



## MEASURING BDC'S IMPACT ON ITS CLIENTS From BDC's Economic Research and Analysis Team



**July 2013**

### INCLUDED IN THIS REPORT

This report is based on a Statistics Canada analysis that assessed the impact of the Business Development Bank of Canada's (BDC) financing and consulting services. It provides an objective and quantifiable comparison of the performance of BDC clients with that of non-clients. The findings are based on key performance indicators, such as growth in sales, employment, productivity and profit, and business survival rates.

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## Executive summary

As Canada's development bank, BDC offers financing and consulting services with the goal of accelerating the success of entrepreneurs. While clients are surveyed on an annual basis regarding the value they perceive in the services provided, BDC wanted an independent, quantifiable assessment of whether its financing and consulting services actually helped accelerate the success of entrepreneurs. To do this, BDC commissioned Statistics Canada to measure its impact on clients between 2001 and 2010.

Statistics Canada developed a longitudinal database of BDC clients (the "study group") and non-clients (the "comparison group") and then compared their performance in each year over the period. Both groups were similar in terms of age, employment, assets, debt ratio, profit margin, revenues, industry and geographic location. Statistics Canada used statistical regressions to test a series of hypotheses (see Appendix) related to BDC's influence on the business performance of its clients. It used five performance indicators: clients' growth in sales, employment, productivity and profits, as well as their survival rates over the years after receiving BDC financing and/or consulting services.

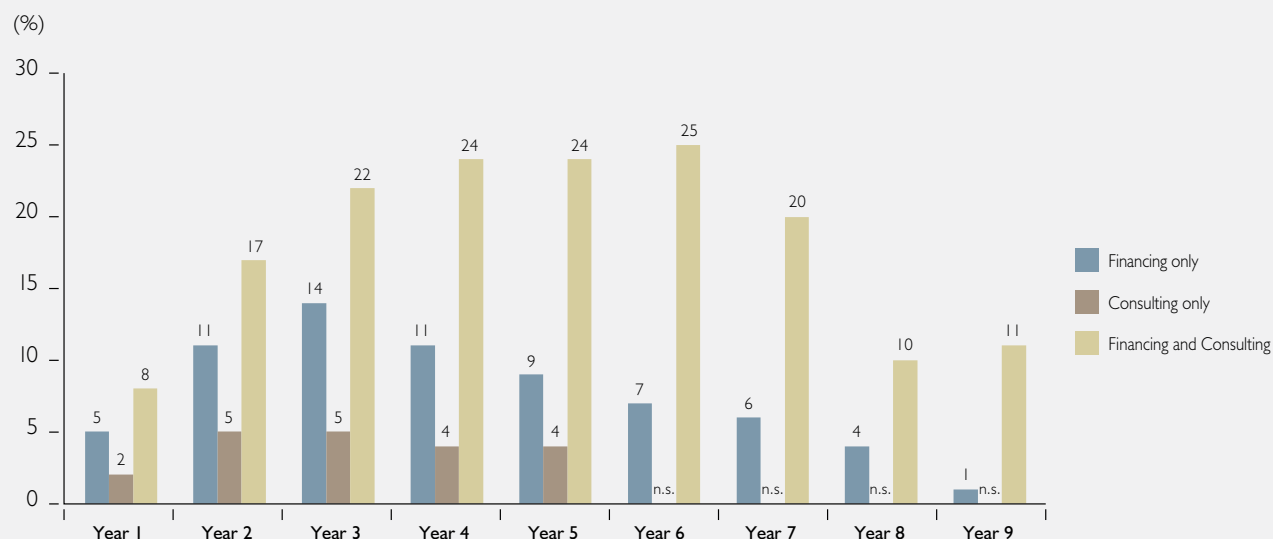
The statistical analysis revealed that BDC had a positive impact on all five performance indicators, particularly when both financing and consulting services were used.

### *BDC clients surpassed non-clients in sales growth*

- > Sales growth among BDC financing clients was 1% to 14% higher than that of non-clients over the period.
- > Sales growth among BDC consulting clients was 2% to 5% greater than that of non-clients for the first five years after receiving consulting services. There was no difference following this period.
- > BDC clients who used both financing and consulting services performed better, with sales growth of 8% to 25% greater than that of non-clients.

## Financing and Consulting clients

Difference in sales growth between BDC clients and non-clients (%)<sup>1</sup>



### *BDC clients surpassed non-clients in employment growth*

- > Employment growth among BDC financing clients was 1% to 4% higher than that of non-clients for the first six years after receiving financing.
- > Employment growth among BDC consulting clients outpaced that of non-clients by 2% to 6% in the first three years after receiving consulting services. After this, the difference was not statistically significant.
- > Clients who used both financing and consulting performed better on the employment front. In the first six years after receiving consulting and financing services, their employment growth was 8% to 14% higher than that of non-clients.

### *BDC clients surpassed non-clients in productivity growth*

- > Productivity<sup>2</sup> growth among BDC financing clients was 1% to 2% higher than among non-clients for the first four years after financing.
- > The analysis showed no difference in productivity growth between BDC consulting clients and non-clients.
- > BDC clients who received both financing and consulting services experienced 4% to 13% higher productivity growth than non-clients, except in Year 9 when it was 5% lower.

<sup>1</sup> The percentage indicates the difference in sales growth between BDC clients and non-clients for each specific year. For example, in the fifth year following financing (Year 5), BDC clients sales growth was on average 9% higher than non-clients for that specific year.

<sup>2</sup> Since detailed data on prices and output were not available, Statistics Canada measured the ratio of sales to employment as a proxy for labour productivity of clients and non-clients

*BDC clients have similar profit growth as non-clients*

- > Profits grew 3% more among BDC financing clients than non-clients in the second, third and sixth years after they received financing. In other years, there was no difference between the two groups.
- > In the first year after receiving consulting services, BDC clients had 5% lower profit growth than non-clients. For the following years, there was no difference in profit growth between the study and comparison groups.
- > Profit growth among BDC clients who received both financing and consulting services did not differ significantly from non-clients.

*The survival rate of BDC clients was higher than non-clients*

- > The survival rate of BDC financing and consulting clients was slightly higher than that of non-clients over the period. The survival rate of BDC financing clients was 0.8% to 5.9% higher, and the survival rate of BDC consulting clients was 0.5% to 5.4% higher.

