LOW-INTENSITY R&D AND CAPITAL BUDGETING DECISIONS IN IT FIRMS

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ABSTRACT

This paper investigates the extent to which formal capital budgeting methods are used in small high-tech firms. We define high-tech firms by their R&D intensity. In addition, we define software industry as a special type of R&D-intensive firm. We focus on the methods that are used by the small high-tech firms in evaluating the profitability of investment projects, estimating the cost of capital and making decisions related to the capital structure. Our results based on two surveys of Finnish firms indicate that the high-tech firms use similar capital budgeting methods and estimate their cost of capital in a similar way to other small-sized firms in other industries. Moreover, high-tech firms seek external financing and co-owners.

1. INTRODUCTION

In the accounting literature, much research effort has been devoted to the investigation of the investment and financing decisions of the firm. There are two main issues involved in capital budgeting decisions, i.e. the decision

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which investment projects should be accepted and how the accepted projects should be financed. A large number of methods are available for the evaluation of the profitability of the investment projects, and the firm has to choose the most appropriate to its purpose. A contingency theory assumes that firm characteristics such as size of the firm affect the firm's decision in choosing method. On the other hand, the life-cycle theory (e.g. Miller & Friesen, 1983, 1984; Churchill & Lewis, 1983; Greiner, 1972) suggests that firms at the same stage of their life-cycle use similar methods to evaluate investment proposals.

Empirical research has attempted to identify the factors that affect the firm's choice of investment evaluation method. Graham and Harvey (2001) find that the use of specific investment evaluation techniques is linked to firm size, which is also commonly used as an indicator of the life-cycle of the firm (e.g. Moores & Yuen, 2001; Miller & Friesen, 1983). Previous studies focusing mainly on large firms suggest that the internal rate of return is the most frequently used method in such evaluation (e.g. Stanley & Block, 1984; Gitman & Forrester, 1977). Graham and Harvey (2001) find that large firms rely heavily on the net present value techniques, while small firms more frequently use the payback method. Similar results are reported by Sangster (1993) who finds that small firms prefer the payback method instead of the net present value method or internal rate of return despite their theoretical superiority. The net present value method is generally considered to provide the most accurate basis for decisions, because it takes into account the discount rate and considers the whole lifetime of the investment project. The cost of capital plays an important role when discounted cash flow techniques are used. Several studies (e.g. Graham & Harvey, 2001; Bruner, Eades, Harris, & Higgins, 1998) report that firms calculate the cost of capital with the Capital Asset Pricing Model (CAPM, henceforth). Graham and Harvey (2001) find that large public firms, CEOs with an MBA degree, firms with a low degree of financial leverage and firms with high foreign sales are more likely to use the CAPM than are small-sized firms.

Most of the previous studies in the area investigate capital budgeting decisions of large firms without any special focus on the branch of industry of the firm. Results regarding the capital budgeting decisions of high-tech firms are limited, even though the industry has grown rapidly and there are certain special characteristics that are likely to affect their capital budgeting decisions. To illustrate, high-tech firms make substantial R&D investments. These investments are often particularly uncertain and the cash flows are expected to be earned far in the future, because the products to be sold do

not even exist when the investment proposal is analyzed. This calls for analytical tools for analyzing investment decisions. In addition, high-tech firms often have well-educated, technically proficient managers, who have capabilities and knowledge to use sophisticated decision-making tools (e.g. Laitinen, 2001). High-tech firms also need to invest heavily in intangible assets without collateral, meaning that they need risk (equity) financing including venture capital financing (e.g. Cassar, 2004; Davila, Foster, & Gupta, 2003; Amir & Lev, 1996). Equity investors often require that the firms should use reliable and sophisticated management control and reporting systems (e.g. Granlund & Taipaleenmaki, 2005; Lerner, Shane, & Tsai, 2003; Mitchell, Reid, & Terry, 1997; Robbie, Wright, & Chiplin, 1997).

This paper investigates capital budgeting decisions in small high-tech firms. We focus on the methods these firms use for evaluating the profitability of investment projects, estimating the cost of capital and making decisions related to their capital structure. Our aim is to identify the capital budgeting methods typically applied in small high-tech firms. We classify firms as high tech based on their R&D intensity. In addition, we analyze the software industry as a special case of the high-tech industry. The empirical analyses are based on the surveys of the Finnish small high-tech firms.

This paper extends the current literature in three main respects. First, it contributes to the literature on the capital budgeting decisions of the firms by providing evidence on the capital budgeting methods used by small-sized high-tech firms, while most of the papers in the area investigate large public firms (e.g. Graham & Harvey, 2001; Stanley & Block, 1984; Sangster, 1993; Gitman & Forrester, 1977). Second, the paper investigates how the special characteristics of the high-tech firms affect their capital budgeting decisions. There is very little research on capital budgeting decisions in small high-tech firms, although they are faced with the more complex challenges than are the small firms in other industries. Third, the paper contributes to the literature by using a sample of Finnish firms and, therefore, by providing results from outside the US. The high-tech industry is rapidly growing in Finland and the paper provides unique results from the field.

The rest of the paper is organized as follows. The next section reviews the relevant literature on capital budgeting decisions in high-tech firms. The third section describes the data and provides preliminary data analysis. Empirical results are presented in the fourth section. The fifth section concludes the paper.

2. CAPITAL BUDGETING DECISIONS IN HIGH-TECH FIRMS

2.1. Managing High-Tech Firms

A high-tech firm can be defined as a firm that systematically develops, produces, or uses new technological skills and invests money in R&D activities (Laitinen, 2001). High-tech firms have certain special characteristics that affect their business operations. High-tech firms have a strong scientific–technical base and they are established for the purpose of exploiting a technological innovation (Berry, 1998). These firms operate on fast-changing markets where they need to respond quickly to technological and market developments (Ackroyd, 1995). In addition to high R&D intensity, high-tech firms are characterized by knowledge intensity, high business risk, high growth potential and the need for venture capital financing (e.g. Granlund & Taipaleenmaki, 2005; Cassar, 2004; Davila et al., 2003).

Previous findings in the financial accounting literature indicate that R&D expenditures can be seen as an investment rather than a cost (e.g. Chan, Lakonishok, & Sougiannis, 2001; Lev & Sougiannis, 1996). Investors view R&D expenditures as investments rather than as costs because R&D expenditures increase the current market value and the future earnings of the firms. Knowledge-based firms have a lot of intangible assets and their profits in future years are generated slowly. The time lag between the R&D investment and the realization of benefits is generally unknown and usually long. Therefore, R&D investments involve an exceptionally high risk. The outcome of these investment projects is more uncertain than that of other capital expenditures.

