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Capital Budgeting Techniques and Divisional Cost of Capital: A Study of its Use by Major Ecuadorian Firms

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ABSTRACT

This study examines the capital budgeting techniques in use by major Ecuadorian Companies. It has a special focus on the use of divisional cost of capital because finance theory advocates the use of risk specific discount rates when valuing investment proposals. Never the less, several studies in the U.S. and Europe have documented that practitioners are not in line with academics when calculating risk specific discount rates. Thus, a study investigating the alignment between practitioners in Ecuadorian firms and finance theory is important to perform.

The study is divided into five sections. First, an introductory chapter explaining the problematic involved when using a single discount rate for the whole firm and the methodology involved when doing the survey. The second chapter introduces in general terms the forty four respondents of the survey which belong to the ranking *Ekos 400, Major Ecuadorian Companies*. A third chapter that reports capital budgeting techniques in use by respondents. Then a fourth chapter in which divisional cost of capital used by respondents is presented. Finally, the last chapter focuses on comparing techniques used by Ecuadorian companies in the present study to what finance literature advocates for and what other studies show firms around the globe are doing. In order to solve the problems involved when not using divisional cost of capital this study suggests some of the normative approaches found in finance literature.

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INTRODUCTION

Problem Statement

The *capital budgeting* decision process remains one of the key areas for the financial manager since its results shape the firm's future opportunities (Gitman & Forrester 1977). There are several ways of analyzing *capital budgeting* decisions. When it comes to corporations, studies have shown that *discounted cash flows (DCF)* are the most widely used and appropriate methods (Block 2003, Brealey & Myers 2000). To apply the *DCF* method, the forecast of *free cash flows* that project X will generate during its lifetime is needed and then is necessary to determine the *discount rate*. This *discount rate* should include the time value of money and the project X's *risk* (Brealey & Myers 2000). Corporate finance literature and studies (Block 2003, Brealey & Myers 2000) show that the most common and appropriate way of determining the *discount rate* is by calculating the *weighted average cost of capital (WACC)*. According to the study of Block (2003), 85.2% of the top 1000 Fortune Companies that responded to his survey used the *WACC* method. However, the use of a single *cut-off rate* leads to several problems when using an investment decision criterion like the *NPV*, *IRR*, *benefit/cost ratio* or others. The use of a single *hurdle rate* assumes that the project being valued is identical both in *risk* and in financing structure as the firm that is undertaking the project. Therefore, it only works for firms that have a constant *capital structure* and *risk* throughout their areas of business. One possible solution is the use of *divisional or project cost of capital*, but it becomes somewhat confusing how to determine the *division's cost of capital*. The *divisional cost of capital* has been introduced in finance literature as a solution to the problems presented by the use of a single corporate cut-off rate. Problems also arise as a result of the diversity of ways in which the *divisional cost of capital* is utilized and calculated.

If the firm's *WACC* is used as the cut-off rate criterion for all projects, "there is the potential for intrafirm misallocation of capital since projects initiated by high *risk* divisions are more likely to be accepted because of high returns. Lower return divisions with less *risk* may be starved for capital when only a single *weighted average cost of capital* is used" (Block 2003).

Brealey and Myers (2000) summarize this key element of *capital budgeting* stating the following: “Many firms use the company *cost of capital* to discount the forecasted cash flows on all new projects. This is a dangerous procedure. In principle, each project should be evaluated at its own opportunity *cost of capital*; the true *cost of capital* depends on the use to which the capital is put. If we wish to estimate the *cost of capital* for a particular project, it is project risk that counts.”

Given the problematic and the possible solutions to the use of a single *hurdle rate*, the present dissertation will examine the use of *capital budgeting techniques* and emphasize on *divisional cost of capital* by *Ekos* magazine July 2005 listing of the 400 largest Ecuadorian corporations¹.

Objectives

The general objective of this study is to determine the common practices of the *capital budgeting process* in Ecuadorian Companies and focus on the use of *divisional cost of capital*. The present dissertation will concentrate on the problems generated when using a single cut-off rate for all projects undertaken by the firm. It will introduce the problems and state different solutions found in the finance literature. Findings will be compared to those found in other studies done in the U.S. and Europe.

Reasons of Study

The justification for the present study is fully related to the problematic of the investigation topic. The problems that arise when firms employ the company's cut-off criterion for all projects it undertakes, have been subject of study by many experts. Most studies regarding this issue have been performed on firms from industrialized countries; this dissertation will try to expand the knowledge about firm's *capital budgeting* techniques in a different environment.

¹ The ranking is based on companies' revenues.

Through the present study what can be inferred is whether or not *Ecuadorian Companies* follow the global movement towards *capital budgeting* and *divisional cost of capital* procedures. This study can be of interest to Chief Financial Officers (CFO) of Ecuadorian Companies and possibly CFO's of similar countries as well. Furthermore, it can be used as a benchmark for current practices used by other *Ecuadorian Companies* and as an evaluation of their actual techniques compared to those employed by major U.S. and European companies.

Research Methodology

A questionnaire was designed to survey the level of sophistication used in *capital budgeting* by Ecuadorian leading companies. The survey found on APPENDIX A is divided into three main sections: general information, *capital budgeting* techniques and *divisional cost of capital*. The general information asks respondents about their financial statements, and businesses in which they are involved. It is basically a section design for obtaining an overview of the participants. Section II of the survey focuses on *capital budgeting* techniques and it includes question on statistics, procedures, techniques in use, capital rationing and *risk* and uncertainty. Questions on section II were developed using as a guideline Gitman and Forrester's (1977) paper on *A Survey of Capital Budgeting Techniques Used by Major U.S. Firms*. Finally, section III focuses on the use of *divisional cost of capital*; its use, methods to determine it and variables taken into consideration. Questions on section III were developed using Block's (2003) study *Divisional Cost of Capital: A Study of its Use by Major U.S. Firms* as a framework.

Even though important studies were employed as guidelines in order to create the survey, it was rechecked by a sociologist for misleading, conditioning or any kind of bias that the survey may present. Questions are ordered in a logical way and intend to avoid influencing the response of subsequent questions. All respondents were presented the questions in the same order. Since technical and sophisticated financial terms are used they were pre-checked to assure the definition of each term and to

prevent confusion in the respondents². Questions on the survey are asked so they flow from the more general to the more specific and in a logical manner. It is important to know that the survey was constructed using contingency questions, this means that only respondents who gave a particular answer to a previous question will answer some of the following questions. This avoids asking questions to companies that do not apply for them. Finally, questions were framed in three different ways:

- (i) 'Factual' questions requiring a dichotomous (Yes/No) answer.
- (ii) Questions seeking assessments of importance of a variable, being 1 the most important and 5 the least important.
- (iii) Closed ended questions, respondents' answers are limited to the pre established responses available.

The survey was addressed to the top financial officer of the company and conducted from July 23 to September 25, 2007. It was conducted to sixty companies, from which forty four of them replied. Respondents were requested to indicate current practices; and with regards to the financial information answers make illusion to 2006 figures. The questionnaire was either sent via e- mail or through a personal interview with the interviewee. It is important to clarify that the firms agreed to publish results but anonymously, in the sense that they do not want to be identified as the company that uses a particular technique.

Theoretical Background

The study will make reference to several financial terms and theory which are going to be briefly described in this chapter. *Capital budgeting* is the planning process of the future investment projects of a firm. These future investments may be investment in new plants, research and development projects, training, new business units or others. There are several formal methods used in *capital budgeting* and they include the *internal rate of return (IRR)*, the *rate of return (ROR)*, the *net present value (NPV)*, the *payback period*, *benefit/cost ratio*. All of the methods mentioned pursue the effective measurement of the attractiveness or the value added to the company by

² Definitions of relevant financial terms on this paper are found on the GLOSSARY and words are in *italics*.

the investment, since the goal of the firm is to maximize present shareholder value. Next, a brief description of each of these methods using Brealey & Myers (2000) definitions will be given.

The *NPV* is considered the project's net contribution to wealth. It is the *present value* minus initial investment. In which *present value* is the discounted value of future free cash flows. The *NPV* decision criteria is to accept all positive *NPV* projects when the environment has no constraints, and when projects are mutually exclusive the rule says to accept the project that has the highest *NPV*. The *IRR* also uses cash flows to find its value. The *internal rate of return* is the *discount rate* at which the investment has zero *net present value*. The *IRR* decision criterion is to accept all investment projects that have a higher *IRR* than the *hurdle rate* in an unconstrained environment. When projects are mutually exclusive the decision rule often used is taking the project with the highest *IRR*, this methodology does not maximize shareholder wealth because the project with higher *IRR* may have a lower *NPV*. The *benefit cost ratio* is the ratio of the benefits relative to its cost, all expressed in monetary terms and using discounted present values. All of the methods mentioned above for *capital budgeting* decisions are sophisticated methods that take into account the time value of money.

The *rate of return (ROR)* also known as *return on investment (ROI)* is an accounting ratio of money gained or lost on an investment to money invested. In accounting terms it is usually book income as a proportion of net book value. *ROR* does not take into account the value of money over time. Finally, the *payback period* is the time taken for a project to recover its initial investment. In this study *payback period* is referred in nominal terms and not discounted *payback period* which discounts the cash flows. These two methods regardless of being simple are widely used by practitioners in the finance arena.

The sophisticated *capital budgeting* methods mentioned above use the *cost of capital* in order to take an investment decision. The *cost of capital* for a firm is defined as the expected return on a portfolio formed by all the shares/securities issued by the company (Brealey & Myers 2000). The most common and proper way to calculate it is by using the Weighted Average Cost of Capital formula:

$$\text{WACC} = D/V * (1-t) * R_d + E/V * R_e$$

Where:

D = value of the debt (usually book value).

E = market value of equity.

V = company value (D+E).

R_d = expected rate of return on debt.

R_e = expected rate of return on equity.

t = taxes expressed as a percentage.