## Introduction

BDC is Canada's business development bank. From more than 100 business centres across the country, BDC promotes entrepreneurship by providing highly tailored financing, venture capital and consulting services to entrepreneurs.

In October 2011, BDC commissioned Statistics Canada to provide objective statistical analysis of the business performance of BDC clients versus non-clients. The intent was to measure the impact of BDC financing and consulting services delivered to clients from 2001 to 2010.

To perform this analysis, Statistics Canada developed a longitudinal database of BDC clients (the "study group") and non-BDC clients (the "comparison group"). Both groups were similar in terms of age, employment, assets, debt ratio, profit margin, revenues, industry and geographic location. Statistics Canada then used statistical regressions to test several hypotheses (see Appendix) related to BDC's influence on the business performance of its clients. It used five performance indicators: clients' growth in sales, employment, productivity and profits, as well as their survival rates, over the years following receipt of BDC financing and/or consulting services.

The study compares performance indicators for the two groups in each year after BDC clients received financing and/or consulting services. For example, results for Year 5 represent a snapshot of the performance of BDC clients and non-clients in that year.

This report summarizes the results of Statistics Canada's data analysis. The first section shows the impact of BDC on clients that received only financing services. The second section demonstrates the impact of BDC on clients that received only consulting services. The third section presents the impact of BDC on clients that received both financing and consulting services. The Appendix presents information on the methodology used by Statistics Canada to perform the statistical analysis.

## 1.0 Impact of BDC financing on clients

This section presents detailed results regarding the impact of BDC on the economic performance of clients that received financing from 2001 to 2009 (the financing “study group”), compared with the performance of non-clients (the financing “comparison group”).

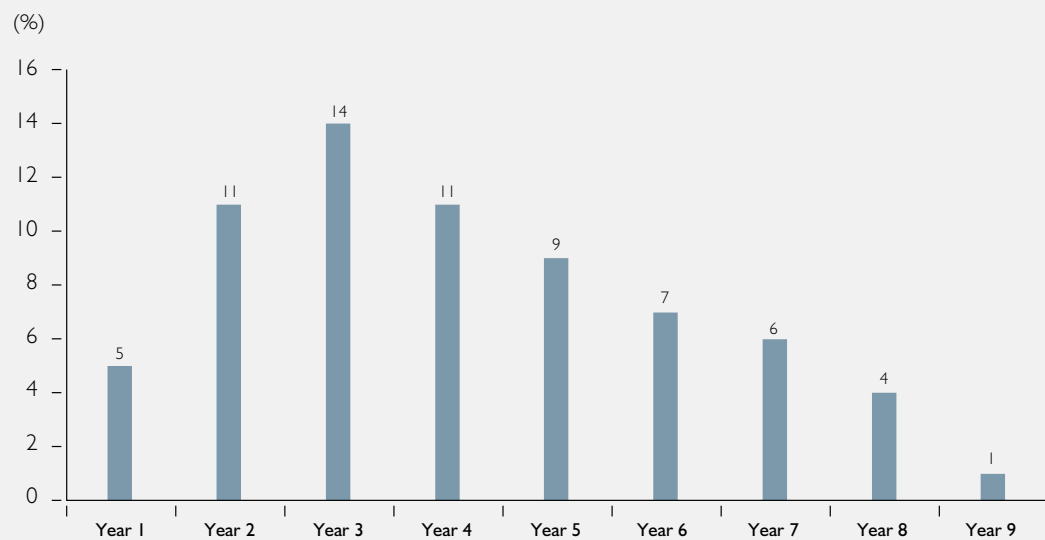
### 1.1 Impact on sales

Statistical results show that clients that obtained BDC financing outperformed non-clients in terms of annual sales growth. In the first year following financing, their annual sales growth was 5% higher, on average, than that of non-clients. In the second year, their annual sales growth was 11% higher, and 14% higher in the third year. After this, BDC clients continued to outperform non-clients, but the gap began to decrease. These results are shown in Figure 1.

Figure 1

#### Financing clients

Difference in sales growth between BDC clients and non-clients (%)<sup>3</sup>



<sup>3</sup> The percentage indicates the difference in sales growth between BDC clients and non-clients for each specific year. For example, in the fifth year following financing (Year 5), BDC clients sales growth was on average 9% higher than non-clients for that specific year.

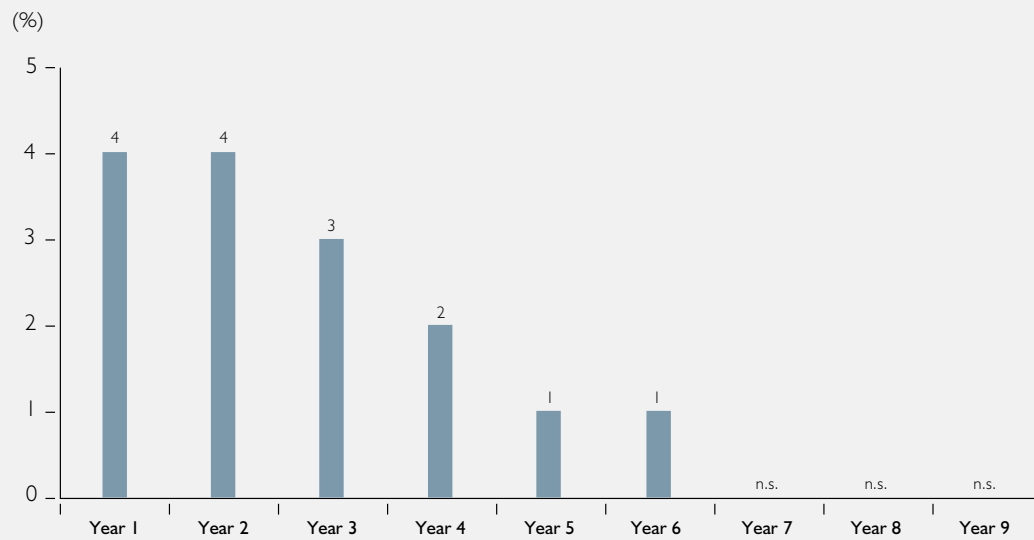
## 1.2 Impact on employment

Results from Statistics Canada's analysis show that BDC financing had a positive impact on employment growth. During the six years after receiving BDC financing, clients added more jobs than non-clients did. The greatest impact was in the first and second years following financing, when employment growth was 4% higher, on average, for the study group. In the third year, employment growth among clients was still higher than that among non-clients, but the difference began to decrease. From the seventh to the ninth year following financing, there was no statistically significant difference in employment growth<sup>4</sup> between the two groups (see Figure 2).