Previous studies that pay attention on technology industries show that the size of the firm is not the main determinant of the accounting systems used by the firms in these industries. Several studies indicate that the accounting systems of high-tech firms are mainly determined by the previous experience of the managers and the balance of skills within the management team. Usually, small firms face a certain difficulties with adopting accounting systems, because they have little or no in-house accounting expertise. However, small high-tech firms typically have expertise in information technology and new production technologies. These technically proficient managers are well educated and use information technology in very innovative ways. Therefore, it is not difficult for high-tech firms to adopt new accounting systems that are closely related to their production systems and modern

technology (e.g. Laitinen, 2001; Berry, 1998; Malhotra, Grover, & Desilvio, 1996; Ackroyd, 1995). In addition, high-tech firms are forced to change and improve their accounting systems to maintain a reasonable probability of survival because of stiff competition and shorter customer relationships (Laitinen, 2001).

The special characteristics of high-tech firms are likely to create differences in the decision-making on the capital budgeting between the high-tech and other firms. Decision-making is more egalitarian in high-tech firms than it is in other firms. In high-tech firms, managers frequently employ such methods as project management and group or participative management in the process (Malhotra et al., 1996; Doran & Gunn, 2002). Decision making related to R&D intensity can be improved by asking whether the projects are strategically appropriate (Ronsley & Rogers, 1994). However, Granlund and Taipaleenmaki (2005) find that capital budgeting calculations have been made only occasionally in Finnish new economy firms, because major investments are intangible and strategic in nature. Corporate resources can be allocated to R&D investments more efficiently and achieve the best return on investment when strategic management and R&D activities are integrated (Liao & Cheung, 2002; Chester, 1994). Successful small-sized high-tech firms use strategic planning to direct their long-term growth and development, and the planning processes become more sophisticated as the firm grows. Financial performance is tightly controlled and monitored, and long-term financial objectives are clearly specified over a relatively short planning horizon in these firms. However, previous studies indicate that the planning horizon covers two to five years in small high-tech companies (Berry, 1998).

2.2. Capital Budgeting Methods

A contingency theory assumes that the use of specific profitability evaluation techniques is linked to firm characteristics, such as the size of the firm. Previous capital budgeting studies indicate that small firms do not use the net present value method as their primary capital budgeting method but tend to use the payback criterion as their primary capital budgeting method (e.g. Graham & Harvey, 2001). In addition, a life-cycle theory supposes that small high-tech firms are likely to use simple methods to evaluate the profitability of the investment projects because of the size of the firm (e.g. Moores & Yuen, 2001; Miller & Friesen, 1983).

It can be assumed that the capital budgeting methods in small high-tech firms differ from those used by other firms for at least three main reasons. First, previous findings in financial accounting literature indicate that the R&D expenditures can be seen as an investment rather than a cost (e.g. Chan et al., 2001; Lev & Sougiannis, 1996). Therefore, the R&D intensity should play an important role in small-sized firms, in which simple methods are usually used. Second, it can be assumed that small high-tech firms tend to use the net present value method, because these firms rely on equity financing, meaning that the risk capital providers require information on future income and the net present value of investment proposals. We assume that the high-tech firms are likely to use the capital budgeting methods that put emphasis on the assessment of the risk of the investment in terms of the cost of capital. If that is the case, the pressure from equity investors may influence the choice of methods in small high-tech firms. Third, previous studies indicate that young and well-educated CEOs are likely to use sophisticated capital budgeting methods, such as the net present value method, instead of the simple payback method (Graham & Harvey, 2001).

We assume that the special characteristics of the high-tech firms, such as R&D investments, equity investors' role and well-educated managers, influence their choice of capital budgeting methods more than the firm size. Therefore, our hypothesis on capital budgeting methods is stated as follows:

H1. Small high-tech firms prefer to use sophisticated capital budgeting methods.

2.3. Cost of Capital

The evidence on methods to estimate the cost of capital in the small high-tech firms is limited, even though previous studies indicate that small and start-up firms in R&D-intensive industries face a higher cost of capital than their larger competitors and firms in other industries (Hall, 2002). Entrepreneurial companies in high-tech industries pay a remarkable price for many benefits provided by equity investors, because investors require a sufficient return on the risk investment. Therefore, it could be assumed that small high-tech firms are likely to use the sophisticated methods, such as CAPM, to estimate the cost of capital. In addition, previous findings also suggest that well-educated CEOs are more likely to use CAPM when calculating the cost of capital (Graham & Harvey, 2001). Laitinen (2001) also reports that the education of CEO drives high-tech firms to adopt new

accounting systems. Therefore, our hypothesis on methods to evaluate the cost of capital can be defined as follows:

H2. Small high-tech firms prefer to use formal methods to measure the cost of capital.

2.4. Capital Structure

Most theoretical and empirical studies on the capital structure of the firm focus on public corporations. Only a limited number of studies on capital structure have been conducted on small-sized enterprises and, especially on small and growing high-tech firms. One of the most important events in the early life-cycle of any enterprise with serious growth ambitions is the infusion of external capital (Reid, 1996). However, previous studies indicate that small high-tech firms face certain problems when financing business start-ups (e.g. Cassar, 2004). In addition, the lack of collateral will be a problem because of the limited tangible assets of high-tech firms. Science-based and high-growth companies have limited tangible assets, high-risk and -growth potential because they invest heavily in intangibles, such as R&D, customer-base creation, franchise and brand development (Cassar, 2004; Amir & Lev, 1996).

One possible solution for the financing problems faced by small high-tech firms is equity financing, including venture capital financing. Previous studies indicate that the growth before but mainly after the financing event is significantly greater than in other months in software firms (Davila et al., 2003). The role of investors affects the management issues of the firms, because the external pressure caused by investors drives towards more reliable control and reporting systems in new technology-oriented firms (e.g. Granlund & Taipaleenmaki, 2005; Lerner et al., 2003; Mitchell et al., 1997; Robbie et al., 1997).

We anticipate that small high-tech firms face certain difficulties in executing their investment projects because fast-growing firms usually have financing problems at the early stage of the business life cycle, sources of capital are limited and competition equity funding is stiff in small high-tech firms. It can be argued that high-tech firms avoid running into debt and prefer to use long-term debt rather than short-term debt. It is also assumed that at the early stage of the business life cycle small high-tech firms seek co-owners and business partners for growth purposes. We summarize our

hypothesis on capital structure as follows:

H3. Small high-tech firms seek new equity financing and therefore need external equity investors.

3. DATA ENVIRONMENT AND PRELIMINARY DATA ANALYSIS

3.1. Data Description

Our empirical analyses are based on two surveys of Finnish firms. The data were gathered by questionnaires in April 2002 using random sampling. All the firms included in the surveys are located in the southern part of Finland, including the Greater Helsinki Area. Finland provides a good empirical setting for the study because it is a small but technologically advanced country. We sent identical questionnaires to two different groups of firms. The first group of firms includes small software firms and the second group of firms covers small firms in other industries. The surveys are identical and were conducted at the same time.

