CAPITAL BUDGETING THEORY AND PRACTICES

LINGESIYA YASOTHARALINGAM

THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF KINGSTON UNIVERSITY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

JANUARY 2016

ORIGINAL COPY TIGHTLY BOUND

ABSTRACT

Capital budgeting is crucial in order for companies to sustain themselves, survive and flourish in markets and to increase shareholders' wealth. Nonetheless, decisions on capital budgeting are critical owing to the influence of uncertainty factors and dramatic changes in the environment milieu. Capital budgeting practices vary from country to country, from company to company and from project to project. Although many studies have been conducted in developed countries, there is a dearth of studies in emerging economies. Therefore, aims of this study were to investigate the prevalent choice of capital budgeting practices and influences of firms' characteristics on their choice based on Sri Lankan emerging market, identifying uncertainty factors and its influence on use of capital budgeting practices and explore the interacting effect of uncertainty factors between capital budgeting practices and performance, and finally, develop a capital budgeting model that would meld with the core components of uncertainty, firms' characteristics and firms' performance based on Sri Lankan emerging market.

The data for this study were garnered from primary data and secondary data collections. The primary data were collected from 186 CFOs working in companies listed on the Colombo Stock Exchange using self-administered questionnaires. The questionnaire was piloted with a sample of five CFOs. The secondary data were mainly collected from CSE via the Bloomberg website/annual reports. After the data were collected, they were analysed using multivariate analysis such as factor analysis, confirmatory factor analysis and structural equation modelling.

This study revealed that the most popular capital budgeting technique used in Sri Lanka was NPV, followed by IRR, PB, ARR and DPB. As for capital budgeting tools incorporating risk, the most preferred method among Sri Lankan firms was uncertainty absorption in cash flows, followed by sensitivity analysis, probability analysis, scenario analysis, and adjusting the required return. Moreover, this study found that the most popular method for calculating cost of equity was the CAPM model followed by average historical returns on common stock. Emerging real options are at an embryonic stage in Sri Lanka. The use of naive capital budgeting practices was mostly preferred by small firms and mainly managed by CFOs with non-MBA educational qualifications and a short tenure. Sophisticated and advanced capital budgeting practices were used mostly by large firms; these were mainly managed by MBA qualified CFOs with a long tenure. As for industry differences, ARR was primarily applied by non-MBA CFOs and was also preferred by non-manufacturing firms. None of the other methods made any significant differences in terms of type of industry. This study found four new levels uncertainty: operational uncertainties (input, labour and production), financial uncertainties (interest rate, inflation and exchange rate), social uncertainty (policy, political and social) and market uncertainty (competitive, output market and input market). Apropos of the model, sophisticated capital budgeting practices were determined by the size of the capital budget, market uncertainty and financial uncertainty. Advanced capital budgeting practices were determined by the size of the capital budget, the educational qualifications of the CFOs, operational uncertainty and financial uncertainty. In a similar vein, naive capital budgeting practices were determined by the size of the capital budget, the educational qualifications of the CFOs, industry and financial uncertainty. Moreover, this study found that social uncertainty moderates the relationship: between advanced capital budgeting practices and effectiveness, between sophisticated capital budgeting practices and Tobin_q and between advanced capital budgeting practices and Tobin_q.

Overall, this study has made theoretical contribution as melding with uncertainty factors with capital budgeting practices, geographical contribution as investigated the prevalent capital budgeting practices in Sri Lankan emerging market and parametric contributions as identified firm characteristics and uncertainty factors on the choice of capital budgeting practices and consequence influence on firm performances. The directions for future research are clearly discussed. In a nutshell, beyond its valuable contribution, this study serves as a springboard for future research

Acknowledgements

The completion of this thesis would never have been to fruition without the support and contribution of many people. I take the pleasure of thanking them.

I owe a deep debt of gratitude to my outstanding research supervisor Dr Mohamed Nurullah, Reader, Department of Accounting, Finance and Informatics, Kingston University, London for his intellectual guidance and constructive comments. This thesis would not be materialized without his unceasing support. I would like to express sincere thanks to Professor Giampiero Favato, Head of Department, Accounting, Finance and Informatics, Kingston University, London for his valuable guidance, unstinting support and feedback. I feel privileged to have had them as my supervisors.

I am thankful to the CFOs for sparing valuable time in their busy lives to share their thoughts and insights. My sincere thanks to Professor John R.Graham, Duke University, USA and Dr,Salma Ibrahim, Associate Professor and Associate Head of Department for Research Accounting, Finance and Informatics, Kingston University, London for their valuable comments on my research questionnaire. My special thanks to Professor Manikkam Nadarajasundaram University of Jaffna for his encouragement and the inspiration to undertake a PhD. I am thankful to the University of Jaffna, Sri Lanka for granting leave for my doctoral study.

I am very grateful to the University of Kingston, London and the National Centre for Advanced Studies in Humanities and Social Sciences, Sri Lanka, HETC Project, Ministry of Higher Education, Sri Lanka, for their financial support. Last but not least, I acknowledge with great respect for my mother, husband, daughter Aatushie, siblings and friends for their encouragement, support and sacrifices.

Declaration

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Full name of student: Lingesiya Yasotharalingam

Date of submission: January, , 2016

Table of Contents

List of Tables

List of Figures

List of Abbreviations

CFO	Chief Financial Officer
CSE	Colombo Stock Exchange
NPV	Net Present Value
IRR	Internal Rate of Return
PB	Payback
DPB	Discounted Payback
ARR	Accounting Rate of Return
CAPM	Capital Assets Pricing Model
IFAC	International Federation of Accountants
BCR	Benefit Cost Ratio
PI	Profitability Index
DCF	Discounted Cash Flow
APV	Adjusted Present Value
MIRR	Modified Internal Rate of Return
PDCC	Project dependent (risk-adjusted) cost of capital
WACC	Weighted Average Cost of Capital
CD	Cost of Debt
ROT	Real Option Theory
ROR	Real Options Reasoning
GT	Game Theory
FDI	Foreign Direct Investment
VAR	Value at Risk
EVA	Economic Value Added
ROA	Return on Assets
ROE	Return on Equity
EBIT	Earnings Before Interest and Tax
EPS	Earnings Per Share
SPSS	Statistical Packages for Social Sciences
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
AMOS	Analysis of Moment of structures
GOF	Goodness –Of- Fit
SEM	Structural Equation Modelling
MVE	Market Value of Equity
TA	Total Assets

CHAPTER ONE
INTRODUCTION

1.1 Chapter overview

This chapter introduces capital budgeting theory and practices followed by the objectives of the study, the motivation for the study and its practical relevance to the study. At the end of this chapter, the structure of the remainder of the thesis is presented.

1.2 Background

Over the course of the last six decades, the sphere of capital and capital budgeting of financial management has fascinated many research scholars and consequently, many overarching theories and models have been developed, namely: Portfolio Theory (Markowitz, 1952, 1959), Optimal Capital Structure (Modigliani and Miller, 1958; Miller and Modigliani, 1961; Myers, 1977; Jensen, 1986; Ritter, 1991; Graham and Harvey, 2001), Efficient Market Theory (Fama, 1970; Roll, 1977), Option Pricing Theory (Black and Scholes, 1973), Arbitrage Pricing Theory (Ross, 1976), Agency Theory (Ross, 1976; Myers, 2003; Atkeson and Cole, 2005), Pecking Order Theory (Myers and Majluf, 1984; Halov and Heider, 2011), Real Options Theory (Dixit and Pindyck, 1994), and the models (e.g., Mean-Variance Model: Markowitz, 1952; Capital Assets Pricing Model: Sharpe, 1964; Lintner, 1965; Roll, 1977; Single Index Model: Sharpe, 1963). Nonetheless, the applicability of such theories and models developed in the past is an intriguing conundrum and many of them may not hold water today (Sangster, 1993; Slagmulder, Bruggeman and Wassenhove, 1995). A curious instance illustrated by Brounen, de Jong and Koedijk (2004) is that,

> "Nobel Prize winning concepts such as the capital asset pricing model and capital structure theorems have been praised and taught in classrooms, but the extent to which these celebrated notions have also found their way into corporate board rooms remains somewhat opaque" (p. 72).

Furthermore, environmental uncertainty in the market, increased global competition, the shortening of product life cycles, the need for more customisation, cutting-edge technological developments and fully-fledged globalisation have all contributed to tremendous changes in capital budgeting (Slagmulder, Bruggeman and Wassenhove, 1995; Verbeeten, 2006; Verma, Gupta and Batra, 2009). For instance, "traditional capital budgeting methods such as the PB period and the ARR have been heavily criticised for discouraging the adoption of advanced manufacturing technology and thus undermining the competitiveness of Western firms"

(Slagmulder, Bruggeman and Wassenhove, 1995, p. 121). Ipso facto, many renowned research scholars suggest that there are gaps in the theory of capital budgeting and its applicability (e.g., Mukherjee and Henderson, 1987; Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Cooper et al., 2002; Brounen, de Jong and Koedijk, 2004; Kersyte, 2011; Mutairi et al., 2012; Andres, Fuente and Martin, 2015). More recently, Andres, Fuente and Martin (2015) pointed out the need for a more intensive approach in the corporate finance literature by explaining the gap between what is theoretically right and what is actually preferred in practice for a particular business environment.

Capital investment decisions can be acquisitions, investing new facilities, new product development, employing new technology and adoption of new business processes or some combination of these (Emmanuel, Harris and Komakech, 2010). Capital investments have a significant impact on the future cash flow of a company and are the ultimate source of a company's present valuation. The returns on capital investment usually represent a large amount of the funds available to support future growth within firms; if such investments turn out to be unsuccessful, a firm may run into liquidity problems and even financial distress (Keasey and Watson, 1989). The funds allocated to capital investments are normally committed for a lengthy period of time; again, this commitment represents a threat to the liquidity of a firm if not properly planned and managed (Aziz and Lawson, 1989).

Although capital budgeting investment of firms involved large sums of money over the long periods are crucial for the sustaining, surviving and flourishing in markets (Emmanuel, Harris and Komakech, 2010; Ghahremani, Aghaie and Abedzadeh, 2012), decisions on capital budgeting investments are critical owing to the influence of uncertainty factors (e.g., Peterson and Fabozzi, 2002, Cooper et al., 2002; Dayananda et al., 2002; Ghahremani, Aghaie and Abedzadeh, 2012). The global financial crisis epitomised this truth. The sources of uncertainty range from the mundane (such as cash flow estimation, number and sources of estimation error) to the more esoteric (such as complementarities among investments, options presented by investment opportunities, opportunity cost of investments) (Haka, 2006). One of the most intractable issues confronted by researchers is how to identify, capture, and evaluate uncertainties associated with long term investment projects (Haka, 2006).

Considering the importance of investment decisions nowadays, complex methods are used for making capital budgeting decisions rather than purely depending on theories of capital budgeting to mitigate the effect of uncertainty and other contingency factors (Arnold and Hatzopoulos, 2000; Cooper et al., 2002; Byrne and Davis, 2005; Verbeeten,2006; Zhang,

Huang and Tang, 2011; Kersyte, 2011; Bock and Truck, 2011; Singh, Jain and Yadav, 2012). Thus, the process of change requires a re-examination of the fundamental assumption that cut through traditional boundaries of the financial management. Therefore, a study on capital budgeting theory and practice melding with core components of uncertainty provides a significant contribution into extant capital budgeting literature. Thus, the main aim of this study was to develop a capital budgeting model that would meld with the core components of uncertainty, firms' characteristics and firms' performance, based on an emerging country, Sri Lanka.

1.3 Objectives of the study

This study:

1. Investigates the prevalent choice of capital budgeting techniques and identifies the influences of firms' characteristics on their use based in an emerging market such as Sri Lanka. The objective sheds new light on how theoretical concepts of capital budgeting are being applied by finance professionals in Sri Lanka and investigates the influence of firm characteristics on practices of capital budgeting. Moreover, the current study compares the results with similar studies carried out in developed economies that have highly developed capital markets with high levels of liquidity, meaningful regulatory bodies, large market capitalisation, and high levels of per capita income (Geary, 2012), such as the USA and the UK, and an emerging economy in a country in the process of rapid growth and development with lower per capita income, less mature capital markets and very small capital projects than developed countries. As a result of this, emerging market economies clearly pose challenges in applying capital budgeting techniques owing to less developed capital markets and the difficulty of setting key parameters. Consequently, the findings of the study will make a geographical contribution to the existing literature in the terrain of capital budgeting in situ.

2. Identifies uncertainty factors and examines the extent to which they affect capital budgeting practices. In the globalisation era, stand-alone application of capital budgeting theory is challenging and some theories do not hold water today, accounting for the influence of uncertainty factors. Nonetheless, uncertainty factors and their influence vary across countries. Thus, identifying uncertainty factors and their influence in a country which has not been focused on makes a parametric contribution.

3. Evaluates the interacting effect of uncertainty between capital budgeting practices and performance. Once uncertainty factors were identified, they were examined to find out any

interacting effect between capital budgeting practices and performance. There is only flimsy evidence in extant literature to support the impact of capital budgeting techniques on firm performance (e.g., Kim, 1982; Pike, 1988; Farragher, Kleiman and Sahu, 2001; Jiang, Chen and Huang, 2006; Vadeei et al., 2012). Thus, this study investigates the relationship between capital budgeting practices and performance with conjoining interaction effects of uncertainty factors.

1.4 Motivation of the study

The survival and vitality of a company is determined by its ability to regenerate itself through the allocation of capital into productive use (Arnold and Hatzopoulos, 2000). Allocating resources among competing investment projects is one of the most critical decisions made by the top management and is of strategic importance, and it invariably involve large sums of money and have a long-term economic life cycle. These decisions are critical to managing strategic change and sustaining long term corporate performance. Therefore, one of the most important strategic decisions for an organisation is how much to invest in assets, when to invest and which assets should be invested in. This is evaluated by systematic capital budgeting decisions. Nonetheless, current investment markets are evolving within an increasingly volatile and intertwined global network and investments are strongly exposed to uncertainties (Bock and Truck, 2011). Uncertainties could lead to failure of a good investment decision and thus integration of uncertainty with capital budgeting techniques is overarching, nonetheless, often complex (Ghahremani, Aghare and Abedzadeh, 2012). Over the last two decades, corporate practices regarding capital budgeting have not been static and have diverged from theories (Slagmulder, Bruggeman and Wassenhove, 1995; Arnold and Hatzopoulos, 2000). Empirical evidence shows that the theoretical application of sophisticated capital budgeting involves the use of multiple tools and procedures (e.g., Monte Carlo simulation, certainty equivalents, game theory decision rules and real options reasoning, Verbeeten, 2006). Therefore, capital budgeting theories are not applicable in all situations in contemporary borderless global business, leading to a research gap between theory and practices.

Moreover, the ways of looking at capital budgeting practices are different from country to country and from company to company. This scenario places emphasis on seminal studies that capital budgeting practices are influenced by a 'country effect' (e.g., Graham and Harvey, 2001; Hermes, Smid and Yao, 2007). Many studies has been conducted on capital budgeting methods and practices, predominantly in the USA (e.g., Graham and Harvey,

2001; Ryan and Ryan, 2002), the UK (e.g., Arnold and Hatzopoulos, 2000), Australia (e.g., Truong, Partington and Peat, 2008), China (e.g., Chen, 2008), Canada (e.g., Bennouna, Meredith and Marchant, 2010), Japan (e.g., Shinoda, 2010), Sweden (e.g., Sandahl and Sjogren, 2003), Indonesia (e.g., Leon, Isa and Kester, 2008), Ireland (e.g., Kester and Robbins, 2011), South Africa (e.g., Maroyi and Poll, 2012), New Zealand (e.g., Lord, Shanahan and Bogd, 2004), Tennessee (e.g., Sekwat, 1999), Belgium (e.g., Dardenne, 1998), Romania (e.g., Dragota et al., 2010), Nigeria (e.g., Elumilade, Asaolu and Ologunde, 2006), Pakistan (e.g., Zubairi, 2008), Argentina (Pereiro, 2006), Italy (e.g., Cescon, 1998), Singapore (e.g., Kester and Chong,1998), Bahrain (e.g., Al-Ajmi,Al-Saleh and Hussain, 2011), Cyprus (e.g., Lazaridis, 2004), Croatia (e.g., Dedi and Orsag, 2007), Jordan (e.g., Khamees, Al-Fayoumi, and Al-Thuneibat, 2010),Taiwan (e.g., Haddad, Sterk and Wu,2010), Nepal (e.g., Poudel et al., 2009), India (e.g., Singh, Jain and Yadav, 2012), Hong Kong (e.g., Lam, Wang and Lam, 2007), Kuwait (e.g., Mutairi et al., 2012), Libya (e.g., Mohammed, 2013), Poland (e.g., Wnuk-Pel, 2013), Kenya (e.g., Kitili and Nganda, 2014), Spain (e.g., Andres, Fuente and Martin, 2015). Comparative studies have been conducted in Europe: the UK, France, Germany and the Netherlands (e.g., Brounen, de Jong and Koedijk, 2004); in the Asia-Pacific region: Malaysia, Singapore and Hong Kong (e.g., Wong, Farragher and Leung, 1987), Australia, Hong Kong, Indonesia, Malaysia, the Philippines and Singapore (Kester et al., 1999); the Netherlands and China (Hermes, Smid and Yao, 2007); and in Central and Eastern Europe including Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia (Ander,Mohanty and Toth, 2010). All of these studies have made contributions to extant literature by illuminating the prevailing capital budgeting practices across many countries. This study focuses on capital budgeting practices and the influence of uncertainties and firms' characteristics on their use in a Sri Lankan emerging market, where, to the best of the researcher's knowledge, no studies have been conducted. Thus, studying capital budgeting practices in a country that has not, as yet, been focused on is a great geographical contribution to the existing literature. Furthermore, the current study compares the results with similar previous empirical studies in the USA and Europe, based on developed economies and one emerging economy.

1.5 Practical relevance of the study

In the field of capital budgeting practices, professionals and practitioners are currently expected to play a role in

> "challenging conventional assumptions of doing business (e.g., efficient market hypothesis, investors are rational, etc.), identifying risks, and seizing opportunities; integrating sustainability issues into strategy, operations, and reporting; redefining success in the context of achieving sustainable value creation; establishing appropriate performance goals and targets; encouraging and rewarding the right behaviours; and ensuring that the necessary information, analysis, and insights are available to support decision making" (International Federation of Accountants (IFAC), 2011, p. 6).

Therefore, the need for updated information and knowledge from diversified fields would be required by decision makers in order to accomplish these tasks effectively. At the cutting edge of the technological world, many practitioners have been confronted by a choice between decision-making techniques for mitigating uncertainty and risk (Schuyler, 1997; Singh, Jain and Yadav, 2012) to sustain and succeed with the organisation effectively and consequently, this sets out the gap between theory and practice in finance (e.g., Mao, 1970; Ross, 1986; Klammer, Koch and Wilner, 1991; Arnold and Hatzopoulos, 2000; Cooper et al., 2002; Kersyte, 2011). Therefore, overriding aspect as to mitigating risk and uncertainty is certain extent contingent upon the choice of capital budgeting (Macmillan, 2000; Verbeeten, 2006). Capital investment decisions are vital at both firm level and national level; at the firm level, capital investment decisions would have implications for many aspects of company operations and the results have a crucial effect on survival, profitability and growth. At the national level, healthy planning and allocation of capital investment are crucial for an efficient use of other resources; on the other hand, poor investment negatively affects the productivity of labour, materials and the economy's potential output. Therefore, this study receives significant attention.

Over the last decades, there has been a dramatic change observed in the environment milieu, where the organisation operates on presenting new opportunities as well as threats to practitioners and managers (Verbeeten, 2006). Uncertainties such as unpredictable changes in exchange rates, interest rates, and prices of goods cannot be ignored. Increased volatility in unpredictable changes would create more cut-throat competition than ever before (Smith,

Smithson and Wilford, 1989). In some countries, the increase in lawsuits for liability on products can adversely affect the organisation by the increasing cost of liability insurance. In addition, Prahalad (1994) opined that 'corporate governance' creates new uncertainties in large organisations. The concept of governance includes many interlinked aspects of corporate control, corporate policy, and corporate structure, the distribution of income among shareholders and specifically, the goals of companies. However, it is important to recognise the interest of stakeholders other than shareholders (such as suppliers, customers, employees and the wider community) or there may be serious financial consequences (Verbeeten, 2006). All of these developments and changes nurture a new financial environment, markets and governance structures in the way that organisations work. Therefore, change in use of capital budgeting methods is challenging but also vital for competition with other organisations. Specifically, uncertainties are the dominant aspects which change the use of capital budgeting practices and the identification of uncertainties and their influence on capital budgeting practice combined with performance is examined in this study.

While this study has been designed to contribute to extant capital budgeting literature, the findings will also offer valuable insight to financial directors, management accountants and accounting/finance consultants. Furthermore, the results support senior managers and financial analysts in identifying, evaluating, selecting and implementing investment decisions.

1.6 Structure of the thesis

The rest of this thesis is organised as follows.

Chapter 2 provides the theoretical underpinnings of the study, including conceptualising capital budgeting theory (traditional and emerging theories), uncertainty theory, the concept of organisational performance and the research model.

Chapter 3 presents the research design and methodology including the philosophy of the research design, exploratory study, data collection (target population, sampling, research instrument, tackling potential biases, and piloting), analytical strategy (data analysis, assessment of non-response bias, data needs matrix) and ethical considerations.

Chapter 4 sets out the prevailing capital budgeting practices in the emerging Sri Lankan market, reports the sampled firm's characteristics and influence on the choice of capital

budgeting practices, and tests the relevant hypotheses with the aid of robust statistical analysis.

Chapter 5 analyses the impact of uncertainty factors on capital budgeting practices. The survey data were analysed using factor analysis, confirmatory factor analysis and structural equation modelling and the results were used to test the developed hypotheses.

Chapter 6 reports the relationship of the firm's characteristics in combination with uncertainty which was thoroughly examined with capital budgeting and an outcome variable (the firm's performance). The final model is developed.

Chapter 7, the final chapter, discusses the findings in relation to the research questions, the contributions and implications of this study, outlining limitations and directions for future research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Chapter overview

This chapter attaches great importance to the known and unknown terrain of capital budgeting. In the chapter, past studies are critically reviewed and the gaps in the literature are unearthed. This chapter starts with definitions and an understanding of capital budgeting. The rest of the sections are discussed under the following themes: theory of capital budgeting, capital budgeting techniques, capital budgeting tools for incorporating risk, classification of capital budgeting practices, capital budgeting across countries, disparities between capital budgeting theory and practice, firms' characteristics and capital budgeting (size, nature of industry, educational qualifications of the CFOs and their experience), uncertainty and capital budgeting, and corporate finance theory on corporate performance. In the penultimate section, a research model is presented and the research questions and hypotheses are summarised. The chapter ends with a brief summary.

2.2 The nature of capital budgeting

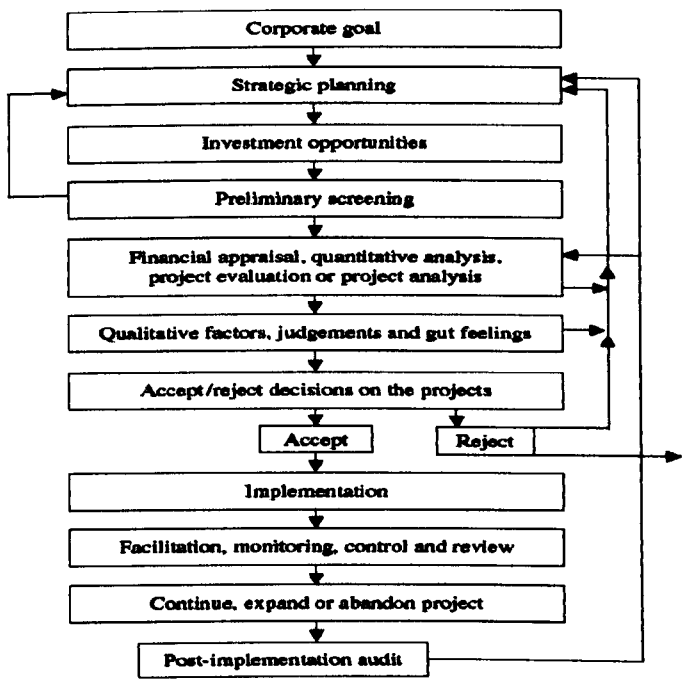
Defining and understanding capital budgeting

Capital budgeting is a major terrain of the sphere of financial management. Although capital budgeting involves the investment of a present sum of funds in an efficient and effective way to generate future fund flows in the long term (Quirin, 1967), different authors define capital budgeting in different ways. Gitman, Juchau and Flanagan (2010) define capital budgeting as "the process of evaluating and selecting long term investment consistent with the firm owners' goal of wealth maximization" (p.344). A clear explanation of capital budgeting was set forth by Segelod (1998), who defined it as the procedures, routines, methods and techniques used to identify investment opportunities, develop initial ideas into specific investment proposals, evaluate and select a project, and control the investment project to assess forecast accuracy. Therefore, capital budgeting mainly deals with sizable investments in long-term assets (Dayananda et al., 2002) and the assets can take a form of either tangible (i.e., property, plant or equipment) or intangible assets (i.e., new technology, trademarks). Regardless of whether the investments are tangible or intangible, they are long-term and consume large sums of money and, consequently, the resultant effects prevail for many years. Due to the nature of capital budgeting, capital budgeting decisions have a major effect on the value of the firm and they are critical to the firm's success or failure (Dayananda et al., 2002). Beckett - Camarata (2003) clearly articulated that the substantial funding involved in capital

budgeting is at stake in capital budgeting decisions and this affects the long-term spending of a community.

Capital budgeting is not a stand-alone single activity related decision; rather it is a process called the "capital budgeting process". The nature of the capital budgeting process makes it extremely important in arriving at a capital investment decision. The capital budgeting process is a multi-faceted activity designed to help in the selection of investment projects that are viable and worthy of pursuing. It is dynamic, not static. No universally accepted consensus exists on and it is influenced by many changing factors in the organisational environment. By and large, any capital budgeting process includes planning, reviewing, analysing, selecting, implementing and following up activities. According to Baker and Powell (2005), the capital budgeting process involves six stages: identifying project proposals, estimating project cash flows, evaluating projects, selecting projects, implementing projects and performing a post-completion audit. Dayananda et al. (2002) connoted that the capital budgeting process involves many distinctive stages and that organisations use their own tailor-made process. They clearly depict a typical capital budgeting process in a large firm; this is shown in Figure 2.1.

Figure 2.1: Capital budgeting process



Source: Capital budgeting process adapted from Dayananda et al., 2002, p.5.

As noted earlier, capital budgeting is long-term investment involving substantial funds and the decisions on capital budgeting have a significant impact on organisational survival and shareholders' wealth maximisation. Owing to this fact, the process of capital budgeting is represented by corporate goals. The actual capital budgeting process starts with strategic planning and the identification of investment opportunities. The strategic planning translates the firm's corporate goals into business goals in pursuit of solid objectives. The identification of investment opportunities is the dominant step in the capital budgeting process. These have to fit with the strategic planning of the organisation. Some investments are mandatory and the rest of them are discretionary. Profitable investment is not born; a firm needs to identify lucrative investment opportunities (Dayananda et al., 2002). Some firms establish separate a Research and Development (R& D) division to searching for and capitalize on investment opportunities. All of the identified investment opportunities are subject to a preliminary screening process to identify viable investment opportunities. Investments screened through the preliminary screening process go through a rigorous financial appraisal to ensure that they will increase the value of the firm. At this stage, the expected cash flow from viable investments will be forecast using quantitative techniques and thus, sometimes, this stage is called the quantitative analysis stage. An accurate estimation of the projected cash flow is of utmost important since improper estimations can lead to incorrect decisions in selecting investment projects (Dayananda et al., 2002).

Capital investment selection involves a unique set of challenges and many techniques are employed in the selection process including project evaluation techniques, risk analysis, mathematical programming techniques and so on (Dayananda et al., 2002). Decision-making at this stage is vital, since investment selection is crucial to the firm's success in the face of limited investment funds. There are plenty of capital budgeting methods that can be deployed at this stage including NPV, IRR, PB period and so on. Having evaluated the investment projects, those that are worth pursuing are selected and implemented and other alternative unprofitable investment projects are discarded. Proper monitoring is then required to ensure the success of the investments. If needed, corrective action will be taken to eliminate potential bottlenecks in the investments. Finally, a post-implementation audit will be carried out to evaluate the success of the projects. This is called the post-mortem of the performance of the implemented projects. The major benefit of the post-implementation audit is to provide important feedback for current and future investments, and consequently make capital investments more effective (Pierce and Tsay, 1992).

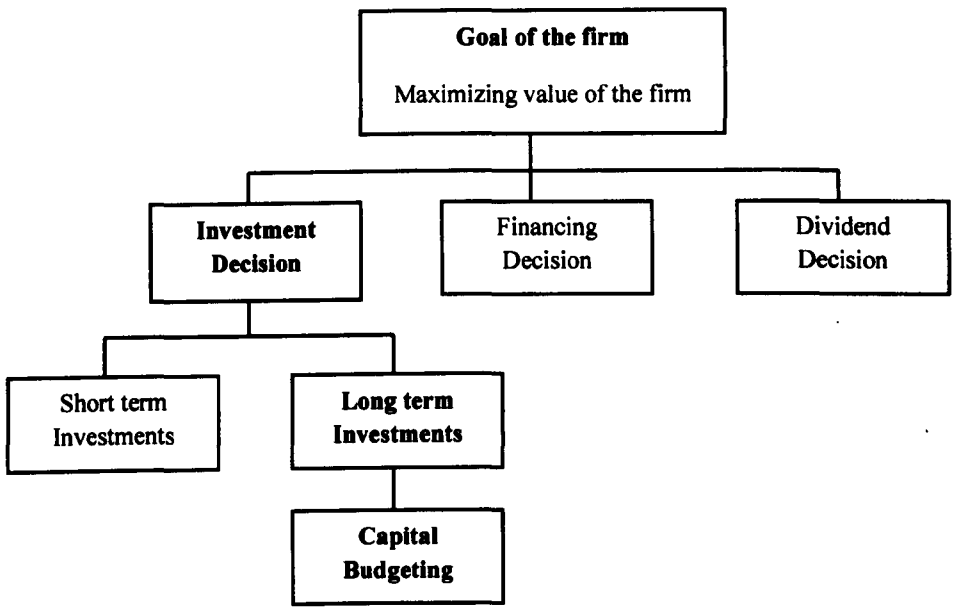
The capital budgeting process demonstrates that capital budgeting method is the backbone and decisive factor in seizing the right investment opportunities. The wrong capital investment decisions can cause the entire process of capital budgeting to collapse. Although there are many methods for assessing capital budgeting, investment decisions based on capital budgeting methods are complex and challenging and not at all straightforward. Consequently, many research scholars have focused on the use of the best capital budgeting methods and the factors associated with these in the contemporary world (Verbeeten, 2006).

2.3 Theory of capital budgeting

2.3.1 Financial management theory

Financial management theory is related to maximising the market value of a firm for its owners, to wit, the maximisation of shareholders' wealth (Cho, 1996; Peterson and Fabozzi, 2002; Cooper et al., 2002; Dayananda et al., 2002; Atrill, 2009). Financial management primarily concerns investment, financing and dividend decisions and the interactions between them. Thus firms face three major decisions: what to invest in (the investment or capital budgeting decisions), how to finance these assets (the financing decision), and how to reward shareholders (the dividend decision) (Freeman and Hobbes, 1991; Pike and Neale, 2009). These decisions are directly related to the primary objective of a firm: maximising the wealth of its owners (Pandey, 1989, Ryan and Ryan, 2002; Hermes, Smid and Yao, 2007; Atrill, 2009; Hornstein, 2013). Financial management is thus about management of the finances of a firm in order to achieve financial objectives that enable firms to survive financially. The management of a firm's finances includes both the generation and better utilisation of finance. The relationship between a firm's overall goals and the types of decisions made can be seen in Figure 2.2.

Figure 2.2: The relationship between a firm's overall goals and types of decision in finance theory



As discussed, the primary objective of financial management is to maximise the value of the firm, and the decision makers need to learn how to identify investments and financing arrangements that impact favourably on the value of the firm. Among the types of decisions that must be made, long-term investment decision-making is of vital importance and critical to the survival and long-term success of firms (Bennouna, Meredith and Marchant, 2010). A good investment decision can result in a major return on the investment for the firm, and is vital for running a business and competing in the market. This is called capital budgeting.

Capital budgeting theory relates to the concept of shareholders' wealth maximisation (e.g., Cho, 1996; Pike, 1988; Pike and Neale, 2009; Dayananda et al., 2002; Peterson and Fabozzi, 2002; Hermes, Smid and Yao, 2007) and involves investment decisions in which expenditure and receipts continue over a significant period of time. Verbeeten (2006) stated that, 'Capital budgeting practices are the methods and techniques used to evaluate and select an investment project' (i.e., the decision-making role of the accounting system) (p.108). Capital budgeting is thus the application of the principle of profit maximisation to multi-period projects to pave the way for a firm's growth, survival and sustainability. The survival of a company depends very much on its ability to generate returns on its investments (Mustapha and Mooi, 2001, Ryan and Ryan, 2002) and it deserves organisational operations. Capital budgeting techniques are the best alternative for investment decision makers, to help them decide to invest a fixed amount today in exchange for an uncertain stream of future payoffs. Profoundly, capital budgeting decisions have been recognized as the most important strategic

decisions for an organisation to determine how much to invest in specific assets and when to invest (Verbeeten, 2006).

Capital investment decisions, which are also called long-term investment decisions/capital budgeting decisions, have long been of interest to many management scholars. Capital investment decisions are mainly concerned with the identification of investment opportunities and selecting the best of these in order to ensure a firm's survival and long-term growth (Mustapha and Mooi, 2001; Megginson, Smart and Lucey, 2008; Bennouna, Meredith and Marchant, 2010). The long-term success of a firm depends on excellent investment decisions more than any other factor (Megginson, Smart and Lucey, 2008). The majority of firms' investment decisions involve the acquisition of fixed assets, for example, the purchase of land, plant, equipment and buildings. Firms invest hundreds of billions of dollars every year in investment projects. Capital investment decisions are thus of utmost important in determining a firm's fortunes over many years.