The WACC can be interpreted as the opportunity cost for investing in the assets of the company, making it the appropriate *discount rate* for the projects that the company undertakes. The following question arises: should this *cost of capital* be used for all the projects? The definite answer is NO; the companies or corporate *discount rate* should only be used for projects that have the same *risk* of the company. As stated previously, the core of the problem is found in the common practices used by corporations: many of them use the companies *hurdle rate* as the proper *discount rate* for all projects (Block 2003, Fuller and Kerr 1981). Using the overall corporate *hurdle rate* is inappropriate if the project's systematic *risk* differs significantly from that of the firm (Fuller and Kerr 1981). The major problem of using a single cut-off criterion for all projects is misallocation of capital. Projects/divisions with high *risk* will be favored in spite of having lower returns than those required by their systematic *risk* (Fuller and Kerr 1981). On the other hand, lower *risk* divisions/projects will lack capital in spite of offering returns higher than those required by their systematic *risk* (Fuller and Kerr 1981). In conclusion, if just one *hurdle rate* is used for all the firms projects/divisions it will lead to incorrect decisions and a reduction of stockholders' wealth (Block 2003). To illustrate the intrafirm misallocation of capital stated before, in FIGURE 1³ we can observe an adaptation of Brealey et al. (2006) text, *Principles of Corporate Finance*:

³ Adaptation also includes ideas from Block (2003) and Álvarez (1992).

**Internal Rate of Return /
Cost of Capital**

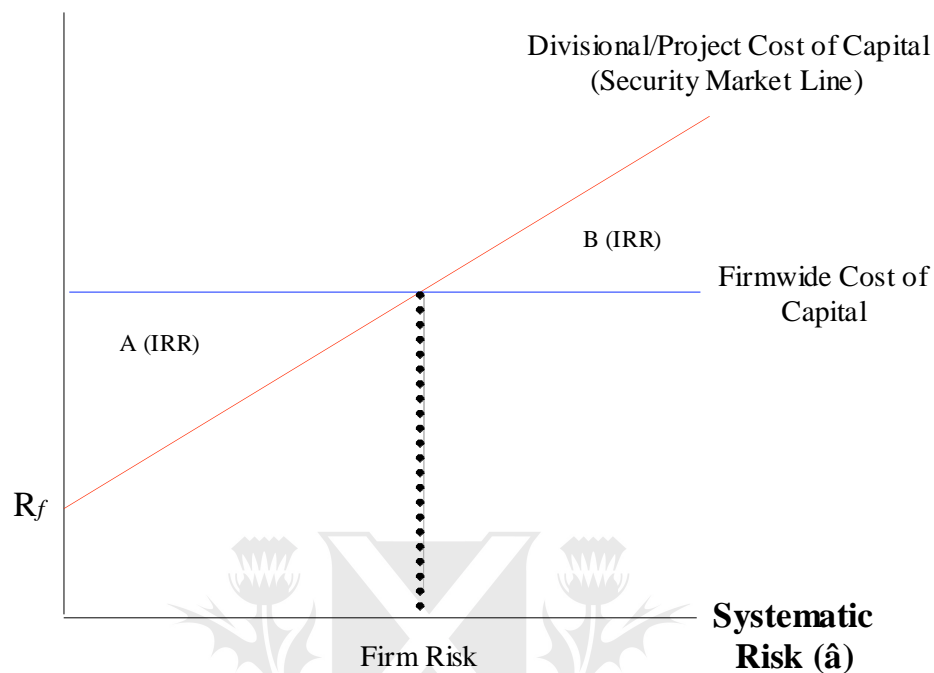


FIGURE 1: The effect of using firm cost of capital for all projects

FIGURE 1 clearly shows the intrafirm misallocation stated beforehand. If the firm's *cost of capital* is used as the only decision criteria, project B will be accepted since it has a higher *IRR* than the firm's *cost of capital*. Meanwhile project A will be rejected since it has a lower *IRR* than the firm's *cost of capital*, the same decision will take place when using any other of the *DCF's* methods. If *divisional cost of capital* based on *risk* was taken into consideration, project A will be accepted since it surpasses the *rate of return* required for its *risk* and project B will be rejected because it has an *IRR* lower than the required *rate of return* according to its systematic *risk*. In other words, project A exceeds the *divisional cost of capital* and project B fails to cover *divisional cost of capital* (Block 2003). By using *divisional cost of capital*, the firm is more likely to maximize stockholder wealth in a *risk averse*, efficient capital market environment (Block 2003).

THE DATABASE

The *Ekos* magazine July 2005 listing of the 400 largest Ecuadorian corporations served as the database for this study. Using as a guide both Block's (2003) and Gitman & Forrester's (1977) surveys a careful pre tested questionnaire was developed. The questionnaire was either sent via e-mail or through a personal interview with the firm's top financial officer of the firm. Forty four usable responses were returned, twenty nine (66%) of them were personal interviews and fifteen (34%) were responses via e-mail. As a whole, the response rate was high, out of the sixty companies contacted, forty four (73,3%) completed the survey. Of the questionnaires sent through e-mail the response rate was 48%. Due to the different techniques used to survey participants, data was tabulated separately, for personal interviews and for e-mail responses in order to analyze if major differences occur. After a comparative analysis of both data samples no significant differences were found.

The sample size is in effect limited to those companies that opened their doors and contributed to this paper and it accounts for 11% of the 400 largest Ecuadorian corporations. Companies that responded to the survey are randomly distributed through the ranking of *Ekos* and vary across different industries. A general overview of the companies' financial statements and industry classification is presented on TABLES 1, 2, 3, 4 and 5. All data provided in monetary values is in United States dollars.

TABLE 1: Industry Classification of Respondents

<u>Classification</u>	Responses	
	Number	%
Distributor	12	27,27%
Manufacturer of Durables	3	6,82%
Manufacturer of Non Durables	14	31,82%
Service Company	15	34,09%
Total Responses	44	100,00%

As seen in TABLE 1, industry classification amongst respondents is randomly distributed. There are similar percentages of respondents involving distributors,

manufacturer of non durables, and service companies. There exists a very small percentage of manufacturers of durables and this can be inferred from the nature of the Ecuadorian economy.

TABLE 2: Year 2006 Total Revenue of Survey Participants

<u>Revenue Classification</u>	Number	%			
Under \$20 million	8	18,18%			
\$20 to \$40 million	11	25,00%			
\$40 to \$100 million	11	25,00%	Mean \$299,42 million		
\$100 to \$250 million	8	18,18%	Median \$50,48 million		
Over \$250 million	6	13,64%			
Total Responses	44	100,00%			

TABLE 3: Year 2006 Total Assets of Survey Participants

<u>Asset Classification</u>	Number	%			
Under \$20 million	16	36,36%			
\$20 to \$100 million	16	36,36%	Mean \$313,92 million		
Over \$100 million	12	27,27%	Median \$34,41 million		
Total Responses	44	100,00%			

TABLE 4: Year 2006 Net Profit (Loss) of Survey Participants

<u>Profit Classification</u>	Number	%			
Under \$1 million	11	25,00%			
\$1 to \$2 million	9	20,45%	Mean \$82,51 million		
\$2 to \$6 million	11	25,00%	Median \$2,55 million		
Over \$6 million	13	29,55%			
Total Responses	44	100,00%			

TABLE 5: Year 2006 Ratio of Fixed Assets to Total Assets of Survey Participants

<u>Ratio Classification</u>	<u>Number</u>	<u>%</u>			
0 to 9%	11	25,00%			
10 to 30%	11	25,00%	Mean 32,85%		
30 to 50%	11	25,00%	Median 30,05%		
Over 50%	11	25,00%			
Total Responses	44	100,00%			

TABLES 2 to 5 show the diversity of the firms involved in the survey and how their financial statements differ substantially. Having a sample in which financial statements vary considerably made the task of creating significant segments extremely difficult. Segments on TABLES 2 to 5 were created subjectively using two criterions. First, trying to show the companies size when being part of a segment and secondly, trying to have an even number of participants on each of the segments.

It is important to state that of the forty four respondents, twenty three (52,27%) were Multinational companies operating in Ecuador and twenty one (47,73%) were companies that only operate in Ecuador. This paper will refer to the sample as a whole as Ecuadorian Companies. In terms of the companies ranking in *Ekos* publication of Ecuadorian largest corporations it is as follows; eighteen (40,91%) are in the Top 100, ten (22,73%) are in the Top 200, eight (18,18%) are in the Top 300 and eight (18,18%) are in the Top 400.

CAPITAL BUDGETING TECHNIQUES

Capital budgeting decisions help mold the firm's future opportunities, thus being one of the key processes for financial managers (Gitman & Forrester 1977). This chapter surveys the *capital budgeting* techniques in use by Ecuador's leading firms. When it is possible and relevant the findings in this section are compared and analyzed with similar past studies.

Capital Budgeting Statistics

A part of the survey was dedicated to finding the various statistics describing the respondent firm's *capital budgeting* activities. As it can be observed in TABLE 6, 43,18% of the firms have a *capital budget* between 1 and 10 million U.S. dollars. Later on the survey, firms were asked the minimum project size in terms of investment to have a formal financial analysis; the results are seen in TABLE 7. More than 60% of the respondents indicated that a minimum outlay of \$50,000 was required to justify formal analysis and only 13,64% responded that as low as \$1,000 is enough for formal analysis. Gitman and Forrester (1977) reported that when companies do not consider a project an investment it is generally consider an expense. According to literature, expenses are costs incurred by a business over a specified period of time to generate revenues earned during that same period of time. On the other hand, assets or investments are purchases that provide future economic benefit to the company (Bhatawedekhar et al. 2005). Companies are making a mistake by classifying expenses and assets or investments on the basis of the economical value of them and not on the basis of time in which they generate economic benefit. Ecuadorian companies should revise how they classify projects when they are not formally analyzed.

TABLE 6: Size of Annual Capital Budget

Size of Annual Capital Budget	Responses	
	Number	Percent
Less than \$1 million	10	22,73%
\$1 to \$10 million	19	43,18%
\$10 to \$20 million	6	13,64%
\$20 to \$50 million	6	13,64%
\$50 to \$100 million	2	4,55%
More than \$100 million	1	2,27%
Total Responses	44	100,00%

TABLE 7: Project Size for Formal Analysis

Project Size	Responses	
	Number	Percent
Greater than \$1,000	6	13,64%
Greater than \$10,000	10	22,73%
Greater than \$50,000	12	27,27%
Greater than \$100,000	4	9,09%
Greater than \$500,000	10	22,73%
Greater than \$1,000,000	2	4,55%
Total Responses	44	100,00%

Capital Budgeting Procedures

For further analysis, firms had to answer questions regarding their *capital budgeting* procedures; results will be presented in this section. Firms were asked whether their companies utilize a central review committee for investment decision making, it was a 'yes or no' question. The majority of the firms answered positively to this question, 86,36% accounted for using a central review committee.