The survey contains 23 questions and is three pages long. The survey focuses on three areas of capital budgeting, i.e. the use of capital budgeting methods, the measurement of the cost of capital and decision-making related to the capital structure. The main questions are presented in the appendix. The survey is based, in part, on previous surveys of capital budgeting methods (e.g. Graham & Harvey, 2001; Sangster, 1993; Stanley & Block, 1984; Gitman & Forrester, 1977). The questions are related to broad categories of capital budgeting decisions as well as to more detailed aspects of the methods (e.g. when those methods are used, the reasons for the abandonment of investment projects, etc.). In the questionnaire, a five-point Likert scale ranging from (1) ''Not used at all/not important'' to (5) ''Used to a great extent/very important'' was used to elicit the respondents' views on the importance of various areas of the capital budgeting decisions. Respondents were asked to choose the alternative that best described the capital budgeting decisions of the firm.

The respondent, who is typically the financial manager, chief accountant, senior management accountant or chief executive of the firm, is the most eligible person in the firm to complete the questionnaire. The survey package includes a questionnaire and an introductory letter explaining the purpose of the research. Respondents can answer anonymously and mail the

questionnaire. We sent the questionnaire to 217 software firms and to 250 small-sized firms in other industries. We received a total of 100 responses giving an average response rate of 21.4%. More precisely, we received 22 responses from software firms and 78 responses from other small-sized firms giving the response rates of 10.1% for software firms and 32.0% for other small-sized firms. The sample of software firms represents the characteristics of Finnish software firms very well despite the response rate (e.g. Hietala et al., 2002).

In the preliminary data analysis, we divided the sample into three groups based on the reported R&D intensity of the firm. Following previous literature, we use the ratio of R&D costs to sales as a measure of R&D intensity. The first group contains 30% of the firms for which the ratio of R&D costs to sales is more than 3% and these are defined as high R&D-intensity firms. The second group contains 33% of the firms for which the ratio of R&D costs to sales is more than one but less than 3%. Finally, the third group contains 36% of the firms for which the ratio of R&D costs to sales is less than 1% and these are defined as low R&D-intensity firms.

Fig. 1 depicts the summary statistics of the firms. A remarkable difference between the R&D-intensive firms and other firms is the amount of human resources. More than 40% of the R&D-intensive firms employ fewer than 10 employees. The R&D-intensive firms are also relatively small in size because almost half of them have net sales less than million euros. The results indicate that the ratio of exports to net sales is usually quite low in all groups of firms. One-third of the R&D-intensive firms have no export activity at all. The results, therefore, indicate that the firms in all groups are relatively small and operate mainly on their home markets. However, the R&D-intensive firms are the most active in export business. The ratio of gross investment to net sales seems to be higher in the R&D-intensive firms than in the other groups. We can conclude that the R&D-intensive firms are relatively small, make significant investments and try to operate on foreign markets.

Fig. 2 reveals that the R&D-intensive firms have younger CEOs than the other firms. Almost half of the CEOs are under 40 years of age in the R&D-intensive firms. The age distribution in the other firms is reversed; most of the CEOs are older. The duration of the CEO's employment has an even distribution in the R&D-intensive firms. On the other hand, about 60% of the CEOs in the other firms have worked for more than nine years and only 20% of them have worked for less than four years in their current positions. The CEOs in the R&D-intensive firms are better educated than the CEOs in other firms; more than half of the CEOs in the R&D-intensive firms have a

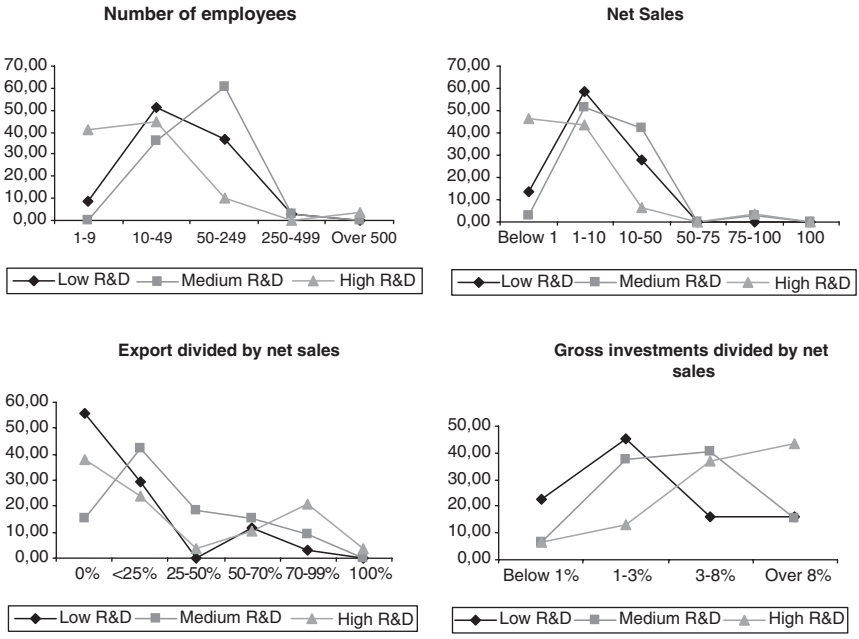

Fig. 1. Summary Statistics of the Firms Clustered by the Research and Development Costs Divided by Net Sales. The Panels are Based on Background Information of the Firms Provided by the CEOs. The Upper Left Panel Depicts the Number of Employers and the Upper Right Panel Depicts the Net Sales. The Lower Left Panel Depicts the Export Divided by Net Sales. The Last Graph Depicts the Gross Investments Divided by Net Sales.

university degree and as many as 20% of them have a doctoral degree. This supports the view that high-tech firms have well-educated managers.

We also gathered some other background information on the firms. Almost all firms are incorporated companies. Even though most of the R&D-intensive firms are incorporated companies, they operate like entrepreneurs, because the main owner usually owns a large part of the firm's stock and the firm does not have many employees. In almost half of the firms in all groups all shares are owned by management. The diversity in industries illustrates that all firms, including the R&D-intensive firms, are largely diversified over several industries. We look more closely at software firms in order to investigate the role of R&D intensity in the high-tech firms. Software firms are mainly registered for telecommunications and other services. Most of the