2.3.2 Capital budgeting techniques

The most prevalent capital budgeting techniques found in the recent literature are the PB period, the ARR, the NPV, the IRR, the BCR, and the PI (e.g., Pike, 1996; Kester et al., 1999; Sekwat, 1999; Cooper et al., 2002; Hermes, Smid and Yao, 2007). Of these methods, four methods viz., NPV, IRR, PB and ARR, are noted as the predominant methods (e.g., Pike, 1996; Kester et al., 1999; Hermes, Smid and Yao, 2007).

The PB method determines the length of time required to recover the invested cash outlay and ignores the return on the capital investment after the initial outlay is recovered; nonetheless, this method is often used (e.g., Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004; Bennouna, Meredith and Marchant, 2010). The PB method has been criticised for failing to make an accurate assessment of a project's value as it does not consider the use of cash flows, the time value of money, or the risk in a systematic manner. Furthermore, it does not identify investment projects that will maximise profits; thus PB does not have a theoretical justification (Pike, 1988, Lefley, 1996). Notwithstanding, researchers have argued that the reasons behind the widespread use of the PB method are its ease of use and the fact that it provides information about the recovery of the initial investment. Apropos of ARR, it is calculated as the ratio of the investment's average after tax income to its average book value (Cooper et al., 2002). In a similar vein, research scholars and practitioners have criticised ARR due to the ignorance of the time value of money (e.g., Cooper et al., 2002;

Ross et al., 2005). Thus, both methods have been considered as non-discounted cash flow (DCF) methods.

Thus, in the next generation, by considering the importance of the time value of money, the discounted cash flow (i.e., NVP, IRR) was introduced. NPV measures the difference between the present value of the money in and the present value of the money out (Cooper et al., 2002). Therefore, a capital investment with a positive NPV is accepted and vice versa. The IRR determines the rate at which a capital investment can be acceptable and thus equates the cost of the capital investment to the present value of that project (Cooper et al., 2002). 'Capital budgeting theory assumes that projects are evaluated based on economic merit. Building upon certain economic assumptions, including the time value of money, risk aversion, and an assumed goal of value maximisation, sophisticated investment appraisal techniques such as NPV and IRR have been advocated in the literature' (Slagmulder, Bruggeman and Wassenhove, 1995, p.123). Notwithstanding, several researchers have criticised the fact that the requisite necessary information for NPV and IRR is commonly not known with certainty owing to longer periods, uncertainty in the future, a higher degree of risk and the absence of a logical comparison on the time value of money (e.g., Sekwat, 1999; Cooper et al., 2002; Hermes, Smid and Yao , 2007). Similarly, some experts have argued that both the NPV and IRR methods ignore the size of the investment (Cooper et al., 2002). Thus, in order to overcome both the time value of money and the size of the investment, the PI model has emerged. This is the ratio of the capital investment to its outlay and the decision being made in terms of the highest PI (Cooper et al., 2002). If this method is used carelessly with constrained investment resources, it generates bad results (Brealey and Myers, 2003).

Graham and Harvey (2001) identified 12 capital budgeting methods in their seminal study: NPV, IRR, Annuity, Earning multiple (P/E), APV, PB, DPB, PI, ARR, Sensitivity analysis, Value at risk and Real options. Nonetheless, none of these are usable in situations that depend on several factors. For example, IRR is not the best method if investments are mutually exclusive or have multiple rates of return. However, in practice, IRR is often used (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004; Bennouna, Meredith and Marchant, 2010). Of these methods, DPB considers the time value of money but it still ignores cash flows after the initial outlay is recovered. VAR measures "the worst expected loss over a given horizon under normal market conditions at a given confidence level" (Jorion, 2006; p.12); it is a relatively new method. The APV additionally covers the value of the financial side effects of an investment to NPV, and is principally treated as having no drawbacks (Ross et al., 2005).

Overall, DCF is the central theory of any investment analysis that considers the time value of money. It is regarded as theoretically correct, and includes at least four different discounting models: NPV, IRR, MIRR, and PI (Brigham and Ehrhardt, 2002). But the greatest problems with the traditional present value models are their complete reliance on quantifiable cash flows. However, in the contemporary high tech world, many new projects entail the complete redesign of the manufacturing environment and computerised design is of paramount importance in order to be innovative, of higher quality and to respond quickly (Cooper et al., 2002). Therefore, making an investment decision is not an easy task. One has to bear in mind that decision-making is affected by risk factors such as the upgrading of technology, fluctuations in price, the actions of competitors, changes in customer preferences, regulations, legislation, and the political and economic environment. These factors have an influence over future decisions related to a firm's investments. Thus, it is essential for decision-makers to apply an evaluation tool that has the advantage of integrating all of the risk elements related to their investment decision-making.

Therefore, research scholars are looking at the influence of uncertainty and other risk related factors that influence capital budgeting practices. This is based on classical decision theory. This theory concerns the efficiency of markets and making rational decisions to maximise a firm's profits (Fama, 1970). Tversky, Slovic and Kahneman (1990) argued that classical decision making in the light of risk and uncertainty generally makes three assumptions: (1) asset integration: integrating risky projects with the rest of the assets; (2) risk aversion - being generally willing to select a less risky investment; and (3) rational expectation - investors are expected to be coherent, accurate and unbiased forecasters and assume that all relevant information is publicly available.

Uncertainty and risk are the major influences in making investment decisions. The analysis of risk involves a straightforward adaptation of Markowitz's quadratic programming model of portfolio selection (Mao, 1970). Modern portfolio theory tools for better investment decisions are Efficient Frontier, Single Index Model (Sharpe, 1963), Capital Assets Pricing Model (Sharpe, 1964) and Arbitrage Pricing Theory (Ross, 1976). Despite the age of these tools, they are currently useful in managing investment risk and detecting mispriced securities, among other things (e.g., Trahan and Gitman, 1995; Graham and Harvey, 2001; Alkaraan and Northcott, 2006). Presently, a number of new risk analysis tools and investment assessment methods are also being used.

Moreover, the discount rate (cut-off) rate is inextricably intertwined with capital budgeting practice. In capital budgeting, the hurdle rate is the minimum rate that a company expects to

earn when investing in a project. Hence the hurdle rate is also referred to as the company's required rate of return or target rate. Firms may accept investment opportunities if the rate of return exceeds shareholders' cost of capital. Nowadays, there are a number of methods for evaluating the cost of capital including the project-dependent (risk-adjusted) cost of capital , the weighted average cost of capital, the cost of debt , the cost of capital derived from CAPM, an arbitrary rate, earnings yields on shares, the average historical return on stock, the cost of equity, the minimum rate of return stipulated by shareholders, and a measure based on past experience (e.g., Arnold and Hatzopoulos, 2000; Ryan and Ryan, 2002; Lazaridis, 2004; Truong, Partington and Peat, 2008; Dedi and Orsag, 2007; Zubairi, 2007; Hermes,Smid and Yao, 2007; Leon, Isa and Kester, 2008; Bennouna, Meredith and Marchant, 2010; Ekeha, 2011; Al-Ajmi, Al-Saleh and Hussain, 2011).

2.3.3 Capital budgeting tools for incorporating risk

Effective capital budgeting requires the use of DCF techniques, adequate cash flows, discount rate estimates, and risk analysis (Brigham and Ehrhardt, 2002). The complex nature of capital investment in today's world means that many new models are being put into practice, including the multi-attribute decision model and the analytical hierarchy process, which are more subjective (Cooper et al., 2002). Modern theoretical developments in finance views that DCF methods are not the best methods to select capital investment projects: they have severe drawbacks in the analysis of investment projects if information about future investment decisions is not available (Trigeorgis, 1993; Dixit and Pindyck, 1994). In such a situation, Real Options Reasoning and Game Theory serve as better analytical tools to evaluate such investment projects (Smit and Ankum, 1993). ROR indicates how the value to delay in adoption of decision takes until further information about the capital investment projects is available. GT stresses that firms have an incentive to invest early if there is fear of pre-emption (Smit, 2003). The integration of ROR and GT offers a complete assessment of investment projects (Smit, 2003).

Real option theory: Real option is closely related to corporate capital investment decision-making and has been introduced as an alternative approach for investment appraisal under uncertainty. The starting point for real options research was the criticism of traditional strategic investment decision-making and capital budgeting methods. In general, a real option represents or reflects the option or options that a company has when it comes to deciding whether to invest in a project, delay, put it on hold, expand or reduce an investment, or any other flexibility that it may have (Rigopoulos, 2014). ROT involves the use of investment

evaluation tools and processes that properly account for both uncertainty and the company's ability to react to new information (Verbeeten, 2006). ROT has operating flexibility (which enables the management to make or revise decisions at a future time, such as expansion or abandonment of the project) and the strategic option value (resulting from interdependence with future and follow-up investments, such as implementation in phases and the postponement of investments) (Verbeeten, 2006). Many researchers have argued that the use of real options analysis has an advantage over NPV, since NPV is not able to capture the value of managerial flexibility (e.g., Ingersoll and Ross, 1992; Trigeorgis, 1993; Dixit and Pindyck, 1994). For example, the management could delay, expand, abandon, temporarily close or alter the operation during the project' life. Ross et al. (2005) argued that most capital investment projects have options (i.e., the option to expand, the option to modify, the option to abandon), which have value per se. Although this method has not been applied on a large scale in practice (Hermes, Smid and Yao, 2007), it is mostly applicable in specific industries or situations. DCF techniques are used concurrently with real options in order to determine the true NPV (Amram and Howe, 2002). Many research scholars have found that only a few firms have employed real options (Graham and Harvey, 2001; Ryan and Ryan, 2002; Brounen, de Jong and Koedijk, 2004; Block, 2007; Truong, Partington and Peat,2008; Verma, Gupta and Batra,2009; Bennouna, Meredith and Marchant,2010; Shinoda,2010, Singh, Jain and Yadav,2012; Andres, Fuente and Martin,2015).

Overall, uncertainty affects future cash flows and causes estimation difficulties. Therefore, various risk analysis and management science techniques have been developed to supplement the traditional present value based decision models. Scholarship on the practice of capital budgeting in many countries has found that firms are increasingly employing more sophisticated capital budgeting techniques in order to make investment decisions over several years (Klammer, 1973; Klammer and Walker,1984; Pike,1988; Jog and Srivastava,1995; Gilbert and Reichart,1995; Farragher, Kleiman and Sahu,1999; Arnold and Hatzopoulos, 2000; Brounen, de Jong and Koedijk, 2004; Truong, Partington and Peat,2008; Baker, Dutta and Saadi,2011). In the contemporary world, there are a number of sophisticated capital budgeting methods including the oft-cited: Monte Carlo Simulations, Game theory decision rules , Real option pricing, Using certainty equivalents, Decision trees, CAPM analysis / ß analysis, Adjusting expected values, Sensitivity analysis/break-even analysis, Scenario analysis, Adaptation of required return/discount rate, IRR, NPV, uncertainty absorption in cash flows, and PB (e.g., Arnold and Hatzopoulos, 2000; Hall, 2000; Graham and Harvey, 2001; Ryan and Ryan, 2002; Murto and Keppo, 2002; Cooper et al., 2002; Smit, 2003;

Sandahl and Sjogren, 2003; Brounen, de Jong, and Koedijk 2004; Lazaridis, 2004; Lord, Shanahan and Bogd, 2004; du Toit and Pienaar, 2005;Verbeeten, 2006; Elumilade, Asaolu and Ologunde, 2006; Hermes, Smid, and Yao , 2007; Leon, Isa and Kester, 2008; Verma, Gupta and Batra, 2009; Bennouna, Meredith and Marchant, 2010; Shinoda, 2010; Hall and Millard, 2010; Dragota et al, 2010; Poudel et al., 2009; Kester and Robbins, 2011; Maroyi and Poll, 2012; Singh, Jain and Yadav, 2012; Andres, Fuente and Martin, 2015). However, the superiority of IRR and NPV analysis has also been demonstrated in the milieu of uncertainty (e.g., Klammer, Koch and Wilner, 1991, Ryan and Ryan, 2002). A brief description of capital budgeting tools that incorporate uncertainty and risk is given in the table below.

Table 2.1: Brief description for capital budgeting tools incorporating uncertainty and risk

Capital budgeting tools incorporating uncertainty	Brief description
Sensitivity analysis	It allows for the change in one input variable at a time, such as sales or cost of capital, to see the change in NPV (Ryan and Ryan, 2002, p.360)
Break even analysis	It is of a special application of sensitivity analysis. It finds the value of individual variables assuming the project's net present value method is zero. In this case the variables selected for the break-even analysis can be tested only one at a time.
Scenario analysis	It allows for a change in more than one variable at a time, including probabilities of such changes, to see the change in NPV (Ryan and Ryan, 2002, p.360)
Inflation Adjusted Cash Flows	It adjusts expected future cash flows by an estimated inflation factor (Ryan and Ryan, 2002, p.360)
Economic Value Added	It measures managerial effectiveness in a given year or period (net operating profit after taxes- after tax cost of capital required to support operations (Ryan and Ryan, 2002, p.360)
Internal IRR	It is the IRR of the difference in cash flows of two comparison projects, and is commonly used in replacement decisions (Ryan and Ryan, 2002, p.360)

Simulation	It is a method for calculating the probability distribution of the possible outcome (Ryan and Ryan, 2002, p.360) by considering all possible combinations of variables according to a pre-specified distribution (Pike and Neale, 2003)
Market Value Added	It is the market value of the equity – equity capital supplied by shareholders (Ryan and Ryan, 2002, p.360)
PERT/CPM	It is the analysis and mapping of the most efficient financial decision (Ryan and Ryan, 2002, p.360)
Decision Tree	It is a graphical illustration used to model a serious of sequential outcomes, along with their associated probabilities (Ryan and Ryan, 2002, p.360)
Complex mathematical model	It is a general term inclusive of various option pricing model techniques, complex real options and firm specific proprietary models and methods (Ryan and Ryan, 2002, p.360)
Linear programming	It identifies a set of projects that maximise NPV subject to constraints (such as maximum available resources) (Ryan and Ryan, 2002, p.360)
Option Pricing Model	It includes either binomial option pricing model or the Black-Scholes option pricing model; the latter is used by firms with high R and D expenditures and relatively few, albeit large positive NPV investments (Ryan and Ryan, 2002, p.360)
Real Options	It includes the opportunity for the expansion, contraction or abandonment of a capital investment project before the end of its life (Graham and Harvey, 2001)
Probability distribution	Measuring the risk of a capital investment project statistically in terms of its cash flows (Pruitt and Gitman, 1987)

2.3.4 Classification of Capital budgeting Practices

Capital budgeting practices help managers to select n out of N investment projects with the highest profits and an acceptable 'risk of ruin' (Verbeeten, 2006, p.108). By and large, all capital budgeting practices can be subsumed into the categories of sophisticated, advanced and naive (e.g., Haka, 1987; Haka, Gordon and Pinches, 1985; Verbeeten, 2006; Wolffsen, 2012). Naive practices includes PB, the adaptation of required payback and ARR, and the advanced /NPV based, including Sensitivity analysis/break-even analysis, scenario analysis,

the adaptation of required return/discount rate, IRR, NPV, uncertainty absorption in cash flows, MIRR and PI. Farragher, Kleiman and Sahu (2001) suggested that a degree of sophistication is represented by the use of DCF techniques and incorporating risk into the analysis. Sophisticated capital budgeting methods generally include Monte Carlo simulations, GT, RO, using certainty equivalents, decision trees, CAPM analysis / ß analysis, and adjusting expected values (Verbeeten, 2006; Wolffsen, 2012).

2.3.5 Empirical findings of capital budgeting practices across countries

Many studies have been conducted about capital budgeting practices in the U.S. and Europe (e.g., Pike, 1996; Sangster, 1993; Block, 2007; Hermes, Smid and Yao, 2007). Chadwell-Hatfield et al. (1997) conducted a survey among 118 manufacturing firms in the U.S. Their results showed that NPV (84%) and IRR (70%) were preferred primary methods. Nonetheless, it was clearly observed that two thirds of firms relied on shorter PB periods rather than on IRR or NPV. Another seminal study entitled 'the theory and practice of corporate finance: evidence from the field' was carried out by Graham and Harvey (2001). Their sample consisted of 392 CFOs in the USA. In larger firms with a high debt ratio, CFOs with an MBA were more likely to use DCF (75% NPV and IRR) than their counterparts. Larger firms applied a risk-adjusted discount rate whereas smaller firms opted for a Monte Carlo simulation for adjusting risk. The research found that CAPM was the most popular method of estimating the cost of equity. In addition, their findings show that PB method was not used as a primary tool; however, it was kept as a vital secondary tool. This indicates that practitioners might not apply the CAPM or NPV rule correctly. Very similar results were reported in Ryan and Ryan's (2002) study, in which the sample consisted of Fortune 1000 U.S companies. The results found that NPV was the most popular technique, followed by IRR. Most of the firms used sensitivity analysis, scenario analysis, inflation adjusted cash flows, economic value added, and incremental IRR along with NPV and IRR. In 1997, Block studied capital budgeting techniques across small business firms operating in the United States. The most popular method was PB (42.7%), followed by ARR (22.4%) and small business owners seemed to be increasingly using DCF as a primary method. Cooper et al. (2002) studied capital budgeting practices in Fortune 500 companies in America; their data were collected from 102 chief financial officers. The results revealed that the most commonly used primary capital budgeting method is IRR and the second most common method is the payback. Ken and Cherukuri (1991) found that IRR was the most preferred method in larger companies operating in the U.S. and NPV was the second most preferred method. The most

widely used discount rate was the WACC (78%) and risk was commonly measured using sensitivity analysis (80%). Similar results were reported in a survey of Fortune 100 firms by Bierman (1993).

Arnold and Hatzopoulos (2000) conducted a study entitled, "the gap between theory and practice in Capital Budgeting: Evidence from the UK for 300 UK companies (comprising 100 large, 100 medium and small 100). The results of their study indicate that UK companies have increasingly adopted the analysis of prescribed financial textbooks. The study revealed that managers still use simple rule of thumb techniques in the UK. Drury, Braund and Tayles (1993) surveyed 300 manufacturing companies in the UK with regard to their capital budgeting practices. The results showed that PB (86%) and IRR (80%) were the most preferred methods across the sample. The most widely used risk analysis was sensitivity analysis. Brounen, de Jong and Koedijk (2004) conducted a seminal study across four European countries, the UK., France, Germany and the Netherlands, with a sample of 313 companies between 2002 and 2003. Their results showed that 47% and 67% of the UK companies used NPV and PB respectively as a primary tool for evaluating capital budgeting decision whereas 70% of companies in Netherlands used NPV and 65% used PB methods. However, companies in France and Germany reported lower usage of both methods (42% for NPV, 50 % for PB and 44% for NPV, 51% for PB respectively). Previous studies have mainly been conducted in the US and the UK. However, a limited number of studies have been carried out in the Netherlands (e.g., Brounen, de Jong and Koedijk, 2004).

Jog and Srivastava (1995) conducted a survey of capital budgeting practices in Corporate Canada and the results showed that the most preferred method was PB. Similar results were found in the UK in Pike's (1996) study. Further results indicated a decreased use of ARR in Canada and the United Kingdom. Bennouna, Meredith and Marchant (2010) conducted a survey in Canada of 500 firms to demonstrate the improved capital budgeting practices. It was identified that Canadian firms seem to be increasingly using sophisticated methods when dealing with risk (i.e., sensitivity analysis, decision-tree analysis, Monte Carlo simulation, ROR, GT) (Bennouna, Meredith and Marchant, 2010). They argued that the application of DCF techniques in larger businesses cannot necessarily be generalised to businesses of all sizes. The literature on more general managerial decision-making has found that many decisions in a complex, fast paced environment are made on intuitive and pragmatic grounds. There is a limited research on capital budgeting that focuses on small firms.

Many studies have recognised that DCF is the dominant capital budgeting evaluation method in the UK (e.g., Arnold and Hatzopoulos, 2000), the USA (e.g., Ryan and Ryan, 2002) and Canada (e.g., Payne, Heath and Gale, 1999). However, most US firms use DCF techniques in comparison with firms in European countries (e.g., Brounen, de Jong and Koedijk, 2004). There is still some reluctance in this field due to the technical aspects of DCF (e.g., Cary, 2008; Magni, 2009). In 1993, Bierman and Smidt opined that DCF methods are the pre-eminent investment decision tools and thus, it is imperative for managers to learn about their uses. However, NPV, IRR and PB are the most popular methods among North American and Western European companies (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004).

Sekwat (1999) studied capital budgeting practices among 321 Tennessee municipal government organisations. His results showed that most of the municipal government' organisations use benefit cost ratio (62.5 %) and PB methods (61.5%), and financial officers were reluctant to use IRR, ARR or NPV methods. Holmen (2005) conducted a survey of the capital budgeting techniques used for FDI's in Swedish firms and found that larger firms preferred to use NPV and IRR methods. Nonetheless, the most preferred method was PB (79%). In a survey of capital budgeting practices in Australian listed companies, Truong, Partington and Peat (2008) found that NPV, IRR and PB were the most popular capital budgeting evaluation methods. The researchers also identified the use of real options across the sample but these are not yet part of the mainstream.

Kester and Robbins (2011) surveyed the capital budgeting techniques used by Irish listed companies. The results revealed that they use DCF methods and the most prevalent method was NPV, followed by PB and IRR. Scenario analysis and sensitivity analyses were found to be most important tools for incorporating risk. WACC was the most important widespread method employed for calculating discount rate. On the other hand, Lazaridis (2004) studied capital budgeting practices in Cyprus, where PB was found to be the most preferred method, not NPV.

Shinoda (2010) carried out a survey of capital budgeting in Japan. A questionnaire was administered to collect data from a sample of 225 companies listed on the Tokyo Stock Exchange. The results showed that firms were using a combination of PB and NPV to evaluate capital investment projects. The capital budgeting techniques used depend on the subject and situation; they are not purely based on theory. Effective decision making with regard to capital budgeting requires a more multifaceted approach to the issue of capital

budgeting methods rather than rigorous academic theory. Moreover, it is important to see how firms across the globe use capital budgeting methods and how they boost the efficiency of their decision-making. Therefore, it is fair to say that sophisticated capital budgeting techniques are increasingly being used among many developed countries: US, UK, European and Australian companies (Freeman and Hobbes, 1991;Shao and Shao,1996; Pike, 1996; Brounen, de Jong and Koedijk, 2004 ; Truong, Partington and Peat, 2008). However, US companies seem to be using more DCF methods compared to European countries.

There is a dearth of studies on the capital budgeting practices of developing countries during the last two decades. In comparison with developed countries, the results of most studies show a different picture. In most developing countries, the PB method was the dominant method in evaluating capital investment. Kester et al. (1999) surveyed a total of 226 companies across six countries: Australia, Hong Kong, Indonesia, Malaysia, the Philippines and Singapore. Their results showed that PB is still an important method and that DCF methods have become increasingly important. In five Asian countries, 95% of firms used the PB method and 88% used the NPV in evaluating projects. However, both methods were treated as equally important. The rate of CAPM usage was significantly higher in Australia compared with other countries considered in this study. Kester et al. (1999) noted that the sophistication of capital budgeting techniques within the developing countries in Asia has increased very rapidly during the last decade.

Babu and Sharma (1996) studied Indian industries' capital budgeting practices and their findings show that 90% of companies were using capital budgeting methods. Of these, 75% were adopting DCF methods in evaluating capital budgeting, and among them IRR was the most popular. Sensitivity analysis was found to be popular for assessing risk. In 1998, Jain and Kumar studied comparative capital budgeting practices in the Indian context; they sampled 96 non-government companies listed on the Bombay Stock Exchange and five companies in South East Asia. They observed that the most preferred capital budgeting technique was PB (80% companies), followed by NPV and IRR. Sensitivity analysis was the preferred risk assessment method.

Cherukuri (1996) surveyed capital budgeting practices in a comparative study of India and the South East Asian countries of Hong Kong, Malaysia and Singapore. The sample consisted of the top 300 non-government companies. This study found widespread use of DCF methods. 51% of companies used IRR, and this was followed by NPV (30%). Of the non-DCF methods, PB (38%) was the dominant method followed by ARR (19%). The non-DCF

methods were used to supplement the DCF methods. WACC was the most widely used discount rate and sensitivity analysis was mainly used for risk assessment. Another survey of capital budgeting practices in corporate India was conducted by Verma, Gupta and Batra (2009), with a sample of 30 manufacturing companies. This study showed that the most preferred method was IRR (56.7%), followed by NPV (50%) and PB (36.7%). WACC (43.3%) was the most widely used discount rate and sensitivity analysis (36.7%) was mainly used for risk assessment. The results were similar to those of Cherukuri (1996). They concluded that companies have begun to use sophisticated discounted cash flow techniques rather than traditional non-discounted techniques. Notwithstanding, researchers have connoted that companies should give more attention to the size of their capital budget and the nature of the industry in making their capital budgeting decisions. For example, if the capital budget is larger, more sophisticated discounted capital budgeting techniques should be benefited. In 2012, Singh, Jain and Yadav studied capital budgeting decisions with a sample of 31 listed companies in India. Their results revealed that firms are using DCF techniques combined with non-DCF techniques. Of the DCF techniques, more than three quarters of the sampled companies used the IRR, which was preferred more than the NPV; this was used by half of the sampled companies. Furthermore, it was reported that half of the companies used real option techniques in selecting their capital investment projects. Most of these findings are country specific and thus researchers have called for further detailed research that considers a sectorial analysis of the constituent sectors of the sample companies, as this would shed new light on this area.

Hermes, Smid, and Yao (2007) carried out a comparative study of Dutch and Chinese firms with regard to their capital budgeting practices. 66.7% of the Dutch CFOs stated that they used WACC and only 9.5 % of them used PDCC. Small firms used CD most often (22.7%) in comparison with larger firms (5.0%). Among the Dutch firms, 89% of the CFOs reported that they used NPV methods. However, 2% of the CFOs stated that they used ARR, which was the least popular method. In contrast, 53.3% of the Chinese firms indicated that they used WACC, and just 15.7% of the CFOs of Chinese firms used PDCC. However, 28.9% of the CFOs reported that they used CD, which was more than their Dutch counterparts. The Chinese CFOs stated that they were more likely to use NPV and PB methods (89% and 84% respectively) in evaluating capital budgeting projects. Thus, on average, Dutch CFOs use more sophisticated capital budgeting techniques than Chinese CFOs.

In 2008, Leon, Isa and Kester conducted a survey of the capital budgeting practices of listed companies in Indonesia. They found that DCF was the primary method used for evaluating capital investment projects. The most prevalent risk assessment tools were scenario and sensitivity analysis. The results found that CAPM was not so popular. A survey of capital budgeting practices in Jordan was conducted by Khamees, Al- Fayoumi and Al-Thuneibat (2010). They reported that both DCF and non-DCF method were still popular in evaluating capital budgeting investments. Surprisingly, the most popular method was PI, followed by PB.

Maroyi and Poll (2012) conducted a survey of capital budgeting practices in listed mining companies in South Africa. Their results showed that NPV, IRR and PB were the most prevalent methods in evaluating larger investment projects. Their results also indicated that PB was found to be long lasting use of method. Mutairi et al. (2012) conducted an interesting survey on corporate governance and corporate finance practices among the listed companies on the Kuwait stock exchange. Their study concluded that firms are widely using IRR for capital budgeting decision-making. CAPM is also in use, whereas WACC remains the most popular method used to calculate the cost of capital.

Recently, Andres, Fuente and Martin (2015) conducted a survey with a sample of 140 non-financial Spanish firms to shed further light on the capital budgeting techniques used by Spanish companies. Primarily payback was most widely used tool, while real options were used relatively little. Furthermore, their results confirmed that a firm's size and industry were related to the frequency of use of certain capital budgeting techniques. Finally, they found that the relevance of growth opportunities and flexibility was an important factor in explaining the use of real options.

The key findings of the seminal studies on capital budgeting practices from the 1970s are summarised in the tables below.

Table 2.2: Summary of the empirical evidence on the most frequently used capital budgeting methods in different countries from 1970s

Authors/ Year published	Country	Year surveyed	Survey sample	Usable response	Response rate %	Usage of capital budgeting techniques in percentage (%) (Always and almost always)													
						PB	DPB	ARR	NPV	IRR	DCF(NPV or IRR	APV	PI	RO	GTD	MIRR	Hurdle rate	VAR	EVA
1970s																			
Klammer /1972	USA	1969/70	369	184	49.9	12	-	26	-	-	57	-	-	-	-	-	-	-	-
Gitman & Forrester/1977	USA	1977	268	110	41	10	-	28	-	-	74	-	-	-	-	-	-	-	-
Kim & Farragher/1981	USA	1979	1000	200	20	12	-	8	-	-	68	-	-	-	-	-	-	-	-
1980s																			
Pike/1988	UK	1986	140	100	71.4	92	-	56	68	75	84	-	-	-	-	-	-	-	-
1990s																			
Klammer,Koch & Wilner/1991	USA	1988	468	100	21.4	5	-	4	-	-	86	-	-	-	-	-	-	-	-
Sangster/1993	Scotland	1989	491	94	21.8	78	-	31	48	58	-	-	-	-	-	-	-	-	-
Jog &Srivastava/1995	Canada	1991	582	133	22.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Replacement project					53.7	-	14.9	38	51.2	66.1	-	-	-	-	-	-	-	-
	Expansion-existing project					52.4	-	17.5	42.9	64.3	80.9	-	-	-	-	-	-	-	-
	Expansion- new operations					50	-	19.9	47.6	65.1	84.9	-	-	-	-	-	-	-	-
Trahan & Gitman/1995	USA	1992	700	84	12	66.7	56	59.5	81	79.8	-	-	20.2	-	-	15.5	-	-	-
Pike/1996	UK	1992	208	99	78.10	94	-	50	74	81	88	-	-	-	-	-	-	-	-
Cescon/1998	Italy	1996	40	34	85														-
Study covers 40 listed manufacturing companies including 16 multinational companies operating in Italy	Italian companies-	1996	20	18		66.6	-	16.6	55.5	72.2	-	-	-	-	-	-	-	-	-
	German companies	1996	10	8		100	-	12.5	62.5	62.5	-	-	-	-	-	-	-	-	-
	American companies	1996	10	8		87.5	-	25	62.5	37.5	-	-	-	-	-	-	-	-	-
Farragher,Kleiman & Sahu/1999	USA	1999	379	128	34	52	-	34	78	80	-	-	-	-	-	-	-	-	-
Kester et al./1999	Asia Pacific	1996/97		226	16.30											-	-	-	-
Surveyed Asia Pacific countries	Australia	1996/97		57		51		27	79	79	100	-	-	-	-	-	-	-	-
	Hong Kong	1996/97		29		80		40	49	58	68	-	-	-	-	-	-	-	-
	Indonesia	1996/97		16		48		17	83	77	100	-	-	-	-	-	-	-	-
	Malaysia	1996/97		35		70		35	71	68	89	-	-	-	-	-	-	-	-
	Philippines	1996/97		35		71		39	66	87	98	-	-	-	-	-	-	-	-
	Singapore	1996/97		54		70		44	59	70	82	-	-	-	-	-	-	-	-
2000s																			

Arnold & Hatzopoulos/2000	UK (overall results)	1997	296	96	32.4	70	-	56	80	81	96	-	-	-	-	-	-	-	-
	Small firms	1997		34		71	-	62	62	76	91								-
	Medium firms	1997		24		75	-	50	79	83	96								-
	Large firms	1997		38		66	-	55	97	84	100								-
Graham & Harvey/2001	USA	1999	4440	392	9	56.70	29.45	20	74.90	75.70		11	12	-	-		-	-	-
Ryan & Ryan/2002	USA	2001	1000	205	20.5	52.60	37.60	14.70	85.10	76.70	-	-	21.4	1.6	-	9.3	-	-	-
Sandahl & Sjogren/2003	Sweden	2000	528	129	24.4	78.10	-	21.10	52.30	22.70	64.80	-	-	0	-	-	-	-	-
Lazaridis/2004	Cyprus	2001	100	56	56	36.71	-	17.72	11.39	8.86	-	-	-	-	-		-	-	-
Brounen, deJong & Koedijk/2004	European countries	2002/03	313		5												-	-	-
Surveyed European countries	UK	2002/03	N/R	68		69.20	-	-	47	53.10	-	-	-	-	-	-	-	-	-
	Netherland	2002/03	N/R	52		64.70	-	-	70	56	-	-	-	-	-	-	-	-	-
	Germany	2002/03	N/R	132		50	-	-	47.60	42.20	-	-	-	-	-	-	-	-	-
	France	2002/03	N/R	61		50.90	-	-	35.10	44.10	-	-	-	-	-	-	-	-	-
Truong, Partington & Peat/2008	Australia	2004	356	87	24	90	-	57	94	81	-	54	-	32	-	-	40	72	-
Dedi & Orsag2007	Croatia		234	59	25.21	56	27	8	42	59	-	-	22	-	-				-
Lam, Wang & Lam/2007	Hong Kong	2004	157	46	30.7	84.8	-	82.6	71.7	65.2	-	-	-	-	-	-	-	-	-
Zubairi/2007	Pakistan	2007	150	35	23	85	-	-	91	88	-	-	52	-	-	52	-	-	-
Hermes, Smid & Yao/2007 Comparative study		2003/04	550	87															-
	Netherland	2003/04	250	42	17	79	-	-	89	74	-	-	-	-	-	-	-	-	-
	China	2003/04	300	45	15	84	-	-	49	89	-	-	-	-	-	-	-	-	-
Leon, Isa & Kester/2008	Indonesia	2000/01	229	108		86.4	-	40.9	63.6	63.6	-	-	42.1	-	-	-	-	-	-
Verma, Gupta & Batra/2009	India	2009	100	30	30	80	23.3	26.7	63.3	76.7	-	16.6	40	16.7	-	-	16.7	-	-
2010s																			
Bennouna, Meredith &Marchant/2010	Canada	N/R	478	88	18.4	-	-	-	94.20	87.70	80.70	-	-	8.1	-				-
Andor, Mohanty & Toth/2010	CEE countries	2008	N/R	400															-
Study covers Central and Eastern European (CEE) countries	Bulgaria	2008	N/R	20		40	-	30	-	-	35	-	-	-	-	-			-
	Croatia	2008	N/R	16		69	-	63	-	-	56	-	-	-	-	-			-
	Czech	2008	N/R	57		53	-	40	-	-	37	-	-	-	-	-			-
	Hungary	2008	N/R	46		63	-	76	-	-	43	-	-	-	-	-			-
	Latvia	2008	N/R	9		33	-	67	-	-	44	-	-	-	-	-			-

