE COMPLETED

FINDINGS

The overall impact of the CDG scheme on firms' revenue was positive and statistically significant. On average, as compared to pre-treatment periods, firms' revenues were 9.3% higher after joining the CDG scheme

CDG

9.3% increase in revenues

RESULTS IN

The Productivity Improvement projects had the largest impact of 12.4% on firms' revenue, compared to 7.8% for Technology Innovation projects and an average of 6.7% for the remaining 8 project areas

12.4%

7.8%

6.7%

PRODUCTIVITY IMPROVEMENT

TECHNOLOGY INNOVATION

OTHER PROJECT AREAS
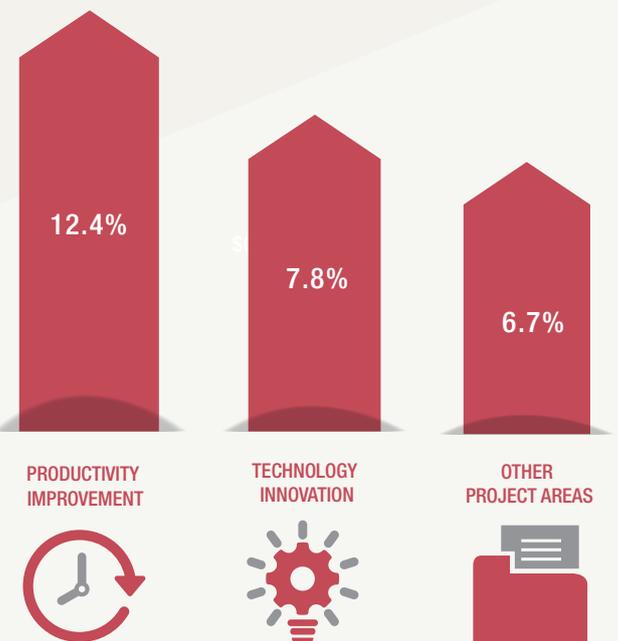
EXECUTIVE SUMMARY

- The Capability Development Grant (CDG) scheme is a financial assistance programme administered by SPRING that aims to help local firms, especially small- and medium-sized enterprises (SMEs), build capabilities and become more competitive. This study evaluates the impact of the scheme on the revenue of firms that participated in the scheme.

- Our findings show that firms' revenues were, on average, 9.3 per cent higher after embarking on projects supported by the CDG scheme. Across the various project areas, productivity improvement projects were found to have the largest impact on revenue, at 12.4 per cent on average, compared to 7.8 per cent for technology innovation projects and 6.7 per cent for other types of projects.

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.[1]

INTRODUCTION

The Capability Development Grant (CDG) scheme is a financial assistance programme administered by SPRING that aims to help local firms, especially small- and medium-sized enterprises (SMEs), build capabilities and become more competitive. Currently, the CDG scheme helps firms to develop capabilities across 10 project areas by defraying up to 70 per cent of the qualifying project costs.[2] On top of financial assistance, SPRING also works with CDG firms to understand the areas for improvement and scope the projects based on their needs. Between 2005 and 2012, around 1,200 firms completed a total of 1,904 projects under the CDG scheme. Of the completed projects, the majority were technology innovation and productivity improvement projects (Exhibit 1).[3]

Given that the CDG scheme is one of the key financial assistance schemes targeted at SMEs in Singapore, this study seeks to evaluate the impact of the scheme on the revenue performance of firms. Apart from quantifying the overall impact of the CDG scheme, the study also examines whether the effectiveness of the scheme varies across different project development areas.