Figure 2

### Financing clients

Difference in employment growth between BDC clients and non-clients (%)



<sup>4</sup> "n.s." means that the difference estimated between BDC clients and non-clients is not statistically different from zero.



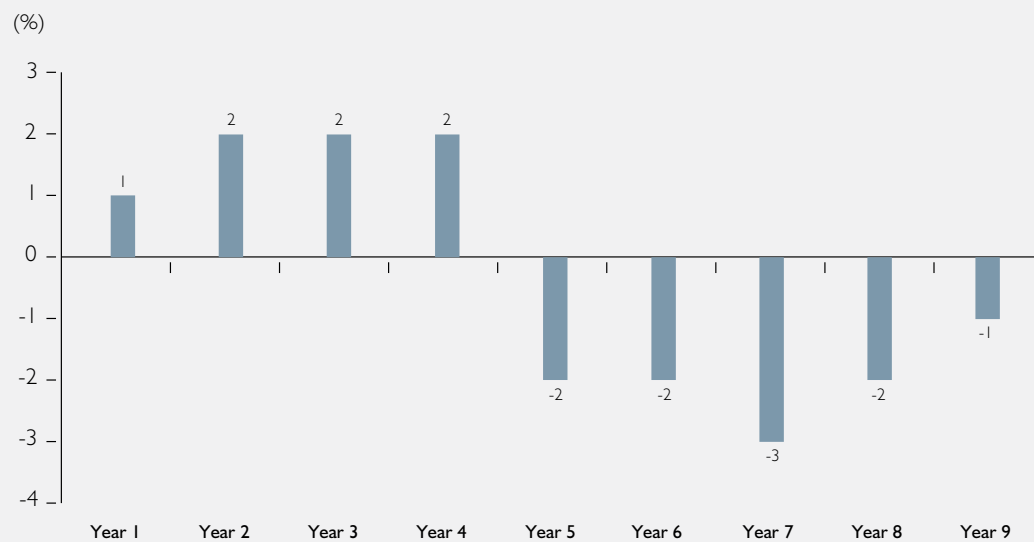
### 1.3 Impact on productivity

Statistics Canada measured the productivity of clients and non-clients by using the ratio of their sales to employment.<sup>5</sup> The empirical results show that the study group had a slightly higher rate of productivity growth than the comparison group for each of the three years after clients received financing. After one year, the annual productivity growth rate among BDC clients was 1% higher, on average, than that of similar enterprises. In the second, third and fourth years, the average annual productivity growth rate was 2% higher. In the fifth year and beyond, productivity growth among non-clients outperformed that of BDC clients (see Figure 3).

Figure 3

#### Financing clients

Difference in productivity growth (sales to employment) between BDC clients and non-clients (%)



<sup>5</sup> Statistics Canada used this proxy due to the lack of data on prices, quantity of output and quality of output (the measures usually used to calculate productivity).

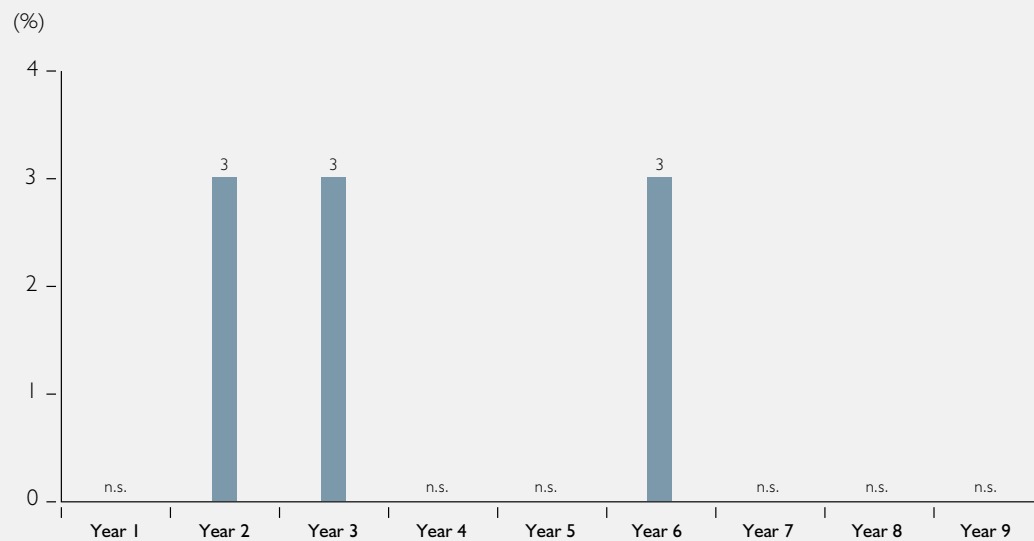
## 1.4 Impact on profits

While the annual growth in profits for clients did not differ significantly from that of businesses in the comparison group one year after receiving financing, their annual growth in profits was 3% higher in the second, third and sixth years. The difference in profit growth was not significant for the other periods (see Figure 4).

Figure 4

### Financing clients

Difference in profit growth between BDC clients and non-clients (%)



From these results, it appears that the impact of BDC's intervention on the profitability of its clients took at least one year to materialize and that BDC clients outperformed non-clients during three periods only. Nevertheless, BDC clients performed as well as or better than non-clients with regard to profit growth.