	Lithuania	2008	N/R	14		57	-	50	-	-	43	-	-	-	-	-			-
	Poland	2008	N/R	143		81	-	59	-	-	58	-	-	-	-	-			-
	Romania	2008	N/R	57		61	-	68	-	-	58	-	-	-	-	-			-
	Slovakia	2008	N/R	25		64	-	72	-	-	56	-	-	-	-	-			-
	Slovenia	2008	N/R	13		62	-	77	-	-	46	-	-	-	-	-			-
Haddad, Sterk & Wu/2010	Taiwan	NR	NR	25	NR	52.17	21.74	26.09	30.43	47.83	-	-	17.39	-	-	13.04	-	-	-
Shinoda/2010	Japan	2008/09	2224	225	10	50.2	20.4	30.3	30.5	25	-	-	-	0.5	-	-	-	-	-
Ekeha/2011	Europe and West Africa	2006/07	345	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Europe	2006/07	225	28	12	79	-	7	89	75	-	-	-	-	-	-	-	-	--
	W.Africa	2006/07	120	8	6	75	-	12	50	87	-	-	-	-	-	-	-	-	--
Kester & Robbins /2011	Ireland	2009	43	18	41.9	-	-	-	-	-	100	-	-	-	-	-	-	-	--
Al-Ajmi, Al-Saleh & Hussain/2011 Study covers the conventional & Islamic institutions	Bahrain	N/R	200	105	52.5	52	-	53	66	92	-	-	-	-	-	-	-	-	--
	66 conventional Institution			66		56.1	-	60.6	78.8	100	-	-	-	-	-	-	-	-	22.7
	39 Islamic Institution			39		46.2	-	41.1	46.1	79.5	-	-	-	-	-	-	-	-	46.1
Maroyi & Poll/2012	South Africa	2011	35	13	37	23	-	-	69	46	-	-	-	-	-	-			-
Mutaiti et al,/2012	Kuwait	2008	-	80	53	53.8	-	42.5	96.3	97.4	-	-	-	-	-	-	-	-	
Singh, Jain & Yadav/2012	India	2010	166	31	18.67	64.28	-	39.28	50	78.57	-	-	21.42	-	-	-	-	-	-
Mohammed/2013	Libya	2010	97	45	46.4	98	53	69	80	73			56			60			
Hussain & Shafique/2013	Pakistan	2011	Five Islamic Banks			78.5	-	-	94.2	87.7	-	-	-	8	-	-	-	-	-
Andres, Fuente & Maritn/2015	Spain	2011	2000	140	7	75	-	-	65.7	74.1	-	-	-	14.3	-	-	-	-	-

Table 2.3: Supplementary capital budgeting techniques/tools for incorporating risk from different countries

	Klammer (1972)	Gitman & Forrester (1977)	Kim & Farragher (1981)	Klammer, Koch & Wilner (1991)	Trahan & Gitman (1995)	Chong, Keung & Jeffrey/1997	Pike/1988	Pike/1996	Arnold & Hatzopoulos (2000)	Graham & Harvey (2001)	Ryan & Ryan (2002)
Country	USA	USA	USA	USA	USA	Hong Kong	UK	UK	UK	USA	USA
Sensitivity analysis	-	-	23%	57%	63.1%	90%	71%	88%	85%	51.54%	65.1%
Scenario analysis	-		-	-	36.9%	-	-	-	85%	-	41.6%
Monte Carlo Simulation	13%	-	10%	12%	31%	-	40%	-	-	-	19.4%
Decision trees	-	-	-	-	26.2%	-	34%	-	-	-	7.9%
CAPM/β analysis	-	-	-	-	29.8%	69%	16%	20%	3%	-	8.2%
High cut off rates	-	-	-	-	-	-	61%	-	-	56.94%	-
Uncertainty absorption in cash flows	-	-	-	-	-	-	-	-	-	-	-
Break even analysis	-	-	-	-	-	-	-	-	-	-	-
Inflation adjusted cash flows	-	-	-	-	-	-	-	-	-	-	31.4%
Market Value Added	-	-	-	-	-	-	-	-	-	-	14.9%
Complex mathematical model	-	-	-	-	-	-	21%	-	-	-	7.6%
Linear programming	-	-	-	-	-	-	-	-	-	-	5.4%
Shorter payback period (Adjusting the payback period	10%	13	14%	19%	-	84%	61%	60%	205	-	-
Adjusting the required return	21%	44	19%	40%	-	94%	61%	65%	52%	-	-
Use of certainty equivalents instead of expected cash flows	-	27	3%	-	-	-	-	-	-	-	-
Probability analysis	-	-	-	-	-	73%	40%	48%	31%	-	-
Any other (Value at risk)	-	-	-	-	-	29%	-	-	-	13.66%	-

	Brounen, deJong and Koedijk.(2004)				Lazaridis (2004)	Truong, Partington & Peat (2008)	Dedi & Orsag (2007)	Lam, Wang & Lam (2007)	Zubairi (2007)	Leon,Isa & Kester (2008)	Verma ,Gupta & Batra (2009)	Bennouna,Meredith &Marchant/2010
Country	UK	Dutch	German	France	Cyprus	Australia	Croatia	Hong Kong	Pakistan	Indonesia	India	Canada
Sensitivity analysis	42.86%	36.73%	28.07%	10.42%	28.33%	-	49%	69.6%	-	43.5%	73.4%	92.8%
Scenario analysis	-	-	-	-	30%	-	7%	-	-	67.5%	-	-
Monte Carlo Simulation	-	-	-	-	10%	-	19%	58.9%	-	29.7%	-	-
Decision trees	-	-	-	-	-	-	-	73.9%	-	43.5%	-	-
CAPM/β analysis	-	-	-	-	-	-	-	43.5%	-	-	36.7%	-
High cut off rates	26.98%	41.67%	28.81%	3.85%	-	71%	-	-	-	-	16.7%	-
Uncertainty absorption in cash flows	-	-	-	-	-	-	-	-	-	-	-	-
Break even analysis	-	-	-	-	-	-	-	-	-	-	-	-
Inflation adjusted cash flows	-	-	-	-	-	-	-	-	-	-	-	-
Market Value Added	-	-	-	-	-	-	-	66.7%	-	-	-	-
Complex mathematical model	-	-	-	-	-	-	-	52.2%	-	-	-	-
Linear programming	-	-	-	-	-	-	-	-	-	-	-	-
Shorter payback period (Adjusting the payback period	-	-	-	-	-	-	-	80.4%	9%	-	50%	-
Adjusting the required return	-	-	-	-	-	-	-	78.3%	33%	-	-	76.8%
Use of certainty equivalents instead of expected cash flows	-	-	-	-	-	-	-	-	-	-	-	-
Probability analysis	-	-	-	-	-	-	-	71.7%	-	-	-	-
Any other –Value at Risk	14.52%	4.26%	23.68%	29.79%	-	40%	-	-	-	-	20%	-

	Al-Ajmi,Al-Saleh & Hussain (2011)			Mutaiti et al, (2012)	Singh, Jain & Yadav/2012	Tufuor & Doku/2013	Andres, Fuente & Martin/2015
Country	Bahrain			Kuwait	India	Ghana	Spain
	Overall	Conventional Institutions	Islamic Institutions				
Sensitivity analysis	77.1%	69.7%	89.7%	72.6%	96.15%	12.5%	54.4%
Scenario analysis	-	-	-	57.4%	-	25%	-
Monte Carlo Simulation	-	-	-	-	-	-	47.5%
Decision trees	-	-	-	31.2%	-	-	-
CAPM/β analysis	8.6%	7.6%	10.3%	-	-	-	-
High cut off rates	59%	65.2%	48.7%	-	11.53%	-	-
Uncertainty absorption in cash flows	28.6%	36.4%	15.4%	-	-	-	-
Break even analysis	-	-	-	-	-	25%	-
Inflation adjusted cash flows	-	-	-	-	-	-	-
Market Value Added	-	-	-	-	-	-	-
Complex mathematical model	-	-	-	-	-	-	-
Linear programming	-	-	-	-	-	-	-
Shorter payback period (Adjusting the payback period	12.4%	13.6%	10.3%	-	11.53%	-	-
Adjusting the required return	-	-	-	-	-	-	-
Use of certainty equivalents instead of expected cash flows	-	-	-	-	-	-	-
Probability analysis	21%	18.2%	25.6%	11.2%	-	-	-
Any other –Value at Risk	-	-	-	-	7.69%	-	-

Table 2.4: Practices of Methods to calculate the Cost of Capital/ Discount Rate from different countries

	Arnold & Hatzopoulos (2000)	Ryan & Ryan (2002)	Lazaridis (2004)	Truong, Partington & Peat (2004)	Dedi & Orsag (2007)	Zubairi (2007)	Hermes, Smid & Yao (2007)		Leon,Isa & Kester (2008)	Bennouna ,Meredith &Marchant (2010)	Ekeha (2011)		Al-Ajmi, Al-Saleh & Hussain (/2011)			Tufuor & Doku/2013
Country	UK	USA	Cyprus	Australia	Croatia	Pakistan	Dutch	China	Indonesia	Canada	Europe	W.Africa	Bahrain			Ghana
													Overall	Conventional Institutions	Islamic Institutions	
WACC	54%	83.2%	-	-	40%	52%	66.7%	53.3%	74.1%	76.1%	67.9%	50%	54.3%	74.2%	20.5%	50%
Cost of capital derived from CAPM	8%	-		72%	9%	-	-	-	-	-	-	-	-	-	-	-
Cost of Debt	11%	7.4%	30.95%	34%	-	67%	14.3%	28.9%	-	9.9%	14.3%	25%	58.1%	41.9%	84.6%	-
An arbitrary rate	6%	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Earnings yields on shares	1%	-		-	-	-	-	-	-	-	-	-	-	-	-	-
Average historical return on stock	-	-	-	11%	-	49%	-	-	-	-	-	-	-	-	-	
Project dependent (risk adjusted) cost of capital	-	-	-	-	-	-	9.5%	15.7%	-	-	10.7%	12.5%	22%	29.3%	10.3%	
Cost of equity	-	-	-	-	-	-	-	-	-	1.4%	-	-	31.4%	26.1%	41%	
Minimum rate of return stipulated by shareholders	-	-	-	-	-	-	-	-	-	-	-	-	65.7%	79.8%	41%	
A measure based on past experience	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5%
Any other	10%	8.4%	13.10%	-	-	-	9.5%	2.2%	9.3%	12.7%	7.1%	12.5%	-	-	-	12.5%

Table 2.5: Discount rate used by companies when evaluating a new project in an overseas market from different countries

Authors name and year published	Graham and Harvey, (2001)	Brounen, deJong and Koedijk. (2004)				Al-Ajmi, Al-Saleh & Hussain (2011)			Kester & Robbins (2011)
Name of the country	USA	UK	Netherland	Germany	France	Bahrain			Ireland
Discount rates						Overall	Conventional Institutions	Islamic Institutions	
The discount rate for entire company	58.79%	40.98%	64.58%	41.96%	24.14%	53.3%	33.3%	87.1%	66.7%
The discount rate for the overseas market (country discount rate)	34.52%	20%	14.89%	14.85%	16.36%	44.8%	30.3%	69.2%	-
A divisional discount rate (if the project line of business matches a domestic division)	15.61%	17.24%	17.02%	12%	12.50%	27.6%	24.2%	33.4%	–
A risk matched discount rate for this particular project (considering both country and industry)	50.95%	23.73%	27.08%	25%	27.27%	39.1%	47%	25.7%	–
A different discount rate for each component cash flow that has a different risk characteristics (e.g. depreciation Vs. operating cash flows)	9.87%	10.53%	2.13%	7.14%	11.32%				–
Other						3.8%	6.1%	0%	–

Table 2.6: Usage of emerging theory on capital budgeting: real options from empirical studies

		Arnold & Hatzopoulos (2000)	Graham & Harvey (2001)	Ryan & Ryan (2002)	Sandahl & Sjogren (2003)	Brounen, deJong and Koedijk.(2004)				Lazaridis (2004)	Truong, Partington & Peat (2008)	Elumilade, Asaolu & Ologunde (2006	Dedi & Orsag (2007)	Lam, Wang & Lam (2007)
Country		UK	USA	USA	Sweden	UK	Dutch	German	France	Cyprus	Australia	Nigeria	Croatia	Hong Kong
Real option	-	-	26.56%	1.6%	-	29.03%	34.69%	44.04%	53.06%	-	32%	-	-	-

	Zubair (2007)	Hermes , Smid & Yao (2007)		Leon, Isa & Kester (2008)	Verma, Gupta & Batra (2009)	Bennouna, Meredith & Marchant (2010)	Haddad, Sterk & Wu (2010)	Shinoda (2010)	AlAjmi, AlSaleh & Hussain (2011)	Mutaiti et al. (2012)	Singh, Jain & Yadav (2012)	Andres, Fuenter & Martin (2015)
Country	Pakistan	Dutch	China	Indonesia	India	Canada	Taiwan	Japan	Bahrain	Kuwait	India	Spain
Real option	-	-	-	-	10%	8.1%		0.5%	-	-	50%	14.3%

2.3.6 Disparities between capital budgeting theory and practices

Capital budgeting theory recommends using DCF (NPV, IRR, MIRR, PI and DPB) and non-DFC methods (PB and ARR) when making capital budgeting decisions. However, as can be seen in the tables above, most firms in developed and developing countries are inclined to use sophisticated capital budgeting methods along with capital budgeting tools for incorporating risk (i.e., sensitivity analysis, real options) and sophisticated discounted rate (i.e., WACC, CAPM) (e.g., Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Ryan and Ryan, 2002; Cooper et al., 2002; Brounen ,de Jong and Koedijk, 2004; Hermes, Smid, and Yao, 2007; Bennouna, Meredith and Marchant, 2010; Maquieira, Preve and Sarria-Allende, 2012). Moreover, the decision about which capital budgeting methods to choose is also dependent on numerous factors (see the review in this section) such as size of the firm, the nature of the industry, the educational qualifications of the CFO, the experience of the CFO, uncertainty (for example, interest rate, inflation, foreign exchange rate), non-financial considerations and other factors (i.e., economic, human, technology, finance, ethical and political) (e.g., Bowman and Moskowitz, 2001; Zhu and Weyant, 2003; McGrath and Nerkar, 2004; Verbeeten, 2006; Donker, Santen and Zahir, 2009). Besides, the factors determining capital budgeting are prone to the 'country effect', for example economic factors, cutting edge technology (i.e., decision support system), political factors, accounting policies, accounting standards and other infrastructure facilities. Consequently, although capital budgeting theory is applicable to all countries, to a certain extent the actual practices of capital budgeting vary (e.g., Graham and Harvey, 2001, Hermes, Smid and Yao,2007) .

'In practice uncertainty, information asymmetry, multiple (conflicting) objectives, real options and multi -period multi project considerations greatly complicate capital budgeting beyond the focus of the theory' (Arnold and Hatzopoulos, 2000, p.609). Consideration of the impact of information asymmetry, real options and other complications related to the capital budgeting exercise gives one the view that there is no unique correct technique and that there is a need for multiple methods (Arnold and Hatzopoulos, 2000). Modern theory suggests that financial decision makers are inconsistent. Therefore, there are disparities between theory and practice. Capital budgeting is not static per se. It diverged from theories (Slagmulder, Bruggeman and Wassenhove, 1995; Arnold and Hatzopoulos, 2000),and it is influenced by the 'country effect' (e.g., Graham and Harvey, 2001; Brounen ,de Jong and Koedijk, 2004; Hermes, Smid, and Yao, 2007; Ekeha, 2011). Thus, the current study considers the extent to

which modern investment appraisal techniques, including risk analysis, are being employed by Sri Lankan companies.

Thus capital budgeting techniques are not applicable in all situations of investment decision making in practice, which has led to raising a research question:

RQ_1: To what extent are capital budgeting practices prevalent in Sri Lanka?

As discussed earlier, studies on the practice of capital budgeting in many countries have found that firms increasingly employ more sophisticated capital budgeting techniques to make investment decisions over several years (Klammer, 1973; Klammer and Walker, 1984; Pike, 1988; Klammer, Koch and Wilner, 1991; Jog and Srivastava, 1995; Gilbert and Reichart, 1995; Farragher, Kleiman and Sahu, 1999;Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Mustapha and Mooi, 2001; Ryan and Ryan, 2002; Brounen, de Jong and Koedijk, 2004; Hermes, Smid, and Yao, 2007; Truong, Partington and Peat, 2008; Baker, Dutta and Saadi, 2011; Singh, Jain and Yadav, 2012). When comparing a developed economy with an emerging economy, the developed economy has highly developed capital markets with high levels of liquidity, meaningful regulatory bodies, large market capitalisation, and high levels of per capita income (Geary, 2012). Sri Lanka, which is an emerging market, is a country in the process of rapid growth and development with lower per capita income, less mature capital markets and very small capital projects, compared with developed countries. Therefore, emerging market economies would pose challenges in applying sophisticated capital budgeting techniques, owing to less developed capital markets and the difficulty of setting key parameters. Consequently, a hypothesis is postulated:

H_1: Sri Lankan listed companies do not use sophisticated capital budgeting practices.

2.4 Firm characteristics and capital budgeting practices

This study considers firms' demographic characteristics that are expected to account for the differences in their use of capital budgeting practices across countries. Although firms have many characteristics, many seminal studies set out three major characteristics viz., firm size, industry differences, and the CFO's educational qualification and experience in the field that have a strong influence on the choice of capital budgeting practices (e.g., Ho and Pike, 1992; Trigeorgis, 1993; Ho and Pike, 1998; Payne, Heath and Gale, 1999; Bowman and Moskowitz, 2001; Graham and Harvey, 2001; Williams and Seaman, 2001; Farragher, Kleiman and Sahu,2001; Ryan and Ryan, 2002; Billington, Johnson and Triantis,2003; Brounen ,de Jong and Koedijk, 2004; McGrath and Nerkar, 2004; Verbeeten, 2006; Hermes,

Smid and Yao,2007; Verma, Gupta and Batra, 2009; Bennouna, Meredith and Marchant, 2010; Andres, Fuente and Martin, 2015)

2.4.1 Size

The size of a firm is one of the major determinants of its capital budgeting practices (e.g., Ho and Pike, 1992; Graham and Harvey, 2001; Farragher, Kleiman and Sahu, 2001; Brounen, de Jong and Koedijk, 2004; Verbeeten, 2006). Research supports the notion that large firms adopt more innovative capital budgeting methods, e.g. sophisticated capital budgeting practices, to a larger extent than smaller firms (e.g., Williams and Seaman, 2001), since larger firms have the capacity and resources to use sophisticated capital budgeting practices (Ho and Pike, 1992). Payne, Heath and Gale (1999) and Ryan and Ryan (2002) documented the fact that large firms are more inclined to use more sophisticated capital budgeting practices. This is due to the fact that larger firms have larger projects and the use of sophisticated capital budgeting practices becomes less costly (Payne, Heath and Gale, 1999; Hermes, Smid and Yao, 2007). Larger firms are much more likely to have full time staff members working on capital budgeting (Verbeeten, 2006). Furthermore, they can spend a considerable amount of capital on new plant and equipment, which requires the use of more sophisticated capital budgeting practices. However, the nature of the relationship between the size of a company and its capital budgeting practice has not been clearly established in developing/emerging countries. Thus, this leads to another research question:

> **RQ_2:** Is there any significant difference between the size of a firm's capital budget and its capital budgeting practices?

And thus, it can be hypothesised that:

> **H_2:** Sophisticated capital budgeting practices are used when a firm's capital budget is large.

2.4.2 Industry

Companies from different industries may vary in their use of capital budgeting practices (e.g., Ho and Pike, 1998). This may, for example, be due to the nature of their business activity, differences in technology, competition and human resource skill, the amount of investment in fixed assets, business risk, and so forth. For instance, widespread use of real option and game theory is more prevalent in the pharmaceutical industry (e.g., Bowman and Moskowitz, 2001; McGrath and Nerkar, 2004), the extraction industry (e.g., Trigeorgis, 1993), the financial services industry and the high-tech industry (e.g., Billington, Johnson and Triantis,2003,

Verbeeten, 2006). This scholarship explores how industrial types are different in their use of capital budgeting practices, which leads to the research question:

RQ_3: Is there any significant difference the capital budgeting practices used in different industries?

And thus, it can be hypothesised that:

H_3: Manufacturing firms use more sophisticated capital budgeting practices.

2.4.3 Educational qualification of Chief Financial Officers and their experience

Recently, Hornstein (2013) found that managers and CFOs significantly influence corporate behaviour and performance. In particular, the educational qualifications of CFOs have been recognised as a determinant of capital budgeting practice (Graham and Harvey, 2001). There is a general consensus that a CFO with a higher level of education will have fewer problems in understanding more sophisticated capital budgeting techniques and thus they will be capable of using them. A positive relationship has been identified between the educational background of CFOs and the use of sophisticated methods (Hermes, Simd and Yao, 2007). Among the U.S. sample, a positive association was found between CFOs' education and the use of sophisticated capital budgeting practices (Graham and Harvey, 2001) and these findings were consistent with those in the Netherlands, Germany and France, but not in the UK (Brounen, de Jong and Koedijk, 2004). There is a dearth of studies in emerging counties on the relationship between CFOs' educational qualifications and the choice of capital budgeting practices and the results found in developed countries are not consistent with previous studies (e.g., Brounen, de Jong and Koedijk, 2004), leading to a research question:

RQ_4: Is there any significant difference between the educational qualification of chief financial officers' and firms' capital budgeting practices?

And thus, it can be hypothesised that:

H_4: Chief Financial Officers with higher educational qualifications use more sophisticated capital budgeting practices.

Besides the educational qualifications of CFOs, their experience might also determine their choice of capital budgeting practice. However, a handful of research studies have reported that the experience of CFOs will determine the use of capital budgeting methods since over time they become more familiar with more sophisticated capital budgeting methods (e.g.,

Hermes, Smid and Yao, 2007; Verma, Gupta and Batra, 2009). And thus, this study raises the research question:

RQ_5: Is there any significant difference between years of experience of chief financial officers and their capital budgeting practices?

And thus, it can be hypothesised that:

H_5: Chief Financial Officers with a greater number of years of experience use more sophisticated capital budgeting practices.

2.5 Uncertainty on capital budgeting practices

In an economic context, uncertainty can be seen as being composed of two main elements: low-uncertainty and upturned uncertainty (Knight, 1921). Low uncertainties are events that have an adverse effect on outcomes compared with expectations. In contrast, upturned uncertainties are events that have a surprisingly better result than expected. In financial management, uncertainties are sometimes called risks. Verbeeten (2006) defines uncertainty as "the gap between the information currently available and the information required to make the decision' (p. 289). However, Al-Harthy (2010) states that 'uncertainty is defined as the range of an outcome, and risk is the probability of gain or loss associated with a particular outcome' (p.331). In the management literature, the terms uncertainty and risk are used interchangeably (Miller, 1992).

Many research scholars concur that uncertainty exists in capital budgeting and that this might have far reaching consequences for the survival of a company (e.g., Zhu and Weyant, 2003; Simerly and Li, 2000; Smit and Ankum, 1993; McGrath, 1997; Bulan, 2005; Emmanuel, Harris and Komakech, 2010; Bock and Truck, 2011; Ghahremani, Aghaie and Abedzadeh, 2012). Over time, many measures have been developed to assess uncertainties (e.g., Lawrence and Lorsch, 1967; Wernerfelt and Karnani, 1987) and many studies have been conducted to investigate the effect of uncertainty on investment practices across many countries (e.g., Govindarajan, 1984; Chen, 1995; Ho and Pike, 1998; Bulan, 2005; Byrne and Davis, 2005; Verbeeten, 2006; Bock and Truck, 2011). Miller (2000) states that 'in the real world, virtually all numbers are estimates' and 'the problem with estimates, of course, is that they are frequently wrong' (p.128). Therefore, a capital budgeting decision requires systematic and careful analysis in the current uncertain global environment. Pike (1996) conducted a study on the application of tools for uncertainty analysis in capital budgeting practices. He suggested that capital budgeting decisions were taken under uncertainty.

Several studies have attempted to identify the nature of the relationship between uncertainty and the capital budgeting practices of organisations. The results of this relationship are often clashing. For example, Kim (1982) and Schall and Sundem (1980) found that all uncertainty seems to be related to the application of a criterion for payback in capital budgeting practices. Besides that, most studies found that the use of DCF techniques appears to decrease in highly uncertain environments. This result is contrary to the findings of Schall and Sundem (1980), who stated that firms in uncertain environments use sophisticated capital budgeting practices (i.e., DCF-techniques). Haka (1987) found that predictable environments led to increased use of DCF techniques and higher performance. However, Haka's results have been contradicted by the results of Chen (1995), who found that most environmental uncertainty resulted in higher application rates for DCF-techniques. Verbeeten (2006) revealed that increasing financial uncertainty is associated with the use and importance of sophisticated capital budgeting practices in terms of ROT and GT.

Uncertainty takes different forms: business uncertainty and project uncertainty; market uncertainty and company uncertainty; static and dynamic uncertainty; strategic, operational and financial uncertainty (Vojta, 1992); general, industry and firm uncertainty (Miller, 1992); direct and indirect uncertainty; aggregate uncertainty and firm-specific or idiosyncratic uncertainty (Dixit and Pindyck,1994); business and financial uncertainty (Baril, Benke and Buetow, 1996); endogenous and exogenous uncertainty (Folta, 1998); market, industry and firm specific uncertainty (Bulan, 2005); input uncertainty, financial uncertainty, social uncertainty and market uncertainty (Verbeeten, 2006).

Of these different types of uncertainty, Miller's (1992) uncertainty framework has been selected for the current study on capital budgeting practices under uncertainty in line with Verbeeten, (2006) as other models of uncertainty demonstrate a lack of knowledge with regard to the factors that determine measures of uncertainty. This framework provides an opportunity to analyse the impact of uncertainty factors on capital budgeting practices and this framework covers a wide range of uncertainties: external environment (competition, exchange rates, etc.) and internal environment (behaviour, research and development, etc.), and it also provides the opportunity to cover general, industry related and firm specific uncertainty factors. The details are presented in Table 2.7.

Table 2.7: Uncertainty and its components

Uncertainty	Description	Miller's (1992) model	Verbeeten's (2006) model
Political	Terrorism, War, Changes in Government, Political instability	A three level model	A four level model
Government policy	Fiscal and monetary policies, Trade restrictions, regulations affecting the business sector, Tax policy	**General environment uncertainties include** Political Government policy Macro Economic Social	**Input uncertainties include** Raw material Input market Production Labour Liability
Macro Economic	Exchange rate, Interest rate, Inflation, Terms of trade		**Financial uncertainties include** Inflation Interest Exchange rate
Social	Social unrest, Shift in social concerns, (beliefs, values and attitudes reflected in current government policy or business practice)	**Industry specific uncertainties include** Input market Product market Competition	**Social uncertainties include** Political Society Policy
Natural	Variations in weather, Natural disaster		
Input market	Quality of inputs, Supply relative to industry demand	**Firm specific uncertainties includes** Operations Liability R & D Credit & fraud Cultural Behavioural	**Market uncertainties include** Competition Output market
Product market	Consumer preferences, Market demand, Availability of substitutes and complements		
Competition	Pricing and other forms of rivalry, New entrants, Product and process innovation, technological uncertainty		
Operations	Labour relations, Availability of inputs, Production variability and downtime		

Liability	Product liability, emission of pollutants		
R & D	R & D activities, regulatory approval of new product		
Credit & fraud	Problems with collectibles, Fraudulent behaviour of employees		
Cultural	Cultural friction		
Behavioural	Agency problems, Emotions, Overconfidence		

Miller's (1992) framework was applied by Verbeeten (2006), which offered the opportunity to investigate the role of specific uncertainties that have an impact on capital budgeting practices. As can be seen in Table 2.6, although they used similar variables to investigate uncertainty, the model and the variables composing uncertainty are different. This might be attributed to country-culture specific factors. Therefore, this study raises a research question:

RQ_6: What factors make up uncertainty and to what extent does each specific uncertainty influence the choice of capital budgeting practices in Sri Lanka?

And thus, it can be hypothesised that:

H_{6a}: Miller's (1992) three-level model is applicable in the Sri Lankan context.

H_{6b}: Specific uncertainties influence the choice of capital budgeting practices in the Sri Lankan context.

As mentioned previously, there is no clear relationship between uncertainty and capital budgeting practices (Aggarwal, 1980; Schall and Sundem, 1980; Scapens and Sale, 1981; Kim, 1982; Mukherjee and Henderson,1987; Haka,1987; Klammer, Koch and Wilner,1991; Staw, 1991; Ho and Pike,1992; Nutt, 1993; Sangster,1993; Chen,1995; Slagmulder , 1997; Bowman and Moskowitz, 2001; Zhu and Weyant, 2003; McGrath and Nerkar, 2004; Verbeeten, 2006; Brown and Sarma, 2007; Donker,Santen and Zahir, 2009; Daunfeldt and Hartwig, 2014). This study attempts to identify the relationship between specific uncertainties and the capital budgeting practices used in organisations, with the aim of developing a descriptive model of capital budgeting practices. Consequently, this study examines the effect of uncertainty on capital budgeting practices as well as the moderating relationship of

uncertainty between capital budgeting practices and a firm's performance, which leads to another research question:

RQ_7: Do specific uncertainties moderate the relationship between capital budgeting practices and performance?

Thus, it can be hypothesised that:

H_7: Specific uncertainties moderate the relationship between capital budgeting practices and firms' performance i.e., the relationship between capital budgeting practices and firms' performance will be weakened for firms that experience higher levels of uncertainty than those that experience low levels of uncertainty.

2.6 Corporate finance theory and corporate performance

Traditional financial theory states that the application of sophisticated capital budgeting techniques will result in improved corporate performance. Capital budgeting decisions are among the most critical for a firm's performance and future prospects (Rigopoulos, 2014). Capital budgeting is derived from the concept of maximising a firm's value because capital investment projects are supposed to maximise the value added to the stockholders (Hermes, Smid and Yao, 2007). The performance of a firm depends on its investment decisions. Investing in the 'right' project has an influence on the success of the firm and its future growth.

Organisations have many goals and objectives, such as survival and sustainability, profit maximisation, shareholder value growth, sales growth, quality, innovation and social responsibility. Many studies have found that sophisticated capital budgeting practices positively influence firms' performance (e.g., Kim, 1981; Haka, Gordon and Pinches, 1985; Chen, 1995; Dardanne, 1998, Farragher, Kleiman and Sahu, 2001; Gomes, Yasin and Lisboa, 2011; Jiang, Chen and Huang, 2006). Table 2.8 summarises the relationship between capital budgeting practices and firm performance measures across many seminal studies.