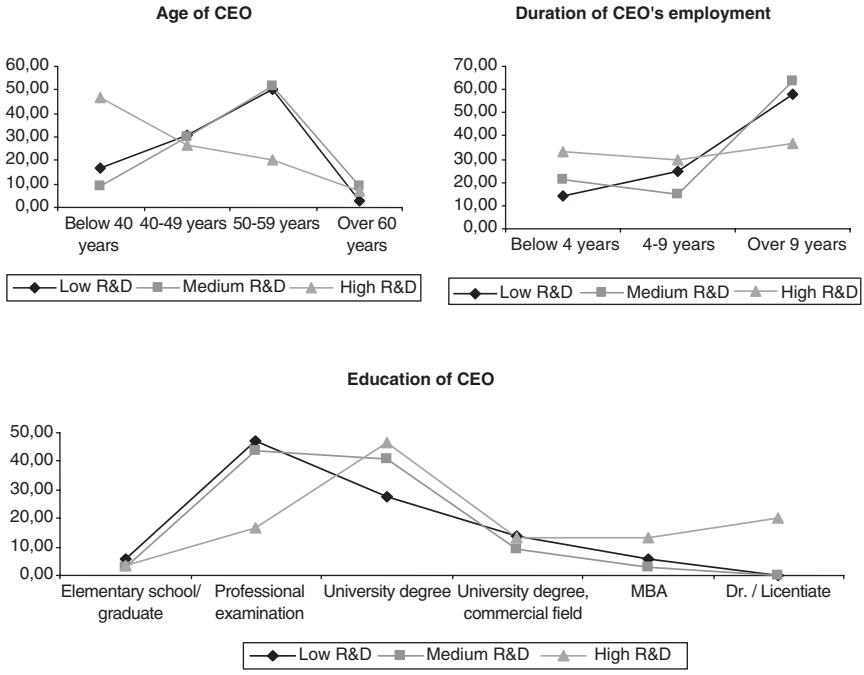

Fig. 2. Summary Statistics Regarding the Characteristics of the CEOs of the Survey Firms. The Panels are Based on Background Information Provided by the CEOs. The Upper Left Panel Depicts the Age Distribution of CEO and the Upper Right Panel Depicts the Gross Duration of the CEO's Employment. The Lower Panel Depicts the Education of the CEO.

software firms produce mainly software products and one-third of the software firms produce mainly customer-specific software services. Therefore, the software firms are representative of the R&D-intensive and science-based firms in the field of high technology.

3.2. Preliminary Data Analysis

The main questions of the survey, i.e. the use of capital budgeting methods, the measurement of the cost of capital and decision-making related to capital structure, are presented in the appendix. It also presents the results of

the preliminary data analysis. A *t*-test is used to test whether the sample mean of a response is statistically different from three. The value of three is the mean value describing the alternative of respondents' neutral opinion. The Kruskal–Wallis test is used to test whether the mean values differ across the three groups of firms.

The planning horizon refers to the time period of how far into the future the firm plans its financial needs. The results for Question 1 reported in the appendix indicate that the planning horizon typically covers the next five years in all firms.[1] The R&D-intensive firms prepare their capital budgeting decisions very often for at least the next two years and often for the next five years. The planning horizon is longest in the medium R&D-intensity firms, because after the first two years there is a significant difference in the planning horizon between the medium R&D-intensity and other firms. The R&D-intensive firms seldom plan their capital budgeting decisions over the next five years and never over a 10-year period. This is understandable in a rapidly changing business environment. The results of the planning horizon of the R&D-intensive firms reported here are similar to those reported by Berry (1998), who finds that the planning horizon covers two to five years in small high-tech companies.

The systematic use of capital budgeting methods is as popular in the R&D-intensive firms as it is in the other firms. The results indicate that only 53% of the high R&D-intensity firms, 68% of the medium R&D-intensity firms and 60% of the low R&D-intensity firms use formal capital budgeting methods.[2] Therefore, the preliminary results do not support Hypothesis 1. The results for Question 2 regarding the use of the capital budgeting methods reported in the appendix indicate that the return on investment and the payback period method are the most important capital budgeting methods in the R&D-intensive firms. The results are consistent with previous studies (e.g. Graham & Harvey, 2001) claiming that small firms are generally less likely to use the net present value method than the payback period method when evaluating their investment proposals.

The results for Question 3 indicate that the capital budgeting methods are typically used in the R&D-intensive firms when an investment is new or strategically important, the nature of the investment requires calculations and the size of the investment is large enough. The comparison of groups of firms reveals that all groups of firms use capital budgeting methods in almost the same situations except for the R&D-intensive firms, which are not likely to use capital budgeting methods when the investment is necessary and the investment entails repairs. The results for Question 4 indicate that

the capital budgeting methods are typically used in the R&D-intensive firms because of the business culture, the project is international in nature or the final decision-makers require formal calculations.

The results on the use of different methods to determine the cost of capital reported in Question 5 indicate that the sample firms seldom use sophisticated methods such as CAPM and the weighted-average cost of capital (WACC, henceforth).[3] The results indicate that measuring the cost of capital is usually based on experience. Quite often owner's return requirement or cost of liabilities is used in calculating the cost of capital. The results are consistent with those of Graham and Harvey (2001), who report that firms usually calculate the cost of capital with CAPM, but that small firms are less likely to use CAPM. Since there is no significant difference between the high-tech and other firms, we can conclude that both groups of firms define the cost of capital in a similar way.

The results for Question 6 reveal the reasons why firms have given up on their capital budgeting decisions. The most common problems in the R&D-intensive firms are financing problems and budget constraints. Such problems are typical for fast growing firms. The vision of the future is the only significant reason why the other firms have to given up on their investment decisions, but that seems not to be such a significant problem in the high R&D-intensity firms.[4] The results for Question 7 indicate reasons for adjusting the capital structure. The capital structure of the R&D-intensive firms is marked by a tendency to avoid running into debt.[5] Avoidance of debt and, on the other hand, if necessary using long-term debt are specific characteristics of the firms in other industries. There is a significant difference between the groups of firms, i.e. seeking co-owners and main financiers is more important to the R&D-intensive firms but insignificant to other firms. High-tech firms especially have more problems and, on the other hand, challenges in their capital structures than the other firms have. The results indicate that the R&D-intensive firms are young enterprises at the beginning of the business life cycle with little internal financing. In addition, these enterprises will not get enough debt because of lack of collateral, which causes financial problems. Therefore they must seek venture capitalists more often than other firms. Previous studies (e.g. Cassar, 2004) indicate that financing business start-ups is more problematic in small firms than in large firms. The results indicate that financing business start-ups seems to be a problem for R&D-intensive firms especially. The results of capital structure are consistent with the third hypothesis.

4. EMPIRICAL RESULTS

4.1. Factor Analyses

We begin the empirical analyses by using factor analysis to reduce the number of items in the questionnaire to a more manageable and interpretable set of factors. The use of factor analysis is appropriate, because the questionnaire includes various questions for each dimension of capital budgeting decisions. The results of the factor analyses are reported in Tables 1 and 2. The factor solutions passed both Bartlett's test of sphericity (a χ^2 test) and the Kaiser–Myer–Olkin measure of sampling adequacy. In all cases, two or three factors can be identified and these factors explain more than 50% of the variance of the original variables, i.e. the item in the questionnaire. In Tables 1 and 2, factor loadings greater than 0.50 are displayed in italic.

4.1.1. Capital Budgeting Methods

Panel A of Table 1 shows the factor loadings of the capital budgeting methods used by the firms. Capital budgeting methods that are based on the present values of future cash flows, i.e. net present value, net present index and internal rate of return have high loadings with the first factor. On the other hand, payback method and return on investment, which are not based on discounting future cash flows, have high loading with the second factor. Therefore, the first factor can be interpreted as a factor of those capital budgeting methods that discount the future cash flows generated by the investment project. In the same way, the second factor can be interpreted as a factor of those capital budgeting methods that do not discount the future cash flows. The factor structure observed is consistent with the capital budgeting literature, which divides capital budgeting methods into two categories. The first category includes sophisticated methods, which pay attention to the interest rate, such as the net present value method. The second category includes simple methods, such as the payback method, which do not discount the future cash flows generated by the investment project.