In general terms, finance literature indicates that the *capital budgeting* process can be conceived as a process consisting of four stages: project definition and estimation of cash flows; project analysis and selection; project implementation; and project review

(Myers, Gitman & Forrester 1977). Two questions were asked to respondents about these four stages; which they thought it was the *most difficult* aspect of the *capital budgeting* process and which was the *most critical*. Results, seen on TABLE 8, are *not* surprising since more than 40% of the respondents considered project definition and cash flow estimation the most difficult aspect of the *capital budgeting* process. This result is not surprising because estimating cash flows involves an enormous number of assumptions, estimations, forecasts, and tax-related decisions. Regarding the most critical stage, results show a partition between respondents; some considering project definition and cash flow estimation and others project implementation. The results confirm those of Gitman and Forrester (1977), as well as those of Fremgen (1973). In a different environment, top U.S. firms as well as top Ecuadorian firms consider estimation of project cash flows the most difficult and critical parts of the *capital budgeting* process.

TABLE 8: Most Difficult and Most Critical Stages of Capital Budgeting Process

Stage	Responses			
	Most Difficult		Most Critical	
	Number	Percent	Number	Percent
Project Definition and Cash Flow Estimation	19	43,18%	17	38,64%
Financial Analysis and Project Selection	7	15,91%	4	9,09%
Project Implementation	15	34,09%	21	47,73%
Project Review	3	6,82%	2	4,55%
Total Responses	44	100,00%	44	100,00%

Capital Budgeting Techniques

One of the main objectives of the present study was finding the *capital budgeting* techniques most widely used by Ecuadorian leading firms. Results will be compared to other similar studies in different environments in a later chapter. By doing such a comparison and investigating what current literature suggests about techniques to be used, the sophisticated nature of such techniques can be assessed.

Several *capital budgeting* techniques are available for evaluating projects. The *Net present value*, *Benefit/Cost Ratios*, and the *Internal rate of return* are sophisticated methods of analyzing investment decisions since all take into consideration the value of money over time. Other less sophisticated methods also exist like the simple *payback period* or the *rate of return*; probably the most widely known unsophisticated methods. Respondents were asked to indicate the primary and secondary method used; the choices were the five mentioned before and respondents could answer other and identify which method it was. The responses are shown on TABLE 9. There is a clear move towards the normative; more than 85% of respondents use a sophisticated method as their primary method of evaluation. As can be observed below, there is a preference towards the *internal rate of return (IRR)* as the primary technique in use. If we add the companies that use the *IRR* as a primary and secondary method, more than 75% of respondents use it.

In addition to the primary technique, more than 65% of the firms surveyed use a sophisticated method of evaluation as their secondary technique. *Net present value (NPV)* was the most popular secondary technique used, but the simple *payback period* had its role regardless of being an unsophisticated method. It is important to see that both the *NPV* and the *payback period* are used as supplementary techniques, more than 40% use the *NPV* as a secondary technique while only 20% used it as a primary one. A more drastic difference occurs with the *payback period* technique which is used by 25% as a secondary technique and by none of the respondents as a primary technique.

TABLE 9: Capital Budgeting Techniques in Use

Technique	Responses			
	Primary		Secondary	
	Number	Percent	Number	Percent
Internal (or Discounted Rate of Return)	28	63,64%	5	11,36%
Rate of Return (Average Rate of Return)	1	2,27%	0	0,00%
Net Present Value	9	20,45%	19	43,18%
Payback Period	0	0,00%	11	25,00%
Benefit/Cost Ratio	1	2,27%	5	11,36%
Other	5	11,36%	4	9,09%
Total Responses	44	100,00%	44	100,00%

As part of the *capital budgeting* techniques in use respondents were asked to indicate a value which best described the *cost of capital* for their firm. Since the survey also focuses on *divisional cost of capital*, this question was regarding the firm as a whole, known as the company's cut off rate. The answers to this question are summarized in TABLE 10. At the time of the survey 43,18% of the firms had a cutoff rate of 10 to 15% and 75% of the respondents had a cutoff rate higher than 10%. Even though these findings do not augment our knowledge on the techniques being used to find the cutoff rates they do give a general idea about the minimum required *rate of return* projects have to meet in order to be accepted.

TABLE 10: Cost of Capital or Cut-off Rate

Rate	Responses	
	Number	Percent
Less than 5%	0	0,00%
5 to 10%	11	25,00%
10 to 15%	19	43,18%
15 to 20%	8	18,18%
More than 20%	6	13,64%
Total Responses	44	100,00%

Capital Rationing

One of the restrictions upon investment decisions is the availability of capital for the company due to the fact that companies sometimes are in a capital rationing environment. This section surveys the restriction on capital that companies face. Respondents were asked whether or not their companies work in a capital rationing environment, in which a fixed budget needed a competitive allocation between all competing projects. The answers for this yes or no question are: twenty three (52,27%) of all firms surveyed do work in a capital rationing environment and 47,73% do not. Then respondents were asked to identify the cause of the capital rationing. These results are seen on TABLE 11. Answers were mainly divided in two; 40% of firms' major cause of capital rationing was limit placed on borrowing by internal management and another 40% were companies who wanted to maintain target earnings per share or price- earnings ratio.

TABLE 11: Major Cause of Capital Rationing

Cause	Responses	
	Number	Percent
Debt Limit Imposed by Outside Agreement	4	17,39%
Debt Limit by Management External to the Organization	0	0,00%
Limit Placed on Borrowing by Internal Management	10	43,48%
Restrictive Policy Imposed upon Retained Earnings for Dividend Payout	0	0,00%
Maintenance of a Target Earnings Per Share or Price-Earnings Ratio	9	39,13%
Total Responses	23	100,00%

Risk and Uncertainty

Finance literature emphasizes the importance of considering different risks associated with different projects (Brealey & Myers 2000, Gitman & Forrester 1977). The survey included one question regarding *risk* and uncertainty. It was a yes or no question on whether or not respondents considered *risk* and uncertainty explicitly in

the decision making process for investment proposals. More than 95% of the respondents indicated that they gave explicit consideration to *risk* and uncertainty, while less than 5% did not.



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DIVISIONAL COST OF CAPITAL

The present chapter examines the techniques, methods and variables taken into account to determine *cost of capital*, having a particular focus on *divisional cost of capital*. In the next chapter results from this section will be contrasted to those found by Block (2003) in his study of U.S. firms.

Cost of Capital

As presented in the previous chapter, companies are moving towards the normative. Of the 44 survey participants, more than 85% use discounted cash flow as the primary method of evaluation. Among participants as seen on TABLE 9 there is a big preference towards the *internal rate of return* which is preferred more than 3 times over the *net present value* method as a primary technique.

Respondents were asked to state which method they implement when calculating the required *rate of return (discount rate)*. The weighted average cost of capital (WACC) was the preference among respondents, with more than 40% using the WACC method to determine the *hurdle rate* of the firm. The answers are presented in TABLE 12. The use of the WACC as the principal method for determining the cutoff rate is consistent with research studies (Bierman 1993, Gitman & Forrester 1977, Petty & Scott 1975). Some companies use a combination of the methods presented, which is why there are more responses than respondents.

TABLE 12: Primary Method of Determining the Required Rate of Return

<u>Method</u>	Responses	
	Number	Percent
Cost of Equity Financing	8	17,39%
Desired growth rate for the firm	1	2,17%
Industry Average rate of return	6	13,04%
Weighted Average Cost of Capital	19	41,30%
Desired return on stockholders	4	8,70%
Other	8	17,39%
Total Responses	46	100,00%

Divisional Cost of Capital

There exists a movement towards the normative and recommendations found in finance literature when it regards to *capital budgeting* techniques. Moreover, when respondents were asked about *divisional cost of capital*, answers were not so enlightening. Participants were asked the following question: *Do you have different rates of return that are required for different divisions, subsidiaries or projects of the firm?* To this yes – no question, 38,64% of respondents answer positively to the question. Close to 2/3 of the major firms that operate in Ecuador do *not* use *divisional cost of capital*, thus causing them to suffer the problems discussed in the section dedicated to the problematic nature of the issue, found in chapter one.

Follow up questions were presented in order to identify the approaches and methods used by the 17 firms that do use *divisional cost of capital*. Respondents were asked to rank in order of importance the variables that differentiate and determinate the required *rate of return* for the division. Answers clearly show a predominance of *risk* (64,71%) as being the most important and differentiating variable for determining *divisional cost of capital*. Results that are presented on TABLE 13 are in coherence with other studies in which the variable that predominates is *risk*. The consideration of the topic *risk* follows.

TABLE 13: Most Important Variables in Determining Divisional Cost of Capital

Variable	Level of Importance					
	1st	%	2nd	%	3rd	%
Risk	11	64,71%	6	35,29%	0	0,00%
Strategic Importance of Division	6	35,29%	9	52,94%	2	11,76%
Division's Ability to Raise It's Own Capital	0	0,00%	2	11,76%	15	88,24%
Total Responses	17	100,00%	17	100,00%	17	100,00%

Determining Risk and Required Rates of Return for a Division

Analogous to Block's (2003) study, the present paper shows that firms that use *divisional cost of capital*, consider *risk* to be the most influential variable when determining the *divisional cost of capital*. Finance literature offers a variety of methodologies to determine *risk* in order to establish *cost of capital* of a division. These approaches will be presented in the next chapter as possible solutions for those firms not using divisional cost of capital.

Firms that use *risk* as the primary variable to assess *divisional cost of capital* were asked the method by which they measured *risk*. Results are shown on TABLE 15. It is important to note that results vary significantly from those of Block's (2003) on U.S. firms.

In analyzing TABLE 14, item (a) represents a pure – play in which the division is compared to another public company in the same industry. Item (b) suggests that the *beta* of the division should be determined using the average *beta* of the entire industry the division is involved in. Item (c) represents the usage of an objective measure that is not market related, for example the variability of the division's earnings compared to overall corporate earnings. Finally, item (d) is a subjective approach for determining *risk* (Block 2003).