Table 2.8: Previous research on the relationship between capital budgeting practices and performance

Author	Performance measure	Research Method	Results
Christy (1966)	Earnings Per Share	Cross-classified four groups of firms based on EPS trend with capital budgeting techniques	There was no relationship between earnings per share trend and the use of sophisticated capital budgeting techniques
Klammer (1973)	Operating Rate of Return	Multiple regression: independent variables:- capital budgeting techniques, size, risk and capital intensity	There was no significant relationship between profit performance and the use of sophisticated capital budgeting techniques, but size and risk were positively related to performance
Kim (1981)	Average earnings per share	Multiple regressions: independent variables- degree of sophistication of the capital budgeting process, size, risk and capital intensity.	Positive significance relationship between degree of sophistication of the budgeting process, DCF methods, firm performance, size and risk.
Haka, Gordon & Pinches (1985)	Market return (Share price)	Matched pairs approach: matching variables size, risk and industry	There was no significant relationship between market return and the use of sophisticated capital budgeting practices (discounted cash follow techniques)
Pike (1984)	Average operating rate of return	Multiple Regression Analysis: Dependent variable- degree of sophistication of capital budgeting practices, control variables – firm size, degree of risk, capital intensity, industry classification	There was a significant negative association between the level of sophistication of capital budgeting practices and corporate performance.
Pike (1988)	Investment decision making effectiveness	Multiple regression analysis: dependent variable- application of sophisticated capital budgeting practices, controlling factor – firm size	There was a significant positive association between the application of sophisticated capital budgeting practices and capital budgeting effectiveness.
Ho & Pike (1992)	Corporate Investment	Matched pairs approach: matching variables size,	There was no significant relationship between the

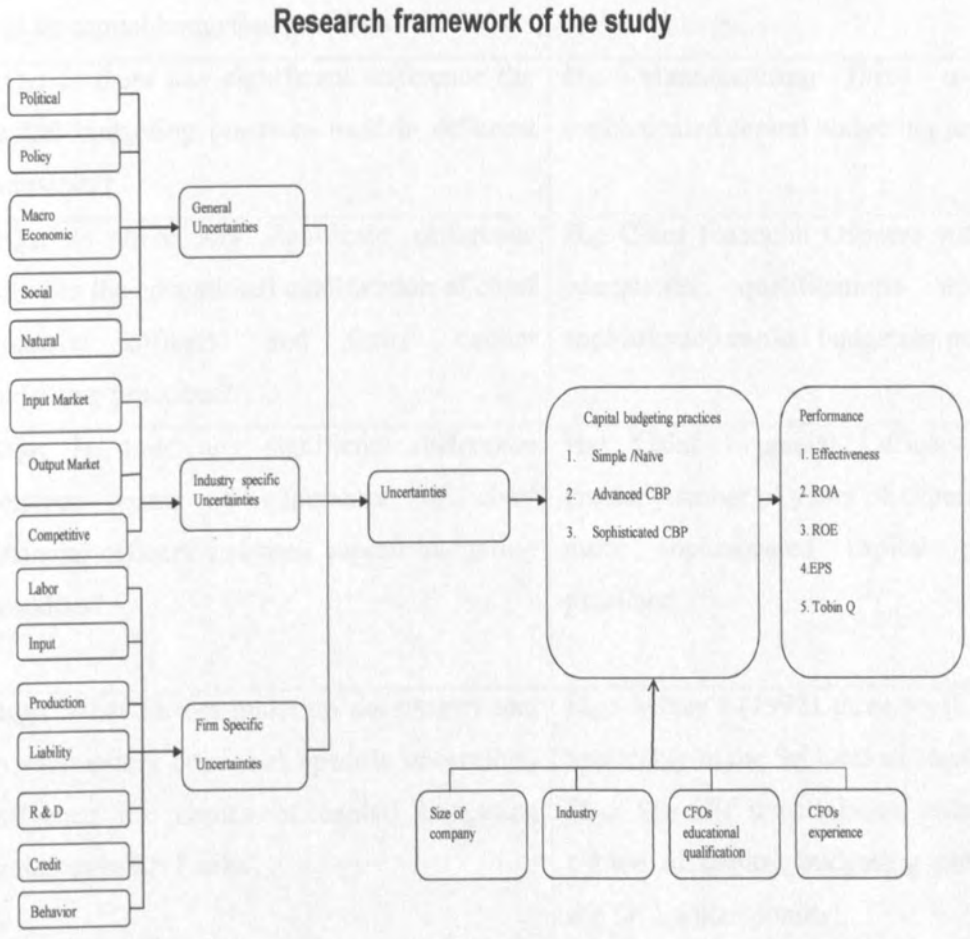
		risk and industry	sophistication of capital budgeting (discounted cash follow techniques and formal risk analysis) and corporate investment.
Chen (1995)	Return on Assets	Comparison of ROA of two groups (high-use or low-use) of capital budgeting decision rules	There was no significant difference between the ROA for the capital budgeting decision rules (DCF, PB. ARR and non financial)
Mooi & Mustapha (2001)	Return on Assets, Earnings per Share	T test: independent variable – degree of sophistication of capital budgeting practices	Degree of capital budgeting sophistication did not significantly affect firm performances
Farragher, Kleiman & Sahu (2001)	Operating performance	Multiple regression: independent variables- degree of sophistication of the capital budgeting process, size, risk capital intensity and degree of focus	There was no significant relationship between operating performance and capital budgeting sophistication.
Gilbert (2005)	Return on Assets	Regression Analysis	There was no significant relationship between capital budgeting practices and performance.
Jiang, Chen & Huang (2006)	Earnings	Regression analysis: independent variable – capital expenditure	Significant positive association between capital expenditures and future corporate earnings even after controlling for current corporate earnings.
Vadeei, Mahmoudi, Khatibi & Mohammadi (2012)	Return on Assets	Regression analysis: independent variable capital budgeting techniques	Significant positive relationship between capital budgeting practices and performance.

As discussed earlier, this study investigates the interacting effect of uncertainty factors between capital budgeting and firm performance in Sri Lanka.

2.7 The research model

Based on the literature review, a research model was devised to answer the research questions. The model is presented in Figure 2.3 demonstrating the relationship between the variables.

Figure 2.3: Research Framework



A summary of the research questions and hypotheses is presented in Table 2.9

Table 2.9: Research questions and hypotheses

Research questions	Hypotheses
RQ_1: To what extent are capital budgeting practices prevalent in Sri Lanka?	**H_1:** Sri Lankan listed companies do not use sophisticated capital budgeting practices.
RQ_2: Is there any significant difference between the size of a firm's capital budget and its capital budgeting practices?	**H_2:** Sophisticated capital budgeting practices are used when a firm's capital budget is large.
RQ_3: Is there any significant difference the capital budgeting practices used in different industries?	**H_3:** Manufacturing firms use more sophisticated capital budgeting practices.
RQ_4: Is there any significant difference between the educational qualification of chief financial officers' and firms' capital budgeting practices?	**H_4:** Chief Financial Officers with higher educational qualifications use more sophisticated capital budgeting practices.
RQ_5: Is there any significant difference between years of experience of chief financial officers and their capital budgeting practices?	**H_5:** Chief Financial Officers with a greater number of years of experience use more sophisticated capital budgeting practices.
RQ_6: What factors make up uncertainty and to what extent does each specific uncertainty influence the choice of capital budgeting practices in Sri Lanka?	**H_{6a}:** Miller's (1992) three-level model is applicable in the Sri Lankan context. **H_{6b}:** Specific uncertainties influence the choice of capital budgeting practices in the Sri Lankan context.
RQ_7: Do specific uncertainties moderate the relationship between capital budgeting practices and performance?	**H_7:** Specific uncertainties moderate the relationship between capital budgeting practices and firms' performance i.e., the relationship between capital budgeting practices and firms' performance will be weakened for firms that experience higher levels of uncertainty than those that experience low levels of uncertainty.

2.8 Summary

The extant literature on capital budgeting has been scrupulously reviewed. Capital budgeting is the process of evaluating and selecting long-term investments in order to maximise shareholders' wealth in line with financial management theory. Capital budgeting practices have been grouped into sophisticated (Monte Carlo simulations, GT, RO, using certainty equivalents, decision trees, CAPM analysis / ß analysis, and adjusting expected values), advanced (sensitivity analysis/break-even analysis, scenario analysis, the adaptation of required return/discount rate, IRR, NPV, uncertainty absorption in cash flows, MIRR and PI) and naive (PB, the adaptation of required payback and ARR). The empirical studies lent credence to the notion that firms are increasingly using multiple methods in their selection of capital investments. Consequently, a gap between theory and practice was identified. Moreover, choice of capital budgeting practice is influenced by uncertainty, the size of the firm, the nature of the industry, the educational qualifications of the CFOs, and the experience of the CFOs. Nonetheless, there are no clear consistent results across many studies. The different results were attributed to country-culture specific factors. Furthermore, the relationship between capital budgeting practices and firms' performance was explored in different context. Finally, based on the literature, a hypothetical research model was devised to investigate its applicability in the Sri Lankan context.

CHAPTER THREE
METHODOLOGY

3.1 Chapter overview

This chapter describes the background of the research, and sets out robust arguments for the methodology that underpins the study. The research methodology articulates the way in which this research was carried out. The selection of the appropriate methodology followed throughout the research was determined by the overall objective and the framework of the current research. It begins with the fundamental research philosophical assumptions, followed by a clear rationalisation for the choice of the research approach, research type and strategy. The research design, the justification for the selected geographical location, target population, sampling method and survey instruments used, the pilot testing, the assessment of non - responsible bias and the data collection procedures are explained in great detail. The subsequent sections describe the data analysis techniques, ethical considerations and the data needs matrix. This chapter ends with a brief summary.

3.2 The philosophy of the research design

3.2.1 Research Philosophy

Research philosophies tell us about the way in which particular phenomena should be studied. A research philosophy helps to clarify the research design and the research approach as well as the data collection and analysis (Blumberg, Cooper and Schindler, 2008). Out of these philosophies, the research ontology and epistemology are dominant and are frequently discussed in academic studies.

3.2.2 Ontological assumption

The 'ontological assumptions' that a researcher makes are related to the nature of reality, and any study without these assumptions would be treated as "blinded" (Easterby-Smith, Thorpe and Lowe, 2002, p. 27). This research assumes that capital budgeting practices prevail in the contemporary world, paving the way for organisational survival and sustainability. Nonetheless, actual practices differ from country to country, company to company and project to project as country effect influence the capital budgeting practices and the ways of looking at capital budgeting practices are not the same all of the time. The traditional theories might not hold water in contemporary borderless global businesses (Jog and Srivastava,1995; Pike,1996; Arnold and Hatzopoulos, 2000). Thus, the ontological assumption is mostly

related to the objectivism in this study as social phenomena confront us as external factors that are beyond our reach (Bryman and Bell, 2007). Generally people understand their inner world and guess the reality of the world using experience and external indicators. Therefore, companies speculate about the uncertainty factors causing a risk in an investment selection process and subsequently this would be expected to influence the use of advanced capital budgeting practices to incorporate those risk related factors.

3.2.3 Epistemological assumption

The paradigm of this study emanated from positivism as the objective of this study is empirically borne out and it observes how capital budgeting theoretical concepts are being applied by professionals in Sri Lanka. The purpose of positivism is to produce general laws for behaviour prediction (Fisher, 2010), which is consistent with the goals of understanding how financial professionals apply capital budgeting theory to make investment decisions. It is clear that this research takes on positivistic epistemological position with regard to the principle of deductivism. On the basis of a positivistic approach to the investigation of knowledge, this research is most suited to a quantitative study. That is, the knowledge is objective and quantifiable: it can be attained by the testing of hypotheses, conducting large scale surveys of populations, the use of questionnaires, statistical analysis inferences and so on.

3.2.4 Research approach

In general, theory is built and tested based on two different approaches: induction and deduction. When a deductive approach is employed, researchers start with the existing theory and logical relationships among concepts, and then continue to support the empirical evidence. In contrast, in inductive research, theory is developed from the observations of empirical reality and researchers infer the implications of the findings for the theory that prompted the research (Bryman and Bell, 2007; Saunder, Lewis and Thornhill, 2007; Blumberg, Cooper and Schindler, 2008; Ghauri and Gronhaug, 2010).

This study is anchored in the theory of capital budgeting theory and contingency theory and ipso facto, a deductive approach is the most appropriate choice. Following a robust review of capital budgeting theory and contingency theory, the research model and hypotheses were proposed. Then, the questionnaires were adapted and modified. Therefore, it is fair to say that this research is quite consistent with a deductive approach, which emphasises that the

researcher may know how the world operates and examine these ideas with "hard data" (Neuman and Kreuger, 2003).

A deductive approach is usually associated with quantitative studies, which involve collecting quantitative or quantifiable qualitative data and analysing them with the aid of statistical methods and by testing hypotheses. Generally, a deductive study has five sequential phases (Cavana, Delahye and Sekaran, 2001): hypotheses development (chapter 2), hypotheses in operational terms (measuring) (chapter 3), testing the hypotheses (chapter 4, 5 and 6), examining the specific outcome (chapter 4, 5, 6 and 7), and a theoretical discussion of the findings (chapter 7). The vast majority of qualified studies published in leading journals employed a quantitative strategy with advanced statistical models and computer-aided data analysis.

3.2.5 Research strategy

The research strategy is the 'general plan of how you will go about answering your research question(s)' (Saunders, Lewis and Thornhill, 2007, p.131). It can take different forms viz., experiment, case study, ethnography, survey, grounded theory, action research and archival research, which can be employed in exploratory, descriptive and/or explanatory research. This study chose a "survey" strategy to answer the research questions. This strategy provided a framework for the data collection and analysis (Bryman and Bell, 2007). The survey strategy permits the researcher to garner requisite data using the questionnaire and archival data.

3.3 Data collection

3.3.1 Research site

The data for this study were collected from all companies listed on the Colombo stock exchange, Sri Lanka. Sri Lanka is an island located at the southern tip of India and geographically it is extremely important. During its history it has experienced three eras of colonial rule: the Portuguese (1500s), the Dutch (1650s) and the English (1790s). Of late, driving forces of enhanced economic performance: the growth of GDP, peace, freedom from terrorism and stability have led the IMF to change the state of Sri Lanka from 'Poverty Reduction and Growth Trust' to an 'emerging middle income market'. This is an important milestone as the island nation makes its way down the path of development and reaps the benefits of peace. Sri Lanka has shown robust growth since the end of the 30-year civil war in May 2009 and it has begun to show more sustainable growth. According to the Central Bank

of Sri Lanka (2011), all key sectors of the economy demonstrated a commendable performance in 2010 and 2011, supported by the peaceful domestic environment, the improved investor confidence, favourable conditions of macroeconomic factors, and the gradual recovery of the global economy from one of the deepest recessions in history. In the post war recovery phase, the on-going reform of the financial market has become essential to accelerate its economic growth more than ever before.

As well as local demand for business investment, heightened foreign interest in investment has also escalated due to the strategic location of Sri Lanka: close to India and the east-west international sea route. For instance, the central bank of Sri Lanka reported that Foreign Direct Investment (FDI) reached a peak of USD 1.07 billion in December 2011, this was USD 1.38 billion in 2012 and USD 1.42 billion was in 2013. FDI has steadily been increasing towards Sri Lanka. This improvement in status is expected to open up further international capital markets for the country and bring attention from investors targeting emerging markets with strong projected growth. Therefore, nowadays, investment decisions play a more vital role than ever before in Sri Lanka. To the researcher's knowledge, no studies have been conducted in the terrain of capital budgeting in Sri Lanka over the course of the last four decades.

Moreover, Sri Lanka is recognised as the most liberalised economy in South Asia, and foreign investment is a crucial element representing Sri Lanka's economic growth. In other words, compared to other South Asian countries, Sri Lanka is relatively open to foreign investment and has a relatively open financial system and a reasonably good infrastructure. Greenberg (2013) connoted that Sri Lanka is an emerging economy that is increasingly attractive to foreign investors and he invoked several facts to back up his statement: (1) In 2010, the Sri Lankan stock exchange posted an increase of 95% for the year, which was the highest of any stock exchange in the world; and (2) Sri Lanka has a strong tourism sector and has been recognised by the New York Times and the National Geographic as a top vacation spot. Its economy has seen the tourism sector double over the past year due to the end of the 30-year civil war. (3) Sri Lanka maintains important trade ports linking Western Europe and Africa to Eastern Europe and Asia, and they are currently constructing new ports and improving old ones. (4) Roads and railroads are being constructed to increase transportation, commerce and communication. Sri Lanka is also improving its infrastructure, especially its telecommunications. (5) Sri Lanka has historically posted high literacy rates and they recognise that having a skilled/educated workforce is an important part of being an emerging

economy. They plan to increase government funding to reduce poverty and increase education. (6) Sri Lanka is only beginning on its road to becoming an emerging economy and many obstacles currently exist. Sri Lanka's debt (5% of its GDP) and budget deficit is high relative to other emerging economies. It is crucial that Sri Lanka sticks to its newly created policies, which aim to create a knowledgeable labour force, improve its infrastructure, and reduce its debt. (7) Since the end of their civil war in 2009 and with the current resurrection of its economy, Sri Lanka has seen foreign direct investment increase by staggering percentages (over 100%). Foreign investors recognise the economic improvements and are more willing to invest in this emerging economy now that Sri Lanka is more politically stable.

Although Sri Lanka is paving the way for more lucrative foreign investment, uncertainty is unavoidable. According to the 2012 Sri Lanka Investment Climate Statement (Bureau of Economic and Business Affairs, 2012), Sri Lanka can still be a difficult place to do business with an unpredictable policy environment, cumbersome bureaucracy, and a recent asset forfeiture bill that has created business uncertainty. In addition, the government has increased control of the economy recently and this is a concern for private investors.

In a nutshell, this scholarship focused on Sri Lanka to fill the "geographical-country effect" gap found in the extant literature, to explore the nature of uncertainty and the influence of firms' characteristics on capital budgeting practices and to explore impact of uncertainty between capital budgeting practices and firm performances.

3.3.2 Population and Sampling framework

In most cases, considering every unit of the population in order to study a particular phenomenon is difficult, mostly because of restrictions on time, cost, resources etc. Instead, researchers select a certain number of units from the population; this is called sampling. Sampling is "the segment of the population that is selected for investigation and it is a subset of the population" (Bryman and Bell, 2007, p. 182). Sampling can either take the form of probability sampling or non-probability sampling. In probability sampling, each population element is given a known non-zero chance of selection; on the other hand, each population element does not have a known non-zero chance of being included (Blumberg, Cooper and Schindler, 2008). Probability sampling includes a simple random sample, a systematic sample, stratified random sampling and multi-stage cluster sampling. Non-probability sampling accommodates convenience sampling, snowball sampling and quota sampling

(Bryman and Bell, 2007). As this is the first study conducted in Sri Lanka, as a caveat, meticulous attention was given to the selection of sampling.

The table 3.1 below summarises the sampling and data collection methods employed in seminal studies conducted across many countries during the last decades.

Table 3.1: Sample and data collection methods used on capital budgeting studies

Author/s	Region	Number of responded sample, respondents and response rate	Method of data collection
Arnold & Hatzopoulos (2000)	UK	300 UK Companies (100 large, 100 medium and 100 small), Finance Directors and 32.4%	Questionnaire survey(mail survey)
Graham & Harvey (2001)	US	392 US Large firms, CFOs and 9%	Questionnaire survey (mail survey)
Ryan & Ryan (2002)	US	205 US Fortune companies, CFOs and 20.5%	Questionnaire survey (Mail survey)
Sandahl & Sjogren (2003)	Sweeden	129 Largest Swedish companies, CFOs/CEOs and 24.2%	Questionnaire survey
Lord, Shanahan & Boyd (2004)	New Zealand	29 Local Authorities, Finance Managers and 78%	Questionnaire survey
Lam, Wang & Lam (2007)	Hong Kong	307 Building contractors, CFOs and 30.7%	Questionnaire survey (Questionnaire adopted from Pike, 1988)
Truong, Partington & Peat (2008)	Australia	44 Australian companies, CFOs and 24.4%	Questionnaire survey
Verma, Gupta & Batra (2009)	India	30 Indian Manufacturing companies, CFOs and 30%	Questionnaire survey
Shinoda (2010)	Japan	225 Listed firms on Tokyo Stock Exchange (Total population was considered), Managers (act as coordinators of capital budgeting process) and 11%	Questionnaire survey
Bennouna, Meredith & Marchant (2010)	Canada	88 Canadian firms listed in the Financial Post (FP500) magazine, CFOs and 18.4%	Questionnaire survey
Kester & Robbins (2011)	Irish	18 companies listed on the Irish Stock Exchange (ISE), CFOs and 41.9%	Questionnaire survey

Singh, Jain & Yadav (2012)	India	31 companies listed on Bombay Stock Exchange, CFOs/Finance Manager/ Director of Finance and 18.67%	Primary data – Questionnaire survey and secondary data – Annual reports of the companies
Mutaiti et al. (2012)	Kuwait	80 Listed firms in the Kuwait Stock Exchange, CFOs and 53%	Questionnaire survey (based on Graham & Harvey)
Andres, Fuente & Martin (2015)	Spain	140 non-financial Spanish firms, CFOs and 7%	Questionnaire survey

As can be seen in table 3.1, Shinoda (2010) considered the whole population for his study. However some researchers have covered different sizes of companies (e.g., Arnold and Hatzopoulos, 2000), and others have focused on industry groups (e.g., Singh, Jain and Yadav, 2012). Furthermore, the majority of the studies reported a low response rate (e.g.,Andres, Fuente and Martin, 2015). Since only 287 companies are listed on the Colombo stock exchange in Sri Lanka and hypothesis testing is based on multivariate analysis techniques that require a large sample size, this study decided to consider the whole population. Moreover, selecting the whole population means representing Sri Lanka as a whole and thus the findings will be robust for generalisation.

Although the people who make capital budgeting decisions in Sri Lanka are named chief financial officers, chief executive officers, financial controllers, finance managers, and financial directors, this research commonly refers to them chief financial officers. The self-report questionnaire was designed and emailed and some were directly distributed to CFOs. Of the 287 companies listed on the Colombo Stock Exchange in Sri Lanka, 186 companies' CFOs responded en bloc, yielding a response rate of 64%, which is quite high in comparison with other similar studies (e.g., Graham and Harvey, 2001 Brounen, de Jong and Koedijk, 2004; Verma,Gupta and Batra, 2009; Mutairi et al., 2012) . The high response rate might be attributed to the fact that: (a) this is the first study conducted in Sri Lankan context; (b) this study funded by ministry of higher education, Sri Lanka; and (c) researcher's network – senior lecturer in a public university Sri Lanka. Table 3.2 clearly shows the details of the companies (industry, nature of industry and number of companies), the number of respondents and the response rate.

Table 3.2: The nature and the details of respondents

Industry/Sector	Nature of industry	No. of companies	No. of respondents	Response rate (%)
Banking, Finance and Insurance (BFI)	Banking, Finance and Insurance activities (Life & Nonlife)	62	9	15
Beverages, Food and Tobacco (BFT)	Manufacture of food products, beverages & tobacco products	20	17	85
Chemical and Pharmaceuticals (CP)	Manufacture of chemicals, chemical products & Pharmaceuticals	10	9	90
Construction and Engineering (CE)	Civil engineering activities such as Construction of buildings, Construction of utility projects	4	3	75
Diversified Holdings (DIV)	Company engaged in 03 or more business activities not directly related to one another where each activity required relatively different expertise.	18	11	61
Footwear and Textiles (FT)	Manufacture of textiles, wearing apparel, leather & related Products	4	3	75
Healthcare (HLT)	Hospitals & health care activities, dealings of medical equipments	6	6	100
Leisure (LEI)	Hotels/Tourism & travels	38	29	76
Information Technology (IT)	Software/Hardware, other information services	2	0	0
Investments Trust (INV)	Investment funds & forestry (excludes finished wood products)	9	7	78
Land and Property (LP)	Sales/Rents out lands & property	19	15	79
Manufacturing (MFG)	Manufacture of goods except BFT, CP, FT, MT and OIL	37	28	76
Motors (MT)	Trade/ assemble/ Manufacture of automobiles, spare parts & related products (Tyres...)	6	5	83
Oil Palms (OIL)	Manufacture and trade of palm oils	5	5	100
Plantation (PLT)	Companies growing crops (Tea, Rubber, etc)	19	17	89
Power and Energy (PE)	Electric power generation/transmission, Manufacture and/or distribution of gas/ lubricants/ fuel.	8	3	38

Services (SRV)	Businesses that produce/ provide services, ecommerce	8	5	63
Stores and supply (SS)	Warehousing, storage & support activities	4	4	100
Telecommunication (TLE)	Telecommunication service providers (fixed line, mobile)	2	2	100
Trading (TRD)	Trading of goods specifically not covered under other sectors (home appliances, electrical items...)	8	8	100
	Total	**287**	**186**	**64 %**

Source: Directory Listed companies on CSE, (2012)

3.3.3 Data sources

The relevant data for the purpose of this study were garnered from primary and secondary sources.

3.3.3.1 The primary source of data collection- The questionnaire

A Questionnaire was administered to collect the primary data. The questionnaire consisted of three parts: Part I of the questionnaire elicited information regarding the company's demographic information (including the respondent's qualifications and experience) and corporate practices regarding capital budgeting, including the planning horizon for capital budgets, the size of the capital budget, the purpose of the company's capital budgeting, the capital budgeting method, supplementary capital budgeting tools for incorporating risk and uncertainty, methods to derive discount/cut-off rates, methods to calculate cost of equity, the use of a discount rate when evaluating new projects in overseas markets, the type of risk involved in the investment panel and factors related to deciding on the capital budgeting method (see appendix A). The questions measuring the capital budgeting practices were borrowed from previous seminal studies (Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Brounen, deJong and Koedijk, 2004; Hermes, Smid and Yao, 2007; Verma, Gupta and Batra, 2009). Nonetheless, fundamental changes were made to the questionnaire in order to fit with the Sri Lankan context. The respondents were asked to indicate on a five-point Likert scale (ranging from 1= never to 5 = always) the extent to which they agreed with the statements provided. An example item is, "Please assign the capital budgeting techniques /methods presented below a number between (1- 5) depending on the degree of usage of capital budgeting tools for a particular investment: 1)Net Present Value.....". The

information contained in part I was used to answer the question of how theoretical concepts of capital budgeting are being applied by finance professionals in Sri Lanka and the influence of firm characteristics on practices of capital budgeting.

Part II of the questionnaire was used to identify the general, industry and organisational uncertainty factors, the methods used in the identification of uncertainties and the measures for uncertainty mitigation. The questions in part II were originally developed and validated by Miller (1992) and Verbeeten (2006), and were adapted for this study. The participants were asked to indicate on a five-point Likert scale (ranging from 1= not at all important, to 5 = very important) the extent to which they considered a number of uncertainties relevant for their company within the time frame of an investment decision. An example item is "Please specify how important the following risk and uncertainties affect your company's capital budgeting decision: 1) Policy uncertainties: changes in Government policy, company policies, accounting policies...". The information contained in part II was used to explore how uncertainty factors are identified and examine the extent to which uncertainty affects capital budgeting practices.

Part III: The performance of capital budgeting can be measured by objective measures and subjective measures (i.e., attitudinal scale). Not all factors related to the effectiveness of investment decisions (e.g., investments in new product development, market development and research and development) can be measured objectively (Govindarajan and Gupta, 1985, Govindarajan, 1984). Part III of the questionnaire was used to collect information about the effectiveness of investment decisions based on satisfaction and success with regard to achieving organisational goals and objectives. The original idea was borrowed from Brounen, deJong and Koedijk (2004). Each respondent was asked to rate their satisfaction with an investment decision on a five-point Likert scale (ranging from 1 indicating 'not at all satisfactory' to 5 indicating 'outstanding'). An example item is, " How satisfied are you with how your investment decisions affect the success of your organisation in the following area: 1) The development of new markets and products". Nonetheless, other performance indicators were measured using the secondary data. The data in part III were used to evaluate the performance/effectiveness of capital budgeting.

Data collection procedure

In the initial stage, the designed questionnaire was sent out to two experts with a covering letter explaining the purpose of the study. The letter made a humble plea for them to elicit their suggestions on it. Feedback was received from John R. Graham (professor in finance), Fuqua School of Business, Duke University, USA, who is a veteran research scholar in the terrain of corporate finance practices. His research paper, published in 2001, entitled "the theory and practice of corporate finance: Evidence from the field" has been cited by around 4000 academics so far. Feedback was also received from one of the practitioners of capital budgeting practices in Sri Lanka. After a detailed discussion with the research supervisor about the feedback received, the necessary amendments were made to the questionnaire and it was then piloted. No major problem was reported in the pilot test and the questionnaire was ultimately finalized. The details of pilot test are reported in the following section.

The researcher confronted difficulties in obtaining the names and email addresses of CFOs in all of the 287 listed companies in Sri Lanka. Three approaches were adopted: the researcher personally visited the CSE; phone contact was made with the company secretaries (companies' contact numbers and secretaries' names were found in the listed companies registry of CSE); the annual reports of companies were used to identify the relevant individuals. The finalised self-report questionnaire was emailed to all of the listed companies with a straightforward covering letter addressed to the Chief Financial Officers of the companies, emphasising the purpose of the survey, confidentiality and the benefits of the research for practitioners and academics. Alternatively, a web link containing the questionnaire was provided in case any of the respondents were interested in filling it in online. The questionnaire survey was carried during the period from June to December 2013. Timely reminders were sent to CFOs to elicit a high response rate. All in all, 191 questionnaires were received.

Pilot Testing

Pilot testing is generally conducted to ensure that the measurement is clear to the respondents before the data collection is carried out (Adams et al., 2007) and to detect potential problems/weaknesses in the measurement (Blumberg, Cooper and Schindler, 2008). In this study the questionnaire survey was conducted using a paper-based self- administered questionnaire with a sample of five CFOs. Of these, only one of the CFOs agreed to fill in the questionnaire in front of the researcher. What was observed was how the respondent understood the questions in the questionnaire, how long it took to complete the questionnaire

and if anything important was missing. The respondent understood all of the questions in the way that the researcher intended and the respondent spent 28 minutes completing the questionnaire. The CFO did not express any concerns about the questionnaire. The results and the nature of the pilot study were successful and this paved the way for implementing it among a large group of potential respondents.

Testing the reliability

A reliability analysis of the item-scales was performed using SPSS. Cronbach's alpha (α) values were assessed for each variable with item-scales. The reliability of the test is reported in table 3.3. The reliability of the measures was well above the minimum threshold of 0.60 in every case (Gliner and Morgan, 2000). Thus, it can be concluded that all of the measures were generally reliable.

Table 3.3: Testing the reliability

Dimensions of variables	No. of dimensions	Cronbach's Alpha (α)
Capital budgeting methods (capital budgeting methods and supplementary capital budgeting methods)	28	0.636
Discount rate/ cut-off rate	7	0.635
Methods to calculate the cost of equity capital	7	0.719
Factors determining capital budgeting methods	7	0.603
Use of discount rate when evaluating new project in overseas market	6	0.600
Uncertainty factors (General, industry specific and firm specific uncertainties)	18	0.668
Methods to identifying risk and uncertainties	10	0.603
Tools for risk mitigation	8	0.620
Effectiveness of investment decisions	12	0.873

Source: survey data

3.3.3.2 Secondary data collection

The secondary data were collected from CSE via the Bloomberg website. Specific secondary data relating to different measures of performance, size of capital expenditure and general information relating to the companies were garnered. Data apropos of performance were

collected for the 5-year period from 2009 to 2013, in line with many seminal studies (e.g., Farragher, Kleiman and Sahu, 2001; Jiang, Chen and Huang, 2006; Vadeei et al., 2012).

Financial performance

Financial performance measures that have been used in previous research include return on assets (Klammer, 1973; Kim, 1982; Chen, 1995; Vadeei et al., 2012) and earning performance (Kim,1975; Kim,1981). This research selected two unadjusted financial performances: Return on total assets and Return on Equity . The annual reports of the companies were supplied in order to calculate the ROA and ROE. The following definitions are used:

ROA: ROA is the ratio of income to total assets:

1. ROA = Earnings Before Interest and Tax / Total Assets

The ROA seeks to measure the effectiveness of the company. The EBIT is defined as the operating income before interest and taxes. The total assets are defined as the sum of the book values of all assets present in the organisation at the end of the year. The assets in a company's books are calculated on the basis of original cost less depreciation.

ROE: the ratio of net profit after taxes to equity

2. ROE = Net Income / Average Equity

The ROE is focused on the return on equity of the company. The net income is defined as net income available to the common shareholders. Since the equity of an organisation is likely to change in a year, it is common to measure the return on average equity by considering it at the beginning and the end of the year. Therefore, the ROE used is based on the average equity.

Accounting principles and financial performance

Both the ROA and the ROE are vulnerable to accounting principles (changes in) and / or financing decisions. For the purposes of this research, it is assumed that organisations apply similar accounting principles for the applicable evaluation period. The results of the different organisations have not been adjusted to reduce the effects of different accounting principles or funding agreements.

Evaluation period

Frequently, performance is evaluated at a time interval of at least four years, with yields measured during several periods in the range - usually monthly or quarterly. The evaluation period used to evaluate the performance of the companies in this study is five years (from

2009-2013). Annual returns were measured for each year separately as quarterly or monthly information were not available.

Tobin q

Tobin's q confines the essence of the application of sophisticated capital budgeting techniques. In order to get the maximum value out of the input, this ratio was applied as a measure of performance (Perfect and Wiles, 1994; Manawaduge, De Zoysa and Chandrakumara, 2010).

Tobin's q is in this model defined (Perfect and Wiles, 1994) as:

3. $q = \frac{MVE + DEBT}{TA}$

EPS

EPS is generally considered to be the single most important variable in determining a share price. The portion of a company's profit allocated to each outstanding share of common stock. Earnings per share serves as an indicator of a company's profitability. It reveals a lot about the financial health of a company. Increasing EPS is a very good sign for a company. EPS tells you how much profit a company earns from a single stock available in the market. Therefore this study considers EPS in order to evaluate organizational performance, in line with Kim (1981),Mooi and Mustapha (2001)

4. EPS = Net profit / Total no. of outstanding shares

3.4 Analytical strategy

This section discusses the use of statistical techniques in this study. The data from the self administered questionnaires were inputted into IBM SPSS Statistics 19 for analysis. Each questionnaire was rechecked before doing the statistical analysis. The inputted data were then analysed using a number of statistical techniques. Two types of analysis were carried out: descriptive statistics and inferential statistics. Descriptive statistics were mainly used for the preliminary analysis to describe the characteristics of the subjects and check the reliability and assumptions of the parametric statistics. Inferential statistics were primarily used for testing the hypotheses (Hair et al., 2010; Pallant, 2010; Field, 2013).

The chapter 'descriptive analysis of the survey respondents' describes the main characteristics of the sample using descriptive statistics such as percentages (%), frequencies (*N*) and graphs. Mean (indicating average value of variable) and standard deviation (the

deviation from the mean of the data set) were used to present the averages with regard to the prevalent capital budgeting practices and *t*-statistics were employed to capture the significant mean differences between the variables studied (Hair et al., 2010; Field, 2013).

The chapter 'an assessment of the research framework' includes an exploratory factor analysis and confirmatory factor analysis. The exploratory factor analysis was carried out using principal component analysis to extract the components of capital budgeting practices and uncertainties by searching for a structure among a set of variables (Hurley et al., 1997; Hair et al., 2010; Field, 2013). In this study, 28 items measuring capital budgeting techniques were subjected to exploratory factor analysis to identify the variables that make up a factor. Confirmatory factor analysis is the most widely used technique during the scale development process for establishing the validity of a scale following an EFA (e.g., Bagozzi and Foxall, 1996; Worthington and Whittaker, 2006) and thus it was performed with the aid of AMOS 19. In AMOS, the data analysis is in the form of a path diagram, which is a visual pictorial presentation of the model. The CFA path diagram consists of latent constructs (unobserved variables), indicators (measured or manifest variables), error terms and their linkages, using one-headed arrow or two-headed arrows per se. In a CFA, the measurement model validity is dependent on two aspects: the first deals with establishing acceptable levels of Goodness – Of- Fit measures, and the second is related to establishing construct validity. GOF measures explain how the model reproduces the observed covariance matrix among the indicators; that is, GOF measures the model fit by comparing theory (estimated covariance matrix) with reality (the observed covariance matrix) (Hair et al., 2010). Construct validity suggests the extent to which the items designed to measure actually measure the theoretical latent construct (Hair et al., 2010). In general, construct validity takes three forms: content adequacy analysis, convergent validity and discriminant validity. Reliability was assessed to confirm the internal consistency of the scale by dint of a Cronbach alpha reliability coefficient. Before running the analysis, the assumptions of normality (multivariate normality), homoscedasticity, linearity and multicollinearity were examined in a multivariate analysis (Hair et al., 2010; Byrne, 2010). The CFA confirmed the factor structure that emerged in the exploratory factor analysis and indicated good construct validity.