4.1.2. Types of Investments

Panel B of Table 1 reports factor loadings of the types of investments for which the firms use formal capital budgeting methods. We categorize investment types into three categories, i.e. operational, strategic and large investments. The factor solution is consistent with the capital budgeting

Table 1. Factor Loadings for the Varimax Rotated Factor Matrix.

		Factor Pattern (Loadings)	
		Factor 1	Factor 2
Panel A. Capital Budgeting Methods			
Net present value		*0.850*	0.010
Net present index		*0.785*	0.111
Internal rate of return		*0.694*	0.099
Payback method with interest rate		0.411	0.069
Payback method		−0.074	*0.862*
Return on investment		0.286	*0.666*
Kaiser–Myer–Olkin measure of sampling adequacy	0.628		
Bartlett's test of sphericity	0.021		
Variance explained by factors	0.548		

		Factor 1	Factor 2	Factor 3
Panel B. Types of Investments				
Reparation investment		*0.863*	0.145	−0.075
Necessary investment		*0.811*	−0.011	−0.156
New investment		*0.625*	0.495	0.286
Important project		*0.533*	−0.424	*0.516*
Nature of the investment		−0.098	*0.843*	−0.016
Strategic investment		0.158	*0.772*	0.449
IT investment		0.293	*0.609*	−0.255
Size of the investment		−0.180	0.076	*0.885*
Kaiser–Myer–Olkin measure of sampling adequacy	0.634			
Bartlett's test of sphericity	0.000			
Variance explained by factors	0.723			

		Factor 1	Factor 2
Panel C. Reasons to Use Formal Methods			
International		−0.001	*0.765*
Final decision-maker requires calculations		−0.067	*0.756*
Financier requires calculations		0.411	0.460
Lack of the time		*0.763*	0.239
Measuring responsibilities		*0.664*	0.285
Corporate culture		*0.754*	−0.203
Importance of the project		*0.637*	−0.153
Kaiser–Myer–Olkin measure of sampling adequacy	0.575		
Bartlett's test of sphericity	0.014		
Variance explained by factors	0.534		

Table 2. Factor Loadings for the Varimax Rotated Factor Matrix.

		Factor Pattern (Loadings)	
		Factor 1	Factor 2
Panel A. Methods to Measure A Cost of Capital			
Experience		0.147	*−0.912*
Cost of liabilities		0.394	*0.793*
CAPM + beta		*0.900*	0.112
CAPM + interest rate		*0.963*	0.011
WACC		*0.812*	0.077
Kaiser–Myer–Olkin measure of sampling adequacy	0.536		
Bartlett's test of sphericity	0.000		
Variance explained by factors	0.810		
		Factor 1	Factor 2
Panel B. Reasons for Abandoning Capital Budgeting Decisions			
Budget constraint		*0.537*	0.450
Lack of collateral		*0.726*	0.347
Financing problems		*0.821*	0.320
Weak capital structure		*0.743*	0.216
Vision of the future		*0.667*	−0.210
External financiers		0.152	*0.774*
Lack of owner's perseverance		0.092	*0.762*
Kaiser–Myer–Olkin measure of sampling adequacy	0.785		
Bartlett's test of sphericity	0.000		
Variance explained by factors	0.602		
		Factor 1	Factor 2	Factor 3
Panel C. Capital Structure				
Income financing is insufficient		*0.719*	0.140	−0.249
Projects define the amount of debt		*0.755*	−0.019	−0.158
Long-term debt		*0.786*	0.050	−0.339
Short-term debt		0.395	*0.506*	−0.090
Interest rate level		*0.776*	−0.062	0.175
Tax deductibility		*0.696*	0.250	0.386
Avoid running into debt		−0.289	0.221	*0.723*
Withdrawing profit funds		0.047	−0.170	*0.767*
Seeking co-owners		−0.083	*0.890*	0.042
Seeking main financier		0.068	*0.924*	0.013
Kaiser–Myer–Olkin measure of sampling adequacy	0.676			
Bartlett's test of sphericity	0.000			
Variance explained by factors	0.661			

literature, which often divides the types of investments into two categories, i.e. the operational and strategic investments. Our analysis, however, yields an additional factor, i.e. large investments. This may indicate that firms have limited time to evaluate every single small-sized investment project using the formal capital budgeting methods. Therefore, the size of the investment project is an important factor of using formal capital budgeting methods.

4.1.3. Reasons for Using Formal Methods

Panel C of Table 1 shows the factor loadings for the reasons for using formal methods when evaluating the investment proposals. Reasons inside the firm, i.e. lack of time, measuring responsibilities, corporate culture and importance of the project, have high loadings with the first factor. Therefore, the first factor can be interpreted as a factor of internal reasons for using formal capital budgeting methods. In the same way, the second factor can be interpreted as a factor of those reasons outside the firm, i.e. the internalization and the final decision-makers' needs. Internal reasons are caused by the firm itself and those reasons may be consequences of the rapid and uncontrolled growth. Small-sized firms probably want to ensure the profitability of the investment, because the future of the firm may be endangered if an erroneous decision is made. External reasons, by contrast, are caused by the external actors who require formal analyses of capital budgeting proposals. The result is consistent with the previous studies, which indicate that the external pressure caused by venture capitalists drives toward more reliable control and reporting systems in new technology-oriented firms (e.g. Granlund & Taipaleenmaki, 2005; Lerner et al., 2003). Our result indicates that capital budgeting methods are also used for external reasons.

4.1.4. Methods for Evaluating the Cost of Capital

Panel A of Table 2 shows the factor loadings of the methods for measuring the cost of capital. The methods that are based on the theory-driven measures of the cost of capital, i.e. CAPM and WACC models, have high loadings with the first factor. On the other hand, experience and the cost of liabilities, which are not based on theoretical models, have high loadings with the second factor. Therefore, the first factor can be interpreted as a factor of theoretical methods. In the same way, the second factor can be interpreted as a factor of practical methods to evaluate the cost of capital based on simple methods.

4.1.5. Reasons for Abandoning Capital Budgeting Decisions
Panel B of Table 2 reports the factor loadings of the reasons for abandoning capital budgeting decisions. Items that are based on the internal reasons, i.e. budget constraint, lack of collateral, financing problems, weak capital structure and the vision of the future have high loadings with the first factor. On the other hand, external financiers and a lack of owner's perseverance, i.e. the external reasons, have high loadings with the second factor. Therefore, the first factor can be interpreted as a factor of internal reasons for abandoning capital budgeting decisions, and the second factor can be interpreted as a factor of external reasons for abandoning investment proposals.