Exhibit 1: No. of Successfully Completed CDG Projects, by Project Development Areas
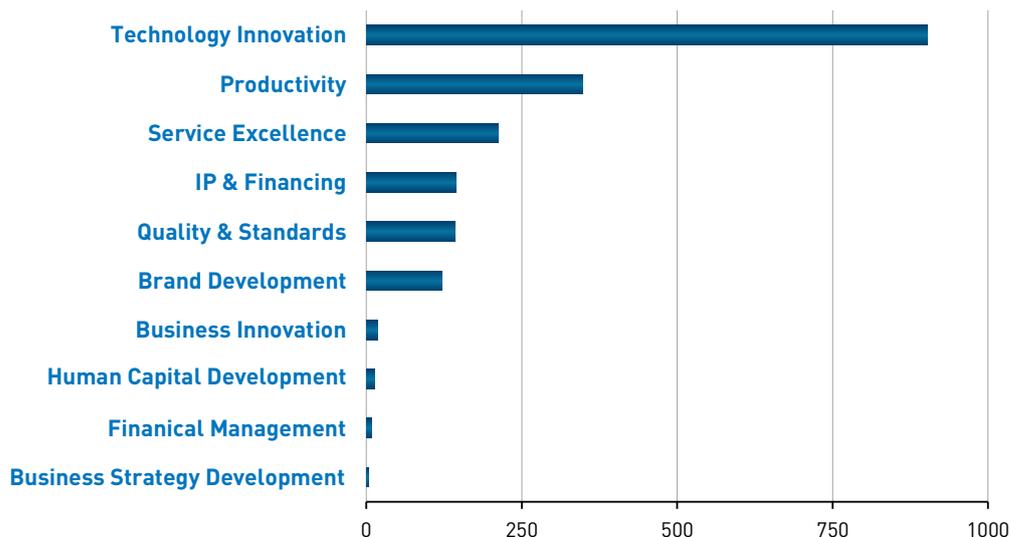
[2] SPRING's enhanced funding support of up to 70 per cent would be effective for three years until 31 March 2018.

[3] Other project areas include: Service Excellence, Intellectual Property and Financing, Quality and Standards, Brand Development, Business Innovation, Human Capital Development, Financial Management and Business Strategy Development. Refer to Exhibit A1 in Annex A for the description of each development area.

LITERATURE REVIEW

In the literature, a key empirical issue that studies evaluating the impact of firm-level assistance programmes have to address is that of selection bias. This is because participation in such programmes is typically not random, with firms likely to self-select into the programmes based on factors that cannot be observed in the data, such as the presence of better managers. To the extent that these unobservable characteristics of firms also affect the firm-level outcomes that the studies are trying to quantify, a comparison of the outcomes of assisted and unassisted firms would lead to biased results. For instance, if firms that participate in an assistance programme are better managed than the firms that do not participate, the difference in outcomes between the two groups may be due to differences in managerial quality rather than the programme itself.

Using a variety of econometric methods to overcome the selection bias problem, studies overseas have found mixed results in terms of the impact of firm-level assistance programmes on SMEs.[4] For example, a UK study on a programme that provides advisory and support services (e.g., referral and brokerage) to SMEs found that the programme had no impact on sales[5], while another UK study on a programme that provides direct consultancy services suggested a sales impact of up to 10 per cent per annum for mid-sized SMEs[6].

DATA AND EMPIRICAL METHODOLOGY

Our study uses an anonymised dataset that tracks individual firms annually from 2001 to 2013. The dataset contains firm-level characteristics, such as the revenue of the firm, the remuneration paid out by the firm, and the industry in which the firm is in. The dataset also includes data pertaining to SPRING's CDG scheme, such as the project development area and the year of CDG grant application for individual projects undertaken by the firms.

Like other studies overseas, a key empirical issue that our study has to address in order to quantify the causal impact of the CDG scheme is that of selection bias. Using propensity score matching (PSM), we compare firms who participated in the CDG scheme with similar firms that did not, and find that CDG firms exhibited different revenue trends, especially during and after the economic downturn in 2008/9 (Exhibit 2). The resilience of the CDG firms during the recession suggests that there may be unobservable quality differences between the two groups of firms. As such, a simple comparison of the revenue of the firms that participated in the CDG scheme with that of firms that did not could overstate the impact of the scheme.

Exhibit 2: Unobservable quality differences remain between CDG and non-CDG firms despite application of the PSM methodology
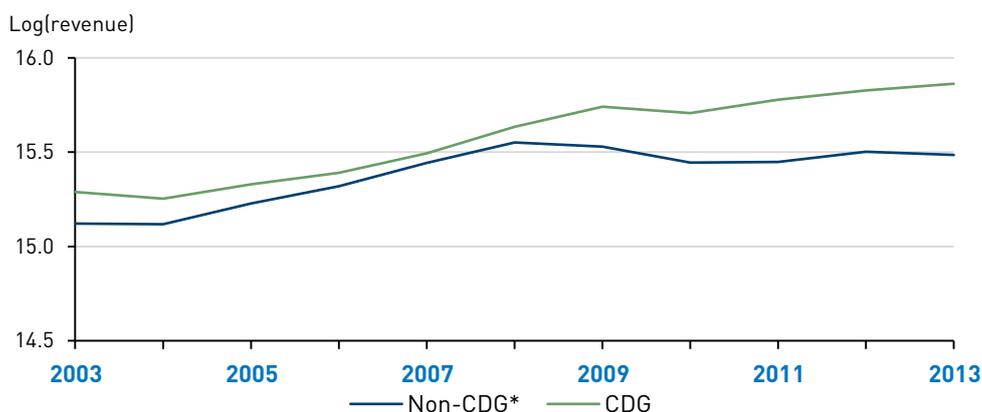
*Non-CDG firms are control firms formed by one of the PSM specification.