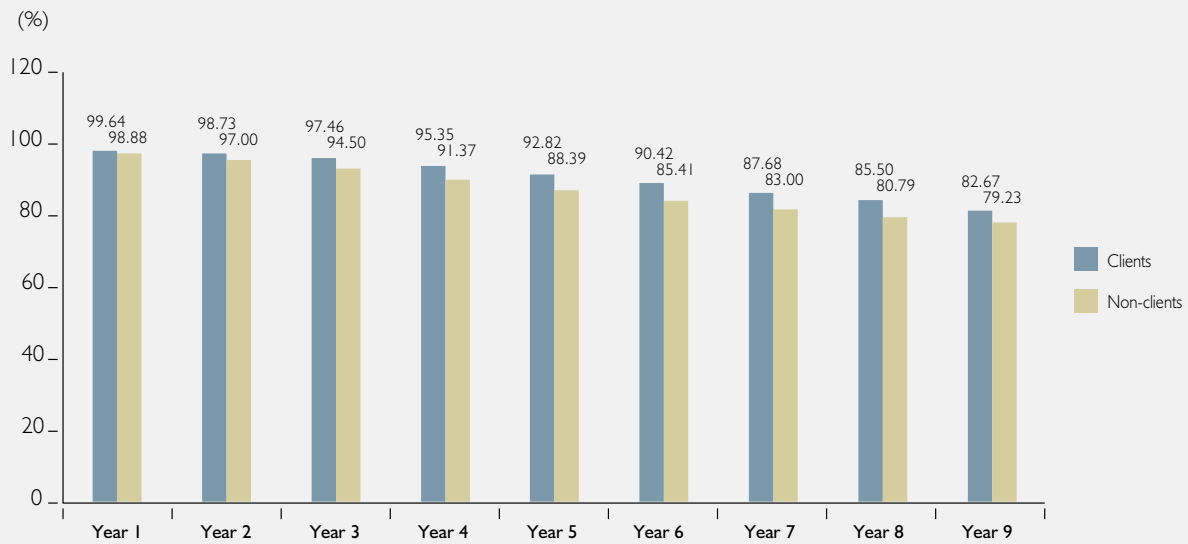
## 1.5 Impact on business survival

Firms included in this study were at various stages of development, from start-up to maturity. The statistical analysis showed that survival rates were very high for both the study and comparison groups. However, BDC clients survived at a slightly higher rate than non-clients (0.8% to 5.9% higher) (see Figure 5).

Figure 5

### Financing clients

Survival rates of BDC clients and non-clients (%)



## 2.0 Impact of BDC consulting on clients

This section presents detailed results regarding the impact of BDC on the economic performance of clients that received consulting services from 2000<sup>6</sup> to 2009 (the consulting “study group”), compared with the performance of non-clients (the consulting “comparison group”).

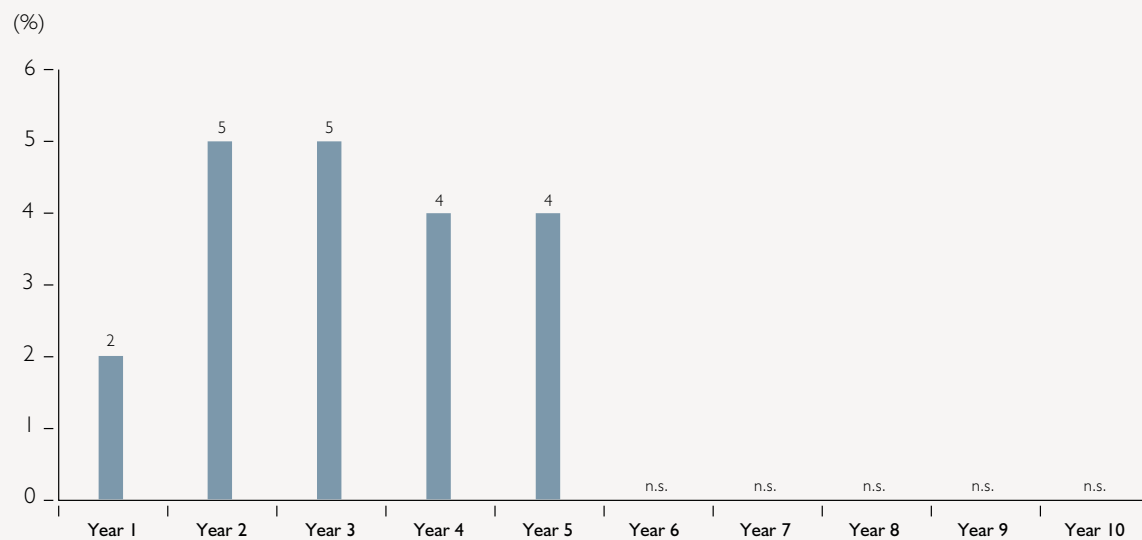
### 2.1 Impact on sales

According to Statistics Canada's analysis, enterprises that used BDC consulting services exhibited higher sales growth than did similar enterprises that were not clients. In the first year after BDC clients received consulting support, their sales growth was 2% higher, on average, than that in the comparison group. It then rose to be 5% higher, on average, in the second and third years, and 4% higher in the fourth and fifth years. The difference between the two groups was not statistically significant in the remaining years (see Figure 6).

Figure 6

#### Consulting clients

Difference in sales growth between BDC clients and non-clients (%)



<sup>6</sup> Since the BDC database was smaller in the case of consulting, the analysis performed on BDC consulting clients contains the 2000 cohort as well. Therefore, the analysis was performed over 10 years instead of 9 years.