The chapter 'exploring the factors related to capital budgeting practices and uncertainty' includes a correlation analysis, structural equation modelling and an analysis of moderators. SEM is an extension of several multivariate techniques, notably multiple regression analysis (Hair et al., 2010). It is the most frequently used advanced technique in testing hypotheses as

it facilitates the examination of a series of dependent relationships simultaneously. The moderated hypotheses ($H_{3.1}$, and $H_{3.2}$) were tested using a special statistical file, "process.spd", downloaded from Andrew Hayes' website: http://www.afhayes.com/spss-sas-and-mplus-macros-and-code.html, as recommended by Field (2013). Once the downloaded file is installed, an option for performing moderator analysis becomes part of the analytical tool in the existing IBM SPSS Statistics 19: this appeared under [redacted] and the resultant process facilitated the testing of the proposed moderated hypotheses. The statistical techniques used to answer the research question are presented in table 3.5.

3.5 Assessment of Non-response bias

Failure to return questionnaires (questionnaire response) or failure to answer some questions (item response) is called non-response (Wallace and Mellor, 1988). As potential bias can limit the generalisability of the findings, it is important to check the non- response bias if the response rate is below 75% (e.g., Burkell, 2003; Dooley and Lindner, 2003; Ary et al., 2013). The non-response rate of 36% in this study warranted an assessment of the nonresponse bias. The non-response bias was evaluated by using a "surrogate" method; the difference between the early and late responses was compared in line with Wallace and Mellor (1988) and Van der Stede, Young and Chen (2005). In this method, late responses were deemed to be a non-response. This study considered the first 30 responses as the early responses and the last 30 responses as the late responses. A two sample independent *t*-test was employed to find any significant mean differences between the early and late responses and the results are presented in table 3.5.

Table 3.4 :Assessing non response bias between early and late responses

	No. of responses	N	Mean	Std. Dev.	T value	Sig.
Survey responses on degree of usage of capital budgeting tools for a particular investment						
Simple payback period (PB	Early Responses	30	3.33	.959		
	Late Responses	30	3.53	.776	-.888	.378
Discounted payback period (DPB	Early Responses	30	3.07	.691		
	Late Responses	30	3.10	.662	-.191	.849
Accounting rate of return (ARR)	Early Responses	30	2.93	.740		
	Late Responses	30	3.07	.740	-.698	.488
Net present value (NPV)	Early Responses	30	3.93	1.048		
	Late Responses	30	4.23	.679	-1.316	.194

Internal rate of return (IRR)	Early Responses	30	3.60	1.329		
	Late Responses	30	4.03	.999	-1.428	.159
Modified internal rate of return (MIRR)	Early Responses	30	1.37	.669		
	Late Responses	30	1.43	.817	-.346	.731
Adjusted present value (APV)	Early Responses	30	2.07	.640		
	Late Responses	30	2.27	.691	-1.163	.250
Profitability Index (PI)	Early Responses	30	1.83	.913		
	Late Responses	30	1.87	.860	-.146	.885
Real option theory	Early Responses	30	1.30	.596		
	Late Responses	30	1.27	.521	.231	.818
Game theory decision	Early Responses	30	1.30	.535		
	Late Responses	30	1.17	.461	1.034	.306
Intuitive Judgement	Early Responses	30	1.37	.669		
	Late Responses	30	1.40	.770	-.179	.859
EMIRR	Early Responses	30	1.00	.000		
	Late Responses	30	1.03	.183	-1.000	.326
Sensitivity analysis	Early Responses	30	3.87	1.106		
	Late Responses	30	4.03	.890	-.643	.523
Scenario analysis	Early Responses	30	3.77	.858		
	Late Responses	30	3.93	.785	-.785	.436
Monte Carlo simulation	Early Responses	30	1.07	.254		
	Late Responses	30	1.20	.407	-1.523	.134
Decision trees	Early Responses	30	1.57	.774		
	Late Responses	30	1.37	.615	1.108	.273
CAPM /β- analysis	Early Responses	30	1.40	.724		
	Late Responses	30	1.33	.802	.338	.737
High cut-off rates	Early Responses	30	1.93	.583		
	Late Responses	30	2.20	.610	-1.730	.089
Uncertainty absorption in cash flows	Early Responses	30	3.83	.913		
	Late Responses	30	4.03	.556	-1.025	.311
Adjusting required return	Early Responses	30	3.77	.858		
	Late Responses	30	4.00	.643	-1.191	.239
Inflation adjusted cash flows	Early Responses	30	3.70	.596		
	Late Responses	30	3.73	.521	-.231	.818
Market value added	Early Responses	30	1.97	.718		
	Late Responses	30	2.27	.785	-1.544	.128
Complex mathematical model	Early Responses	30	1.30	.466		
	Late Responses	30	1.27	.521	.261	.795

Linear programming	Early Responses	30	1.40	.675		
	Late Responses	30	1.37	.615	.200	.842
Shorter payback period (Adjusting the payback period)	Early Responses	30	2.60	.855		
	Late Responses	30	2.83	.834	-1.070	.289
Use of certainty equivalents instead of cash flows	Early Responses	30	1.27	.450		
	Late Responses	30	1.37	.556	-.766	.447
Probability analysis	Early Responses	30	3.80	.714		
	Late Responses	30	3.83	.913	-.158	.875
Methods uses to derive the discount rate used in the appraisal of major capital investment						
Weighted average cost of capital	Early Responses	30	3.87	.900		
	Late Responses	30	3.97	.765	-.464	.645
Cost of capital derived from the CAPM	Early Responses	30	3.33	.802		
	Late Responses	30	3.23	.817	.478	.634
Cost of debt/interest payable on debt capital	Early Responses	30	3.57	1.194		
	Late Responses	30	3.60	1.037	-.115	.909
An arbitrary rate	Early Responses	30	1.20	.407		
	Late Responses	30	1.33	.479	-1.161	.250
Earnings yield on shares	Early Responses	30	1.50	.731		
	Late Responses	30	1.63	.765	-.690	.493
Average historical return on stock	Early Responses	30	1.90	.803		
	Late Responses	30	2.00	.788	-.487	.628
Any other methods:	Early Responses	30	1.10	.403		
	Late Responses	30	1.30	.750	-1.287	.205
Factors influencing the choice of capital budgeting method						
Finance theory	Early Responses	30	3.70	.596		
	Late Responses	30	3.73	.521	-.231	.818
Experience and competency	Early Responses	30	4.17	.648		
	Late Responses	30	4.10	.607	.411	.682
Informal rule of thumb	Early Responses	30	3.57	.728		
	Late Responses	30	3.63	.718	-.357	.722
Importance of the project	Early Responses	30	4.30	.596		
	Late Responses	30	4.17	.592	.869	.388
Easy understandability	Early Responses	30	2.97	.718		
	Late Responses	30	3.10	.759	-.699	.487
Top management familiarity	Early Responses	30	3.70	.596		
	Late Responses	30	3.73	.521	-.231	.818
Other factors	Early Responses	30	2.93	1.143		
	Late Responses	30	2.70	.837	.902	.371

Methods used by companies to calculate cost of equity capital						
Average historical returns on common stock	Early Responses	30	3.43	.504		
	Late Responses	30	3.50	.509	-.510	.612
CAPM (The beta approach)	Early Responses	30	3.80	.805		
	Late Responses	30	3.73	.868	.308	.759
CAPM with some extra factors	Early Responses	30	1.73	1.015		
	Late Responses	30	1.67	.959	.262	.795
As per the choice of the investors	Early Responses	30	2.13	1.137		
	Late Responses	30	2.27	1.172	-.447	.656
Regulatory decisions	Early Responses	30	2.40	1.070		
	Late Responses	30	2.43	.971	-.126	.900
Discounted dividend/earnings model	Early Responses	30	2.20	1.095		
	Late Responses	30	2.03	.850	.658	.513
Any other methods	Early Responses	30	1.27	.868		
	Late Responses	30	1.17	.648	.506	.615
How frequency use of the following discount rates when evaluating a new project in an overseas market						
The discount rate for our entire company	Early Responses	30	4.13	.571		
	Late Responses	30	4.17	.699	-.202	.840
The discount rate for the overseas market (country discount rate)	Early Responses	30	2.73	.785		
	Late Responses	30	2.70	.750	.168	.867
A divisional discount rate (if the project line of business matches a domestic division)	Early Responses	30	2.00	.788		
	Late Responses	30	2.17	.699	-.867	.390
A risk matched discount rate for this particular project(considering both country and industry)	Early Responses	30	3.30	.702		
	Late Responses	30	3.23	.626	.388	.699
A different discount rate for each component cash flow that has a different risk characteristics	Early Responses	30	2.20	1.186		
	Late Responses	30	2.37	.999	-.589	.559
When valuing a project do you adjust either the discount rate or cash flows for the following risk factors						
Risk of unexpected inflation	Early Responses	30	1.97	.414		
	Late Responses	30	2.10	.548	-1.064	.292
Interest rate risk (change in general level of interest rates)	Early Responses	30	1.83	.461		
	Late Responses	30	1.87	.346	-.317	.753
Term structure risk (Change in the long term Vs. short term interest rate)	Early Responses	30	2.63	1.299		
	Late Responses	30	3.20	1.215	-1.745	.086
GDP or business cycle risk	Early Responses	30	3.73	.785		
	Late Responses	30	3.70	.794	.163	.871
Commodity price risk	Early Responses	30	2.00	.263		
	Late Responses	30	2.03	.183	-.571	.571

Foreign exchange risk	Early Responses	30	1.87	.434		
	Late Responses	30	1.97	.414	-.913	.365
Distress risk (probability of bankruptcy)	Early Responses	30	3.67	.802		
	Late Responses	30	3.67	.802	.000	1.000
Size (small firms being risker)	Early Responses	30	3.77	.626		
	Late Responses	30	3.80	.610	-.209	.835
Market to book ratio (ratio of market value of firm to book value of assets)	Early Responses	30	3.77	.626		
	Late Responses	30	3.80	.610	-.209	.835
Momentum	Early Responses	30	3.77	.626		
	Late Responses	30	3.80	.610	-.209	.835
Specify how important the following risk and uncertainties affect your companies capital budgeting decision						
Political uncertainties	Early Responses	30	3.63	.809		
	Late Responses	30	3.53	1.008	.424	.673
Policy uncertainties	Early Responses	30	3.67	.758		
	Late Responses	30	3.37	1.066	1.256	.215
Macroeconomic uncertainties: Interest rate	Early Responses	30	4.47	.860		
	Late Responses	30	4.50	.630	-.171	.865
Macroeconomic uncertainties: Inflation rate	Early Responses	30	4.20	.887		
	Late Responses	30	4.50	.777	-1.394	.169
Macroeconomic uncertainties: Exchange rate	Early Responses	30	4.47	.730		
	Late Responses	30	4.50	.777	-.171	.865
Social Uncertainties	Early Responses	30	3.73	.691		
	Late Responses	30	3.53	.900	.965	.339
Natural uncertainties	Early Responses	30	1.23	.430		
	Late Responses	30	1.10	.403	1.240	.220
Uncertainties about input market	Early Responses	30	4.37	.615		
	Late Responses	30	4.17	.648	1.227	.225
Uncertainties about output market	Early Responses	30	4.40	.621		
	Late Responses	30	4.37	.556	.219	.827
Competitive uncertainties	Early Responses	30	4.53	.571		
	Late Responses	30	4.53	.507	.000	1.000
Labour uncertainties	Early Responses	30	3.13	.776		
	Late Responses	30	3.30	.750	-.846	.401
Input uncertainties	Early Responses	30	3.00	.788		
	Late Responses	30	3.07	.785	-.328	.744
Production uncertainties	Early Responses	30	3.27	.828		
	Late Responses	30	3.23	.817	.157	.876
Liability uncertainties	Early Responses	30	2.27	.450		
	Late Responses	30	2.17	.461	.850	.399

Research and Development	Early Responses	30	3.00	.371		
	Late Responses	30	2.97	.320	.372	.711
Credit uncertainties	Early Responses	30	2.57	.626		
	Late Responses	30	2.67	.606	-.628	.532
Behavioural uncertainties	Early Responses	30	1.73	.828		
	Late Responses	30	2.00	.788	-1.278	.206
Methods for identifying risks and uncertainties in potential investment project						
Use of checklist with potential loss sources by type of project	Early Responses	30	3.73	.521		
	Late Responses	30	3.80	.664	-.433	.667
Analysis of (expected) project balance and /or results (account)	Early Responses	30	3.67	.547		
	Late Responses	30	3.63	.490	.249	.805
Use flowcharts to risks in the process input mapping	Early Responses	30	3.03	.615		
	Late Responses	30	3.13	.730	-.574	.568
Site inspections with similar projects	Early Responses	30	3.53	.973		
	Late Responses	30	3.73	.828	-.857	.395
Consultation with other organizational units (engineering, marketing, production)	Early Responses	30	3.83	.592		
	Late Responses	30	3.83	.531	.000	1.000
Consultation with external parties (accountants, consultants, bankers, lawyers)	Early Responses	30	3.93	.365		
	Late Responses	30	3.97	.320	-.376	.708
Analysis of contracts that are linked to the investment project	Early Responses	30	3.20	.610		
	Late Responses	30	3.27	.740	-.381	.705
Analysis of statistical data	Early Responses	30	3.97	.615		
	Late Responses	30	3.87	.507	.687	.495
Analysis of environment development	Early Responses	30	3.50	.630		
	Late Responses	30	3.60	.563	-.648	.519
Other	Early Responses	30	1.03	.183		
	Late Responses	30	1.10	.305	-1.027	.310
Use of the following risk mitigation for your organization for the long term investment						
Insurance underwriting	Early Responses	30	4.50	.509		
	Late Responses	30	4.30	.535	1.484	.143
Using financial instrument (options, forward contract etc)	Early Responses	30	3.90	.403		
	Late Responses	30	3.70	.651	1.431	.159
Reduce leverage (equity / total assets)	Early Responses	30	3.27	.740		
	Late Responses	30	3.13	.730	.703	.485
Withdrawing from or outsource certain activities	Early Responses	30	2.87	.730		
	Late Responses	30	2.93	.640	-.376	.708
Spreading activities (geographically or in different industries)	Early Responses	30	1.77	.728		
	Late Responses	30	1.90	.662	-.742	.461
Undertaking political activities	Early Responses	30	1.43	.568		
	Late Responses	30	1.63	.669	-1.248	.217

Collaborate with other organizations (joint ventures, strategic alliances)	Early Responses	30	2.23	.935		
	Late Responses	30	2.20	.887	.142	.888
How satisfied are you with how your investment decisions affect the success of your organization in the followings						
Profit, profit margin	Early Responses	30	4.40	.498		
	Late Responses	30	4.40	.563	.000	1.000
Operating cash flows	Early Responses	30	4.63	.490		
	Late Responses	30	4.57	.568	.487	.628
Market capitalization , share price and dividend	Early Responses	30	3.90	.481		
	Late Responses	30	4.07	.450	-1.387	.171
Cost of control/ reduction	Early Responses	30	4.13	.571		
	Late Responses	30	4.13	.507	.000	1.000
Sales growth	Early Responses	30	4.40	.498		
	Late Responses	30	4.37	.615	.231	.818
Market share	Early Responses	30	4.13	.730		
	Late Responses	30	4.27	.691	-.726	.471
Development of new markets and products	Early Responses	30	3.57	.626		
	Late Responses	30	3.67	.661	-.602	.550
Research and development	Early Responses	30	3.47	.629		
	Late Responses	30	3.53	.681	-.394	.695
Quality of products , service customers	Early Responses	30	4.47	.507		
	Late Responses	30	4.33	.547	.979	.332
Personnel development/ development of human capital	Early Responses	30	3.73	.521		
	Late Responses	30	3.80	.610	-.455	.651
Political and social effects	Early Responses	30	3.33	.479		
	Late Responses	30	3.37	.615	-.234	.816
Ethical integrity of the organizational component/ ethical performance	Early Responses	30	3.17	.379		
	Late Responses	30	3.17	.531	.000	1.000
	No.of responses	N	Mean	Std. Dev.	T value	Sig.
Comparing total assets and size of the capital budget to see significance differences between early and late responses						
Total Assets	Early Responses	30	9.42	.901		
	Late Responses	30	9.54	.920	-.515	.608
Size of the capital budget	Early Responses	30	1.20	.407		
	Late Responses	30	1.13	.346	.684	.497

As can be seen in table 3.4, the early responses on capital budgeting method, supplementary capital budgeting tools for incorporating risk and uncertainty, methods to derive discount/cut-off rates, methods to calculate cost of equity, use of discount rate when evaluating new projects in overseas markets, type of risk involved in investment panel and factors deciding capital budgeting method were not significantly different from the late responses ($p > 0.05$).

Therefore, it can be concluded that there is no portend of non-response bias and the results are generalisable without any non-response bias caution.

3.7 Data needs matrix

The data needs matrix contains information about how the research questions will be answered including the linkage between the research questions and the study aims, the theory behind the formation of the research questions, date sources, data collection techniques, analytical strategy and ethical issues. The data needs matrix is shown in table 3.5.

Table 3.5: Data Needs Matrix

Research question	Connectedness of research question with research aim	Supporting theory	Required data/Data sources	Data collection methods	Method of data analysis	Ethical and related concerns
RQ_1: To what extent are capital budgeting practices prevalent in Sri Lanka?	*Investigating the prevailing capital budgeting practices in Sri Lanka*	Capital budgeting theory /Management accounting theory	Respondents' responses in Part I of the questionnaire, which assessed corporate practices regarding capital budgeting methods, supplementary capital budgeting tools for incorporating risk and uncertainty, methods to derive discount/cut-off rates, methods to calculate cost of equity, use of discount rate when evaluating new projects in overseas markets, type of risk involved in investment panel and factors related to deciding on capital budgeting method. Measures were developed in line with the previous seminal studies (Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Brounen, deJong and Koedijk, 2004; Hermes and Yao, 2007; Verma,Gupta and Batra, 2009)	Self-administered questionnaire	Mean, percentage analysis, EFA,CFA **(H_1)**	Ensuring no harm and confidentiality

RQ_2: Is there any significant difference between the size of a firm's capital budget and its capital budgeting practices?	Evaluating how the demographic characteristics of an organisation influence its capital budgeting practices: Size of the capital budget	Capital budgeting theory	Respondents' responses on size of the capital budget (Verma, Gupta and Batra, 2009) (Part I of the questionnaire)	Self administered questionnaire	*t* test ($H_{1.1}$)	Ensuring no harm and confidentiality
RQ_3: Is there any significant difference the capital budgeting practices used in different industries?	Evaluating how the demographic characteristics of an organisation influence its capital budgeting practices: Types of industry	Capital budgeting theory	From the Colombo Stock Exchange sectored list *(Verbeeten,2006)*	Secondary data collected from CSE's Website	*t* test ($H_{1.2}$)	Published documents are available in public domain. So, there are no special ethical concerns.

RQ_4: Is there any significant difference between the educational qualification of chief financial officers' and firms' capital budgeting practices?	Evaluating how the demographic characteristics of an organisation influence its capital budgeting practices: Educational qualification of CFOs	Capital budgeting theory	Respondents' responses from given options in Part I of the questionnaire *(Graham and Harvey,2001)*	Self-administered questionnaire	*t*_test ($H_{1.3}$)	Ensuring no harm and confidentiality
RQ_5: Is there any significant difference between years of experience of chief financial officers and their capital budgeting practices?	Evaluating how the demographic characteristics of an organisation influence its capital budgeting practices: Experience of CFOs	Capital budgeting theory	Respondents' responses from given options in Part I of the questionnaire *(Graham and Harvey,2001)*	Self-administered questionnaire	*t* test ($H_{1.4}$)	Ensuring no harm and confidentiality
RQ_6: What factors make up uncertainty and to what extent does each specific uncertainty	*Identifying uncertainty factors and examining the extent to which*	Contingency theory	Respondents' responses in Part II of the questionnaire, which assessed uncertainty factors, methods of identification of uncertainties in investment projects, and	Self-administered questionnaire	EFA and CFA ($H_{2.1}$,$H_{2.2}$)	Ensuring no harm and confidentiality

influence the choice of capital budgeting practices in Sri Lanka?	*uncertainty affects capital budgeting practices*		measures for uncertainty mitigation. The measures were adapted from Miller (1992) and Verbeeten (2006).			
RQ_7: Do specific uncertainties moderate the relationship between capital budgeting practices and performance?	*Evaluating the interaction effect of uncertainty between capital budgeting practices and performance.*	Capital budgeting theory, Contingency theory and Decision making theory	Respondents' responses in Part III of the questionnaire, which assessed the information about effectiveness of investment decisions based on perceived satisfaction and success in reaching organisational goals and objectives. The original idea was borrowed from Brounen, de Jong and Koedijk (2004). Some objectives measures in organisational performance are also included. ROA = EBIT / Total Assets *(Chen, 1995)* ROE = Net Income / Average Equity *(Chen, 1995)* Tobin q = $\frac{MVE + DEBT}{TA}$ *(Perfect and Wiles, 1994)* EPS = Net profit / Total no. of outstanding shares (Christy, 1966)	Self-administered questionnaire and secondary data from annual reports	SEM ($H_{3.1}$, $H_{3.2}$)	Ensuring no harm and confidentiality

3.7 Ethical considerations

Ethical considerations are related to the appropriateness of the researcher's behaviour in relation to the rights of the respondents (Saunders, Lewis and Thornhill, 2007). This study was undertaken with strict adherence to the professional ethical code of the University of Kingston, London, UK. All data sources have been properly acknowledged, and the respondents were assured of their privacy and confidentiality with regard to the data, with a statement on the front page of the questionnaire. Furthermore, accuracy, accountability, honesty and respect for human dignity have been ensured throughout the research process and the writing of the report. All potential questions that could reveal the identity of the respondents were avoided in the first place. Moreover, the results were documented in an aggregated form rather than on an individual basis.

3.8 Summary

This research adopted an objective epistemology with a deductive approach using a survey strategy. The respondents were the CFOs of the listed companies on the Colombo Stock Exchange. A self-administered questionnaire was used to garner the requisite data and it was validated with the advice of two experts in the terrain of capital budgeting. Before distributing the questionnaires among the companies, a pilot test with a small sample of five CFOs was carried out to test the suitability of the main survey. The whole population (N=287) was considered in this study. Of the distributed questionnaire, 186 of the responses were usable. At the outset, the non-response bias was examined. However, the results did not portend any form of non-response bias, suggesting that the findings of the study can be generalised to the population of listed companies in Sri Lanka as a whole. Advanced multivariate analysis was proposed for the analysis of the collected data. The relationships between the research questions and the aims of the research as well as the sources of data were summarised in a data needs matrix. The next chapter presents a descriptive analysis of the survey data.

CHAPTER FOUR

FIRMS' CHARACTERISTICS AND CAPITAL BUDGETING PRACTICES

4.1 Chapter overview

This chapter intends to answer the research questions concerning what capital budgeting practices are prevalent in Sri Lanka and how the firms' characteristics differ on capital budgeting practices. Firstly, descriptive analysis of survey responses is presented including educational qualification of the CFOs, experience of the CFOs, types of industry, and size of the capital budget. Secondly, analysis focuses on the identification of prevalent capital budgeting practices in Sri Lanka. Thirdly, firms' characteristics are examined to see the difference in the choice/use of capital budgeting practices. Finally, other important tools used in capital budgeting practices, including discount rates/cut off rates, methods used for calculating cost of equity capital, calculating discount rate for new projects in overseas market, risk factors and adjustments are discussed. The chapter ends with a brief summary.

4.2 Descriptive analysis of the survey responses

Of the total of 287 companies listed on the CSE in Sri Lanka, 186 companies' CFOs' responses were used en bloc, yielding a usable rate of 64%, which is quite high in comparison with other similar studies (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004; Verma,Gupta and Batra, 2009; Mutairi et al., 2012). The descriptive analyses of the survey responses are discussed under the following sub-headings.

4.2.1 Educational qualification of the CFOs

Classification of the educational qualification of the CFOs was grouped into: bachelor degree, MBA, non-MBA Master's, above Master's degree and professional qualification (e.g.,CIMA, ACCA). Above master degree qualification (e.g., MPhil/PhD or master degree with professional qualification) was held by 52.2% of CFOs, followed by MBA qualification (29%), non-MBA Master's (13.4%), Bachelor degree (3.8%) and professional qualification (1.6%), as per table 4.1.

Table 4.1: Educational qualification of the CFOs

Educational qualification	No. of CFOs (*N*)	Percentage (%)
Bachelor degree	7	3.8%
MBA	54	29.0%
Non-MBA Master's	25	13.4%
Above Master's degree	97	52.2%
Professional qualification	3	1.6%
Total	**186**	**100.0%**

Further to such general classification, the educational qualification of the CFOs was regrouped into two for analytical purposes: MBA-level and above and non-MBA and other. The MBA-level and above includes both MBA and above Master's degree whereas non-MBA and other includes Bachelor degree, non-MBA Master's and professional qualification. The classifications were in line with Graham and Harvey (2001) and Brounen, de Jong and Koedijk (2004).

4.2.2 Experience of the CFOs

Experience of the CFOs was classified into four groups in terms of number of years they had been in the profession: less than 5 years, 5-9 years, 10-19 years and 20 years and more. The higher number of CFOs had 10 to 19 years' experience (*N*=81), followed by 20 years' and more experience (*N*=77), 5 to 9 years' (*N*=21) and a small number of CFOs had less than 5 years' experience (*N*=7). Table 4.2 shows experience of the CFOs.

Table 4.2: Experience of the CFOs

Experience in years	No. of CFOs (*N*)	Percentage (%)
Less than 5 years	7	3.8%
5-9 years	21	11.3%
10-19 years	81	43.5%
20 years and more	77	41.4%
Total	**186**	**100.0%**

For analytical purposes, experience of CFOs was regrouped into two in line with Graham and Harvey (2001) and Brounen, de Jong and Koedijk (2004): short tenure and long tenure. The short tenure includes both less than 5 years' experience and 5-9 years' experience whereas long tenure includes both 10-19 years' experience and 20 and more years' experience.

4.2.3 Types of industry

Types of industry were initially classified in terms of their nature (Verbeeten, 2006) as shown in table 4.3: financial service industry, manufacturing industry, diversified holdings, health care industry, hotel industry and other non-financial industry. As can be seen in the table, 52.7% of industries are manufacturing, followed by other non-financial industry (17.7%), hotel industry (15.6%), diversified holdings (5.9%), financial service industry (4.8%) and health care industry (3.2%).

Table 4.3: Types of industry

Industries	No. of Companies (*N*)	Percentage (%)
Financial Service Industry (e.g., bank, finance and insurance- FINSERV)	9	4.8%
Manufacturing Industry (e.g., beverages, food & tobacco, chemical & pharmaceutical, construction and engineering, foot ware and textile, manufacturing, power and energy motors, oil palms, plantations and trading- MFTG)	98	52.7%
Diversified Holdings (DIVERS)	11	5.9%
Health care Industry (HEALTH)	6	3.2%
Hotel Industry (HOTEL)	29	15.6%
Other Non-Financial Industry (e.g., investment trust, land and property, services, stores and supplies and telecommunications (OTNFIN)	33	17.7%
Total	**186**	**100.0%**

Nonetheless, for analytical purposes as suggested by Graham and Harvey (2001) and Brounen, de Jong and Koedijk (2004), they were regrouped into "manufacturing" and "non-manufacturing". Manufacturing includes only manufacturing industries and all other industries were considered as non-manufacturing industries.

4.2.4 Size of capital budget

Size of capital budget was categorized into five groups in line with Verma, Gupta and Batra (2009): less than LKR 10 million, LKR 10–99 million, LKR 100–499 million, LKR 500 –999 million and LKR 1 billion and over. The large number of CFOs reported that size of their capital budget is between LKR 100 –499 million (39.2%), followed by LKR 10-99 million (27.4%), LKR 1 billion and over (14%), LKR 500-999 million (10.2%) and less than LKR 10 million (9.1%). Table 4.4 presents the different sizes of capital budget.

Table 4.4: Size of the capital budget

Capital budget	No. of companies (*N*)	Percentage (%)
Less than LKR 10 million	17	9.1%
LKR 10 –99 million	51	27.4%
LKR 100 –499 million	73	39.2%
LKR 500 –999 million	19	10.2%
LKR 1 billion and over	26	14.0%
Total	**186**	**100.0%**

For analytical purposes, sizes of capital budget were regrouped into "large" and "small" in line with Graham and Harvey (2001) and Brounen, de Jong and Koedijk (2004). Firms with capital budget greater than LKR 1 billion is considered as "large" and less than LKR 1 billion is considered as "small"

4.3 Capital budgeting practices

As discussed in the literature, there is a tendency to use multi-methods in making capital budgeting decisions (e.g., Arnold and Hatzopoulos, 2000). Some are primary methods and others are secondary methods. Table 4.5 summarises the choice of capital budgeting methods used in capital budgeting decision-making.

Table 4.5: Primary and secondary methods of capital budgeting techniques

Capital budgeting techniques	Primary method	Secondary method
Simple payback period (PB)	62.9% (117)	37.1% (69)
Discounted payback period (DPB)	27.4% (51)	66.1% (123)
Accounting rate of return (ARR)	4.8% (9)	41.4 % (77)
Net present value (NPV)	96.8% (180)	3.2% (6)
Internal rate of return(IRR)	65.1% (121)	33.3% (62)
Modified internal rate of return (MIRR)	-	21.5% (40)
Adjusted present value (APV)	11.3% (21)	1.6% (3)
Probability Index (PI)	-	57.0% (106)
Real option theory (RO)	1.6% (3)	1.1% (2)
Game theory decision	1.6% (3)	-
Non-financial decision rules: Intuitive Judgment (IJ)	-	3.2% (6)

As can be seen in table 4.5, 96.8% of the CFOs reported that NPV was the primary methods for capital budgeting whereas 65.1 % of the CFOs indicated IRR as their primary methods. Widespread use of PB was also observed (62.9%). DPB (27.4%) and APV (11.3%) are the next most popular primary methods. DPB was the main secondary methods (66.1%), followed by PI (57%), ARR (41.4%), PB (37.1%) IRR (33.3%), and MIRR (21.5%). All other methods were used at less than 5% as secondary methods. In comparison, of these methods, PI and MIRR were only used as secondary methods, whereas Game theory decision was only used as a primary method for capital budgeting decisions. In comparison, NPV, IRR, PB, APV, RO, and Game theory decision were the main primary methods whereas DPB, PI, ARR, MIRR and IJ were the main secondary methods.

As a caveat, capital budgeting decision tools, namely capital budgeting methods and capital budgeting tools for incorporating risk, were subjected to principal component analysis with Varimax rotation in line with many research scholars (e.g., Verbeeten, 2006). The results are presented in table 4.6.

Table 4.6: Principal Components Analysis with Varimax rotation for determining capital budgeting methods

Variables	Components/methods		
	Advanced / NPV Based Capital Budgeting Practices	Sophisticated Capital Budgeting Practices	Simple/ Naïve Capital Budgeting Practices
Probability Analysis	.819		
Scenario Analysis	.798		
Adjusting Required Return	.771		
Internal Rate of Return	.765		
Uncertainty Absorption in Cash Flows	.736		
Sensitivity Analysis	.697		
Net Present Value	.670		
Real Options		.793	
Game Theory Decisions		.779	
Decision Trees		.750	
CAPM/β Analysis		.749	
Discounted Payback Period			.857
Accounting Rate of Return			.809
Payback Period			.667
Eigen Value	5.822	2.108	1.365
Proportion of Variance Explained	38.815%	14.052%	9.101%
Cumulative Percentage Explained	38.815%	52.867%	61.968%
Cronbach's Alpha – Reliability of factors	0.890	0.809	0.744

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (.888); Bartlett's Test of Sphericity- Approx. Chi-Square (1221.845), *df* (105)

As can be seen in table 4.6, capital budgeting practices were grouped into three, in line with the literature: Advanced/NPV-based capital budgeting practices include probability analysis, IRR, scenario analysis, adjusting required return, uncertainty absorption in cash flows, sensitivity analysis and NPV; sophisticated capital budgeting practices include real option, CAPM/β analysis, game theory decisions and decision trees, and simple/naive capital budgeting practices include DPB, ARR and PB (e.g., Verbeeten, 2006; Wolffsen, 2012). CMIN (x^2)=137.075 ($p < 0.05$, df=74), CMIN/DF=1.852, GFI=.902, RMR=.036, SRMR= .0631, CFI=.945, RMSEA=.068 and PCLOSE=.051 were all indicative of the good fitting of the three groups of capital budgeting practices.

Table 4.7 shows prevalent capital budgeting practices in Sri Lanka, ranked in terms of their mean value.