TABLE 14: Method by Which Risk is Measured

Method	Responses	
	Number	Percent
An objective measure such as the beta of a public company in same line of business as the division	0	0,00%
An objective measure such as the average beta for the entire industry the division is in	0	0,00%
An objective measure, not market related, such as the variability of the division's earnings compared to overall corporate earnings	4	36,36%
A subjective measure such as top management's view of the perceived risk generally associated with the division	5	45,45%
Other	2	18,18%
Total Responses	11	100,00%

Considerations of Foreign Investments

Regarding *divisional cost of capital*, the international area brings upon thousands of debates between the uses of corporate wide *cost of capital* vs. divisional (Block 2003). When evaluated as an individual investment, foreign projects, and to be more precise with the paper, Ecuadorian projects tend to be riskier than domestic⁴ ones. Thus, given the hypothesis of higher *risk*, the projects require a higher *hurdle rate* due to the fact that they carry higher political, foreign exchange, security, transfer payment, and business cycle *risks*.

Several authors do not agree with the previous hypothesis of higher *risk* and higher *hurdle rate* for foreign investments. They argue that the benefits that come from diversification overpasses the risks associated to the country the project is held on (Shaked 1986, Shapiro 1983).

Shapiro (1983) makes a strong argument about the *risk* and variability of foreign investments, "...to the extent that foreign cash flows are not perfectly correlated with those of domestic investments, the total *risk* (systematic and nonsystematic) associated with foreign cash flows appears to be reduced, not increased by international investments." According to Shapiro the argument is stronger when referring to less developed countries, which have lower correlation coefficients with U.S. and European corporations (Block 2003). Based on the above, Shapiro argues that the cutoff rate for projects held on foreign countries should be lower than the corporate *hurdle rate*.

Based on the answers to the survey, respondents do not agree with Shapiro's line of reasoning. Fifty two percent of the respondents are multinational firms; the others are not eligible for the questions presented next. Survey participants were asked if they used different *hurdle rates* than the mother company, and to this yes – no question, fifteen (65,22%) of respondents answered positively to this question. Regarding if foreign investments as a general rule should have a higher or lower *hurdle rate*, 66% opted for higher *hurdle rates*, 20% for lower *hurdle rates*, and 13% had no opinion.

⁴ Domestic in the sense of the location of the multinational company headquarters.

Finally, respondents were asked what risks are considered the most important when determining a country's *cost of capital*, results are seen on TABLE 15. This final question was not present on Blocks' (2003) study.

TABLE 15: Most Important risks when determining *cost of capital* for foreign investments

Variable	Level of Importance							
	1st	%	2nd	%	3rd	%	4th	%
Political Risk	12	80,00%	3	20,00%	0	0,00%	0	0,00%
Foreign Exchange Risk	1	6,67%	1	6,67%	5	55,56%	2	28,57%
Security Risk	2	13,33%	7	46,67%	3	33,33%	1	14,29%
Transfer payment Risk	0	0,00%	4	26,67%	1	11,11%	4	57,14%
Total Responses	15	100,00%	15	100,00%	9	100,00%	7	100,00%

As seen on the above table, some of the respondents do not consider all the risk variables when calculating the *cost of capital* for foreign investments. None of the respondents added a new *risk* variable in the option *other* of the question. When results are analyzed there is a clear tendency in considering *political risk* the most important variable when calculating *cost of capital* for foreign investment. A similar tendency also occurs with *security risk* which is considered the second most important variable. According to finance literature one of the most important variables when determining *cost of capital* for foreign projects is *exchange rate risk*. It appears that respondents do not agree with this argument. A possible explanation is that Ecuador's official currency is the US dollar, making the *exchange rate risk* a variable that is not as important as in other countries. Results regarding the *capital budgeting* process for foreign investments from this study will be compared to those from other studies in the next chapter.

ANALYSIS & COMPARISON OF RESULTS

One of the main objectives of this paper was to identify the characteristics and techniques used by Ecuadorian Companies when faced with *capital budgeting* decisions. No previous study was found gathering such information and it was considered important to do so. Results were presented on the previous chapters; this chapter will compare results found on this study to those found in previous studies in other parts of the world and it will evaluate the sophistication of such techniques.

Several studies will be taken into account in order to contrast the present study. The three major studies used for comparison will be presented next. It should be clarified that results are not deeply compared to those of Gitman and Forrester (1977) in spite of having the same framework because they have enormous difference in time, and it is considered that recent studies would be more appropriate. For *capital budgeting* techniques studies from Graham and Harvey (2001) done on U.S. firms and Brounen, de Jong and Koedijk done on European firms would be used for contrasting answers. Studies by Graham and Harvey (2001) and Brounen, de Jong and Koedijk (2004) are comparable because they use the exact same framework to study *capital budgeting* practices in two different environments.

Graham and Harvey (2001) study had as a main objective understanding the corporate finance practices in U.S. firms. They gathered 392 responses from the 4,400 companies that the survey was sent to. On the other hand, Brounen, de Jong and Koedijk replicated Graham and Harvey study in a different environment. They sent questionnaires to 6500 firms in Europe and gathered 313 responses. When broken down; 132 responses were from Germany, 68 responses from the UK, 61 responses from France and 52 responses from the Netherlands. Distributions among industries and sizes of companies are fairly close between both studies. The distribution of industries of this study is similar to the two studies being compared but the sizes of companies being surveyed do vary. In spite of the variance in companies' size a comparison is going to be made because no other relevant studies were found.

The third important study used for contrasting answers is Block's (2003) study on *Divisional Cost of Capital: A study of its use by Major U.S. Firms*. The Database

used for his study consists of *Fortune 1000* companies and 298 responses were gathered. Results are comparable because this study uses Blocks' (2003) framework in its section of *Divisional Cost of Capital*. Once again, there is a difference among companies sizes when comparing one study to the other; but comparisons are still pertinent because both studies are surveying the major companies of their environment.

Capital Budgeting Techniques

Through out time the vast majority of research on *capital budgeting* techniques took place on the U.S. and Europe; but it should not be assumed that *capital budgeting* practices are the same in different countries. Therefore, this section compares *capital budgeting* techniques from the U.S. and Europe to those used in Ecuador.

In Graham and Harvey's (2001) and in Brounen, de Jong and Koedijk's (2004) studies, participants were asked "*How frequently does your firm use the following techniques when deciding which projects or acquisitions to pursue?*" Possible answers fluctuated in a five point scale from always to never. Results as a percentage of always or almost always are presented on TABLE 16, and the two most popular techniques are in red for each country. In order to make a suitable comparison with results found on *Ecuadorian Corporations*, results showed in TABLE 9 as primary and secondary techniques used are added as if they were always and almost always responses. It is clear that the question from this study is different than the one asked by Graham and Harvey (2001) and by Brounen, de Jong and Koedijk (2004) but enough similarities exist to make some comparisons. One extra clarification needs to be made; percentage seen for Ecuadorian Companies in the profitability index technique is when companies surveyed answered *benefit/cost ratio*. Profitability index and *benefit/cost ratio* are comparable techniques because $\text{benefit/cost ratio} = \text{profitability index} + 1$ ⁵.

⁵ Brealey & Myers (2000). *Principles of Corporate Finance*.

TABLE 16: Techniques used by U.S. and European Corporations

Method	US	UK	Netherlands	Germany	France	Ecuador
IRR	75,60%	53,10%	56,00%	42,20%	44,10%	75,00%
NPV	75,00%	46,90%	70,00%	47,60%	25,10%	63,64%
Payback	56,70%	69,20%	64,70%	50,00%	51,00%	25,00%
Hurdle Rate	56,90%	26,90%	41,60%	28,90%	3,90%	N/A
Sensitivity Analysis	51,50%	42,90%	36,70%	28,10%	10,40%	N/A
Earnings Multiple	38,90%	39,20%	26,50%	20,50%	33,30%	N/A
Discounted Payback	29,50%	35,40%	25,00%	30,50%	11,30%	N/A
Real options considered	26,50%	39,10%	34,70%	44,10%	53,10%	N/A
Accounting Rate of Return	20,30%	38,10%	25,00%	32,20%	15,10%	2,27%
Value at Risk	13,60%	14,50%	4,30%	23,70%	29,90%	N/A
Adjusted Present Value	10,80%	14,10%	8,20%	7,80%	14,60%	N/A
Profitability Index	11,90%	15,90%	8,20%	16,10%	37,70%	13,64%

Source: Graham and Harvey (2001) & Brounen, de Jong and Koedijk (2004)

Findings from Brounen, de Jong and Koedijk (2004) clearly show that the preferred method by European companies is the *payback period*. As seen on TABLE 16, the payback technique is either the first or second method used in *capital budgeting* decisions among the European companies surveyed. The *payback period* in the U.S. shares third place after both discounted cash flow techniques, the same happens in Ecuador. In Ecuadorian and American firms the two most widely used methods are *discounted cash flows*; the *internal rate of return* and the *net present value*. Findings from Graham and Harvey (2001) on techniques most widely used by U.S. firms have strong similarities with the techniques of Ecuadorian companies. From the data available, results coincide in the first, second and third methods most widely used and the percentage of use is somewhat similar in all three cases. The same occurs with the profitability index (*benefit/ cost ratio*), both countries have similar rates in terms of percentage values. The only big difference of usage occurs in the *rate of return* in which Ecuadorian Companies according to this study barely use it (2,27%) and in Graham and Harvey's (2001) study, 20,30% of the companies surveyed use it. TABLE 16 shows that the dominant *DCF* techniques have around important economies of Europe and the U.S., there also exists a dominance of *DCF* techniques on Ecuadorian firms. It is important to note that when percentage values for *DCF* techniques, *NPV* and *IRR* are added together, the use of discounted cash flow techniques are the most popular in all countries.

In order to explain the differences among countries, the authors find two reasons. First, they believe that there is a correlation between the technique being used and the academic background of the CEO and CFO. Second, they suppose that there is a correlation between the size of the firm and the method used. In order to test both hypotheses, authors included questions in their survey regarding the size of the company and CEOs' and CFOs' relevant educational background. Results showed that variables had some power of explanation in some of the countries but were not strong enough. Questions regarding the CEO and CFO educational backgrounds were not asked in this surveyed so results can not be compared. In order to see if there is a relationship between the use of *DCF* and the size of the company measured by several variables like revenue, total assets and net profit a series of chi-square independence test were done. Results are summarized in APPENDIX B. Based on the information collected from the test, it appears that total assets and net profit have a significant relationship with the use of *DCF*, both of them at a significance level of 0,05.