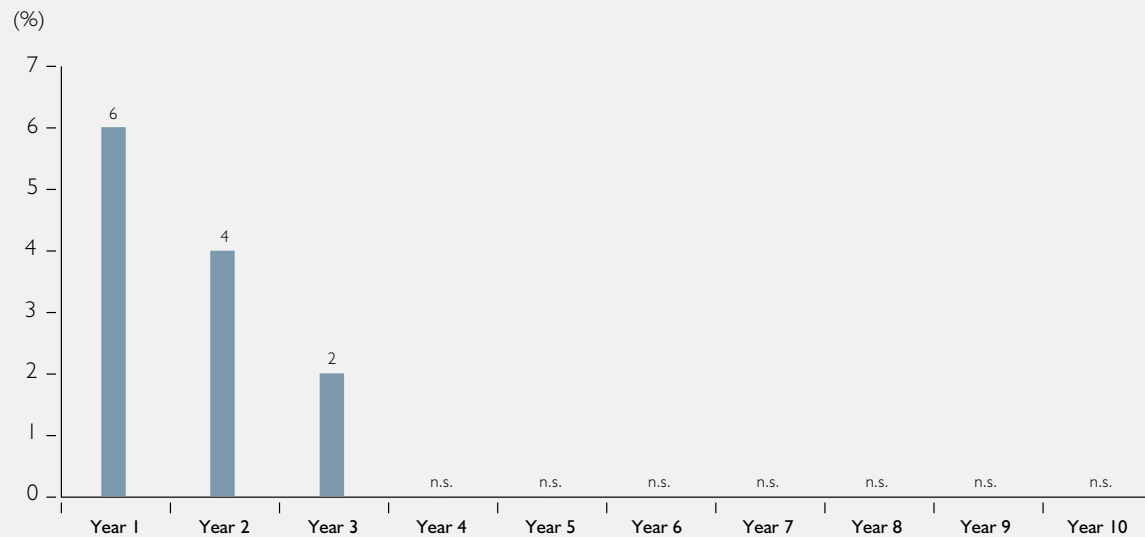
## 2.2 Impact on employment

In the year after receiving consulting services, employment among BDC clients grew 6% more than it did among non-clients; it grew by 4% more in the second year and by 2% more in the third year. In the following years, there was no statistically significant difference in employment growth between clients and non-clients (see Figure 7).

Figure 7

### Consulting clients

Difference in employment growth between BDC clients and non-clients (%)



## 2.3 Impact on productivity

The analysis of productivity growth showed no statistical differences between the study group and the comparison group.

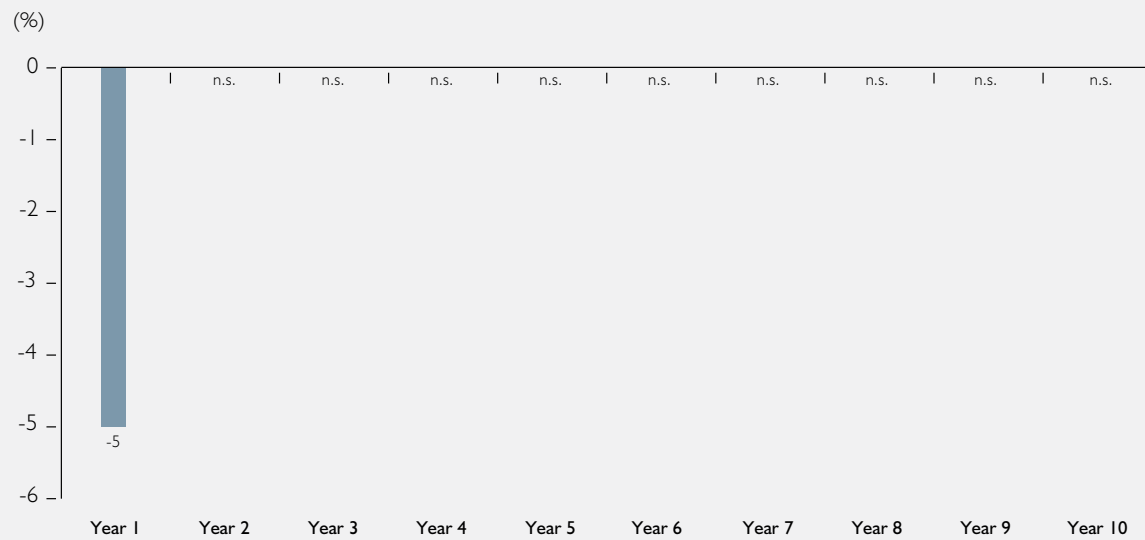
## 2.4 Impact on profits

In the first year after receiving BDC consulting services, clients had 5% lower profit growth, on average, than did non-clients. However, this gap disappeared in the following years, and no significant difference was found between the two groups.

Figure 8

### Consulting clients

Difference in profit growth between BDC clients and non-clients (%)



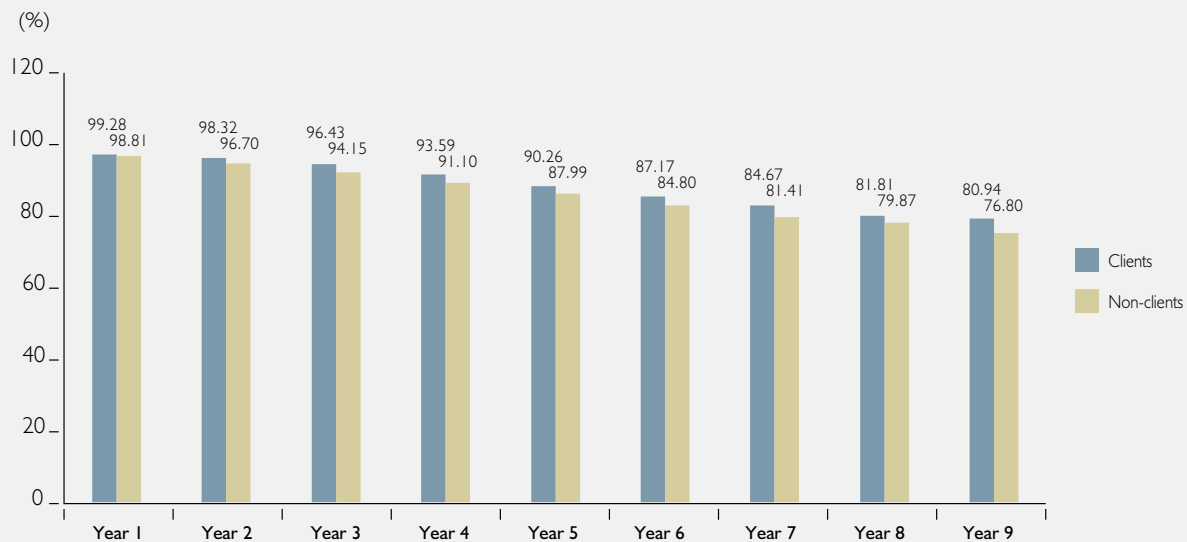
## 2.5 Impact on business survival

Like BDC financing clients, BDC consulting clients had a 0.5% to 5.4% higher survival rate over the period. The data in Figure 9 are based on the average survival rates in each time period.<sup>7</sup>

Figure 9

### Consulting clients

Survival rates of BDC clients and non-clients (%)



<sup>7</sup> Statistics Canada removed the BDC 2000 cohort because the survival rate of this cohort was significantly higher than that of the other cohorts, suggesting that the 2000 cohort was not representative. Therefore, 9 periods instead of 10 are shown in Figure 9.