Table 4.7: Summary of the prevalent capital budgeting practices in Sri Lanka

	Types of method	Never	Rarely	Sometimes	Often	Always	Mean & Rank
Discounted Payback Period	Naive	1.1% (2)	10.8% (20)	64.0% (119)	24.2% (45)	-	3.11 (9)
Accounting Rate of Return	Naive	3.8% (7)	13.4% (25)	61.8% (115)	19.9% (37)	1.1% (2)	3.01 (10)
Payback Period	Naive	2.2% (4)	13.4% (25)	34.4% (64)	37.6% (70)	12.4% (23)	3.45 (8)
Probability Analysis	Advanced	1.1% (2)	3.2% (6)	13.4% (25)	68.8% (128)	13.4% (25)	3.90 (4)
Scenario Analysis	Advanced	1.6% (3)	5.4% (10)	12.4% (23)	65.1% (121)	15.6% (29)	3.88 (5)
Adjusting required return	Advanced	2.7% (5)	5.9% (11)	14.0% (26)	63.4% (118)	14.0% (26)	3.80 (7)
Internal Rate of Return	Advanced	6.5% (12)	5.9% (11)	8.6% (16)	55.9% (104)	23.1% (43)	3.83 (6)
Uncertainty absorption in cash flows	Advanced	0.5% (1)	1.6% (3)	12.4% (23)	69.9% (130)	15.6% (29)	3.98 (2)
Sensitivity Analysis	Advanced	1.6% (3)	8.1% (15)	11.3% (21)	52.7% (98)	26.3% (49)	3.94 (3)
Net Present Value	Advanced	1.6% (3)	2.2% (4)	12.4% (23)	51.6% (96)	32.3% (60)	4.11 (1)
Real Options	Sophisticated	78.0% (145)	15.6% (29)	6.5% (12)	-	-	1.28 (13)
Game Theory Decisions	Sophisticated	83.9% (156)	26.0% (14)	2.2% (4)	-	-	1.18 (14)
Decision Trees	Sophisticated	65.6% (122)	27.4% (51)	7.0% (13)	-	-	1.41 (11)
CAPM/β Analysis	Sophisticated	77.4% (144)	11.8% (22)	8.6% (16)	2.2% (4)	-	1.35 (12)

As can be seen in table 4.7, NPV was the most preferred method of capital budgeting, 83.9% of the CFOs 'always and often' preferred it, yielding a mean value of 4.11. This was followed by Uncertainty absorption in cash flows which was 'always and often' preferred by 85.5% (M=3.98). Sensitivity Analysis was the next 'always and often' preferred method by 78% (M=3.94) followed by Probability Analysis with 82.2% (M=3.90), Scenario Analysis with 80.7 % (M=3.88), Internal Rate of Return with 79% (M=3.83), Adjusting required return with 77.4% (M=3.80), PB with 50% (M=3.45), DPB with 24.2% (M=3.11) and ARR with 21% (M=3.01). Methods such as RO, GTD, decision tree and CAPM/β Analysis were not popular, yielding mean values of less than 2.0. Therefore, based on the mean value and the percentage analysis, it is fair to say that the more prevalent capital budgeting practice in Sri Lanka was the advanced capital budgeting practice (top seven practices). Moreover, a chi-square test was performed to see the significant differences between the three types of capital budgeting practice. The results were presented in table 4.8

Table 4.8a: Chi-Square test

	Naive	Advanced	Sophisticated
Observed (O)	85.13	93.17	6.62
Expected (E)	61.64	61.64	61.64
O-E	23.49	31.53	-55.02
$(O-E)^2$	551.78	994.14	3027.20
$(O-E)^2/E$	8.95	16.13	49.11
Calculated chi-square $\Sigma (O-E)^2/E = 74.19$ (df=2)			

The observed values were the average percentage of "sometimes", "often" and "always". As can be seen in table 4.8a, the calculated chi-square is 74.19 which is greater than the chi-square critical value of 0.05 (5.99) and 0.01 (9.21). Thus, there is sufficient evidence that capital budgeting practices are different at the 0.01 significance level and the high percentage that advanced capital budgeting practices have shows they are the more prevalent practices in Sri Lanka. Nonetheless, the percentages were close to "Naive and Advanced" methods, so a chi-square test was again performed with "often" and "always" to examine significant differences between "Naive and Advanced" methods.

Table 4.8b: Chi-Square test

	Naive	Advanced
Observed (O)	31.7	81.1
Expected (E)	56.415	56.415
O-E	-24.685	24.685
$(O-E)^2$	609.35	609.35
$(O-E)^2/E$	10.80	10.80
Calculated chi-square $\Sigma (O-E)^2/E = 21.60$ (df=1)		

As can be seen in table 4.8b, the calculated chi-square is 21.60 which is greater than the chi-square critical value of 0.05 (3.84) and 0.01 (6.63). Thus, there is sufficient evidence that capital budgeting practices are different at the 0.01 significance level between Naive and Advanced methods. Consequently, there is sufficient statistical evidence to infer that the advanced capital budgeting practices are more prevalent in Sri Lankan firms. Thus, hypothesis (H_1) that Sri Lankan listed companies do not use sophisticated capital budgeting

practices was supported. In addition, table 4.9 compares findings of the current study with previous studies.

Table 4.9: A comparison Sri Lankan capital budgeting practices with some other countries

	Current Study	Verma,Gupta and Batra (2009)	Graham and Harvey (2001)	Brounen, de Jong and Koedijk.(2004)			
Country	Sri Lanka	India	USA	UK	Netherlands	Germany	France
Year Surveyed	2013	2009	1999	2002/2003	2002/2003	2002/2003	2002/2003
Survey Sample	287	100	4440	2000 firms in the U.K., Germany and France, and 500 firms in the Netherlands.			
Usable Response	186	30	392	68	52	132	61
Response rate	64%	30%	9%	5%			
Capital budgeting techniques (How frequency)							
	Always, often	**Always, often**	**Always/ or almost always**	**Always / or almost always**			
PB	12.4%, 37.6%	36.7%, 43.3%	56.70%	69.20%	64.70%	50.0%	50.90%
DPB	-, 24.2%	13.3%, 10%	29.45%	25.40%	25.00%	30.51%	11.32%
ARR	1.1%, 19.9%	16.7%, 10%	20.00%	38.10%	25.00%	32.17%	16.07%
NPV	32.3%, 51.6%	50%, 13.3%	74.90%	47.00%	70.00%	47.60%	35.10%
IRR	23.1%, 55.9%	56.7%, 20%	75.70%	53.10%	56.00%	42.20%	44.10%
APV	-	3.3%, 13.3%	11.00%	14.06%	8.16%	7.83%	14.55%
PI	-	13.3%, 26.7%	12.00%	15.87%	8.16%	16.07%	37.74%
Emerging approach – real options (How frequency)							
RO	Sometimes 6.5%	10%	26.56%	29.03%	34.69%	44.04%	53.06%
Capital budgeting method of incorporating risk (How frequency)							
Sensitivity Analysis	26.3%, 52.7%	36.7%, 36.7%	51.54%	42.86%	36.73%	28.07%	10.42%
Value at risk/other simulation analysis	-	13.3%, 6.7%	13.66%	14.52%	4.26%	23.68%	29.79%
CAPM	-, 2.2%	16.7%, 20%	-	-	-	-	-
High cut off rates	-	-, 16.7%	56.94%	26.98%	41.67%	28.81%	3.85%
Shorter payback		26.7%, 23.3%	-	-	-	-	-
Methods to calculate cost of equity (How frequency 'always/ almost always'- 'always and often')							
Average Historical Return on Stock	4.8%, 45.2%	11.11%, 27.78%	39.41%	31.25%	30.77%	18%	27.27%
CAPM model (The Beta Approach)	19.9%, 42.5%	3.33%, 50%	73.49%	47.06%	55.56%	33.96%	45.16%
CAPM with some extra risk factors	-, 5.4%	5.56%, 38.88%	34.29%	27.27%	15.38%	16.07%	30.30%
As per the choice of the investors	-, 12.9%	-,3.3%	13.93%	18.75%	44.83%	39.22%	34.38%
Regulatory decisions	-, 3.2%	16.67%, 11.11%	7.04%	16.13%	3.70%	-	16.13%
Discounted dividend/ Earnings model	-, 3.2%	16.67%,11.11%	15.74%	10%	10.71%	10.42%	10.34%

As can be seen in table 4.9, the most preferred capital budgeting technique used in Sri Lanka is NPV (often 51.6 %, always 32.3%), followed by IRR (often 55.9%, always 23.1%), PB (often 37.6%, always 12.4%), ARR (often 19.9%, always 1.1%) and DPB (often 24.2%). In contrast, Graham and Harvey's (2001) study revealed that the most preferred technique used in the USA was IRR (always/almost always 75.70%) followed by NPV (always/almost always 74.90%), and PB (always/almost always 56.7%). Brounen, de Jong and Koedijk (2004) found that PB was the most frequently used capital budgeting method in the UK (69.2%), the Netherlands (64.7%), Germany (50%) and France (50.9%). Moreover, IRR and NPV methods were also prevalent in the U.K., the Netherlands, Germany and France. Verma, Gupta and Batra (2009) found that the most preferred technique in Indian firms is PB (always 36.7%, often 43.3%), followed by IRR (always 56.7%, often 20%) and NPV (always 50%, often 13.3%). Only 6.5% of the CFOs reported that they used RO 'sometimes' (M=1.28) in evaluating their investment projects in Sri Lanka. Therefore, it is fair to say that the use of RO is at an embryonic stage in Sri Lanka in comparison with France (53.6%), Germany (44.04%), the Netherlands (34.69%), the UK (29.03%), and the USA (26.56%). However, the results were somewhat similar to those of India at 10% (Verma, Gupta and Batra, 2009).

Risk is always intertwined with capital budgeting decisions and there are a number of tools in use for incorporating risk. According to table 4.7, the majority of the CFOs revealed that they use uncertainty absorption in cash flows (always 15.6%, often 69.9%), Sensitivity analysis was the second most preferred method for incorporating risk (always 26.3% and often 52.7%) followed by probability analysis (always 13.4%, often 68.8%), scenario analysis (always 15.6%, often 65.1%), and adjusting the required return (always 14%, often 63.4%). As can be seen in table 4.9, Graham and Harvey found that 56.94% of the USA CFOs always/almost always preferred a high cut-off rate to incorporate risk and 51.54% always/almost always preferred the sensitivity analysis. Only 13.66% always preferred value at risk. However, Verma, Gupta and Batra (2009) observed that 36.7% of Indian firms always preferred sensitivity analysis while 26.7% always preferred a shorter payback period. Brounen, de Jong and Koedijk's (2004) study revealed that CFOs' most preferred method for incorporating risk is "Sensitivity Analysis" in the UK (42.86%), "High cut-off rates" in the Netherlands (41.67%) and in Germany (28.81%) and "Value at risk/other simulation analysis" in France (29.79%).

As can be seen in table 4.9, the most popular method for calculating cost of equity was the CAPM model (always 19.9%, often 42.5%), followed by Average historical returns on

common stock (always 4.8%, often 45.2%). Other methods were at low use. The results of Brounen, de Jong and Koedijk (2004) revealed that CAPM was the most popular method of estimating the cost of equity capital in Europe: in the UK (47.1%), the Netherlands (55.6%), Germany (34%) and France (45.2%). However, CAPM was the most popular in the USA (73.5%). Although CAPM was a popular method in Sri Lanka, the rate of usage was lower in comparison with the USA and Europe but was higher in comparison with India (3.3%).

4.4 Firms' characteristics and capital budgeting practices

The current survey carefully considered the underlying firm characteristics in order to find out the differences in the use of capital budgeting practices: size of capital budget, educational qualification of CFOs, experience of CFOs and types of industry. The mean difference statistics of independent sample *t*-test was employed.

4.4.1 Size of capital budgets and use of capital budgeting practices

As aforesaid, size of capital budgets were grouped into "small" and "large". The results of the independent sample *t*-test between size of capital budgets and use of capital budgeting practices are presented in table 4.10.

Table 4.10a: Size of capital budgets and use of capital budgeting practices

	Size of the capital budget	*N*	*df*	Mean	SD	SE	*t*	sig
PB	Small	160		3.63	.867	.069		
	Large	26	184	2.35	.629	.123	9.064	0.000
DPB	Small	160		3.18	.578	.046		
	Large	26	184	2.73	.724	.142	2.977	0.000
ARR	Small	160		3.13	.652	.052		
	Large	26	184	2.31	.788	.155	5.754	0.000
NPV	Small	160		3.97	.796	.063		
	Large	26	184	4.96	.196	.038	-6.312	0.000
IRR	Small	160		3.73	1.046	.083		
	Large	26	184	4.50	.860	.169	-4.125	0.000
RO	Small	160		1.13	.357	.028		
	Large	26	184	2.23	.765	.150	-11.947	0.000
GTD	Small	160		1.08	.274	.022		
	Large	26	184	1.81	.694	.136	-9.516	0.000
Sensitivity Analysis	Small	160		3.79	.898	.071		
	Large	26	184	4.85	.368	.072	-5.886	0.000
Scenario Analysis	Small	160		3.84	.797	.063		
	Large	26	184	4.08	.744	.146	-1.467	0.151
Decision Trees	Small	160		1.26	.441	.035		
	Large	26	184	2.35	.745	.146	-10.379	0.000
CAPM/β Analysis	Small	160		1.16	.413	.033		
	Large	26	184	2.58	1.027	.201	-12.467	0.000
Uncertainty absorption in cash flows	Small	160		3.91	.570	.045		
	Large	26	184	4.46	.761	.149	-4.383	0.000
Adjusting required return	Small	160		3.76	.867	.069		
	Large	26	184	4.08	.688	.135	-2.118	0.041
Probability Analysis	Small	160		3.88	.704	.056		
	Large	26	184	4.04	.662	.130	-1.065	0.288

As can be seen in table 4.10, small firms more highly applied the payback method (M=3.63, SE=.06) than large firms (M=2.35, SE=.12). The difference was significant t (184) = 9.064, $p < 0.01$. A similar pattern was observed in the application of DPB and ARR that small firms more highly applied DPB and ARR (M=3.18, SE=.04; M=3.13, SE=.05) than large firms (M=2.73, SE=.142; M=2.31, SE=.155) and the differences were also significant t (184) = 2.877, $p < 0.01$ and t (184) = 5.754, $p < 0.01$ respectively. Therefore, it is fair to say that simple capital budgeting practices PB, DPB and ARR were more highly applied by small

firms in comparison with large firms. As to advanced capital budgeting practices, NPV and IRR are more highly significantly applied by large firms (M=4.96, SE=.038; M=4.50, SE=.169) than small firms (M=3.97, SE=.063; M=3.73, SE=.083) and the significant mean differences were found t (184) = -6.312, $p < 0.01$, t (184) = -4.125, $p < 0.01$, respectively. As regard to sophisticated capital budgeting practices, RO, GTD are also highly applied by large companies (M=2.23, SE=.150; M=1.81, SE=.136) than small companies (M=1.13, SE=.028; M=1.08, SE=.022) and the significant differences were RO and GTD, respectively t (184) = -11.947, $p < 0.01$, t (184) = -9.516, $p < 0.01$.

In the case of supplementary capital budgeting tools, sensitivity analysis, uncertainty absorption in cash flows and adjusting required return were significantly highly applied by large firms (M=4.85, SE=.072; M=4.46, SE=.149, and M=4.08, SE=.135) than small companies (M=3.79, SE=.071; M=3.91, SE=.045, and M=3.76 , SE=.069) and the significant differences were found t (184) = -5.886, $p < 0.01$, t (184) = -4.383, $p < 0.01$ and t (184) = -2.118 , $p < 0.041$, respectively. Although scenario analysis and probability analysis were highly applied by large firms, the differences were not statistically significant at $p < 0.05$. Moreover, CAPM/β analysis and decision trees were also more highly applied by large companies (M=2.58, SE=.201; M=2.35, SE=.146) than small companies (M=1.16, SE=.033; M=1.26, SE=.035) and the differences were significant t (184) = -12.467, $p < 0.01$, t (184) = -10.379, $p < 0.01$.

Therefore, simple capital (naive) budgeting practices were significantly mostly used by small firms, nonetheless, advanced and sophisticated capital budgeting practices were significantly mostly used by large firms. Consequently, hypothesis (H_2) that sophisticated capital budgeting practices are used when a firm's capital budget is large was supported.

Moreover, choice of the capital budget was compared with size of the total assets. The size of the total assets was grouped into small (less than one billion) and large (more than one billion) and the results are shown in table 4.10b.

Table 4.10b: Size of total assets and choice of capital budgeting practices

	Size of the Total Assets	*N*	*df*	Mean	SD	SE	*t*	sig
PB	Small	51		3.47	.857	.120		
	Large	135	184	3.44	.982	.085	.229	.410
DPB	Small	51		3.24	.513	.072		
	Large	135	184	3.07	.649	.056	1.853	.033
ARR	Small	51		3.14	.664	.093		
	Large	135	184	2.96	.747	.064	1.542	.063
NPV	Small	51		3.94	.904	.127		
	Large	135	184	4.17	.778	.067	-1.601	.044
IRR	Small	51		3.75	1.055	.148		
	Large	135	184	3.87	1.057	.091	-.700	.242
RO	Small	51		1.20	.491	.069		
	Large	135	184	1.32	.607	.052	-1.290	.079
GTD	Small	51		1.06	.238	.033		
	Large	135	184	1.23	.488	.042	-2.393	.001
Sensitivity Analysis	Small	51		3.82	.974	.136		
	Large	135	184	3.99	.898	.077	-1.031	.143
Scenario Analysis	Small	51		3.82	.842	.118		
	Large	135	184	3.90	.775	.067	-.537	.289
Decision Trees	Small	51		1.33	.554	.078		
	Large	135	184	1.44	.643	.055	-1.091	.123
CAPM/β Analysis	Small	51		1.20	.530	.074		
	Large	135	184	1.41	.786	.068	-1.835	.015
Uncertainty absorption in cash flows	Small	51		3.94	.614	.086		
	Large	135	184	4.00	.635	.055	-.569	.282
Adjusting required return	Small	51		3.92	.771	.108		
	Large	135	184	3.96	.809	.070	-.259	.396
Probability Analysis	Small	51		3.84	.731	.102		
	Large	135	184	3.93	.687	.059	-.700	.236

Results revealed that DPB was significantly highly applied by small firms (M=3.27, SE=.072) than small companies (M=3.07, SE=.056) and the significant difference was found t (184) = 1.853, $p < 0.05$. In contrast, NPV GTD and CAPM/β analysis were significantly highly applied by large firms (M=4.17, SE=.067; M=1.23, SE=.042; M=1.41, SE=.068) than small companies (M=3.94, SE=.127; M=1.06, SE=.033; M=1.20, SE=.074) and the significant

differences were found t (184) = -1.601, $p < 0.05$, t (184) = -2.393, $p < 0.05$ and t (184) = -1.835 , $p < 0.05$, respectively.

4.3.2 Education qualifications of CFOs and use of capital budgeting practices

The educational qualifications of CFOs were grouped into MBA and non-MBA qualifications in line with Graham and Harvey (2001). An independent sample t-test was performed to see the difference between educational qualification of CFOs and the use of capital budgeting practices. The results are presented in table 4.11.

Table 4.11: Education qualifications and use of capital budgeting practices

	Educational qualifications	*N*	*df*	Mean	SD	SE	*t*	sig
PB	Non-MBA	35		3.91	.781	.132		
	MBA	151	184	3.34	.951	.077	3.332	.001
DPB	Non-MBA	35		3.37	.598	.101		
	MBA	151	184	3.05	.609	.050	2.828	.007
ARR	Non-MBA	35		3.37	.690	.117		
	MBA	151	184	2.93	.713	.058	3.412	.001
NPV	Non-MBA	35		3.06	.873	.147		
	MBA	151	184	4.35	.580	.047	-8.356	.000
IRR	Non-MBA	35		2.60	1.193	.202		
	MBA	151	184	4.12	.783	.064	-9.275	.000
RO	Non-MBA	35		1.09	.284	.048		
	MBA	151	184	1.33	.619	.050	-2.287	.023
GTD	Non-MBA	35		1.06	.236	.040		
	MBA	151	184	1.21	.471	.038	-2.802	.006
Sensitivity Analysis	Non-MBA	35		2.97	.985	.166		
	MBA	151	184	4.17	.743	.060	-6.743	.000
Scenario Analysis	Non-MBA	35		3.03	.857	.145		
	MBA	151	184	4.07	.634	.052	-8.182	.000
Decision Trees	Non-MBA	35		1.17	.382	.065		
	MBA	151	184	1.47	.651	.053	-2.608	.010
CAPM/β Analysis	Non-MBA	35		1.14	.355	.060		
	MBA	151	184	1.40	.785	.064	-2.980	.003
Uncertainty absorption in cash flows	Non-MBA	35		3.34	.765	.129		
	MBA	151	184	4.13	.485	.040	-7.682	.000
Adjusting required return	Non-MBA	35		2.97	.985	.166		
	MBA	151	184	3.99	.688	.056	-7.247	.000
Probability Analysis	Non-MBA	35		3.26	.701	.118		
	MBA	151	184	4.05	.609	.050	-6.769	.000

As shown in table 4.11, simple capital budgeting practices PB , DPB and ARR were more highly applied by non-MBA CFOs (M=3.91, SE=.132; M=3.37, SE=.101, and M=3.37, SE=.117) and the differences were significant t (184) = 3.332, $p < 0.01$, t (184) = 2.828, $p <$ 0.01 and t (184) = 3.412 , $p < 0.01$, respectively. In the case of advanced capital budgeting practices, NPV and IRR were highly applied by CFOs who had MBA qualifications (M= 4.35, SE=.047; M=4.12, SE=.064) than non MBA CFOs (M=3.06, SE=.147; M=2.60, SE= .202) and the differences were significant t (184) = -8.356, $p < 0.01$, t (184) = -9.275, $p <$ 0.01, respectively. A similar pattern was observed in sophisticated capital budgeting practices. RO and GTD were also more highly applied by CFOs who had an MBA (M=1.33, SE=.050; M=1.21, SE=.038) than non-MBA CFOs (M=1.09, SE=.048; M=1.06, SE=.040) and the significant differences were found t (184) = -2.287, $p < 0.05$, t (184) = -2.802, $p < 0.01$, respectively.

As for supplementary capital budgeting tools, sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return and probability analysis were significantly more highly applied by CFOs who had an MBA (M=4.17, SE=.060; M=4.07, SE=.052, M=4.13, SE=.040, M=3.99, SE=.052 and M=4.05, SE=.050) than non-MBAs CFOs (M=2.97, SE=.166; M =3.03, SE =.145, M=3.34, SE=.329, M=2.97, SE=.166 and M=3.26, SE =.118) at t (184) = -6.743, $p < 0.01$, t (184) = -8.182, $p < 0.01$, t (184)= -7.682, $p <$0.01, t (184) = -7.247 , $p < 0.01$ and t (184) = - 6.769 , $p < 0.01$, respectively. Moreover, CAPM/β analysis and decision trees were more highly applied by CFOs with MBAs (M=1.40, SE= .064; M=1.47, SE=.053) than CFOs with non-MBAs (M=1.14, SE=.060; M=1.17, SE=.065) and the differences were significant t (184) = -2.980, $p < 0.01$, t (184) = -2.608, $p <$ 0.01, respectively.

Therefore, simple capital (naive) budgeting practices were significantly mostly used by CFOs with non-MBA qualification, nonetheless, advanced and sophisticated capital budgeting practices were significantly mostly used by CFOs with MBA qualifications. Consequently, hypothesis (H_4) that Chief Financial Officers with higher educational qualifications use more sophisticated capital budgeting practices was supported.

4.4.3 Experience of CFOs and use of capital budgeting practices

This section examines the difference in use of capital budgeting practice in terms of the experience of the CFOs (tenure). The tenure was grouped into "short" and "long" in line with Graham and Harvey (2001). Table 4.12 shows the results of the independent sample *t*-test.

Table 4.12: Tenure and use of capital budgeting practices

	Tenure	*N*	*df*	Mean	SD	SE	*t*	sig
PB	Short	28		3.79	.630	.119		
	Long	158	184	3.39	.982	.078	2.076	.039
DPB	Short	28		3.18	.548	.104		
	Long	158	184	3.10	.630	.050	0.609	.543
ARR	Short	28		3.14	.803	.152		
	Long	158	184	2.99	.714	.057	1.042	.299
NPV	Short	28		3.75	.799	.151		
	Long	158	184	4.17	.808	.064	-2.546	.012
IRR	Short	28		3.64	.870	.164		
	Long	158	184	3.87	1.083	.086	-1.037	.301
RO	Short	28		1.11	.315	.060		
	Long	158	184	1.32	.609	.048	-2.728	.008
GTD	Short	28		1.00	.000	.000		
	Long	158	184	1.22	.470	.037	-5.755	.000
Sensitivity Analysis	Short	28		3.68	.863	.163		
	Long	158	184	3.99	.924	.073	-1.726	.092
Scenario Analysis	Short	28		3.79	.568	.107		
	Long	158	184	3.89	.826	.066	-0.656	.513
Decision Trees	Short	28		1.11	.315	.060		
	Long	158	184	1.47	.645	.051	-2.897	.004
CAPM/β Analysis	Short	28		1.11	.315	.060		
	Long	158	184	1.40	.773	.062	-3.406	.001
Uncertainty absorption in cash flows	Short	28		3.64	.731	.138		
	Long	158	184	4.04	.590	.047	-3.194	.002
Adjusting required return	Short	28		3.64	.911	.172		
	Long	158	184	3.83	.839	.067	-1.069	.286
Probability Analysis	Short	28		3.79	.568	.107		
	Long	158	184	3.92	.719	.057	-1.137	.262

As can be seen in table 4.12, simple capital budgeting practices PB, DPB and ARR were applied more by CFOs with short tenure (M=3.79, SE=.119; M=3.18, SE=.104, and M=3.14, SE=.152) than CFOs with long tenure CFOs (M=3.39, SE=.078; M=3.10, SE=.050, and M= 2.99, SE=.057), however, the difference was only significant for PB t (184) = 2.076, $p < 0.05$.

Similarly, for advanced capital budgeting practices, NPV and IRR were mostly more used by CFOs with long tenure (M=4.17, SE=.064; M=3.87, SE=.086) than CFOs with short tenure (M=3.75, SE=.151; M=3.64, SE=.164), nonetheless, the difference was only significant for NPV (t (184) = -2.546, $p < 0.05$. In the case of sophisticated capital budgeting practices, RO and GTD were also mostly more applied by CFOs with long tenure (M=1.32, SE=.048; M= 1.22, SE=.037) than CFOs with short tenure (M=1.11, SE=.060; M=1.00, SE=.000) and the differences were significant t (184) = -2.728, $p < 0.01$, t (184) = -5.755, $p < 0.01$, respectively. CAPM/β analysis and decision trees were more highly applied by CFOs with long tenure (M=1.40, SE=.062; M=1.47, SE=.051) than CFOs with short tenure (M=1.11, SE=.060; M=1.11, SE=.060) and the differences were significant t (184) = -3.406, $p < 0.01$, t (184) = -2.897, $p < 0.01$, respectively. Uncertainty absorption in cash flows was also more highly significantly applied by CFOs with long tenure (M=4.04, SE=.047) than CFOs with short tenure (M=3.64, SE=.138) at t (184) = -3.194, $p < 0.01$. Notwithstanding that sensitivity analysis, scenario analysis, adjusting required return and probability analysis were mostly used by CFOs with long tenure, they were not statistically significant.

Therefore, in all cases, simple capital (naive) budgeting practices were mostly used by CFOs with short tenure (significantly different only for PB), nonetheless, advanced and sophisticated capital budgeting practices (NPV, RO, GTD, uncertainty absorption in cash flows, decision trees and CAPM/β analysis) were significantly mostly used by CFOs with long tenure. Consequently, hypothesis (H_5) that Chief Financial Officers with a greater number of years of experience use more sophisticated capital budgeting practices was supported.

4.4.4 Types of industry and use of capital budgeting methods

This section draws attention to the differences between types of industry and capital budgeting methods. Types of industry were grouped into non-manufacturing (NMANU) and manufacturing (MANU) in line with Graham and Harvey (2001). The results of an independent sample t-test are presented in table 4.13.

Table 4.13: Types of industry and use of capital budgeting practices

	Industry	*N*	*df*	Mean	SD	SE	*t*	sig
PB	NMANU	88		3.49	.971	.103		
	MANU	98	184	3.41	.929	.094	.577	.564
DPB	NMANU	88		3.15	.635	.068		
	MANU	98	184	3.08	.604	.061	.727	.468
ARR	NMANU	88		3.11	.718	.077		
	MANU	98	184	2.92	.728	.073	1.839	.048
NPV	NMANU	88		4.18	.891	.095		
	MANU	98	184	4.04	.745	.075	1.175	.242
IRR	NMANU	88		3.88	1.059	.113		
	MANU	98	184	3.80	1.055	.107	.509	.611
RO	NMANU	88		1.34	.604	.064		
	MANU	98	184	1.23	.552	.056	1.252	.212
GTD	NMANU	88		1.17	.407	.043		
	MANU	98	184	1.19	.469	.047	-.362	.718
Sensitivity Analysis	NMANU	88		4.00	.935	.100		
	MANU	98	184	3.89	.907	.092	.831	.407
Scenario Analysis	NMANU	88		3.89	.794	.085		
	MANU	98	184	3.87	.795	.080	.163	.871
Decision Trees	NMANU	88		1.44	.641	.068		
	MANU	98	184	1.39	.603	.061	.608	.544
CAPM/β Analysis	NMANU	88		1.32	.670	.071		
	MANU	98	184	1.39	.782	.079	-.648	.518
Uncertainty absorption in cash flows	NMANU	88		3.93	.708	.075		
	MANU	98	184	4.03	.546	.055	-1072	.285
Adjusting required return	NMANU	88		3.83	.887	.095		
	MANU	98	184	3.78	.819	.083	.432	.666
Probability Analysis	NMANU	88		3.88	.724	.077		
	MANU	98	184	3.93	.677	.068	.294	.603

As can be seen in table 4.13, only ARR was statistically significant and mostly applied by non-manufacturing firms (M=3.11, SE=.077) than manufacturing firms (M=2.92, SE=.073) at t (184) = 1.839, $p < 0.05$. Save for ARR, all other capital budgeting practices were not statistically significant with type of industry ($p > 0.05$).

Therefore, in all cases except ARR, type of industry was not significantly different on use of capital budgeting practices. The results only supported the notion that the use of ARR was significantly greater in non-manufacturing firms than in manufacturing firms. Consequently,

in the majority of the cases hypothesis (H_3) that manufacturing firms use more sophisticated capital budgeting practices was not supported.

The differences in use of capital budgeting practices in terms of firm characteristics are all summarised in table 4.14.

Table 4.14: Firms' characteristics and use of capital budgeting practices

CBT	% of Always and Often	Mean	Size		Educational qualification of CFOs		Tenure of CFOs		Industry	
			Small	Large	MBA & Above	Non-MBA & Others	Short	Long	MANU	NMANU
Naive CBP										
PB	12.4, 37.6	3.45	3.63**	2.35	3.34	3.91**	3.79*	3.39	3.41	3.49
DPB	0, 24.2	3.11	3.18**	2.73	3.05	3.37**	3.18	3.10	3.08	3.15
ARR	1.1, 19.9	3.01	3.13**	2.31	2.93	3.37**	3.14	2.99	2.92	3.11*
Advanced CBP										
NPV	32.3 ,51.6	4.11	3.97	4.96**	4.35**	3.06	3.75	4.17*	4.04	4.18
IRR	23.1,55.9	3.83	3.73	4.50**	4.12**	2.60	3.64	3.87	3.80	3.88
Sensitivity Analysis	26.3,52.7	3.94	3.79	4.85**	4.17**	2.97	3.68	3.99	3.89	4.00
Scenario Analysis	15.6,65.1	3.88	3.84	4.08	4.07**	3.03	3.79	3.89	3.87	3.89
Uncertainty absorption in cash flows	15.6,69.9	3.98	3.91	4.46**	4.13**	3.34	3.64	4.04**	4.03	3.93
Adjusting required return	14,63.4	3.80	3.76	4.08**	3.99**	2.97	3.64	3.83	3.78	3.83
Probability Analysis	13.4,68.8	3.90	3.88	4.04	4.05**	3.26	3.79	3.92	3.93	3.88
Sophisticated CBP										
RO	Sometimes 6.5%	1.28	1.13	2.23**	1.33**	1.09	1.11	1.32**	1.23	1.34
GTD	-	1.18	1.08	1.81**	1.21**	1.06	1.00	1.22**	1.19	1.17
Decision Trees	-	1.41	1.26	2.35**	1.47*	1.17	1.11	1.47*	139	1.44
CAPM/β Analysis	-,2.2%	1.35	1.16	2.58**	1.40**	1.14	111	1.40**	1.39	1.32

MANU stands for Manufacturing and NMANU stands for non manufacturing

** t is significant within the specific capital budgeting method at the 0.01 level,

* t is significant within the specific capital budgeting method at the 0.05 level

In a nutshell, as can be seen in table 4.14, the use of the payback criterion was significant at 0.05; it was mostly preferred by small firms and mainly managed by CFOs with non-MBA

educational qualifications and short tenure. Industry differences did not make any significant difference in the use of PB. DPB was more significantly used by small firms than large firms and managed by CFOs with non-MBA educational qualifications. As for ARR, it was used more by small firms than large firms. However, the difference was not statistically significant. ARR was primarily applied by non-MBA CFOs and was also preferred by non-manufacturing firms. NPV and IRR were used more by large firms than small firms; these were significantly managed by MBA-qualified CFOs with long tenure. Those differences were statistically significant at 0.01. Sophisticated capital budgeting practices, in terms of RO and GTD, were significantly preferred by large companies more than by small companies and those were managed by MBA-qualified CFOs who had long tenure.

When considering the underlying firm characteristics influencing usage of risk-taking tools in capital budgeting practice, the use of sensitivity analysis, uncertainty absorption in cash flows and adjusting the required return were significantly preferred by large firms more than by small firms and those were significantly managed by MBA-qualified CFOs rather than non-MBA CFOs. Scenario and probability analysis were significantly managed by MBA qualified CFOs rather than non-MBA CFOs. It was also noticed that the usage of decision tress and CAPM/β analysis was significantly most frequently cited by large firms rather than by small firms, and these were significantly managed by MBA-qualified CFOs who had a significantly longer tenure.