Cost of Capital

When measuring the required *rate of return*, companies have different approaches to calculate its value. Several studies have been done in the past to determine how companies calculate the required *rate of return*. Gitman and Mercurio in 1982 surveyed companies belonging to the Fortune 1000 ranking and reported the practices used to measure the *cost of capital*. In a brief summary, the findings reported a gap between practice and finance theory. For example, most companies knew the concept of *cost of capital* but were not computing or using it properly. As time evolved, several studies showed an increase in the use of the *CAPM* to determine the *cost of equity* and the *WACC* to determine the *cost of capital* of the firm. In 1998 Brunner et al. tried to confront theory with practice regarding the issue of *cost of capital*. In order to do so they considered three sources of information to answer their questions; a sample of 27 firms, a sample of 10 merger and acquisition financial advisers, and 7 of the most sold finance text books. The authors conclude that the calculation of *cost of capital* in practice is in line with that of theory. The question ended up being: when calculating the *discount rate* for a specific project or division of a firm, is the specific *risk* considered or not?

TABLE 17: Primary Method for Determining the Required Rate of Return

Method	Responses		Blocks' Study	
	Number	Percent	Number	Percent
Cost of Equity Financing	8	17,39%	19	6,38%
Desired growth rate for the firm	1	2,17%	15	5,03%
Industry Average rate of return	6	13,04%	2	0,67%
Weighted Average Cost of Capital	19	41,30%	254	85,23%
Desired return on stockholders equity	4	8,70%	8	2,68%
Other	8	17,39%	0	0,00%
Total Responses	46	100,00%	298	100,00%

Source: Block 2003.

Responses from Ecuadorian firms follow the trend but have not reached the optimum yet. Studies from Block (2003), Brunner et al. (1998), and Petty and Scott (1975) state that over 75% of the firms surveyed use the WACC to calculate *cost of capital*. It is clear that the WACC is the preferred method to calculate *cost of capital* among Ecuadorian firms, having over 100% more usage than any other method but it is far from being as popular as in U.S. firms. Financial literature advocates the WACC as the proper method for calculating the *discount rate* of a firm. Ecuadorian companies not using the WACC to calculate its *discount rate* should focus on understanding the advantages of its use and why it is the proper method for calculating the *hurdle rate* of the firm. By doing such an exercise firms will devote themselves and assign resources for calculating it the proper way.

Even when the vast majority of companies use the proper method to calculate the *cost of capital* and they use DCF techniques, a question arises: is the *discount rate* adjusted for the specific *risk* of a project or a division?

Divisional Cost of Capital

We have seen that *capital budgeting* practices in Ecuador are in line with academic literature in which DCF techniques are seen as the most appropriate method when evaluating investment proposals. There also seems to exist a movement towards the trend when companies calculate the *cost of capital*: the WACC is the most appropriate measure and the most widely used in Ecuadorian firms but its use still needs to

increase. If both *DCF* and *cost of capital* are in line with finance literature a third variable needs to be in line in order for their use to be accurate. The variable referred to is *divisional cost of capital*, it is required because the *risk* of each project may vary from that of the firm.

When Ecuadorian companies were asked: *Does your firm explicitly consider risk and uncertainty in the decision making process for investment proposals?* Forty two or 95,45% of respondents say they do consider *risk* for investment proposals. Even though there was this enlightening response it was all shattered down when companies were asked: *Do you have different rates of return that are required for different divisions, subsidiaries or projects of the firm?* Only 17 companies use *divisional cost of capital*, which is 38,64% of respondents. It appears that a contradiction exists between the answers to both of these questions. If *risk* and uncertainty are considered when evaluating investment proposals in 95% of the companies, how can only 39% of them have different *discount rates*? No follow up questions were asked to respondents regarding how they take into account *risk* and uncertainty when they answered positively to the first question of this paragraph. It will be a subject of study to understand how the companies take *risk* into consideration and do not have different rates of return for each of the investment proposals. A similar contradiction is seen on Graham and Harvey (2001) study of U.S. firms. The authors reported that almost 60% of firms participating on the survey commonly used a single company cut off rate, this means only 40% use *divisional cost of capital*. On the other hand, 51% of the respondents said always or almost always their company uses a *risk-matched discount rate*. According to the authors, results probably imply that companies use both methods; sometimes they use the corporate *discount rate* and others a *risk adjusted discount rate* or both.

When compared to Block's (2003) study it is clear again that Ecuadorian companies are following the normative at a slower pace than U.S. firms. Block reported that 46,6% of respondents answered positive to the question, a higher percentage than Ecuadorian firms. Other studies such as Bruner et al. (1998) showed the same type of results when confronting finance literature and experts to practice. Eighty six percent (86%) of the finance books used by the author supported adjusting *beta* for the investment *risk*, and the other 14% of books do not mention it. According to the

authors there is a contradiction between practitioners and academics because when answering the question: “*Having estimated your company’s cost of capital, do you make any further adjustments to reflect the risk of individual investment opportunities?*” only 26% of firms surveyed by the authors said yes to this question, 33% said sometimes and 41% said no. In all three cases, Blocks’ (2003), Bruner et al. (1998), and the present study, more than half of the companies do not adjust for the specific *risk* of an investment. All of these companies are assuming that the *risk* of the project or division is the same as the entire company *risk*. As stated in the “problematic” and “theoretical background” sections making such an assumption causes misallocation of resources.

In order to explain the use of *cost of capital* among firms, Block (2003) runs a series of chi-squared to test independence of classification between the use of *divisional cost of capital* and variables like revenue, total assets, net profit and the ratio of fixed assets to total assets. As stated before, this study follows Blocks’ framework and the same chi-square tests were run, results from tests are summarized in the APPENDIX C. Block reports a significant relationship between revenue and use of *divisional cost of capital* at an alpha level of .10 and fixed assets to total assets at a level of significance of .01. The other two variables had no considerable relationship (Block 2003). This study shows no apparent relationship between the use of *divisional cost of capital* and the variables tested. The hypothesis presented on the APPENDIX C were accepted and there appears to be independence among the use of *divisional cost of capital* and revenue, assets, profit and ratio of fixed to total assets. The chi-square tests of independence are further supported by the graphs shown in APPENDIX D in which a relationship between the use of *divisional cost of capital* is tried to be established with each of the variables but it clearly does not exist. As stated before the sample in the present study consists of only 44 firms and inferences are possible but in order to make proper conclusions further studies with bigger samples are needed.

Firms that do not use Divisional Cost of Capital

This section will develop an introduction framework to some of the methodologies found in finance literature to determine *divisional cost of capital*. For those firms not

using divisional cost of capital the approaches may be helpful if they are convinced that the use of divisional cost of capital will help them reach their objective of maximizing stockholder's wealth.

One of the ways to determine *divisional cost of capital* is by finding the *systematic risk* (β) of the division, then using the *capital asset price model (CAPM)*, and determining with this the *cost of equity* (in the *WACC* model, this calculation will determine R_e). Assuming a cost of debt (R_d) and an optimal *capital structure*, the *divisional cost of capital* could be determined (Brealey & Myers 2000). The question now lies in the way to determine ' β '; this paper will introduce two different ways of finding the *divisional cost of capital*.

Fuller and Kerr (1981) popularized the pure play technique which consists of estimating β using an analogous firm. The pure play technique is based on finding firms that publicly trade securities and its only business is the same as the division in question (Fuller & Kerr 1981). Once the pure play firm is recognized and its β for equity determined; the *CAPM* is used to determine the *cost of equity*, to later calculate the total *cost of capital* of the pure play firm. Therefore, the *cost of capital* of the pure play firm will be used as the *divisional cost of capital*. According to the authors, the use of this technique implies two assumptions: *systematic risk* and *capital structure* of the pure play firm are the same as the division in question. Fuller and Kerr (1981) evaluated empirically the pure play method for estimating the *divisional cost of capital*. They found out that if the pure play technique is used to determine each division *beta* of a multidivisional firm and then made a weighted average of the *betas* according to the relative size of each division compared to the entire corporation, the *beta* calculated for the multidivisional corporation using weighted average will closely approximate the actual *beta* of the corporation (Brealey & Myers 2000, Fuller & Kerr 1981). In other words, when the pure play firm is picked systematically with extreme care, the *cost of capital* of the pure play will be a good approximation to the *divisional cost of capital* in question.

A mixed objective and subjective approach to determine *risk* and *divisional cost of capital* is presented by Gup and Norwood (1982). They present Fuqua industries' approach as being a practical one, different to other approaches that use the *CAPM*

either with market data for the division or when data is not available by using data from a similar company as a proxy. Fuqua industries determine its division's *cost of capital* by using the corporate *cost of capital*, objective and subjective *risk*, and a *risk index*. The objective and subjective risks, as well as the *risk index*, are used to adjust the corporate *cost of capital* in order to reflect different degrees of *risk* in each division (Gup & Norwood 1982). To establish the *risk* of a division, they obtain an average of the objective and subjective *risk*. According to Fuqua Industries, the objective *risk* is measured by the *variance of net operating profits after taxes*. The subjective *risk* is determined by a *Division Risk Profile*, a subjective method for determining relative *risk* of a division (Gup & Norwood 1982). To discern the *Division Risk Profile*, management creates factors called *Risk Elements* which are considered important when evaluating the *risk* of each department (Gup & Norwood 1982). To clarify the idea, examples of *Risk Elements* are some of the subsequent; operational flexibility, seasonal business, market position, brand distinction, etc. Each *risk element* is ranked according to a *Risk Class*, ranging from low (1) to high (5). It is important to notice that *risk class 3* is the same as the parent company's *risk* (Gup & Norwood 1982). After management ranks each *risk element*, a summing of the *risk class* values is *prepared* (total score). The total score is then divided by the number of applicable *risk elements*. The following formula will facilitate the comprehension of the relation between the concepts presented before:

$$\text{Average Subjective Risk Class} = \text{Total Score} / \text{Number of Applicable Risk Elements}$$

The average of the objective and subjective *risk* is used to determine a *combined risk class* for each division (Gup & Norwood 1982).

$$\text{Combined Risk Class} = (\text{Objective Risk} + \text{Subjective Risk}) / 2$$

Each of the *combined risk class* is given a *risk index number*. The *risk index* is an estimated *cost of capital* for various firms compared to Fuqua's *cost of capital*. Managers study the industry that the division is involved in and determine a reasonable estimate of the *beta*. Using the *CAPM*, they determine the cost of equity capital, to later incorporate the *WACC* for determining the firm's *cost of capital*. Similar to the pure play technique, it is assumed that the industry has a similar *capital*

structure than Fuqua Industries. In order to have a *risk index number*, they divide the *cost of capital* for the industry by the *cost of capital* for Fuqua. Fuqua creates a table of *combined risk class* and its respective *risk index number*, by multiplying the *risk index number* of the *combined risk class* that the division belongs to the *cost of capital* of the division is found.

$$\text{Division cost of Capital} = \text{corporate cost of capital} * \text{risk index number}$$

There is logic behind Fuqua Industries technique: a division which is considered riskier than the corporation's average *risk* should have a higher discount rate than the average *cost of capital*, and a division with less *risk* than the corporation's average *risk* should have a lower one (Gup & Norwood 1982).