### 3.0 Impact of combined consulting and financing on clients

Statistics Canada also analyzed a group of BDC clients that received both financing and consulting services to determine whether they differed from non-clients with regard to sales, employment, productivity and profit growth. The results show that enterprises using both BDC services saw an even greater difference in performance than enterprises that used only financing services.

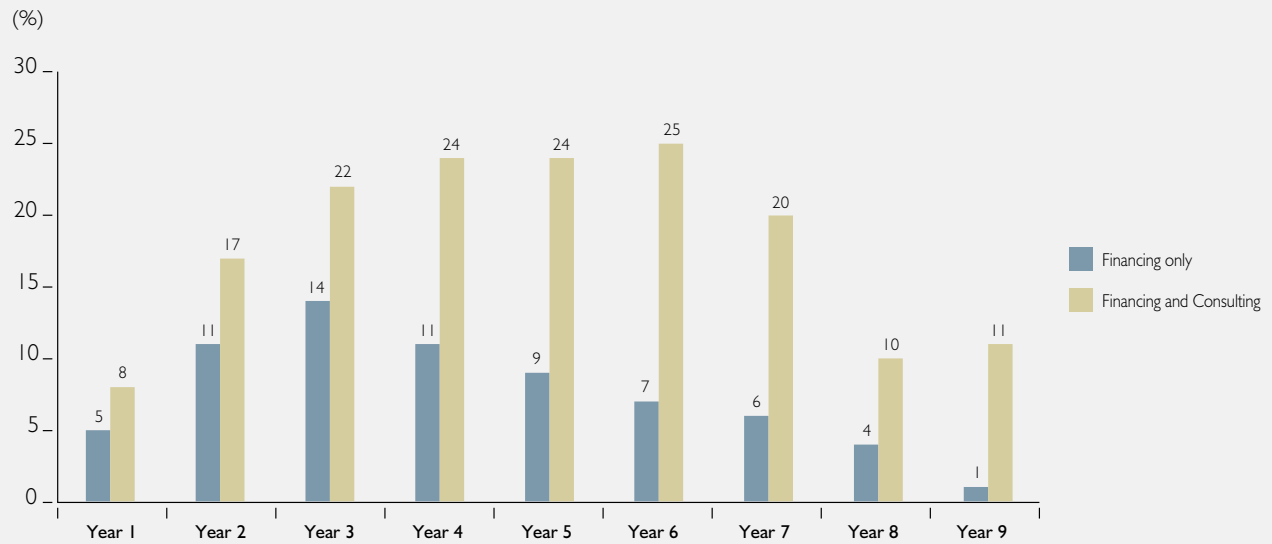
#### 3.1 Impact on sales

For example, one year after receiving financing, BDC financing clients experienced sales growth that was 5% higher, on average, than sales growth in the comparison group. However, clients that also received consulting services saw sales growth that was 8% higher than that in the comparison group. In the second and third years, clients that received both services experienced annual sales growth that was 17% and 22% higher, respectively, than sales growth among non-clients, with the difference peaking at 25% in the sixth year. The difference then decreased but remained significantly higher over all periods (see Figure 10).

Figure 10

#### Financing and Consulting clients

Difference in sales growth between BDC clients and non-clients (%)





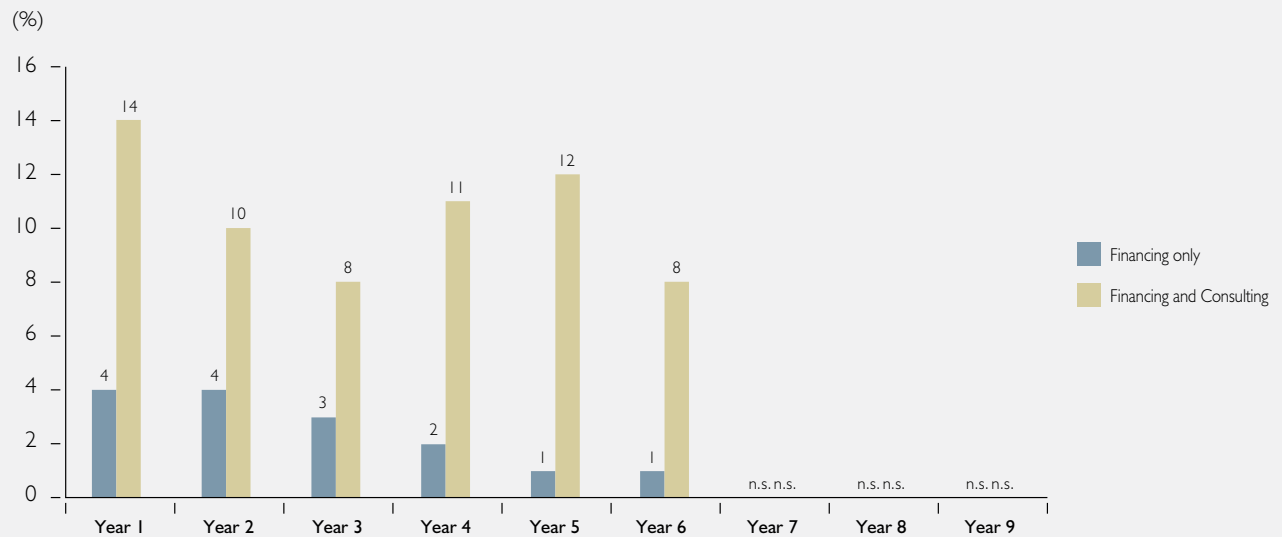
### 3.2 Impact on employment

The addition of consulting also improved employment growth. Indeed, clients that used both financing and consulting services experienced, after one year, employment growth that was 14% higher than that among the comparison group—10 percentage points higher than for clients that used only financing. This positive impact continued to be felt in the second through sixth years. After that, the difference between the study and comparison groups was not significant (see Figure 11).