4.5 Other important tools used capital budgeting practices

4.5.1 Discount rates/ cut-off rates

CFOs were also asked to report the method of calculating the discount rate on a Likert scale from always (5) to never (1). The results are presented in table 4.15. WACC was the most prevalent method to determine the discount rate (always 25.8%, often 59.7%), producing a mean value of 4.05. The next most widely used methods were CD (always 19.4%, often 45.7%) and CAPM (always 2.7%, often 39.8%), yielding mean values of 3.66 and 3.20, respectively. Other methods were not popular for calculating the cut-off rates, as their mean values were less than 2. The theoretical concept of WACC was the most preferred method to calculate the cut-off rate in Sri Lanka; this concurs with the literature (Verma, Gupta and Batra, 2009).

Table 4.15: Firms' characteristics and use of discount rate / cut-off rate

Methods to calculate the cut-off rate	% of Always and Often	M	Size		Educational qualification of CFOs		Tenure of CFOs		Industry	
			Small	Large	MBA	Non MBA	Short	Long	MANU	NMANU
Weighted average cost of capital (WACC)	25.8, 59.7	4.05	3.99	4.42**	4.15**	3.63	3.96	4.07	4.04	4.07
Cost of capital derived from the CAPM model	2.7, 39.8	3.20	3.13	3.65**	3.21	3.17	3.43	3.16	3.32	3.07
Cost of Debt (CD)/Interest payable on debt capital	19.4, 45.7	3.66	3.76**	3.04	3.61	3.89	3.79	3.64	3.86**	3.50
An arbitrary rate	-	1.38	1.38	1.38	1.39	1.31	1.46	1.36	1.36	1.40
Earnings yields on shares	-, 2.7	1.66	1.66	1.92	1.68	1.54	1.86	1.62	1.77	1.53
Average historical return on stock	-	1.89	1.87	2.04	1.89	1.89	1.64	1.94*	1.98	1.80
Other methods (Judgment based return)	-, 1.1	1.20	1.18	1.38	1.23	1.11	1.32	1.18	1.16	1.25

** t is significant within the specific capital budgeting method at the 0.01 level
* t is significant within the specific capital budgeting method at the 0.05 level

When considering the firm characteristic-specific methods used to drive the cut-off rates, WACC and CAPM were significantly more preferred by large firms than by small firms and WACC was managed by MBA-qualified CFOs at the 0.01 significance level. In order to calculate the discount rate, cost of debt was significantly used by small firms more than by large firms, and it was significantly used by manufacturing companies in Sri Lanka. Average historical return on stock was used by long tenure CFOs at the 0.05 significance level.

4.5.2 Method used for calculating cost of equity capital

Estimating the cost of equity is necessary when a firm applies discounting techniques like NPV or IRR methods (Hermes, Smid and Yao, 2007). CAPM (the beta approach) was the most prevalent method for calculating the cost of equity capital (always 19.9%, often 42.5%), yielding a mean value of 3.80. The next most widely used method was the average historical returns on common stock (always 4.8%, often 45.2%), yielding a mean value of 3.53. Other methods were not popular for calculating the cost of equity capital in Sri Lanka.

Table 4.16: Firms' characteristics and methods used for calculating cost of equity capital

Methods to calculate the cost of equity	% of Always and Often	M	Size		Educational qualification of CFOs		Tenure of CFOs		Industry	
			Small	Large	MBA	Non MBA	Short	Long	MANU	NMANU
Average historical returns on common stock	4.8, 45.2	3.53	3.44	4.04**	3.60**	3.23	3.54	3.53	3.54	3.51
CAPM model (The Beta Approach)	19.9, 42.5	3.80	3.69	4.46**	3.88**	3.43	3.71	3.81	3.77	3.83
CAPM with some extra risk factors	-, 5.4	1.61	1.58	1.81	1.65	1.43	1.50	1.63	1.62	1.59
As per the choice of the investors	-, 12.9	2.02	1.96	2.38	2.00	2.09	1.93	2.03	2.17*	1.84
Regulatory decisions	3.2,-	2.22	2.21	2.23	2.21	2.26	1.93	2.27	2.29	2.14
Discounted dividend/earnings model	3.2,-	1.96	1.97	1.92	1.99	1.86	1.64	2.02**	1.92	2.01
Any other method (Judgment of opportunity cost)	1.6, 0.5	1.14	1.16**	1.00	1.16	1.06	1.00	1.16**	1.10	1.18

** t is significant within the specific capital budgeting method at the 0.01 level,
* t is significant within the specific capital budgeting method at the 0.05 level

When considering the firm characteristic- specifics, CAPM and average historical returns on common stock were significantly most frequently used by large firms that were managed by MBA-qualified CFOs. Judgment of opportunity cost was significantly used by small companies more than by large companies and the discounted dividend model and judgment of opportunity cost were significantly used by long-tenure CFOs.

4.5.3 New projects in overseas markets

Further, current study considers an example of how a firm evaluates a new project in an overseas market. The study was most concerned with whether companies consider the company-wide risk or the project risk in evaluating the project. Table 4.17 contains results of the discount rate used by companies when evaluating a new project in an overseas market. Remarkably, the majority of the firms use discount rate for the entire company to evaluate the project; respondents always 28%, often 61.8% used the discount rate for the entire company. However, 19.4% of the firms agreed that they were often and 3.2% were always using a risk-matched discount rate in evaluating the particular project.

Table 4.17: Survey responses for the question; how frequently would your company use the following discount rates when evaluating a new project in an overseas market

Discount rate	Never	Rarely	Sometimes	Often	Always
The discount rate for entire company	-	-	10.2% (19)	61.8%(115)	28.0%(52)
The discount rate for the overseas market (country discount rate)	0.5% (1)	32.3%(60)	55.4%(103)	9.7%(18)	2.2%(4)
A divisional discount rate (if the project line of business matches a domestic division)	29.0% (54)	43.0%(80)	27.4%(51)	0.5%(1)	-
A risk matched discount rate for this particular project (considering both country and industry)	0.5% (1)	5.9%(11)	71.0%(132)	19.4%(36)	3.2%(6)
A different discount rate for each component cash flow that has a different risk characteristics (e.g. depreciation vs. operating cash flows)	39.8% (74)	17.7%(33)	38.7%(72)	-	3.8%(7)
Any other method	95.2% (177)	1.6%(3)	3.2%(6)	-	-

Of U.S. firms, 58.8% indicated that they were using the discount rate for the entire company as opposed to 50.9% which incorporate project particularities by deriving a risk-matched rate (Graham and Harvey, 2001). Of U.K. firms 41.0%, and 64.6% of Dutch firms, 42.0% of German firms and 24.1% of French firms applied the discount rate for the entire company , while as little as 23.7% of U.K. firms, 27.1% of Dutch firms, 25.0% of German firms and 27.3% of French firms found a risk-matched project rate of return (Brounen, de Jong and Koedijk,2004). This analysis was not implied in the study of Verma, Gupta and Batra (see table 4.18).

Table 4.18: Discount rate used by firms across many countries when evaluating a new project in an overseas market (How frequency 'always')

	Current Study	Graham and Harvey (2001)	Brounen, de Jong and Koedijk (2004)			
	Sri Lanka	U.S.A.	U.K.	Netherlands	Germany	France
The discount rate for entire company	28.0%	58.79%	40.98%	64.58%	41.96%	24.14%
The discount rate for the overseas market (country discount rate)	2.2%	34.52%	20%	14.89%	14.85%	16.36%
A divisional discount rate (if the project line of business matches a domestic division)	-	15.61%	17.24%	17.02%	12%	12.50%
A risk matched discount rate for this particular project (considering both country and industry)	3.2%	50.95%	23.73%	27.08%	25%	27.27%
A different discount rate for each component cash flow that has a different risk characteristics (e.g. depreciation vs. operating cash flows)	3.8%	9.87%	10.53%	2.13%	7.14%	11.32%

4.5.4 Risk factors and adjustments

Generally, risk factors including risk of unexpected inflation, interest rate risk, term structure risk, business cycle risk, commodity price risk, and foreign exchange risk were adjusted by either increasing the discount rate or reducing cash flows or by both. Results of the survey are depicted in table 4.19. In this study, risk of unexpected inflation, interest rate risk, commodity price risk and foreign exchange risk were mainly adjusted by cash flow (74.2%, 73.1%, 95.7% and 88.7%, respectively). In contrast, term structure risk was mainly adjusted by discount rate (28%).

Table 4.19: Survey responses for the question: when valuing a project, do you adjust either the discount rate or cash flows for the following risk factors

Risks	Adjust discount rate	Adjust cash flow	Both	Neither
Risk of unexpected inflation	14.0% (26)	74.2% (138)	11.8% (22)	-
Interest rate risk (changes in general level of interest rates)	16.7% (31)	73.1% (136)	7.5% (14)	2.7% (5)
Term structure risk (change in long term vs. short term interest rate)	28.0% (52)	15.1% (28)	4.3% (8)	52.7% (98)
GDP or business cycle risk	2.7% (5)	-	5.9% (11)	91.4% (170)
Commodity price risk	1.6% (3)	95.7% (178)	2.7% (5)	-
Foreign exchange risk	8.1% (15)	88.7% (165)	3.2% (6)	-
Distress risk (probability of bankruptcy)	6.5% (12)	-	11.3% (21)	82.3% (153)
Size (Small firm being riskier)	1.6% (3)	-	7.5% (14)	90.9% (169)
Market to book ratio (ratio of market value of firm to book value of assets)	1.6% (3)	-	9.7% (18)	88.7% (165)
Momentum (recent stock price performance)	1.6% (3)	-	7.5% (14)	90.9% (169)
Any other risk:	1.6% (3)	-	8.1% (15)	90.3% (168)

According to results of Verma, Gupta and Batra (see table 4.20), the majority of Indian companies, nearly 93%, were making an adjustment for the risk of unexpected inflation and interest rate risk, followed by 87% of companies making an adjustment for term structure risk. Similarly, the commodity price risk and foreign exchange risk were each being adjusted by 83% of the companies. In the case of Sri Lanka, almost all of the companies were making an adjustment for the risk of unexpected inflation, commodity price risk and foreign exchange rate risk. In the case of U.S. and European firms, the vast majority of firms did not take specific risk factors into account when evaluating individual investment projects (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004).

Table 4.20: Comparative results of types of risk and adjustment among the similar studies

	Verma, Gupta and Batra (2009)				Graham and Harvey (2001)			
Risks	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**
Risk of unexpected inflation	46.7%	33.3%	13.3%	6.7%	11.90%	14.45%	11.90%	61.76%
Interest rate risk (changes in general level of interest rates)	50%	26.6%	16.7%	6.7%	15.30%	8.78%	24.65%	51.27%
Term structure risk (change in long term vs. short term interest rate)	60%	20%	6.7%	13.3%	8.57%	3.71%	12.57%	75.14%
GDP or business cycle risk	10%	53.3%	6.7%	30%	6.84%	18.80%	18.80%	55.56%
Commodity price risk	23.3%	53.3%	6.7%	16.7%	2.86%	18.86%	10.86%	67.43%
Foreign exchange risk	53.3%	16.7%	6.7%	16.7%	10.80%	15.34%	18.75%	55.11%
Distress risk (probability of bankruptcy)					7.41%	6.27%	4.84%	81.48%
Size (Small firm being riskier)					14.57%	6.00%	13.43%	66.00%
Market to book ratio (ratio of market value of firm to book value of assets)					3.98%	1.99%	7.10%	86.93%
Momentum (recent stock price performance)					3.43%	2.86%	4.86%	88.86%
Any other risk:								
	Brounen, de Jong and Koedijk (2004) – U.K.				Brounen, de Jong and Koedijk (2004) – Netherlands			
Risks	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**
Risk of unexpected inflation	17.74%	25.81%	12.90%	43.55%	8.00%	12.00%	16.00%	64.00%
Interest rate risk (changes in general level of interest rates)	20.97%	27.42%	27.42%	24.19%	20.41%	8.16%	20.41%	51.02%
Term structure risk (change in long term vs. short term interest rate)	17.19%	17.19%	12.50%	53.13%	10.64%	0.00%	10.64%	78.72%
GDP or business cycle risk	16.13%	24.19%	8.06%	51.61%	8.33%	6.25%	10.42%	75.00%
Commodity price risk	19.05%	19.05%	7.94%	53.97%	2.13%	19.15%	10.64%	68.09%
Foreign exchange risk	12.50%	32.81%	17.19%	37.50%	6.00%	26.00%	18.00%	50.00%
Distress risk (probability of bankruptcy)	14.52%	9.68%	6.45%	69.35%	14.58%	4.17%	8.33%	72.92%
Size (Small firm being riskier)	21.88%	12.50%	7.81%	57.81%	17.02%	14.89%	14.89%	53.19%
Market to book ratio (ratio of market value of firm to book value of assets)	17.74%	9.68%	4.84%	67.74%	4.26%	2.13%	19.15%	74.47%
Momentum (recent stock price performance)	16.95%	5.08%	6.78%	71.19%	4.35%	0.00%	8.70%	86.96%
	Brounen, deJong and Koedijk.(2004) - Germany				Brounen, deJong and Koedijk.(2004) – France			
Risks	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**	**Adjust discount rate**	**Adjust cash flow**	**Both**	**Neither**
Risk of unexpected inflation	18.80%	9.40%	9.40%	62.39%	17.54%	24.56%	26.32%	31.58%
Interest rate risk (changes in general level of interest rates)	26.72%	14.66%	22.41%	36.21%	23.21%	26.79%	21.43%	28.57%
Term structure risk (change in long term vs. short term interest rate)	17.12%	7.21%	8.11%	67.57%	22.81%	12.28%	17.54%	47.37%
GDP or business cycle risk	6.19%	9.73%	11.50%	72.57%	15.79%	22.81%	12.28%	49.12%
Commodity price risk	4.39%	26.32%	16.67%	52.63%	8.62%	46.55%	12.07%	32.76%
Foreign exchange risk	13.27%	19.47%	18.58%	48.67%	16.36%	20.00%	5.45%	58.18%
Distress risk (probability of bankruptcy)	8.77%	14.04%	13.16%	64.04%	12.50%	23.21%	14.29%	50.00%
Size (Small firm being riskier)	9.91%	9.01%	12.61%	68.47%	23.64%	16.36%	10.91%	49.09%
Market to book ratio (ratio of market value of firm to book value of assets)	4.63%	8.33%	12.96%	74.07%	20.00%	12.73%	12.73%	54.55%
Momentum (recent stock price performance)	5.66%	0.94%	3.77%	89.62%	27.78%	3.70%	7.41%	61.11%

4.6 Summary

This study found that the most frequently cited discounting cash flows was NPV followed by IRR and also remarkably, applying the payback criterion in Sri Lanka. It can be concluded that discounted capital budgeting methods were commonly preferred over non-discounted techniques and furthermore, Sri Lankan firms with larger capital budgets tend to prefer NPV and IRR, while firms with small capital budgets tend to prefer PB and DPB. Although Sri Lankan firms with large capital projects try to apply the most sophisticated methods of real options and game theory decision, they are at an embryonic stage. Non-MBA qualified CFOs prefer to use PB, DPB and ARR, while MBA-qualified CFOs prefer to use the advanced capital budgeting practices of NPV and IRR, and at rock-bottom level, they tend to use the emerging approach of the most sophisticated capital budgeting practices of RO and GTD. Short-tenure CFOs prefer to use PB. However, long-tenure CFOs use NPV and at a lower level RO and GTD. Popular methods for incorporating risk included uncertainty absorption in cash flows, sensitivity analysis and probability analysis. Sri Lankan firms with large capital projects tend to use the advanced methods for incorporating risk, namely, sensitivity analysis, uncertainty absorption in cash flows and adjusting the required return and as suggested in the theories, they use some of the most sophisticated methods, DT and CAPM/β analysis. Notably, MBA-qualified CFOs prefer to use sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting the required return, DT and CAPM/β analysis more than non-MBA qualified CFOs. Long-tenure CFOs prefer to use uncertainty absorption in cash flows, DT and CAPM/β analysis. Sri Lankan CFOs determined their discount rate, most frequently by WACC, followed by CD and CAPM. In particular, Sri Lankan firms with large capital budgets tend to prefer to use WACC and CAPM while firms with small capital projects prefer to use CD to drive their cut-off rates. Moreover, CAPM was the most preferred method for calculating the cost of equity capital followed by average historical rate of return. While firms with large capital projects and CFOs with MBAs prefer CAPM and average historical return on stock to calculate their cost of equity capital, firms with small capital projects prefer to use judgment of opportunity cost. Remarkably, most firms use a discount rate for the entire company to evaluate the project.

In a nutshell, it can be concluded that as classified by the theory, Sri Lankan firms prefer to use the advanced capital budgeting practices namely, NPV, IRR, sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return and probability analysis. However, remarkably, PB, DPB and ARR are also used by Sri Lankan firms for

small capital budgets and these are largely managed by non-MBA qualified CFOs with a short tenure. Moreover, Sri Lankan firms with large capital projects have applied some of the most sophisticated capital budgeting practices, RO, GTD, DT and CAPM/β analysis, and these are managed by MBA-qualified CFOs.

Table 4.21: Summary of the hypothesis tests

Hypotheses	Results	Decision
H_1: Sri Lankan listed companies do not use sophisticated capital budgeting practices.	Advanced capital budgeting practices were more prevalent in Sri Lanka. Most prevalent CBPs are NPV and IRR. CB tools for incorporating risk were sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return and probability analysis	Supported
H_2: Sophisticated capital budgeting practices are used when a firm's capital budget is large.	Small firms significantly mostly preferred the use of PB and DPB. Nonetheless, large companies preferred to use NPV, IRR, RO, GTD, sensitivity analysis, uncertainty absorption in cash flows, adjusting the required return, decision trees and CAPM/β analysis	Supported
H_3: Manufacturing firms use more sophisticated capital budgeting practices.	The industry differences did not influence the choice of capital budgeting practice. The results only supported the notion that the use of ARR was significantly greater in non-manufacturing firms than in manufacturing firms.	Not supported

H_4: Chief Financial Officers with higher educational qualifications use more sophisticated capital budgeting practices.	Non-MBA qualified CFOs significantly used PB, DPB and ARR and MBA-qualified CFOs significantly used NPV, IRR, RO, GTD, sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return, probability analysis, decision trees and CAPM/β analysis.	Supported
H_5: Chief Financial Officers with a greater number of years of experience use more sophisticated capital budgeting practices.	CFOs with a short tenure used PB. In contrast, long-tenure CFOs significantly used NPV, RO, GTD, and uncertainty absorption in cash flows, decision trees and CAPM/β analysis.	Supported

CHAPTER FIVE

UNCERTAINTY FACTORS AND CAPITAL BUDGETING PRACTICES

5.1 Chapter overview

This chapter is designed to answer the research question of what variables compose uncertainty and the influence of each specific uncertainty variable on the choice of capital budgeting. Three advanced statistical analyses viz., exploratory factor analysis, confirmatory factor analysis and structural equation modelling, were employed. Psychometric properties were also established for validating the uncertainty model. The chapter ends with a brief summary.

5.2 Exploratory Factor Analysis

Gorsuch (2014) pointed out that the "prime use of factor analysis has been in the development of both the operational constructs for an area and the operational representatives for the theoretical constructs" (p. 369) and Dess and Davis (1984) connoted that factor analysis aids in detecting the presence of meaningful patterns among a set of variables. Unfortunately, there is no consistent nature of uncertainty and the variables composition of uncertainty to invoke previous studies (Miller, 1992; Verbeeten, 2006). For example, as discussed in chapter 2, Miller (1992) identified three types of uncertainty: general environment uncertainty, firm specific uncertainty and industry specific uncertainty. In contrast, for the same types of variable, Verbeeten (2006) identified four types uncertainty: finance uncertainty, input uncertainty, social uncertainty and market uncertainty. Their findings might be attributed to the country and cultural specific uncertainty. Thus, it is overarchingly important to conduct factor analysis to identify what variables compose of uncertainty and the prevailing specific uncertainty (Hurley et al., 1997; Hair et al., 2010; Field, 2013). Uncertainty is a latent variable measured by 17 indicators each using a 5-point Likert scale, 1 indicating "not at all important" to 5 indicating "very important" (see appendix A).

5.2.1 Underlying assumptions

Multivariate analysis requires underlying statistical assumptions of normality, homoscedasticity and linearity (e.g., Hair et al., 2010; Field, 2013). Generally, normality of a data set might be affected by outliers. Nonetheless, in this study, the indicators were measured using a Likert scale and ipso facto, outliers were considered as good observation

(Mavridis and Moustaki, 2008). Three important methods are commonly used to measure normality: skewness and kurtosis, the Kolmogorov-Smirnov test and Shapiro-Wilk test, and visual examination (e.g., P-P plots, Q-Q plots etc). Skewness and kurtosis (table 1 in appendix B) shows data are reasonably normally distributed, however, skewness and kurtosis and the Kolmogorov-Smirnov and Shapiro-Wilk tests are more sensitive to a large sample size (e.g., Hair et al., 2010; Field, 2013) For instance, in a nonnormal sample, 30 or fewer observations can have substantial impact on the results but for a large sample size the same detrimental effects may be negligible (e.g., Pallant, 2010; Hair et al., 2010; Field, 2013). Consequently, visual examination of p-p (probability-probability) is recommended as more reliable approach (e.g., Tabachnick, and Fidell, 2007; Hair et al., 2010; Field, 2013). As shown in figure 1 (appendix B), a pattern of spreading the value of all variables along the diagonal line was found, which is indicative of a "reasonably normally distributed" data set. The assumption of normality would enhance the solution but not always necessary (Tabachnick and Fidell, 2007). All in all, in a factor analysis, the assumptions of normality, homoscedasticity and linearity affect the correlation and thus Hair et al. (2010) recommend to assess the factorability of the correlation matrix.

5.2.2 The Sample size

Exploratory factor analysis is based on correlation coefficients that tend to fluctuate sample to sample. For instance, the correlation coefficients are less reliable in a small sample size in comparison with a large sample (Pallant, 2010; Hair et al., 2010; Field, 2013). Many statistical experts say the larger the sample size the better. Nonetheless, the minimum sample size requirement was discussed under absolute cases, ratio of variables to participants, factor loadings and communalities (table 5.1)

Table 5.1: Sample size

Requirement characteristics	Minimum requirements	Observation
Absolute cases	A minimum of 100 or more.	This study has 186 samples and thus met the minimum requirement.
Ratio of variables to participants	10:1 (Nunnally, 1978 cited in Pallant, 2010) or 5 to 10 participants up to a total of 300 (Kass and Tinsley, 1979 cited in Field, 2013)	This study has 17 variables and thus a minimum sample of 170 (17 x10) is met.
Factor loadings	Minimum of 300 sample required if factor loading is less than .4, however, four or more loadings greater than 0.6, sample size is not problematic (Guadagnoli and Velicer, 1988)	This study has a minimum loading of .824 and hence sample size is not problematic.
Communalities	All above .6 –less 100 samples is adequate. With 0.5 ranges - 100 to 200 is adequate. Below .5- minimum of 500 sample required (MacCallum et al.,1999)	The minimum value of the communalities of this study is .687 and thus a sample size of less than 100 is adequate.

As can be seen in table 5.1, this study satisfies the sample size requirement in terms of all criteria.

5.2.3 Techniques used

- Extraction methods

There are two most commonly used factor extraction methods: principal components analysis (PCA) and common factors analysis (e.g., principal-axis factoring, maximum-likelihood factoring, image factoring, alpha factoring, unweighted and generalised least squares). PCA is used to reduce the number of items retaining as much of the original item variance as possible whereas factors analysis is used to understand constructs that account for the shared variance among items (Worthington and Whittaker, 2006; Hair et al., 2010; Field, 2013). Factor analysis is more appropriate with the development of measurement scales (Worthington and Whittaker, 2006), of which the principal axis factoring method is the most widely used technique (e.g., Velicer and Jackson, 1990; Worthington and Whittaker, 2006). Velicer and Jackson (1990) connote that "component analysis can be viewed as a

computational efficient approximation to factor analysis" (p. 23) and "...the principle of parsimony, applied to parsimony procedures, provides the strongest argument for preferring component analysis over factor analysis" (p. 24). Moreover, in a similar study, Verbeeten (2006) also used PCA. Thus, this study employed PCA in line with Verbeeten (2006) and Velicer and Jackson (1990).

- Factor retention

Retaining a number of factors is of conflicting interest; a simple solution with as few factors as possible but needs to explain as much as variance as possible. The retained number of components is largely determined by four major techniques: a priori criterion (subjective), Kaiser's criterion (latent root), scree plot and parallel analysis, and use of those multiple techniques are in praxis and recommended in many seminal studies (e.g., Ford, MacCallum, and Tait, 1986; Matthews, Kath and Barnes-Farrell, 2010). However, a priori criterion was not employed as no well-defined structure of uncertainty is present (Miller, 1992; Verbeeten, 2006).

- Factor rotation

Factor rotation is employed to obtain simpler and theoretically more meaningful factor solutions by minimising cross loadings (Hair et al., 2010). A variable having more than one significant loading onto more than one factor is termed a cross loading (Hair et al., 2010). Thus, rotation supports interpretability of the factors by maximising the loading of each variable onto one factor making much clearer which variable relates to which factor (Field, 2013). Generally, there are two primary methods used in rotating factors for optimizing factor solution, viz., orthogonal and oblique. Of orthogonal rotation, commonly prevalent techniques are Varimax, Quartimax, and Equamax whilst oblique rotation includes Direct Oblimin and Promax. Nonetheless, the widespread use for orthogonal rotation is "Varimax" and for oblique rotation "Direct Oblimin" in social science studies (e.g., Hair et al., 2010). As each uncertainty construct is independent, Varimax rotation is a more congenial rotation method (e.g., Tabachnick and Fidell, 2007; Hair et al., 2010; Field, 2013) in line with Verbeeten (2006).

5.2.4 Analysis and results

The suitability of the data for factor analysis was measured by the Kaiser-Meyer–Olkin (KMO) measures of sampling adequacy and Bartlett's test of sphericity and the inspection of correlation coefficients (e.g., Hair et al., 2010; Pallant, 2010; Field, 2013). As a caveat, KMO

of each individual variable should satisfy a minimum of 0.5, otherwise they should be excluded from the factor analysis: one at a time, smaller taken first (e.g., Hair et al., 2010; Field, 2013). As can be seen in table 2 (2a to 2e - appendix B), initially, the diagonal elements of the anti-image correlation matrix have four variables below the minimum level of 0.5: natural uncertainties, fluctuating results under research projects (research uncertainties) and uncertainties on payment behavior of customers (credit uncertainties) and behavioral uncertainties. They were all removed: one at a time. Once the individual KMO conforms above the minimum of 0.5, the correlation matrix (*R*-matrix) was examined. As shown in table 3a (appendix B), some of the correlations between variables are r = 0.3 and above indicating the data set is suitable for factor analysis (e.g., Hair et al., 2010; Field, 2013). In the first stage of factor analysis, a variable called "Liability uncertainties (environment/product)" was discarded owing to a very low factor loading in line with Stevens (2002), Hair et al. (2010) and (Field 2013) (see table 4, appendix B). The value of the determinant of the correlation matrix is 0.002 (see table 3b, appendix B) which is higher than the minimum value of 0.00001 indicating no existence of multicollinearity (e.g., Hair et al., 2010; Field, 2013).

The results of the KMO and Bartlett's test are shown in table 5.2.

Table 5.2: KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.714
Approx. Chi-Square		1145.743
Bartlett's Test of Sphericity	df	66
	Sig.	.000

A measure of sampling adequacy, the KMO is .714 exceeding the minimum recommended value of .60 (Tabachnick and Fidell, 2007) and Bartlett's test of sphericity is significant (χ^2 (66) = 1145.743, p<.001) indicating factorability of the correlation matrix. That is the *R*-matrix is not an identity matrix explaining relationship between variables and thus, the data set is said to be appropriate for factor analysis.

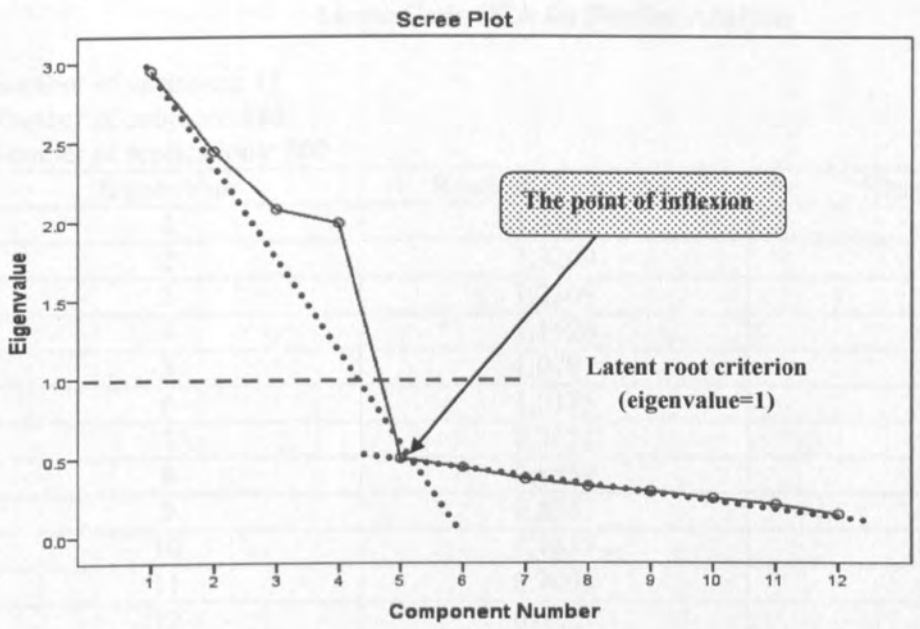
The Kaiser's criterion (eigenvalue rule) is most commonly used technique for retaining number of factors and the components with an eigenvalue greater than 1 is retained (Hair et al., 2010; Pallant, 2010; Field, 2013). The Kaiser's criterion is presented in table 5.3

Table 5.3: Kaiser's criterion for factor extraction

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.953	24.605	24.605	2.953	24.605	24.605	2.610	21.747	21.747
2	2.445	20.374	44.979	2.445	20.374	44.979	2.420	20.165	41.912
3	2.080	17.335	62.313	2.080	17.335	62.313	2.241	18.671	60.583
4	1.993	16.609	78.922	1.993	16.609	78.922	2.201	18.339	78.922
5	.503	4.192	83.114						
6	.442	3.687	86.801						
7	.368	3.063	89.864						
8	.323	2.693	92.557						
9	.291	2.422	94.979						
10	.248	2.070	97.049						
11	.209	1.746	98.795						
12	.145	1.205	100.000						
Extraction Method: Principal Component Analysis.									

As shown in table 5.3, only four components had eigenvalues greater than 1.0. The eigenvalue for the fifth component is .503 that is neither 1.00 nor closer to 1.0 and thus the component was excluded. The first component accounted for 24.61% of variance, the second for 20.37% of variance, the third for 17.34% of variance and the fourth for 16.61% of variance. All in all, all four components accounted for 78.92% of variance which is well above a minimum of 60% as recommended in social sciences (Hair et al., 2010). It is fair to say that the Kaiser's criterion produced an adequate level of variance by retaining a minimum of four components. Following the Kaiser's criterion, Cattell's Scree test (1966) was used to decide for the retention of factors. The scree plot is derived by plotting eigenvalues (on Y axis) against the number of factors (on X-axis). The point of inflexion where the curve becomes horizontal and meets the vertical and horizontal lines is the cut-off point for making factor retention decisions. The factors to the left of the point of inflexion are retained. The scree plot is shown in figure 5.1.

Figure 5.1: Scree plot for factor extraction



As shown in figure 5.1, the point of inflexion is at the fifth component, indicating that four components can be retained and the retention decision was consistent with the Kaiser's criterion.

Parallel analysis is another robust method for retention of number of factors. Hubbard and Allen (1987) connote that the Kaiser's criterion and Cattell's scree test overestimates the retention of factors. The analysis called "Monte Carlo PCA" was downloaded from http://www.allenandunwin.com/spss/further_resources.html as suggested by Pallant (2010) and it required: number of variables (inputted 12), number of subjects (inputted 186) and number of replications (inputted 200). The results are presented in table 5.4.

Table 5.4: Parallel analysis

Monte Carlo PCA for Parallel Analysis

Number of variables: 12
Number of subjects: 186
Number of replications: 200

Eigenvalue	Random Eigenvalue	Standard Dev
1	1.4451	.0649
2	1.3209	.0455
3	1.2309	.0356
4	1.1520	.0323
5	1.0797	.0313
6	1.0175	.0306
7	0.9522	.0270
8	0.8869	.0295
9	0.8263	.0292
10	0.7657	.0346
11	0.7003	.0344
12	0.6225	.0402

The decision rule of parallel analysis is that if the eigenvalue exceeds the corresponding random eigenvalue of the parallel analysis, the component will be retained. Table 5.5 shows the retention decision of the factors based on parallel analysis.

Table 5.5: Parallel analysis for factor extraction

Component number	Eigenvalue from PCA	Criterion value from parallel analysis	Decision
1	2.953	1.4451	Retained
2	2.445	1.3209	Retained
3	2.080	1.2309	Retained
4	1.993	1.1520	Retained
5	.503	1.0797	Rejected
6	.442	1.0175	Rejected
7	.368	.9522	Rejected
8	.323	.8869	Rejected
9	.291	.8263	Rejected
10	.248	.7657	Rejected
11	.209	.7003	Rejected
12	.145	.6225	Rejected

According to the table 5.5, the eigenvalues from PCA are greater for the first four factors than criterion values from the parallel analysis, and consequently, the four factors were retained.

Overall, the decision for the retention of four factors is consistent with the three major criteria: Kaiser's criterion, scree plot and parallel analysis (e.g., Ford, MacCallum, and Tait, 1986; Matthews, Kath and Barnes-Farrell, 2010).

Once the retention decision has been reached, it is overarchingly important to determine which variables make a factor (Hair et al., 2010). As a caveat, the communality is crucial that explains the proportion of common variance within a variable (Field, 2009). Generally, communalities spread between 0 and 1, however if any variable is found beyond the acceptable range, the variable should be eliminated from factor analysis. As can be seen in table 5 (appendix B), 82% of variance associated with variable 1 and 85%, 77%, 76%, 69%, 76%, 82%, 88%, 88%, 76%, 76% and 73% are common for the other eleven variables, respectively. Therefore, it is fair to say that all communalities are above (.727) explaining an excellent level of shared variance as the minimum requirement is set to .50 (Hair et al., 2010). Moreover, communalities suffice to proceed with factor rotation.