4.1.6. Characteristics of Capital Structure
Panel C of Table 2 shows the factor loadings of the reasons for the current capital structure of the firm. The reasons for the current capital structure that include the basic elements of business, such as insufficient income financing, long-term debt, interest rate level, tax deductibility and defining the amount of debt by projects, have high loadings with the first factor. On the other hand, firms that prefer to use short-term debt and try to find external financiers, have high loading with the second factor. Therefore, the second factor can be interpreted as a factor of the growth-oriented firms. Previous studies identify those firms as fast-growing entrepreneurial firms in the early life-cycle stage (e.g. Davila et al., 2003; Reid, 1996). In addition, the firms that avoid running into debt and withdraw profit funds have high loading with the third factor.

4.2. Regression Analyses

The contingency approach assumes that the use of management accounting practices depends on a wide variety of firm-specific elements. In order to identify the firm characteristics that affect the factors estimated in Section 4.1, we estimate the following linear regression model:

$$Y_i = a_1 + b_1 \mathrm{R\&D}_i + b_2 \mathrm{SOFTWARE}_i + b_3 \mathrm{SALES}_i + b_4 \mathrm{EXPORT}_i + \varepsilon_{1i} \quad (1)$$

where Y_i is a dependent variable obtaining the factor score of the ith firm, $\mathrm{R\&D}_i$ the ratio of research and development expenditures to net sales of the ith firm, $\mathrm{SOFTWARE}_i$ a dummy variable that has a value of one if the ith firm is a software firm and otherwise zero, SALES_i the net sales of the ith

firm, $EXPORT_i$ the ratio of export to net sales of the ith firm, a the estimated intercept, b's are the estimated slope coefficients of the variables that affect the factor scores and ε the error term. The factor scores are those obtained from the factor solutions reported in Tables 1 and 2.

4.2.1. Capital Budgeting Methods

The results of regressing the factor scores of different dimensions of capital budgeting methods on the dependent variables defined in Model (1) are reported in Table 3. A dummy variable for the software industry has a significantly negative slope coefficient when Factor 2 is regressed on the variables defined in Model (1). This indicates that software firms do not use simple capital budgeting methods to the same extent as the other firms. All in all, the results do not reveal significant differences in the capital budgeting methods between the high and low R&D-intensity firms. Therefore, the results do not support our first hypothesis that small high-tech firms prefer sophisticated capital budgeting methods because of the special characteristics of the industry.

4.2.2. Types of Investments

Table 3 also reports the results of estimating Model (1) to investigate whether the types of investments of high-tech firms are different from those in the other industries. In Column (4), the estimated slope coefficient of the dependent variable $R\&D_i$ is significantly positive, suggesting that high-tech firms use the formal capital budgeting methods only in the case of strategic investments. The results are consistent with previous studies, which indicate the importance of integrating R&D into strategic issues of the firm (Liao & Cheung, 2002; Berry, 1998; Chester, 1994). In addition, Ronsley and Rogers (1994) suggest that decision-making in R&D can be improved by asking whether the projects are strategically appropriate. The result therefore, extends the previous findings on the significance of the strategic investments in the R&D-intensive firms by revealing that the R&D-intensive firms use formal capital budgeting methods only in strategic investments.

4.2.3. Reasons for Using Formal Methods

The results of estimating Model (1) to investigate the reasons for using formal methods when evaluating the profitability of capital budgeting proposals are also reported in Table 3. The estimated slope coefficients of the dependent variables are insignificant, suggesting that high-tech firms have similar reasons for using formal capital budgeting methods than the firms in other industries.

Table 3. Result of Regressing Factor Loadings on the Measures of the Technology-Intensity of the Firm.

	Capital Budgeting Methods		Types of Investments			Reasons for using Formal Methods	
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
	Factor 1 (*p*-value)	Factor 2 (*p*-value)	Factor 1 (*p*-value)	Factor 2 (*p*-value)	Factor 3 (*p*-value)	Factor 1 (*p*-value)	Factor 2 (*p*-value)
Constant	0.014 (0.983)	−0.350 (0.580)	1.198 (0.078)	−1.336 (0.072)	0.230 (0.721)	0.448 (0.498)	0.008 (0.990)
R&D	0.190 (0.379)	0.212 (0.324)	−0.240 (0.210)	*0.415* *(0.053)*	0.058 (0.754)	−0.028 (0.890)	−0.281 (0.184)
SOFTWARE	−0.120 (0.825)	*−1.340* *(0.018)*	−0.285 (0.556)	−0.667 (0.213)	−0.763 (0.115)	0.196 (0.730)	0.820 (0.167)
SALES	0.195 (0.364)	0.196 (0.359)	−0.292 (0.160)	0.369 (0.107)	0.007 (0.973)	−0.406 (0.068)	−0.038 (0.862)
EXPORT	*−0.367* *(0.021)*	−0.109 (0.468)	0.057 (0.660)	−0.193 (0.182)	−0.043 (0.738)	0.180 (0.219)	0.219 (0.147)
N	32	32	30	30	30	32	32
R^2	0.188	0.255	0.180	0.186	0.120	0.139	0.114

Note: In order to find the firm characteristics that affect the factors estimated in Section 4.1, we estimate the following linear regression model:

$$Y_i = a_1 + b_1\text{R\&D}_i + b_2\text{SOFTWARE}_i + b_3\text{SALES}_i + b_4\text{EXPORT}_i + \varepsilon_{1i}$$

where Y_i is a dependent variable obtaining the factor score of the ith firm, $\text{R\&D}_i$ the ratio of research and development expenditures to net sales of the ith firm, SOFTWARE_i a dummy variable that has a value of one if the ith firm is software firm and otherwise zero, SALES_i the net sales of the ith firm, EXPORT_i the ratio of export to net sales of the ith firm, a the estimated intercept, b's are the estimated slope coefficients of the variables that affect the use of capital budgeting methods and ε is the error term. Factor scores are those obtained from the factor solutions reported in Tables 1 and 2.

4.2.4. Methods for Evaluating the Cost of Capital

The results of regressing the factor scores of different dimensions of methods to estimate the cost of capital on the dependent variables are reported in Table 4. The estimated slope coefficients of the dependent variables are insignificant, suggesting that high-tech firms use similar methods to measure the cost of capital than the other firms. The result does not give support to our second hypothesis that formal methods for estimating the cost of capital are used in small-sized high-tech firms.

Table 4. Result of Regressing Factor Loadings on the Measures of the Technology-Intensity of the Firm.