Firms that use Divisional Cost of Capital

Follow up questions were given to those firms that used *divisional cost of capital*. Respondents were asked to: *rank in order of importance (1 being the most important and 3 being the least important), the variable in determining divisional cost of capital*. TABLE 18, shows the results of both Ecuadorian companies and Blocks' (2003) study on U.S. firms. The order of importance given to each of the three variables is the same for the studies, *risk* being the most important, then the division's strategic importance and finally the division's ability to raise its own capital. Percentages do vary across studies and once again that could be attributed to a hypothesis in which U.S. firms are closer to the normative than Ecuadorian firms.

TABLE 18: Most Important Variables in Determining Divisional Cost of Capital

Variable	Level of Importance						Level of Importance Blocks' Study					
	1st	%	2nd	%	3rd	%	1st	%	2nd	%	3rd	%
Risk	11	64,71%	6	35,29%	0	0,00%	121	87,05%	18	13,95%	0	0,00%
Strategic Importance of Division	6	35,29%	9	52,94%	2	11,76%	18	12,95%	100	77,52%	21	16,03%
Division's Ability to Raise It's Own Capital	0	0,00%	2	11,76%	15	88,24%	0	0,00%	11	8,53%	110	83,97%
Total Responses	17	100,00%	17	100,00%	17	100,00%	139	100,00%	129	100,00%	131	100,00%

Source: Block 2003.

Firms that established *risk* to be the most important variable when assessing *divisional cost of capital* were asked an extra question: *which method does your company use to measure risk?* Results for both Ecuadorian companies and Blocks' (2003) study are seen on TABLE 19.

TABLE 19: Method by which risk is measured

Method	Responses		Block's Study	
	Number	Percent	Number	Percent
An objective measure such as the beta of a public company in same line of business as the division	0	0,00%	20	16,53%
An objective measure such as the average beta for the entire industry the division is in	0	0,00%	15	12,40%
An objective measure, not market related, such as the variability of the division's earnings compared to overall corporate earnings	4	36,36%	7	5,79%
A subjective measure such as top management's view of the perceived risk generally associated with the division	5	45,45%	79	65,29%
Other	2	18,18%	0	0,00%
Total Responses	11	100,00%	121	100,00%

Source: Block 2003.

For companies operating in Ecuador, the primary method used to measure *risk* is a subjective measure not market related, the same happens in Block's (2003) study. The second most popular approach used by U.S. corporations is an objective measure which is market related. However, this approach is not used by any of the respondents of the present paper. A similar event occurs with the second more widely used method among Ecuadorian firms, an objective measure not market related, is barely used by U.S. firms. Even though the sample size for the present study is not significant, the difference between the use of an objective measure that is market related and one that is not may be attributed to the difference in efficiency and size of the capital markets in which the studies take place.

Considerations of Foreign Investments

There is probably no arena where the debate between the use of corporate vs. *divisional cost of capital* is as tense as in the international scenario. Several studies have documented the *capital budgeting* practices that companies use when faced with

investment proposals in foreign countries. This section will compare results from this study to those of Graham and Harvey (2001), Block (2003), and Brounen, de Jong and Koedijk (2004).

When comparing the results found on the present study to results from past studies done in a different environment, it seems that multinational companies operating in Ecuador are more in line with finance literature than U.S. and European firms. In Ecuador Sixty five percent (65,22%) of multinational corporations surveyed have a different *cost of capital* than the corporate *cost of capital*. Graham and Harvey (2001) report that the majority of US firms in the sample used the *plain vanilla firm discount rate* when faced with foreign investments. Basically this implies that when analyzing a foreign investment proposal using *DCF* technique companies use as a *discount rate* the corporate *cost of capital* and do not take into account the differences in project or market risks for each individual project. Brounen, de Jong and Koedijk found similar results for European firms. When analyzing both of this studies it appears that US companies have a better alignment to the so called best practices because 50,9% of the sample said they used a *risk* matched rate while in European companies it ranged from 23,7% to 27,3%. The authors of both studies found correlations between the size of the company and the usage of *risk* matched rates. The size of the company and the educational background of the CEO and CFO have high correlation coefficients with the company using *risk* matched rates. In summary, a higher percentage of multinationals operating in Ecuador take into account the different risks associated with operating in a different environment than U.S. and European firms. It should be clear than in this section multinational companies are considered Ecuadorian firms regardless of its origin. Given this information it can not be stated that Ecuadorian firms have a better alignment with finance theory but rather that multinational companies operating in Ecuador seem to have a better alignment than those surveyed in both U.S. and Europe studies. It should not be forgotten that the sample used in this study is fairly small and that is difficult to make suitable conclusions.

Finally CFO's where inquired: *As a general rule: when comparing the discount rate of the corporation to the discount rate of foreign investments, how should the hurdle rates for foreign investments be?* It should be clarified that by foreign is meant investments outside the country in which the companies have headquarters. The

options available were higher, lower or no opinion. 66% of Ecuadorian companies responded that for higher *hurdle rates*, 20% for lower, and 13% had no opinion. This is quite similar to results found by Block on U.S. firms were 78% opted for higher *hurdle rates*, 13% for lower, and 9% had no opinion. This question shows the mental maps that CFOs have, deeper analysis is needed to understand why they think foreign investments should have higher or lower *hurdle rates*.

Confronting theory with practice

This section will focus in contrasting the *capital budgeting* techniques used in Ecuador and those that are used around the globe to finance theory. In summary it can be stated that there is a global movement towards the normative in terms of using *DCF* techniques to evaluate investment proposals. Regarding in which way the *discount rate* is calculated there also appears to be a move towards the normative but when it refers to *divisional cost of capital* there seems to be a gap between academics and practitioners. This being said, techniques used today could be questioned.

When companies use the *WACC*, or corporate *hurdle rate* to discount cash flows estimation it does not automatically mean that such a practice is completely misused or contradictory to theory. The use of a single corporate rate in some projects is correct because many investments have a similar *risk* to the firm as a whole. However most of the companies today have different divisions, units of business, investment projects, activities, work in different countries, thus having different risks among its divisions, projects, countries.

The underlying question now is: *why is theory so far from practice?* Several factors are considered important to explain the gap between the two. First, when trying to calculate *divisional cost of capital*, literature offers a variety of ways, two of which were presented in the present study. The primary problem with the methods provided is their operational efficacy given that the suggested methods require data which sometimes is difficult to find and their degree of complexity is high for an operational manager to understand (Delom de Mezerac 2006). It is important not to forget that the purpose of *capital budgeting* is to help decision makers choose the right investments. In order to succeed in such a task the tools being used need to be simple

enough for not finance background managers to understand. Delom de Mezerac (2006) in his paper of Theory and Practice in *Capital Budgeting* helps articulate the next core question: “*where shall the risk analysis be stopped? At what level of detail?*” To answer this question it is interesting to recall Brigham (1975) study on *capital budgeting* techniques where he reported several reactions of the managers to initial results of his survey. According to Brigham, managers tend to think that too much *risk* analysis kills *risk* analysis. Operational and financial managers may argue upon the actual purpose of focusing so much on *discount rates* and *risk* analysis when the cash flows being projected are not certain either. Delom de Mezerac (2006) refutes this argument by saying “*why make this wrong, when it is easy to make it right.*” According to managers in Brigham (1975) study a set of skills that not many people possess are necessary to make suitable estimations of *divisional cost of capital*. Brigham also reports that managers tend to think that there is a lack of clarity on the approaches provided by finance theory and that the implementation of such techniques is complicated. Even though Brigham (1975) study was done more than thirty years ago, some or all of the explanatory reasons given by managers in his survey probably still hold true today. All of the factors presented previously explain to a certain degree the common use of subjective methods to consider *risk*.

Taking those facts into account does it mean that companies are picking the wrong projects? (Delom de Mezerac 2006). The obvious answer is no, companies surveyed in the present study are among the most profitable in Ecuador. With regards to other studies, more than 50% of U.S. and European firms have been profitable for the past years (Delom de Mezerac 2006). The question now is: *what are these companies doing to pick the right projects?* A possible explanation is given by Gitman and Forrester (1977) in which more than 80% of firms surveyed adjusted their capital techniques by increasing the minimum *rate of return*, using certainty equivalents or decreasing the minimum *payback period*. In Brigham's (1975) study the argument of judgment is taken into consideration, managers reported to consider *risk* on an individual basis of a project but not necessarily using a standardized or academic method to change the *discount rate* for the project. According to Brigham, managers stated that the *NPV* or *IRR* of a project is not the only criterion used for investment proposals. Their argument consisted that sometimes negative NPV projects were carried out because the management team was confident it aggregates value, the same

holds true for projects with positive *NPV*. Findings from Brigham (1975) leads to the conclusion that different *cost of capital* are calculated for divisions or projects undertaken by the firm but they are probably not clearly calculated.

Limitations of the results

It is not to be forgotten that the sample used for this study is limited, due to the difficulty of reaching the top financial officer of major Ecuadorian firms. Thus the implications of this study have no statistical incidence. Never the less it does contribute as a starting point for reporting and analyzing major *capital budgeting* techniques used by Ecuadorian firms.