Figure 11

#### Financing and Consulting clients

Difference in employment growth between BDC clients and non-clients (%)



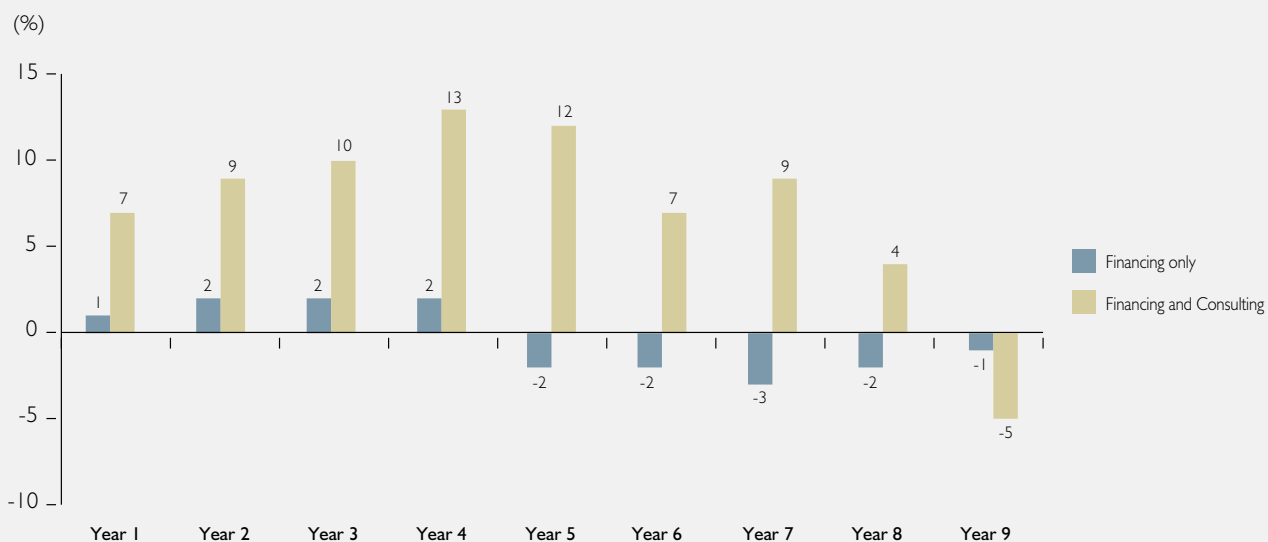
### 3.3 Impact on productivity

Statistics Canada's empirical analysis also showed that combined financing and consulting services had a much greater impact on productivity than financing alone. After one year, BDC financing clients' productivity growth was 1% higher than the comparison group's, while the productivity growth of clients using both financing and consulting was, on average, 7% higher than the comparison group's. This gap increased over the following years to reach 13% in the fourth year, and then tended to decrease. In the 9<sup>th</sup> year, productivity growth of BDC financing and consulting clients was 5% lower than the comparison group (see Figure 12).

Figure 12

#### Financing and Consulting clients

Difference in productivity growth (sales to employment) between BDC clients and non-clients (%)



### 3.4 Impact on profits

We observed previously that while BDC's impact on profit growth was not statistically significant in the first year following financing, it was positive in the second, third and sixth years (see Figure 4). Empirical results show that adding consulting to financing services did not have a statistically significant impact on the profit growth of BDC financing clients. However, profit growth for clients who benefited from both financing and consulting was on a par with businesses in the comparison group.

## 4.0 Other findings

When analyzing the entire business database, Statistics Canada made the following observations.

- > For both the BDC group and the comparison group, sales and employment growth were stronger for younger enterprises than for older enterprises. In other words, there was a negative correlation between the age of the firm and the speed at which it was growing.
- > No significant difference in performance was observed between rural and urban firms.
- > Similarly, no significant difference in business performance was found between geographic regions, between exporters and non-exporters, or between firms that performed R&D and those that did not. The fact that exporting and R&D appeared to make no difference may be due to the relatively small sample of firms carrying out those activities. A more in-depth analysis of a bigger sample size would be needed to definitively quantify the difference in business performance.

## Conclusion

One of the key findings of this study is the positive impact that the combination of financing and consulting has had on the growth of sales, employment and productivity among BDC clients. Statistics Canada's analysis shows that small and medium-sized firms that received both these services experienced 8% to 25% higher annual sales growth, 8% to 14% higher employment growth, and 4% to 13% higher productivity growth (with the exception of the 9th year when productivity growth was lower) than non-clients in the comparison group. BDC financing and consulting clients also survived at greater rates than non-clients did. The results regarding BDC's impact on the profit growth of its clients are more nuanced. Generally, BDC clients did not outperform non-clients in that regard.

As a result of this study, BDC has been able to identify areas where it can improve its service offerings. BDC is currently making a significant effort to ensure small and medium-sized firms can more easily access complementary financing and consulting services that suit their needs and help them achieve their full business potential. We expect to see the results of these improvements when we measure BDC's impact on its clients in the future.

## Appendix: Statistics Canada's methodology

This study measured the economic impact of BDC on the performance of enterprises that used its financing and consulting services compared with similar enterprises that did not. This section presents the methodology Statistics Canada developed to determine whether BDC influenced its clients' sales, employment, productivity and profit growth, as well as their survival rate.

The analysis was conducted in two phases. The first phase consisted of creating a longitudinal database of enterprises by linking the list of BDC financing and consulting clients with various Statistics Canada databases to create the "study group" (composed of BDC financing and consulting clients) and the "comparison group" (non-clients with similar characteristics). The second phase consisted of using statistical regressions to test hypotheses that business performance among BDC clients was better than that among non-clients, to determine whether BDC improved clients' performance and, if so, by how much.

### Record linkage and databases creation

In the first phase, the BDC databases of financing and consulting clients were matched with Statistics Canada's Business Register (BR).<sup>8</sup> A sophisticated approach was used to match BDC records to BR records. Statistics Canada proceeded with detailed and rigorous procedures to ensure the validity, consistency and reliability of the record linkage results. Matched records were reviewed and filtered to retain only enterprises with valid and complete information on the key variables that were used, in the next phase, to create the comparison group. The variables are the following: industry (according to the North American Industry Classification System or NAICS), region, number of employees, total revenues, operating profit margin, total assets and debt ratio. This process yielded a final sample for the study group of 18,161 records pertaining to clients of BDC financing services (39% of the initial 45,953 records) and 5,107 records pertaining to clients of BDC consulting services (35% of the initial 14,376 records).<sup>9</sup>

The selection of the comparison records was done using the nearest-neighbour approach, as measured by their relative distance from the study records in terms of all the matching variables mentioned above (industry, region, total revenues, number of employees, operating profit margin, total assets and debt ratio) plus one variable related to the age of the enterprise.