	Methods for Measuring a Cost of Capital		Reasons for Abandoning Capital Budgeting Decisions		Capital Structure		
	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14
	Factor 1 (*p*-value)	Factor 2 (*p*-value)	Factor 1 (*p*-value)	Factor 2 (*p*-value)	Factor 1 (*p*-value)	Factor 2 (*p*-value)	Factor 3 (*p*-value)
Constant	0.388 (0.690)	0.056 (0.962)	0.337 (0.515)	0.251 (0.657)	0.079 (0.871)	−0.047 (0.910)	0.405 (0.374)
R&D	−0.662 (0.134)	−0.379 (0.453)	−0.244 (0.104)	−0.186 (0.258)	−0.069 (0.655)	−0.217 (0.103)	−0.007 (0.963)
SOFTWARE	1.880 (0.119)	1.296 (0.349)	*1.193 (0.006)*	0.519 (0.266)	−0.362 (0.418)	*1.668 (0.000)*	0.072 (0.862)
SALES	−0.212 (0.606)	−0.037 (0.941)	−0.194 (0.314)	−0.107 (0.613)	−0.070 (0.717)	−0.053 (0.747)	*−0.523 (0.005)*
EXPORT	0.541 (0.173)	0.312 (0.497)	0.194 (0.150)	0.132 (0.243)	0.150 (0.223)	0.089 (0.389)	*0.268 (0.022)*
N	12	12	54	54	53	53	53
R^2	0.328	0.122	0.203	0.048	0.089	0.368	0.191

See footnote in Table 3.

4.2.5. Reasons for Abandoning Capital Budgeting Decisions

Table 4 also reports the results of estimating Model (1) to investigate whether the reasons for abandoning the capital budgeting methods of high-tech firms are different from those in other industries. In Model (10), the estimated slope coefficient of the dependent variable SOFTWARE_i is significantly positive, suggesting that software firms have more internal reasons for abandoning investment projects.

4.2.6. Characteristics of Capital Structure

The results of regressing the factor scores of the different dimensions of capital structure on the dependent variables are reported in Table 4. A dummy variable for software industry has a significantly positive slope coefficient in Column (13). The results indicate that software firms use short-term debt and seek co-owners and main financiers. Previous studies indicate that financing of business start-ups is a problem in small firms despite the

fact that finding external capital is one of the most important events in the early life cycle of any entrepreneurial firm (e.g. Cassar, 2004; Davila et al., 2003; Reid, 1996). These results give support to our hypothesis that small high-tech firms, especially software firms, have limited sources of capital and therefore external financiers are needed.

4.3. Robustness Checks

We begin our robustness checks of the results by estimating Model (1) such that the factors are replaced by the original questions as dependent variables. In other words, we regress each individual question in the questionnaire on the independent variables defined in Model (1). The results from these regressions are essentially similar to those reported in Tables 3 and 4. Small high-tech firms use similar capital budgeting methods and methods for evaluating the cost of capital as the other firms. Supporting the results reported in Tables 3 and 4, software firms as a special case of small high-tech firms are seeking for co-owners and external financing. We have replicated all the analyses by dividing the sample into two groups based on the software industry dummy instead of the R&D intensity of the firm. The results remain the same.

Finally, we analyze non-response bias for the two sets of data, because two sets of questionnaires were distributed. The first group of firms contains the small software firms and the second group of firms covers small firms in other industries. In order to get a measure of the potential non-response bias, the earliest 20% of responses were compared to the latest 20% of replies in both samples. The results remain the same.

5. CONCLUSIONS

This paper investigates the capital budgeting methods used in small high-tech firms. We define high-tech firms based on their R&D intensity and we also investigate the effect on the software industry as a special case of the R&D. We focus on the methods used by small high-tech firms when they estimate the profitability of investment projects, calculating the cost of capital and making decisions related to capital structure. Finnish data gathered by questionnaire in April 2002 are used in the study.

The planning horizon of capital budgeting decisions typically covers the next five-year period in all small firms. The systematic use of capital

budgeting methods is as popular in the R&D-intensive firms as it is in the other firms. The results indicate that the return on investment and the pay-back period method are the most frequently used methods for assessing the profitability of investment in the R&D-intensive firms. The result extends the previous findings of the significance of strategic investments in R&D-intensive firms by revealing that the R&D-intensive firms use formal capital budgeting methods only within strategic investments.

The regression analyses of the factor scores indicate that the high-tech firms do not use simple capital budgeting methods to the same extent as other firms do. Therefore, the results do not indicate significant differences in the capital budgeting methods between the high and low R&D-intensity firms, although the financial accounting literature see R&D expenditures as an investment rather than as a cost (see e.g. Chan et al., 2001; Lev & Sougiannis, 1996). The results indicate that the specific characteristics of the software industry affect more the use than the size of the firm, but the R&D intensity itself does not affect to the use of formal capital budgeting methods.

The results of the regression analyses reveal that neither of the high-tech indicators, R&D intensity and the software industry affect the use of methods of evaluating the cost of capital. The result does not give support to our second hypothesis that formal methods for measuring the cost of capital are used in small-sized high-tech firms. The result is consistent with the corporate finance literature revealing that small firms are less likely to use sophisticated methods such as CAPM to estimate the cost of capital (e.g. Graham & Harvey, 2001).

The results indicate that internal reasons such as financing problems and budget constraints are typical problems in high-tech firms and reasons why small-sized software firms abandon their investment decisions. As previous studies indicate, the financing of business start-ups is a problem in small firms (e.g. Cassar, 2004). Consistent with our third hypothesis we find that the software firms are seeking a main financier and co-owners and try to avoid running into debt. Our results are consistent with previous studies that have found that equity financing is a significant source of growth for small firms (Cassar, 2004; Davila et al., 2003).

NOTES

1. In order to obtain more specific results for the length of planning horizon, we constructed a continuous variable as follows. We select the planning horizon with the highest score using the median point (for one to two years it gets a value of 1.5, for

two to five years it gets a value of 3.5, etc.) and construct a continuous variable describing the planning horizon. Next, we estimate a regression model similar to used later in Section 4.2. The results of estimating the model indicate that all dependent variables, including R&D intensity, have insignificant slope coefficients.

2. Generally, the capital budgeting methods get the following rates of the use among the users of formal methods: return on investment 82%, payback period method 81%, net present value 53%, payback period method with interest rate 44%, internal rate of return 35% and net present index 14%.

3. The following rates of use were reported for methods to calculate the cost of capital: cost of liabilities 85%, owners define the cost of capital 77%, based on experience 76%, CAMP + risk 29%, WACC 13% and CAPM + beta 7%.

4. Generally, the following reasons are behind the abandoning capital budgeting decisions: vision of the future 58%, budget constraints 43%, financing problems 41%, lack of collateral 28%, weak capital structure 22%, lack of owner's perseverance 13% and external financiers withdraw 5%.

5. Actually, the mean equity ratio for the R&D-intensive firms is 50.7 and 47.4% for the other firms. During the last five years the mean cost of current liabilities was 5.4% for the R&D intensive firms and 5.3% for the other firms.

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APPENDIX

Main questions and preliminary data analysis: Mean values and *t*-tests *p*-values among three groups of firms and the results of the Kruskal–Wallis test between the groups. A five-point Likert scale ranging from (1) 'never/not important' to (5) 'always/very important' is used in the survey.