CONCLUSION

In lack of past studies done on capital budgeting techniques in Ecuadorian firms, this study serves as a starting point. The study has reported capital budgeting techniques in use by major Ecuadorian firms. Results show an apparent move towards the normative of what finance literature advocates for in capital budgeting procedures but there exists enormous opportunities for improvement.

Ecuadorian firms consider project definition and cash flow estimation the most difficult stage and project implementation the most critical stage of the capital budgeting process. Results are in line with past studies held on U.S. firms. Ecuadorian firms reported the use of *discounted cash flow* methods as the primary way to evaluate investment proposals. Again, Ecuadorian firms are in line with finance literature and studies held on the U.S. and Europe.

Finance literature advocates the WACC as the proper method to calculate the *cost of capital*, Ecuadorian firms reported using the WACC more often than any other method (41,30%). In Block's study the tendency is stronger, 85,23% of major U.S. firms use the WACC to calculate the *cost of capital* of the firm. Ecuadorian companies not using the WACC to calculate its *discount rate* should analyze the possibility of its use and what advantages it could bring.

Discounted cash flows are seen as the most appropriate technique when evaluating investment proposals, the WACC is considered the proper method for calculating the *discount rate*, but when companies undertake projects that have different risk than the corporation *divisional cost of capital* is required. Finance literature clearly advocates the use of *risk adjusted discount rates* and only 38,64% of Ecuadorian firms are using *divisional cost of capital*. It appears that Ecuadorian firms are facing the same issue as firms worldwide; there is a significant lower number of firms using *divisional cost of capital* than expected. Anyhow this does not mean that firms are necessarily choosing the wrong projects, it probably means that the method being used to account for project risk is not advocated by finance literature.

This study leaves the doors open for further investigations of capital budgeting techniques in Ecuador and in other countries. It gives the opportunity to compare and contrast results observed in other studies to the present one. Furthermore, it gives financial managers of Ecuadorian firms the opportunity to benchmark and evaluate their own practices.



Universidad de
San Andrés

APPENDIX

Appendix A: Survey

SECTION I GENERAL INFORMATION

Please answer the following questions using your balance statement of 2006. Express all the values in U.S. dollars. If your company is a multinational or has operations in other countries, the questions are referring only to its operations in Ecuador.

1) Which of the following industries does your company belong to:

- Distributor
- Manufacturer of Durables
- Manufacturer of Non- durables
- Service Company

2) Total revenue of the company:

3) Total assets of the company:

4) Net profit or loss of the company:

5) Total fixed assets of the company:

SECTION II CAPITAL BUDGETING TECHNIQUES

1) Please identify with an X, the size of the annual capital budget?

- Less than \$1 million
- \$1 to \$ 10 million
- \$10 to \$20 million
- \$20 to \$50 million
- \$50 to \$100 million
- More than \$100 million

2) Please identify with an X, the minimum project size for Formal Analysis?

- Greater than \$1,000
- Greater than \$10,000
- Greater than \$50,000
- Greater than \$100,000
- Greater than \$500,000
- Greater than \$1,000,000

3) Does your company have a central review committee for decision making on the investment opportunities?

- YES
- NO

4) Please mark with an X which does your company consider the **most difficult** stage of the capital budgeting process?

- Project Definition and Cash Flow Estimation
- Financial Analysis and Project Selection
- Project Implementation
- Project Review

5) Please mark with an X which does your company consider the **most critical** stage of the capital budgeting process?

- Project Definition and Cash Flow Estimation
- Financial Analysis and Project Selection
- Project Implementation
- Project Review

6) Rank the primary (with a 1) and secondary (with a 2) method of evaluation used in your company?

- ___ Internal (or Discounted) Rate of Return
- ___ Rate of Return (Average Rate of Return)
- ___ Net Present Value
- ___ Payback Period
- ___ Benefit/ Cost Ratio
- ___ Other

7) Which of the following values best describes the cost of capital of your firm?

- Less than 5%
- 5 to 10%
- 10 to 15%
- 15 to 20%
- More than 20%

8) Does your firm make a competitive allocation of a fixed investment budget to competing projects?

- YES
- NO

If your answer was positive please refer to question 9, if it was negative please refer to question 10.

9) Indicate with an X which of the following best describes the major cause of capital rationing in your company?

- Debt limit imposed by outside agreement
- Debt limit placed by management external to organization
- Limit placed on borrowing by internal management
- Restrictive policy imposed upon retained earnings for dividend payout
- Maintenance of a target earnings per share or price-earnings ratio

10) Does your firm explicitly consider risk and uncertainty in the decision making process for investment proposals?

- YES
- NO

SECTION III COST OF CAPITAL

1) Identify (with an X) which method is used to measure the required rate of return (cost of capital, discount rate)?

- Cost of equity financing
- Desired growth rate for the firm
- Industry average rate of return
- Weighted average cost of capital (WACC)
- Desired return on stockholders equity
- Other

2) Do you have different rates of return that are required for different divisions, subsidiaries or projects of the firm?

- YES
- NO

If your answer was positive please refer to question 3, if it was negative please refer to question 5.

3) Rank in order of importance (1 being the most important and 3 being the least), the variable in determining divisional cost of capital?

- ___ Risk
- ___ Strategic Importance of Division
- ___ Division's Ability to Raise It's Own Capital

If your choice for the most important variable in determining divisional cost of capital was risk please refer to question 4, if it was any other please refer to question 5.

4) Which method does your company use to measure risk?

- An objective measure such as the beta of a public company in the same line of business as the division.

- An objective measure such as the average beta for the entire industry the division is in.
- An objective measure, not market related, such as the variability of the division's earnings compared to overall corporate earnings.
- A subjective measure such as top management's view of the perceived risk generally associated with the division.
- Other

Questions 5 and 6 are only applicable for multinational companies. If your company is not a multinational you have finished the survey. Thank you very much for your time.

5) If your company is a multinational firm, when evaluating investment proposals do you use a different cost of capital than your parent company?

- YES
- NO

If your answer to question 5 was positive please refer to question 6. If your answer was negative you have finished the survey. Thank you very much for your time.

6) When comparing the discount rate of the corporation to the discount rate of foreign investments, how should the hurdle rates for foreign investments be?

- Higher
- Lower
- No opinion

7) Rank in order of importance the variables used by your company in determining the cost of capital for each country it operates on? (1 being the most important)

- ___ Political risks
- ___ Foreign Exchange risk
- ___ Security risk
- ___ Transfer payment risk
- ___ Other

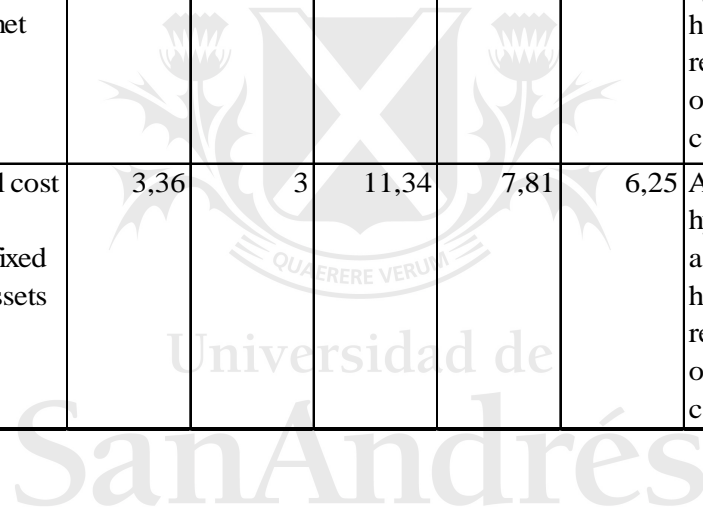
You have finished answering the survey, thank you very much for your time.

Appendix B: Chi-square Independence of Discounted Cash Flows

Null Hypothesis	—	D.F.	Alpha			Conclusion
			0,01	0,05	0,1	
Use of DCF is independent of capital is independent of revenue	5,02	4	13,28	9,49	7,78	Accept the hypothesis. Total revenue has no significant relationship to the use of discounted cash flows
Use of DCF is independent of total assets	6,85	2	9,21	5,99	4,61	Reject the hypothesis at 0,05 level of significance. Total assets have a relationship to the use of discounted cash flows
Use of DCF capital is independent of net profit	8,49	3	11,34	7,81	6,25	Reject the hypothesis at 0,05 level of significance. Net profit has a significant relationship to the use of discounted cash flows
Use of DCF is independent of fixed assets to total assets	0,77	3	11,34	7,81	6,25	Accept the hypothesis. Fixed assets to total assets has no significant relationship to the use of discounted cash flows

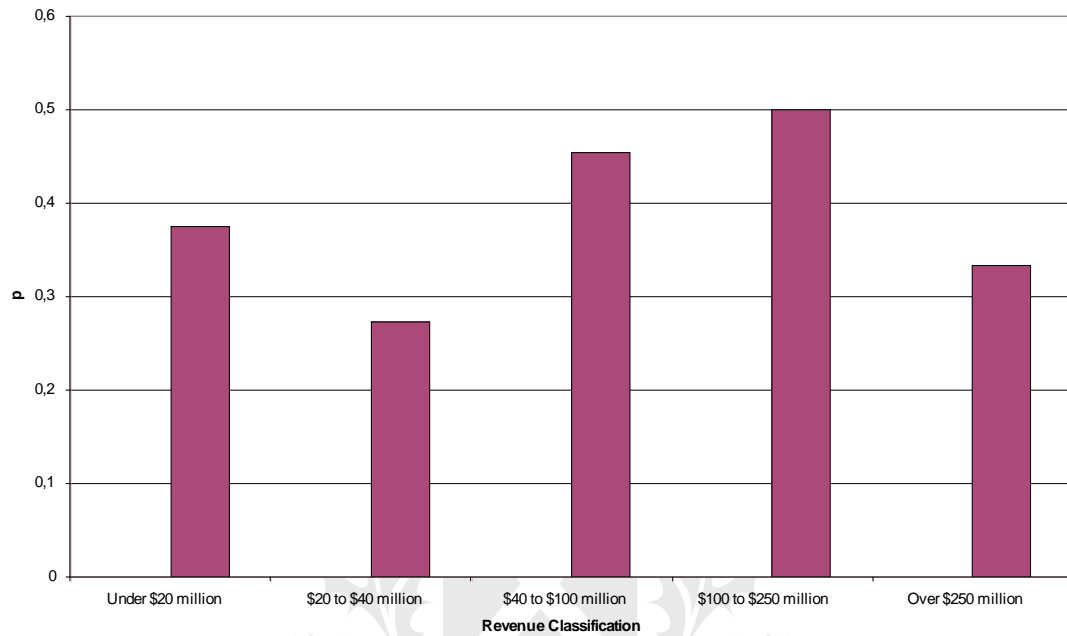
Appendix C: Chi-square Independence of Classification Tests