Finally, records from both the study and the comparison groups were integrated and linked to time series data from administrative files, including tax records. Specifically, all records were linked to the following administrative datasets:

- > The Corporate Income Tax file (T2), which contains financial information on incorporated enterprises;
- > The Payroll Deduction file, which contains information on employees and employers;
- > The Export Register, which is comprised of information on Canadian enterprises engaged in exports;
- > The Research and Development in Canadian Industries Dataset, which contains information on enterprises that perform research and development.

<sup>8</sup> The Business Register (BR) is the central repository of information on businesses in Canada and is used as the principal frame for the economic statistics program of Statistics Canada. It provides business data by industrial classification, revenue, number of employees and total assets.

<sup>9</sup> A comparison of matched versus unmatched records was performed and it was found that there was no statistical difference between the matched and unmatched populations.

## Impact analysis

In the second phase, Statistics Canada used this full database of BDC clients and non-clients to compare the business performance over time of BDC-supported enterprises with that of non-BDC supported enterprises. It followed the study and comparison groups longitudinally from 2001 to 2010 and covered the reference years (i.e., the years the financing and/or consulting services were delivered) from 2001 to 2009.<sup>10</sup> Since the impact of BDC services may not have been evident during the reference years, the following lead structure was used to study the impact of BDC services for the reference years:

t = 2001: L [t +1, t+2, t+3, t+4, t+5, t+6, t+7, t+8, t+9]  
 t = 2002: L [t +1, t+2, t+3, t+4, t+5, t+6, t+7, t+8]  
 t = 2003: L [t +1, t+2, t+3, t+4, t+5, t+6, t+7]  
 t = 2004: L [t +1, t+2, t+3, t+4, t+5, t+6]  
 t = 2005: L [t +1, t+2, t+3, t+4, t+5]  
 t = 2006: L [t +1, t+2, t+3, t+4]  
 t = 2007: L [t +1, t+2, t+3]  
 t = 2008: L [t +1, t+2]  
 t = 2009: L [t +1]

A series of impact analyses were conducted by Statistics Canada in order to determine whether BDC clients outperformed comparable non-clients in terms of growth in sales, employment, productivity and profits. Survival rates of the businesses in each group were also compared.

### **Hypothesis H1: Compared to SMEs who did not receive financial services from BDC, clients of BDC financing services exhibited the following:**

- a. Higher growth in sales a year after having received the services and over subsequent years.
- b. Higher growth in employment a year after having received the services and over subsequent years.
- c. Higher growth in productivity (as approximated by the growth of the ratio of total sales to total employment) a year after having received the services and over subsequent years.
- d. Higher growth in operating profits a year after having received the services and over subsequent years.
- e. Higher business survival rates a year after having received the services and over subsequent years.

<sup>10</sup> Since BDC database was smaller in the case of consulting, the analysis performed on BDC consulting clients contains the 2000 cohort as well. Therefore, the analysis was performed over 10 years instead of 9 years.

**Hypothesis H2: Compared to SMEs who did not receive consulting services from BDC, clients of BDC consulting services exhibited the following:**

- a. Higher growth in sales a year after having received the services and over subsequent years.
- b. Higher growth in employment a year after having received the services and over subsequent years.
- c. Higher growth in productivity (as approximated by the growth of the ratio of total sales to total employment) a year after having received the services and over subsequent years.
- d. Higher growth in operating profits a year after having received the services and over subsequent years.
- e. Higher business survival a year after having received the services and over subsequent years.

The hypothesized relationships between the dependent variables (or outcomes of interest) and the explanatory variables (or controls) can be illustrated by the following equation:

$$y_{i,t} = g(BDC_{i,t}, X_{i,t-L}, Z_{i,t}, D_i, e_{i,t})$$

where	y	represents the outcome of interest (e.g. growth in sales, growth in employment);
	BDC	is a binary variable for BDC services, where BDC = 1 if the enterprise received the services, 0 otherwise;
	X	denotes a set of explanatory variables, which includes sales, employment count, operating profit margin, cost of goods sold (COGS), exports, and current assets and liabilities;
	Z	represents the age of the business;
	D	denotes a set of dummy variables for the industry codes and urban/rural; and
	e	denotes the error term.

The subscripts *i* denotes the enterprise, *t* is the reference year and *L* is the lead period that varies from 1 to 10. Among the explanatory variables, the binary variable for BDC services is kept fixed at the first year of assistance, while other explanatory variables are allowed to vary with the lead period, keeping them one year behind the period for which the impact is assessed. These lags allow for the isolation of more recent impacts of these explanatory variables on the outcome of interest.

## Limitations of this methodology

The analyses conducted by Statistics Canada were very thorough and followed strict and systematic procedures. Statistics Canada experts are confident that they provided reliable statistical evidence to support evaluations of the impact of BDC financing and consulting services on key business performance indicators. However, as pointed out in technical reports provided by Statistics Canada, the analyses present some limitations. They can be summarized as follows:

1. A sizable number of BDC enterprises could not be matched with comparable non-clients due to a problem of **missing data**, which was particularly severe among clients who received consulting assistance. Various factors contributed to this missing data problem. For instance, a significant portion of the records had missing values in key variables and so could not be matched or used for the regression analyses. Procedures were undertaken by Statistics Canada to determine whether the matched enterprises differed from the unmatched enterprises in terms of their business demographic and economic profiles. No statistically significant difference between the matched and unmatched populations was found. It follows that the matched enterprises can be considered as representative of the entire population, and that inferences drawn about the matched records can be generalized to the unmatched records.
2. Potential bias could have arisen because of the **heterogeneity in the frequency of BDC assistance**. Included in the original BDC datasets were clients that received assistance (either financing or consulting) only once, those that received multiple assistances within one year and those that received successive assistances over more than one year. Enterprises that received multiple instances of assistance within the first period of intervention were reduced to one, and subsequent records of interventions were removed from the dataset. This heterogeneity in the frequency of assistance could potentially bias estimates of the impact of BDC services on business performance.
3. Two selection mechanisms could have led to **self-selection biases**. Excluded from the study group dataset are (i) SMEs that were aware of BDC services, applied for assistance but did not meet BDC eligibility criteria to receive assistance; and (ii) SMEs that were not even aware of BDC services. This means that estimates generated by the resulting dataset may be biased.