	High R&D Firms (Mean Value) (*p*-Value)	Medium R&D Firms (Mean Value) (*p*-Value)	Low R&D Firms (Mean Value) (*p*-Value)	Difference (χ^2) (*p*-value)
Question 1: How long is the planning horizon of capital budgeting in your firm?				
1–2 years	*4.73*	*4.67*	*4.65*	0.342
	(0.000)	*(0.000)*	*(0.000)*	(0.843)
2–5 years	*3.76*	*4.30*	*3.74*	*5.780*
	(0.000)	*(0.000)*	*(0.000)*	*(0.056)*
5–10 years	*2.12*	3.39	*2.00*	*17.435*
	(0.000)	(0.130)	*(0.001)*	*(0.000)*
Over 10 years	*1.28*	*1.71*	*1.38*	3.342
	(0.000)	*(0.000)*	*(0.000)*	(0.188)
Question 2: To what extent does your firm use the following capital budgeting methods?				
NPV	3.14	3.24	3.07	0.170
	(0.720)	(0.496)	(0.844)	(0.919)
IRR	2.77	2.60	3.09	0.898
	(0.553)	(0.233)	(0.821)	(0.638)
Net present index	*2.00*	*2.08*	*2.20*	0.389
	(0.020)	*(0.008)*	*(0.037)*	(0.823)
ROI	*4.00*	*4.18*	*4.07*	1.023
	(0.003)	*(0.000)*	*(0.000)*	(0.600)
Payback period	*4.00*	*4.19*	*4.47*	1.939
	(0.002)	*(0.000)*	*(0.000)*	(0.379)
Payback + interest	2.87	3.06	*3.69*	3.858
	(0.670)	(0.854)	*(0.022)*	(0.145)

Question 3: For what kind of investments are the formal capital budgeting methods used?				
Repairs	*2.29*	3.05	3.20	*6.801*
	(0.019)	(0.789)	(0.486)	*(0.033)*
Necessary investment	*2.00*	3.05	3.25	*9.732*
	(0.000)	(0.853)	(0.491)	*(0.008)*
New investment	*3.71*	*4.19*	*3.94*	2.395
	(0.019)	*(0.000)*	*(0.001)*	(0.302)
Important investment	*2.17*	2.69	2.50	1.305
	(0.034)	(0.370)	(0.139)	(0.521)
Nature of investment	*4.20*	*4.13*	*4.10*	0.673
	(0.000)	*(0.000)*	*(0.000)*	(0.714)
Strategic investment	*4.50*	*4.00*	*4.25*	2.653
	(0.000)	*(0.001)*	*(0.000)*	(0.265)
IT-investment	3.14	2.94	3.07	0.137
	(0.635)	(0.816)	(0.844)	(0.934)
Size of investment	*4.40*	*4.42*	*3.60*	2.917
	(0.000)	*(0.000)*	*(0.000)*	(0.233)
Question 4: To what extent are the following reasons to use formal capital budgeting methods?				
International project	3.13	2.82	*2.14*	4.318
	(0.709)	(0.605)	*(0.003)*	(0.115)
Decision-maker requirement	3.20	3.40	3.43	0.423
	(0.550)	(0.176)	(0.234)	(0.810)
Financier requirement	2.43	2.76	3.35	3.622
	(0.120)	(0.448)	(0.303)	(0.163)
Lack of time	2.92	*2.47*	2.92	1.516
	(0.819)	*(0.095)*	(0.809)	(0.468)
Measuring responsibilities	*2.42*	*1.73*	*2.36*	*4.837*
	(0.012)	*(0.000)*	*(0.089)*	*(0.089)*
Business culture	3.25	3.33	3.14	0.490
	(0.389)	(0.331)	(0.635)	(0.783)
Significance of the project	*2.17*	2.69	2.50	1.305
	(0.034)	(0.370)	(0.139)	(0.521)
Question 5: To what extent are the following methods used to measure the cost of capital?				
Experience	*4.00*	*3.75*	*4.29*	1.174
	(0.041)	*(0.080)*	*(0.000)*	(0.556)

Owner's return requirement	3.71 (0.220)	*4.07* *(0.008)*	*4.00* *(0.018)*	0.523 (0.770)
Cost of liabilities	3.20 (0.799)	*3.89* *(0.052)*	*4.33* *(0.001)*	1.648 (0.439)
CAPM + beta	*1.80* *(0.033)*	2.00 (0.111)	2.67 (0.423)	1.744 (0.418)
CAPM + risk premium	*1.80* *(0.033)*	*1.67* *(0.010)*	2.67 (0.423)	3.077 (0.215)
WACC	2.40 (0.468)	*1.50* *(0.001)*	3.20 (0.704)	5.843 (0.054)
Question 6: To what extent are the following reasons for abandoning capital budgeting decisions?				
Budget constraint	3.27 (0.337)	2.74 (0.461)	2.67 (0.339)	2.028 (0.363)
Lack of collateral	*2.35* *(0.029)*	*2.37* *(0.083)*	*2.24* *(0.032)*	0.172 (0.918)
Financing problems	3.27 (0.355)	2.76 (0.489)	*2.36* *(0.090)*	4.031 (0.133)
External financiers	*1.42* *(0.000)*	*1.42* *(0.000)*	*1.60* *(0.000)*	0.765 (0.682)
Weak capital structure	2.70 (0.328)	*1.95* *(0.001)*	*2.41* *(0.061)*	2.957 (0.228)
Vision of the future	3.19 (0.457)	*3.73* *(0.010)*	*3.44* *(0.053)*	2.584 (0.275)
Lack of owner's perseverance	*1.80* *(0.000)*	*1.94* *(0.002)*	*1.89* *(0.001)*	0.122 (0.941)
Question 7: To what extent do the following describe the capital structure of your firm?				
Income financing is insufficient	*1.87* *(0.000)*	2.83 (0.592)	2.58 (0.094)	*6.835* *(0.033)*
Projects define the amount of debt	*2.33* *(0.017)*	*3.74* *(0.005)*	3.22 (0.449)	*12.421* *(0.002)*
Long-term debt	2.81 (0.533)	*4.14* *(0.000)*	3.26 (0.354)	*8.919* *(0.012)*
Short-term debt	*2.04* *(0.002)*	*2.28* *(0.044)*	2.60 (0.187)	2.479 (0.290)
Interest rate level	*2.25* *(0.013)*	3.38 (0.268)	2.64 (0.273)	*6.531* *(0.038)*

Tax deductibility	*1.91*	2.39	*2.26*	2.025
	(0.000)	(0.061)	*(0.008)*	(0.363)
Avoid running into	*3.88*	3.48	3.54	1.680
debt	*(0.004)*	(0.103)	(0.045)	(0.432)
Seeking co-owners	2.72	*1.65*	*1.61*	*8.559*
	(0.396)	*(0.000)*	*(0.000)*	*(0.014)*
Seeking main	2.96	*1.61*	*1.70*	*9.976*
financier	(0.912)	*(0.000)*	*(0.000)*	*(0.007)*
Withdrawing profit	*1.72*	*1.67*	*1.65*	0.037
funds	*(0.000)*	*(0.000)*	*(0.000)*	(0.982)