Null Hypothesis	—	D.F.	Alpha			Conclusion
			0,01	0,05	0,1	
Use of divisional cost of capital is independent of revenue	1,33	4	13,28	9,49	7,78	Accept the hypothesis. Total revenue has no significant relationship to the use of divisional cost of capital
Use of divisional cost of capital is independent of total assets	0,06	2	9,21	5,99	4,61	Accept the hypothesis. Total assets have no significant relationship to the use of divisional cost of capital
Use of divisional cost of capital is independent of net profit	1,47	3	11,34	7,81	6,25	Accept the hypothesis. Net Profit has no significant relationship to the use of divisional cost of capital
Use of divisional cost of capital is independent of fixed assets to total assets	3,36	3	11,34	7,81	6,25	Accept the hypothesis. Fixed assets to total assets has no significant relationship to the use of divisional cost of capital

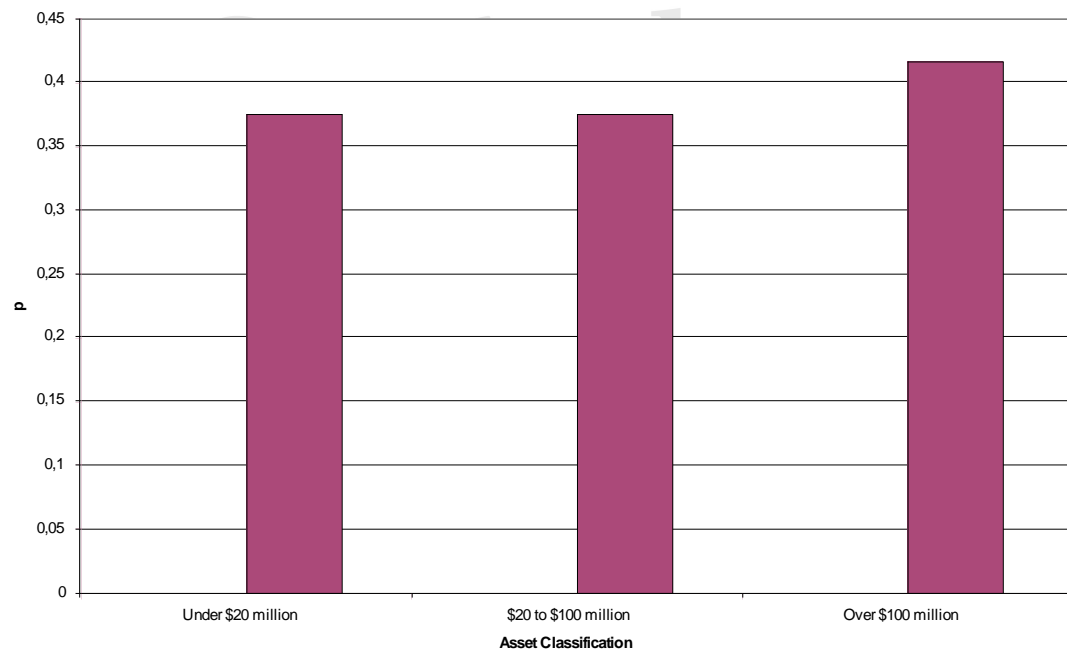


Appendix D: Proportion of Firms Using Divisional Cost of Capital given a Classification

Proportion of firm's using Divisional Cost of Capital given a Revenue Classification

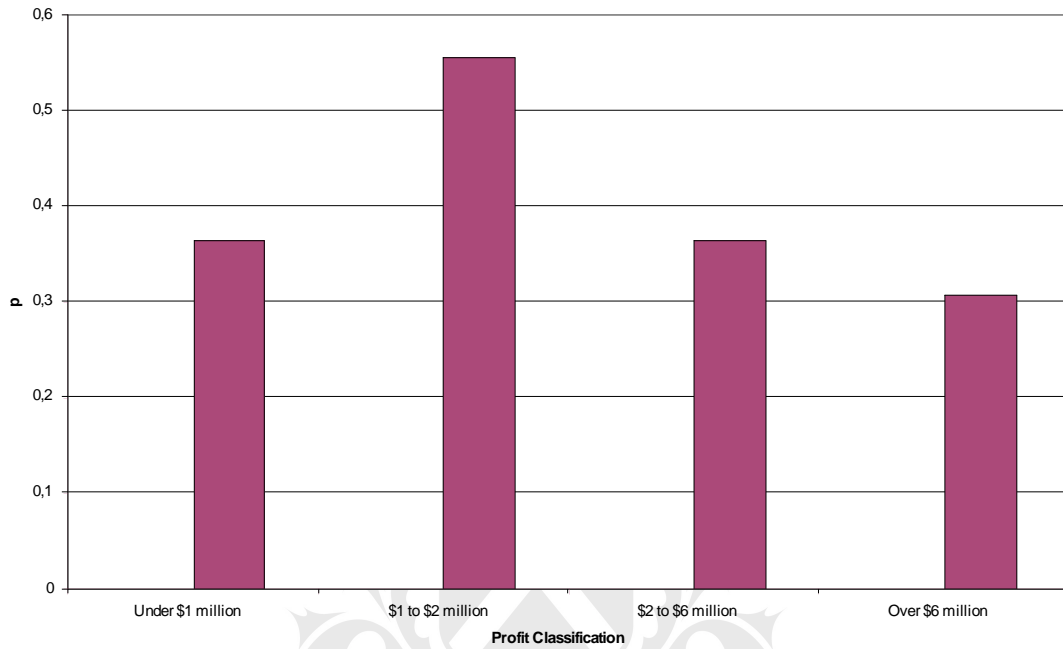


Proportion of firm's using Divisional Cost of Capital given an Asset Classification

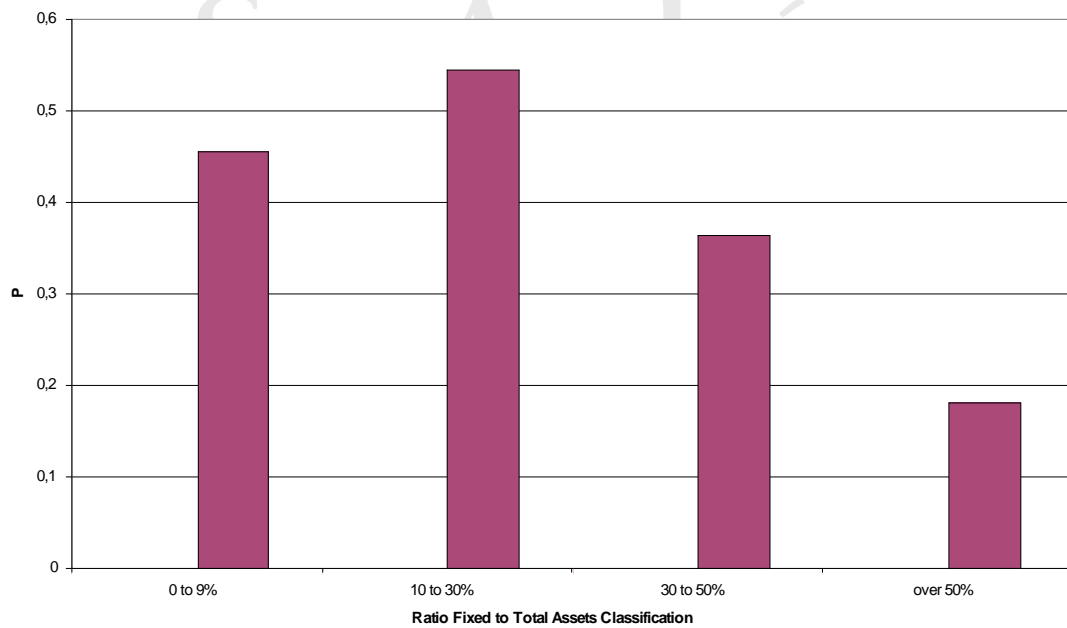


Appendix D: Proportion of Using Divisional Cost of Capital given a Classification
(continued)

Proportion of firm's using Divisional Cost of Capital given a Profit Classification



Proportion of firm's using Divisional Cost of Capital given a Ratio of Fixed to Total Assets Classification



GLOSSARY

All of the definitions in this glossary have been taken out directly from either Brealey & Myers (2000) finance textbook, *Principles of Corporate Finance* (6th edition), or the Vault Guide glossary of finance terms.

Benefit Cost Ratio (Profitability Index): Ratio of a project's NPV to the initial investment.

Capital budget: List of planned investment projects, usually prepared annually.

Capital Structure: Mix of different securities issued by a firm.

Cost of Capital: Expected return that is forgone by investing in a project.

Discounted Cash Flows (DCF): Future cash flows multiplied by discount factors to obtain present value.

Discount Rate (hurdle rate, cut-off rate, cost of capital): Rate used to calculate the present value of future cash flows. The rate is supposed to measure the risk of an investment. It can be understood as the expected return from a project of a certain amount of risk.

Divisional Cost of Capital: Cost of Capital of a division, so it has to take into account the risk of the division or project being evaluated.

Free Cash Flows: Cash not required for operations or for reinvestment.

Hurdle rate (cut off rate): Minimum acceptable rate of return on a project.

Internal Rate of Return (IRR): Discount rate at which investment has zero net present value.

Market Risk: Risk that cannot be diversified. Usually measured by the volatility of returns.

Net Present Value (NPV): A project's net contribution to wealth; present value minus initial investment. NPV is calculated because of the important concept that money today is worth more than the same money tomorrow.

Payback Period: Time taken for a project to recover its initial investment.

Present Value: Discounted value of future cash flows.

Rate of Return (ROR): Generally, book income as a proportion of net book value.

Weighted Average Cost of Capital (WACC): Expected return on a portfolio of all the firm's securities. Used as a hurdle rate for capital investment.

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