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[4] *See Angrist and Pischke (2009) for a formal discussion of the selection problem and econometric methods to overcome it.*

[5] *See Mole, Hart, Roper, Saal (2008) for details.*

[6] *See Wren and Storey (2002) for details.*

To overcome this selection bias, we restrict our sample to the 1,200 firms that had embarked on projects under the CDG scheme between 2005 and 2012. We then exploit differences in the timing of when they embarked on the projects to evaluate the impact of the CDG scheme on their revenue. In essence, this empirical strategy uses the firms that embarked on projects under the CDG scheme later as the control group for those that did so earlier. By comparing changes in the revenue of the firms after they had embarked on the projects, with the changes experienced by firms in the control group, we are able to isolate the causal impact of the scheme.

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 firm-level linear time trends in our regressions. The former would help to remove the effect of time-invariant firm-level characteristics on the revenue of firms, while the latter would account for variations in revenue trends that may arise due to age or product cycle differences between firms.

To determine whether the above empirical strategy is valid, we conduct a parallel trends test to examine whether the revenue trends of firms that embarked on projects under the CDG scheme earlier were similar to those that embarked on projects later. Exhibit 3 below shows that there are no statistically significant differences in revenue trends in the three years before participation in the CDG scheme across the various cohorts of firms. This suggests that our empirical approach is valid.

Exhibit 3: Regression Results for Parallel Trend Test

Dependent variable: Log(revenue)	
3 years before CDG	-0.0348
2 years before CDG	-0.0126
1 year before CDG	0.0341
Year effects	Yes
Industry*year interaction	Yes
Firm-fixed effects	Yes
Firm time trends	Yes
R-squared	0.66
Number of observations	12,661

*, ** and *** indicate significance at the 90%, 95%, and 99% levels, respectively.

Notes: The CDG variables listed above are 3 dummy variables. These dummy variables take on a value of 1 in each of the 3 years before participation in the CDG scheme.

We next run the following regression to tease out the causal impact of the CDG scheme on firms' revenue:

$$Y_{it} = \beta_0 + \beta_1 CDG_{it} + \alpha SME_{it} + \gamma_t + \gamma_t * X_i^{Industry} + \delta_i + trend_{it} + \varepsilon_{it} \qquad (1)$$

Where:

Y_{it} is the log revenue of firm i in time t;

CDG_{it} is a dummy variable that takes on a value of 1 from the year that firm i participates in the CDG scheme, and 0 otherwise;

SME_{it} is a dummy variable that takes on a value of 1 if the firm is an SME in time t, and 0 otherwise[7];

γ_t is a vector of year dummies that captures effects that are common to all firms in the specific year;

$\gamma_t * X_i^{Industry}$ is a vector of year dummies interacted with industry type to capture different industry business cycles;

δ_i denotes the firm time-invariant fixed effects;

$trend_{it}$ is a firm-specific linear time trend to capture firm-level differences in revenue trends; and

ε_{it} is the error term assumed to be uncorrelated with the independent variables in all time periods.

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[7] SPRING defines SMEs as firms that have annual sales turnover of not more than S$100 million and/or employment size of not more than 200 workers. As our dataset does not capture information on the employment size of firms, we define the SME status for the firms in our study using the revenue criteria.

The coefficient β_1 is the coefficient of interest. It measures the average change in the revenue of the firms in the years after they had embarked on a project under the CDG scheme.

To further investigate if the impact of the CDG scheme varies across project areas, we run a similar regression specification as equation (1), except that the treatment dummy variable is replaced with dummy variables that denote the specific project development area for each project that the firm participates in:

$$Y_{it} = \beta_0 + \beta_1 Prod_{it} + \beta_2 Tech_{it} + \beta_3 Others_{it} + \alpha SME_{it} + \gamma_t + \gamma_t * X_i^{Industry} + \delta_i + trend_{it} + \varepsilon_{it} \tag{2}$$

Where:
> $Prod_{it}$ is a dummy variable that takes on a value of 1 from the year that firm i takes part in a productivity improvement project , and 0 otherwise;
> $Tech_{it}$ is a dummy variable that takes on a value of 1 from the year that firm i takes part in a technology innovation project, and 0 otherwise;
> $Others_{it}$ is a dummy variable that takes on a value of 1 from the year that firm i takes part in a project in one of the other 8 project areas, and 0 otherwise[8]; and
> All other variables are as defined in equation (1).

RESULTS AND DISCUSSION

Our findings suggest that participation in the CDG scheme has a positive and significant impact on the revenue of firms (Exhibit 4). These findings are robust to the inclusion of variables that control for macroeconomic factors, industry business cycles and firm-level revenue trends. In the most stringent specification (Column (3) in Exhibit 4), we find that the impact of CDG on firms' revenue was 9.3 per cent. This means that the revenue of firms increased by 9.3 per cent on average after embarking on projects supported by the CDG scheme.

Exhibit 4: Regression Results

Dependent variable: Log(revenue)			
	(1)	(2)	(3)
CDG_{it} (β_1)	0.607***	0.153***	0.093***
Year effects	No	Yes	Yes
Industry*year interaction	No	Yes	Yes
Firm-fixed effects	No	Yes	Yes
Firm time trends	No	No	Yes
R-squared	0.14	0.26	0.66
Number of observations	12,661	12,661	12,661

*, ** and *** indicate significance at the 90%, 95%, and 99% level, respectively.

In terms of the impact by project areas, we find that projects in all areas had a positive impact on firms' revenue, although the magnitude of the impact varied across the areas (Exhibit 5). Specifically, productivity improvement projects were found to have the largest impact on firms' revenue, at 12.4 per cent on average, compared to 7.8 per cent for technology innovation projects and 6.7 per cent for projects in the remaining eight project areas.

[8] The remaining eight development areas have been pooled together because of small sample sizes.

Exhibit 5: Impact of Different CDG Project Areas on Firms' Revenue

Dependent variable: Log(revenue)	
Productivity Improvement (β_1)	0.124***
Technology Innovation (β_2)	0.078**
Others (β_3)	0.0672*
Year effects	Yes
Industry*year interaction	Yes
Firm-fixed effects	Yes
Firm time trends	Yes
R-squared	0.66
Number of observations	12,661

*, ** and *** indicate significance at the 90%, 95%, and 99% level, respectively.

One concern with the results above is that the CDG grants could have been reported by firms as revenue in their income statements, thus artificially inflating their revenue and hence the estimated impact. We therefore conduct robustness checks by deducting the grant amount received by each firm from its revenue, and repeat the regression analysis using the reconstructed dependent variable. We find that the results are robust to this adjustment. Although the estimated impact of the CDG scheme on firm revenue is now lower, it remains positive and statistically significant at 6.7 per cent.

CONCLUSION

In summary, this study finds that the CDG scheme has been effective in helping firms to raise their revenue, with firms that embarked on productivity-related projects under the scheme enjoying the largest increase in revenue. This suggests that SMEs will benefit from tapping on the CDG scheme to upgrade their capabilities and streamline their business processes. Going forward, as part of the wider national effort to boost productivity in Singapore, SPRING will continue to support firms, particularly SMEs, through the CDG and other productivity-related schemes.

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ANNEX A: CDG DEVELOPMENT AREAS

Exhibit A1: 10 Development Areas of the CDG Scheme

Brand & Marketing Strategy Development	Raise your company's profile, emphasise your value proposition and take your brand global
Business Strategy Innovation	Use a structured approach to convert knowledge and ideas into new or improved products, processes, services or business models to gain a competitive advantage
Business Excellence	Improve your management systems for better organisational performance
Enhancing Quality Standards	Adopt standards to improve your processes, raise competitiveness, enhance business credibility and enter new markets
Financial Management	Improve your financial management capabilities and better manage your financial resources
Human Capital Development	Invest in human capital and put in place strategies to attract, develop and retain your talents
Intellectual Property & Franchising	Protect your intellectual property to safeguard your business and gain a competitive advantage
Productivity Improvement	Improve workflow processes and optimise resource allocation to maximise productivity
Service Excellence	Enhance service delivery and adopt service innovation to delight your customers
Technology Innovation	Strengthen your technology innovation capabilities to improve your product and services