To minimise cross loadings and to make sure a given variable loads to a given factor, factors were rotated with the Varimax method of redistribution of variance in line with Verbeeten (2006), Hair et al. (2010) and Field (2013). The results of the rotation are explained by factor loadings that indicate the correlation of each variable with the factor (Hair et al., 2010) and are presented in table 5.6

Table 5.6: Principal Components Analysis with Varimax rotation

Variables	Component			
	Market Uncertainty	Social Uncertainty	Operational Uncertainty	Financial Uncertainty
Competitive uncertainties (intensifying competition, competitor attitudes and low entry barriers)	.932			
Output market (strong fluctuations in the demand for products in general and sector level, changes in consumer preferences, availability of substitutes and complements)	.930			
Input market (strong variations in quality and/or quantity of inputs such as raw materials and staff /supply relative to the industry demand)	.904			
Policy uncertainties (changes in Government policy, company policies, accounting policies, fiscal & monetary policies, tax policy, trade restrictions and regulations affecting business sector)		.918		
Political uncertainties (terrorism, war and changes in political regime)		.896		
Social uncertainties (changes in beliefs, values and attitudes reflected in business practice)		.871		
Input uncertainties (Availability of inputs)			.866	
Labour uncertainties (changes in labour productivity, strikes)			.868	
Production uncertainties (production variability and downtime, Manufacturing faults)			.839	
Interest rate uncertainties				.872
Inflation uncertainties				.865
Exchange rate uncertainties				.824
Eigenvalue	2.953	2.445	2.080	1.993
Proportion of variance explained (%)	24.61%	20.37%	17.34%	16.61%
Cumulative percentage explained	24.61%	44.98%	62.32%	78.93%
Cronbach's Alpha – Reliability of the factors	0.915	0.876	0.825	0.816

As can be seen in table 5.6, all factor loading were greater than .824 indicating a very significant loading as the minimum loadings for a sample of 200 is .364 (Stevens, 2002). Factor one is made up of three variables viz., Competitive uncertainties (intensifying competition, competitor attitudes and low entry barriers), Output market (Strong fluctuations in the demand for products in general and sector level, changes in consumer preferences, availability of substitutes and complements) and Input market (strong variations in quality and/or quantity of inputs such as raw materials and staff) with loadings of .932, .930 and .904, respectively. Factor two is made up of three variables viz., Policy uncertainties (changes in government policy, company policies and accounting policies), Political uncertainties (changes in political regime) and Social uncertainties (changes in beliefs, values and attitudes reflected in business practice) with loadings of .918, .896 and .871, respectively. Factor three

is also made up of three variables viz., input uncertainties (availability of inputs), labour uncertainties (changes in labour productivity, strikes) and production uncertainties (production variability and downtime) with loadings of .866, .868 and .839, respectively. In a similar vein, factor four consisted of three variables viz., Interest rate uncertainties, Inflation uncertainties and Exchange rate uncertainties with loadings of .872, .865 and .824 respectively. Having given meticulous attention to the composite of variables of factors, they were named as Market Uncertainty, Social Uncertainty, Operational Uncertainty and Financial Uncertainty, respectively, and the decision is further supported in line with Verbeeten (2006).

Once variables with factors have been decided, further robust checks for establishing explanatory power to the structure were carried out. Firstly, each factor consisted of three variables which satisfies the "rule of three" considered as "a rock bottom lower bound" (e.g., MacCallum, 1990; Bollen and Lennox, 1991; Velicer and Fava, 1998; Fabrigar et al., 1999; Costello and Osborne, 2005; Hair et al., 2010; Field, 2013). Secondly, reliability of each factor was examined using Cronbach's α, for which a value between 0.60 to .70 is the lower limit of acceptability (e.g., Gliner and Morgan, 2000). The results revealed that all factors have excellent reliability, over .80. Thirdly, inter-item correlation was assessed, for which a minimum value should be at least .30 (Pallant, 2010). The minimum inter-item correlation was .564 for the factor "financial uncertainty", which is well above the minimum requirement of .30. The results of the additional characteristics extracted were summarised in table 5.7 (see table 6 (tables 6.1 to tables 6.4) in appendix B for full details).

Table 5.7: A summary of the final checks of the extracted factors

Factor	Variables composed factor	Satisfy rule of three	Inter- item correlation	Decision on inter item correlation	Cronbach's α	Any item removal would increase the reliability?	Any action needed regarding Cronbach's α
Market Uncertainty	U8, U9, and U10	Factor has three variables and ipso facto satisfies rule of three	A minimum inter correlation is 0.756 and is well above a minimum requirement of .30	No action is needed	0.915	If item 9 deleted, Cronbach's α will go up to 0.917	Both values present excellent reliability and thus no action is needed.
Social Uncertainty	U1, U2, and U6	Factor has three variables and ipso facto satisfies rule of three	A minimum inter correlation is 0.660 and is well above a minimum requirement of .30	No action is needed	0.876	No	No action is needed
Operational Uncertainty	U11, U12, and U13	Factor has three variables and ipso facto satisfies rule of three	A minimum inter correlation is 0.588 and is well above a minimum requirement of .30	No action is needed	0.825	No	No action is needed
Financial Uncertainty	U3, U4, and U5	Factor has three variables and ipso facto satisfies rule of three	A minimum inter correlation is 0.564 and is well above a minimum requirement of .30	No action is needed	0.816	No	No action is needed

In sum, four factors, namely, Market Uncertainty, Social Uncertainty, Operational Uncertainty and Financial Uncertainty, were extracted using the principal component analysis with Varimax rotation. All four factors accounted for 78.93% of variance and have good reliability with sufficient inter-item correlations. The factors are robust and theoretically meaningful and interpretable. In the next step, confirmatory factor analysis was performed to confirm the model fit and to establish psychometrics properties.

5.3 Confirmatory factor analysis

Confirmatory factor analysis is the most widely used technique following an exploratory factor analysis (Bagozzi and Foxall, 1996; Worthington and Whittaker, 2006) to see how fit the data to a preconceived model (Worthington, and Whittaker, 2006). The CFA was conducted by using AMOS (Analysis of Moment Structures). In AMOS, data analysis is in the form of a path diagram which is a pictorial presentation of the model. The CFA path diagram consists of latent constructs (unobserved variables), indicators (measured or manifest variables), error terms and their linkages using one-headed arrows or two-headed arrows. The latent variables are drawn by "ellipses" and measured variables by "rectangles". A one-headed arrow from a latent variable towards an indicator is a factor loading (in AMOS, factor loadings are referred to as regression weights however, in LISREL they are called lambda). Each indicator in turn has an error term indicating how far the latent variable does not explain the measured variables (Hair et al., 2010). The validity of the model was established using both GOF (goodness-of-fit) indices and construct validity.

GOF indices generally fit the model by comparing estimated covariance matrix (theory) to the observed covariance matrix (reality) (Hair et al., 2010). Among the different types of GOF indices, this study reports the RMSEA, CFI, RMR and SRMR to see the model fit (e.g., Kline, 2005; Byrne, 2010). Of the number of fit indices, the fundamental fit index is the chi square (χ^2) statistic which is the mathematical function of the sample size, and the difference between the observed and estimated covariance matrices and ipso facto, ceteris paribus, if sample size (N) increases χ^2 value will also increase and in similar vein, adding indictors would also increase the χ^2 value. Insignificant result of the χ^2 test denotes the model's perfect fit where the model capably reproduces the covariance matrix of the observed variables.

The psychometric property of the model is the construct validity which primarily includes convergent validity and discriminant validity. Convergent validity is generally measured by factor loading, AVE (average variance extracted) and construct reliability. A factor loading of 0.7 is considered as good convergent validity as half the variance (.7 x .7) in the model is explained by indicators rather error variance (Hair et al., 2010). In a similar vein, AVE of .5 or greater is considered as an adequate level as it explains mean variance of the item loadings onto a factor. Construct reliability (CR), as a rule of thumb, over .60 is an indicator of convergent validity (Hair et al., 2010).

Discriminant validity is measured by comparing AVE with the square of the correlation. If AVE is above the square correlation, the constructs are said to be distinct (unique) (Hair et al., 2010).

5.3.1 Fitness of the model- analysis and results

As can be seen in figure 5.2, the model consisted of four latent constructs and each is represented by three indicators: market uncertainty (uncertainties on competitive, output market and input market), social uncertainty (uncertainties on policy, political and social), operational uncertainty (uncertainties on input, labour and production) and financial uncertainty (uncertainties on interest rate, inflation rate and exchange rates). Thus, in total, 12 observed variables (4 x 3 =12) composed the model and each observed variable has an error term marked by e1 to e12. As derived in the factor analysis, each variable was loaded onto a particular factor and as a fundamental, all four factors were connected by a double-headed arrow (covary). Further, it is important to confirm the model is an over identified model (Byrne, 2010). Elaborating, the number of data point is 78 [(P (P+1) / 2) where *P* stands for observed variable (12 (12+1) / 2)] with 30 unknown parameters and consequently, the model is over identified with 48 degrees of freedom. Table 5.8 presents the summary of the model parameters.

Table 5.8: The model summary statistics, variables and parameter

Computation of degrees of freedom	
Number of distinct sample moments:	78
Number of distinct parameters to be estimated:	30
Degrees of freedom (78 - 30):	48
Results	
Minimum was achieved	
Chi-square = 53.918	
Degrees of freedom = 48	
Probability level = .258	
Variables	
Number of variables in your model:	28
Number of observed variables:	12
Number of unobserved variables:	16
Number of exogenous variables:	16
Number of endogenous variables:	12

Parameter summary

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	16	0	0	0	0	16
Labeled	0	0	0	0	0	0
Unlabeled	8	6	16	0	0	30
Total	24	6	16	0	0	46

As shown in table 5.8, the model has 28 variables consisting of 12 observed variables and 16 unobserved variables. In other words, 16 are the exogenous variables and the remaining 16 are the endogenous variables. This model has 24 regression weights consisting of 16 fixed weights (12 error terms and 4 are the first each indicator loading-assigned value of 1). There are 6 covariances (double-headed arrow between factors) and 16 variances. All in all, the model has 46 parameters, of which 30 are estimated (8 regression weights, 6 covariances, and 16 variances).

In CFA, the parameter estimate is anchored in tri-norms: feasibility of the parameter estimates, appropriateness of standard errors and significance of the parameter estimates (Byrne, 2010). The feasibility of the parameter is mainly assessed by the correct sign and size and the results show that all correlations were neither greater than one nor had negative variance/covariance nor with correlation matrix not positive definite (table 7 appendix B). Generally, standard errors should be close to zero for accurate estimation. As can be seen in

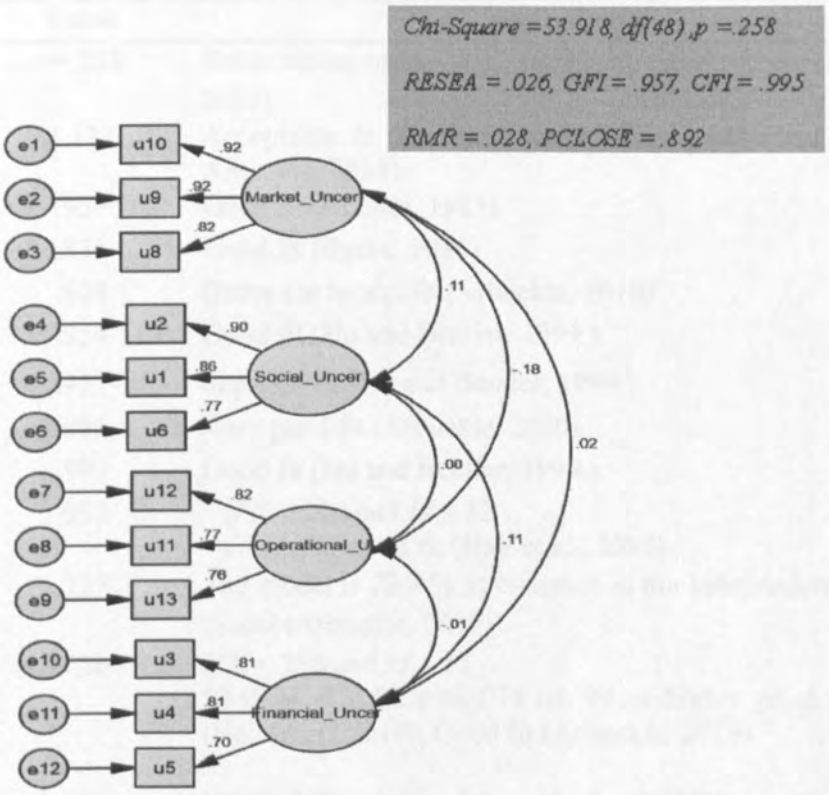
table 7 (appendix B), all standard errors are close to 0.05 indicating accurateness of the model estimation. The crux of the statistical analysis is dependent on the statistical significance and if the CR (critical ratio) is above +/- 1.96, the estimate is deemed to be statically significant. Table 5.9 shows the parameter estimate for both unstandardized solution and standardized solution.

Table 5.9: Parameter estimate both unstandardized solution and standardized solution

Unstandardised solution						Standardised solution
		Estimate	S.E.	C.R.	*p*	Estimate
U8	<--- Market Uncertainty	1.000				.819
U9	<--- Market Uncertainty	1.050	.068	15.347	***	.922
U10	<--- Market Uncertainty	.976	.064	15.363	***	.922
U6	<--- Social Uncertainty	1.000				.772
U1	<--- Social Uncertainty	1.339	.112	11.962	***	.859
U2	<--- Social Uncertainty	1.492	.122	12.224	***	.897
U13	<--- Operational Uncertainty	1.000				.762
U11	<--- Operational Uncertainty	1.008	.108	9.316	***	.767
U12	<--- Operational Uncertainty	1.053	.113	9.298	***	.816
U5	<--- Financial Uncertainty	1.000				.702
U4	<--- Financial Uncertainty	1.212	.138	8.784	***	.806
U3	<--- Financial Uncertainty	1.236	.140	8.810	***	.812

As can be seen in table 5.9, the results of the unstandardised solution all estimate statically significant. As discussed earlier, standardised factor loadings for each indicator to a factor should be at least .50 or most preferably .70. The factor loadings (standardised solution) were all above .70 demonstrating that all indicators are statically significant to their respective factor. Elaborating, U8, U9 and U10 to the factor of market uncertainty have the significant loadings of .819, .922 and .922, respectively. In a similar vein, U6, U1 and U2 to the factor of social uncertainty have the significant loadings of .772, .859 and .897, respectively. As to U13, U11 and U12 to the factor of operational uncertainty, these have the significant loadings of .762, .767 and .816, respectively. Finally, U5, U4and U3 to the factor of financial uncertainty have significant loadings of .702, .806 and .812, respectively. The model of uncertainty is depicted in figure 5.2.

Figure 5.2: The model of uncertainty



Once the basics of significant loadings are confirmed, it is of paramount important to assess the model fit. AMOS provides a number of diagnostic measures, called GOF indices. The crux of GOF is the chi square (χ^2) and as discussed earlier the nonsignificant result is indicative of a well-fitting model. As can be seen in table 8 (appendix B), the χ^2 is expressed as χ^2 (48) = 53.918, p>.05 (p=.258). That is the value of χ^2 is nonsignificant indicating a well-fitting model (e.g., Bagozzi and Foxall, 1996; Kline, 2005; Hair et al., 2010; Byrne, 2010). Moreover, CMIN/DF = 1.123, RMSEA =.026, CFI = .995, RMR = 0.028, and SRMR = .0428 are indicative of a well-fitting model. A summary of the major GOF is presented in table 5.10.

Table 5.10: Summary of relevant GOF measures

GOF	Value	Description
CMIN (χ^2)	p=.258	Better fitting model (e.g., Hair et al., 2010; Arbuckle, 2010)
CMIN/DF	1.123	Acceptable fit (Carmines and McIver (1981 cited in Arbuckle, 2010)
GFI	.957	Good fit (Hoelter, 1983)
AGFI	.931	Good fit (Byrne, 2010)
RMR	.028	Better the model fit (Arbuckle, 2010)
NFI	.954	Good fit (Hu and Bentler, 1999)
RFI	.937	Superior fit (Hu and Bentler, 1999)
IFI	.995	Very good fit (Arbuckle, 2010)
TLI	.993	Good fit (Hu and Bentler, 1999)
CFI	.995	*If* $N < 250$ and $M \leq 12$ CFI > .97 good fit (Hair et al., 2010)
PRATIO	.727	The model is 72.7 % as complex as the independence model (Arbuckle, 2010)
RMSEA	.026	*If* $N < 250$ and $M \leq 12$ RMESA < 0.08 with CFI of .97 or higher good fit (Hair et al., 2010), Good fit (Arbuckle, 2010)
PCLOSE	.892	If PCLOSE > 0.5, null hypothesis of RMSEA $\leq$ .05 is supported (Arbuckle, 2010)

Drawing on GOF, it can be concluded that the four-factor model of uncertainty is a well-fitting model. Nonetheless, an additional robust check was carried out to strengthen the model developed.

The results are based on maximum likelihood methods, and thus as a caveat, it is crucial that the data conform to multivariate normality. As a part of multivariate normality, Mahalanobis *d*-squared did not show any serious multivariate outliers as it measures "distance in standard deviation units between a set of scores for one case and the sample means for all the variables (centroids)" (Byrne, 2010, p. 106). The results of the kurtosis and skewness did not portent of non-normality in line with West, Finch and Curran (1995) (table 1 in appendix B). Moreover, the methods of GLS (Generalized Least Squares) and ADF (Asymptotically Distribution-free) for nonnormal data were carried out to observe the differences between the methods and the results are provides in table 5.11.

Table 5.11: Model fit using alternative methods

GOF	ML	Generalized Least Squares Estimates	Asymptotically Distribution-free Estimates
CMIN (χ^2)	53.918	55.304	62.205
	p=.258	p=.218	p=.082
CMIN/DF	1.123	1.152	1.296
GFI	.957	.950	.965
AGFI	.931	.919	.943
RMR	.028	.041	.069
SRMR	.043	.045	.069
NFI	.954	.821	.864
RFI	.937	.754	.855
IFI	.995	.972	.974
TLI	.993	.959	.963
CFI	.995	.970	.973
PRATIO	.727	.727	.727
RMSEA	.026	.029	.040
PCLOSE	.892	.868	.708

As can be seen in table 5.11, the data is very well-fitted under all alternative methods, ML, GLS and ADF (both normality- and non-normality-based). Any significant differences were not observed. Therefore, it can be concluded the data demonstrates excellent model fit and thus the additional validation process was acknowledged and the results are discussed in the next section.

5.3.2 The psychometric properties of the model – analysis and results

As discussed earlier, the psychometric properties of the model are overarchingly important, which primarily explain construct validity (convergent validity and discriminant validity are required) (Schriesheim et al., 1993). As can be seen in table 5.6, all factor loadings were above .70 indicating strong convergent validity. The further measurement apropos of construct validity is provided in table 5.12.

Table 5.12: The results of the validity measures

	CR	AVE	MSV	ASV	SU	MU	FU	OU
Social Uncertainty (SU)	0.881	0.713	0.013	0.008	0.844			
Market Uncertainty (MU)	0.919	0.790	0.034	0.016	0.112	0.889		
Financial Uncertainty (FU)	0.818	0.601	0.012	0.004	0.109	0.021	0.775	
Operational Uncertainty (OU)	0.825	0.612	0.034	0.011	-0.002	-0.184	-0.008	0.782

CR: Construct Reliability; AVE: Average Variance Extracted; MSV: Maximum Shared Variance; ASV: Average Shared Variance

As reflected in table 5.12, AVE exceeded a minimum of .50 and the lowest AVE is .601 and CR is all well above a minimum threshold of .70; consequently, the model is said to have high convergent validity. Moreover, in all cases CR is greater than AVE which is another indicative of strong convergent validity. In sum, this model is a robust model having excellent convergent validity implying that all items of the model are statically well-fitting to each factor. Having established convergent validity, the discriminant validity deserves much importance to confirm that each factor is distinct/unique. As can be seen in table 5.12, the AVEs are greater than the corresponding squared intercorrelations and MSV and ASV are less than AVE (i.e., MSV < AVE and ASV < AVE) are indicative of high discriminant validity. As can be seen in table 9 (appendix B), all standardised residuals are well below 2.5 indicating the model is further accurate in situ.

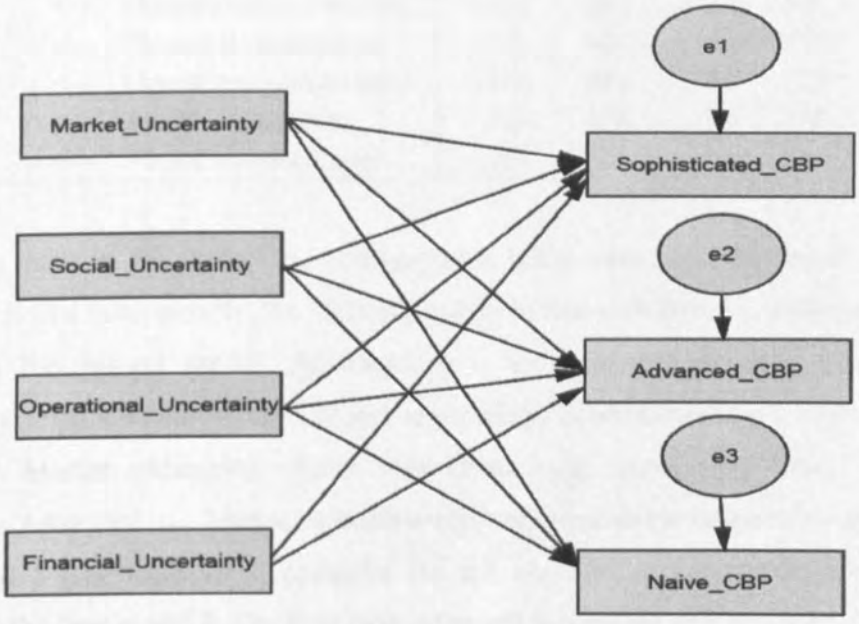
In sum, results of the CFA confirm the four-factor uncertainty model is robust and has strong construct validity. Moreover, the model is theoretical meaningful and interpretable. Therefore, it can be concluded that four uncertainty factors (each represented by three variables) composed of total uncertainty, viz., market uncertainty (uncertainties on competitive, output market and input market), social uncertainty (uncertainties on policy, political and social), operational uncertainty (uncertainties on input, labour and production) and financial uncertainty (uncertainties on interest rate, inflation rate and exchange rates). Therefore, the hypothesis (H_{6a}) that Miller's (1992) three-level model is applicable in the Sri Lankan context was not supported, instead, four- new factor model was devised.

The next section covers the influence of each specific uncertainty on capital budgeting practices.

5.4 Assessing impact of uncertainty on capital budgeting practices using structural equation modelling

The influence of specific uncertainties (market uncertainty, social uncertainty operational uncertainty and financial uncertainty) on capital budgeting practices (sophisticated, advanced and naïve) was examined using SEM (Structural Equation Modeling). The hypothesised model is presented in figure 5.3.

Figure 5.3: The hypothesised model-the influence of uncertainty on capital budgeting practices



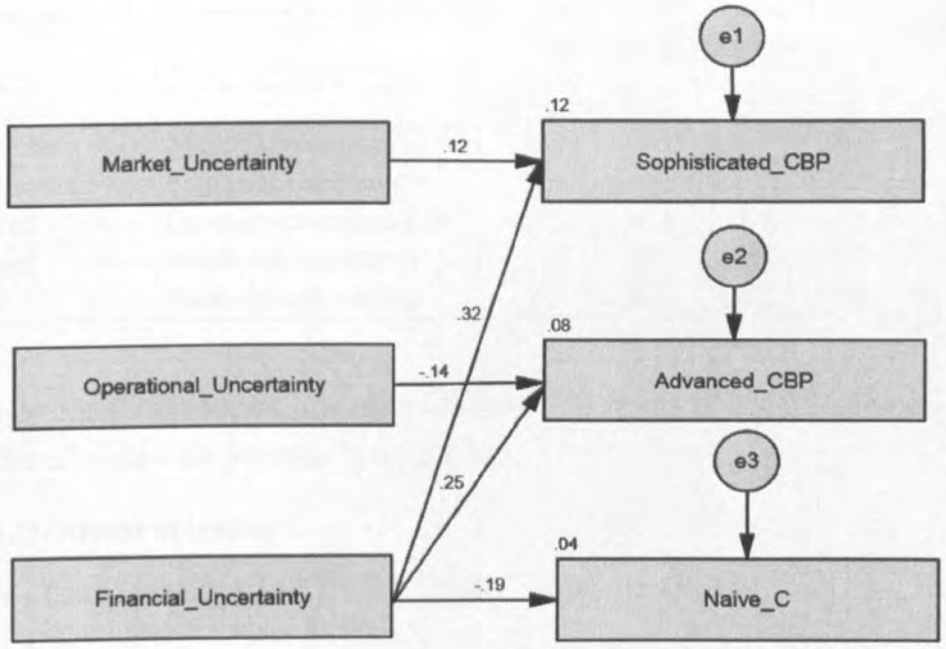
The results of the analysis are presented in table 5.13. Results found in model 1 (hypothesised) indicate that only three paths are statically significant: Sophisticated <--- Financial-uncertainty (β = .213, $C.R$= 4.744, p<.001), Advanced <---Financial-uncertainty (β = .219, $C.R$= 3.535, p<.001) and NAIVE<---Financial-uncertainty (β = -.158, $C.R$= -2.552, p<.05) (CR is greater than ±1.96/ p<.05).

Table 5.13: Results of the hypothesised model using SEM

			Unstandardized Solution				Standardized Solution
			Estimate	S.E.	C.R.	P	Estimate
Sophisticated	<---	Marketing-uncertainty	.091	.049	1.868	.062	.128
Advanced	<---	Marketing-uncertainty	-.055	.067	-.823	.410	-.058
Naive	<---	Marketing-uncertainty	-.048	.067	-.722	.470	-.052
Sophisticated	<---	Social-uncertainty	-.028	.041	-.693	.488	-.048
Sophisticated	<---	Operational-uncertainty	.010	.047	.224	.823	.015
Sophisticated	<---	Financial-uncertainty	.213	.045	4.744	***	.326
Advanced	<---	Social-uncertainty	-.011	.056	-.192	.848	-.014
Advanced	<---	Operational-uncertainty	-.121	.064	-1.873	.061	-.132
Advanced	<---	Financial-uncertainty	.219	.062	3.535	***	.249
Naive	<---	Operational-uncertainty	-.050	.064	-.776	.438	-.056
Naive	<---	Social-uncertainty	-.030	.056	-.527	.598	-.038
Naive	<---	Financial-uncertainty	-.158	.062	-2.552	.011	-.184

In order to improve the model, the nonsignificant paths were removed one at a time: the lowest CR is first (alternatively, the highest *p* value) in line with Byrne (2010) and Hair et al. (2010). In the second model, Advanced <--- Social uncertainty was removed, and respectively Sophisticated<--- Operational uncertainty, Sophisticated<---Social uncertainty, Naive <--- Market uncertainty, Naive <--- Operational uncertainty, Naive <--- Social uncertainty, Advanced <--- Marketing uncertainty were removed in consecutive models 3, 4, 5, 6, 7 and 8 (see table 10 in appendix B). All nonsignificant paths were successfully removed in the final model 8. The final reduced model is depicted in figure 5.4.

Figure 5.4: Model 8 - Reduced model



The results of the final model are presented in table 5.14. Results show that market uncertainty has significant positive impact on sophisticated capital budgeting practices (β = .086, *C.R.* = 1.982, p<.05). In similar vein, financial uncertainty has also statically significant positive impact on sophisticated capital budgeting practices (β = .210, *C.R.* = 4.675, p<.001). Financial uncertainty has the largest impact (largest standardised coefficient .322) on sophisticated capital budgeting practices compared to market uncertainty (.121). Operational uncertainty (β = -.130, *C.R.* = -2.278, p<.05) and financial uncertainty (β = .218, *C.R.* = 3.498, p<.001) have statistically significant impact on advanced capital budgeting practices, to wit, the financial uncertainty has the greatest positive impact (.247) than that of negative impact by operational uncertainty (-.142). Of the three types of uncertainty, only financial uncertainty has impact on naive capital budgeting practices β = -.161, *C.R.* = -2.600, p<.05) and the relationship is negative. Therefore, hypothesis (H_{6b}) that specific uncertainties influence the choice of capital budgeting practices in the Sri Lankan context was supported in case of market, financial and operational uncertainties.

Table 5.14: The results of the reduced model

			Unstandardized Solution				Standardized Solution
			Estimate	S.E.	C.R.	P	Estimate
Sophisticated	<---	Marketing-uncertainty	.086	.043	1.982	.047	.121
Sophisticated	<---	Financial-uncertainty	.210	.045	4.672	***	.322
Advanced	<---	Operational-uncertainty	-.130	.057	-2.278	.023	-.142
Advanced	<---	Financial-uncertainty	.218	.062	3.498	***	.247
NAIVE	<---	Financial-uncertainty	-.161	.062	-2.600	.009	-.188

Besides the significant results, it is crucial to assess the model fit and the summarised GOF indices for all models are presented in table 5.15.

Table 5.15: Model fit indices

GOF→ Models ↓	CMIN (*p*)	CMIN/DF	CFI	GFI	RMR	SRMR	RMSEA	PCLOSE	AIC	ECVI
1	7.258 (.298)	1.210	.989	.989	.020	.039	.034	.562	51.258	.277
2	7.294 (.399)	1.042	.997	.989	.020	.039	.015	.677	49.294	.266
3	7.343 (.500)	.918	1.000	.989	.020	.039	.000	.771	47.343	.256
4	7.782 (.556)	.865	1.000	.988	.020	.038	.000	.821	45.782	.247
5	8.236 (.606)	.824	1.000	.988	.020	.039	.000	.859	44.236	.239
6	8.674 (.652)	.789	1.000	.987	.021	.041	.000	.891	42.674	.231
7	4.741 (.577)	.790	1.000	.992	.017	.036	.000	.794	34.741	.188
8	6.346 (.500)	.907	1.000	.989	.017	.035	.000	.756	34.346	.186

As can be seen in table 5.15, all GOF indices are excellent in model 8 in comparison with the other models. Therefore, it can be concluded that model 8 is the final robust model exhibiting the influences of uncertainty on capital budgeting practices.

Major aspects of uncertainties have been clearly elaborated and in the next step, a hypothesis proposed in chapter 2 that "specific uncertainties influence the choice of capital budgeting practices in the Sri Lankan context" has been partially supported. Elaborating, of four specific uncertainties, market uncertainty and financial uncertainty increased the application

of sophisticated capital budgeting practices. Nonetheless other two types of uncertainty (i.e., operational-uncertainty and social uncertainty) did not significantly influence the use of sophisticated capital budgeting practices. In contrast, operational uncertainty decreased the use of advanced capital budgeting practices whereas financial uncertainty increased the use of advanced capital budgeting practices. Nonetheless, market uncertainty and social uncertainty did not influence the application of advanced capital budgeting practices. Furthermore, only financial uncertainty has a negative influence on naive capital budgeting practices.

5.5 Summary

This chapter identified four major types of specific uncertainty: market uncertainty (uncertainties on competitive, output market and input market), social uncertainty (uncertainties on policy, political and social), operational uncertainty (uncertainties on input, labour and production) and financial uncertainty (uncertainties on interest rate, inflation rate and exchange rates). In CFA, the four-factor model of uncertainty was confirmed with its psychometric properties (convergent validity and discriminant validity). Following the validation of the structure of the uncertainties, the influence of specific uncertainties on capital budgeting was examined and the results revealed that only financial uncertainty influences the use of capital budgeting practices. Moreover, market uncertainty increased application of sophisticated capital budgeting practices while operational uncertainty reduced the use of advanced capital budgeting practices.

CHAPTER SIX

FIRM CHARACTERISTICS, UNCERTAINTY, CAPITAL BUDGETING PRACTICES AND FIRMS' PERFORMANCE

6.1 Chapter overview

This chapter answers the research question: does uncertainty moderate the relationship between capital budgeting practices and firms' performance? Initially, a correlation analysis is employed to find out whether there is an association between firms' characteristics and types of uncertainties and capital budgeting practices, and capital budgeting practices and firms' performance. In the next section, the impact of firms' characteristics on the application of capital budgeting practices and the impact of capital budgeting practices on firms' performances are explored. In the penultimate section, the moderating effect of uncertainty between capital budgeting practices and performance is assessed. Finally a model representing capital budgeting practices in Sri Lanka is developed and the chapter ends with a brief summary.

6.2 Correlations analysis

Correlation analysis measures the strength and direction of the linear relationship between two variables (Pallant, 2010; Field, 2013). The relationship between two variables can be related in three ways: positively related, not related or negatively related. The nature of a significant relationship can be explained in terms of a correlation coefficient and its sign ± (direction of association) along with a significance value. A coefficient of +1 is indicative that the variables are perfectly positively correlated. A coefficient of -1 is the polar opposite, indicating that the two variables are perfectly negatively correlated. A coefficient of zero or close to zero is indicative that there is no linear relationship between the variables. Nonetheless, highly correlated variables (above .8 or .9) are indicative of multicollinearity and are not preferable (Field, 2013).

The Pearson correlation coefficient (known as the Pearson product-moment correlation coefficient) is determined in line with Hair et al. (2010), Pallant (2010) and Field (2013). This study employs a correlation analysis to discover the association, direction and magnitude of the variables, mainly: the variables that determine the choice of capital budgeting practices and capital budgeting practices with performance variables.

6.2.1 Correlation analysis-predictive variables and capital budgeting practices

A correlation analysis was carried out between firms' characteristics (size of the capital budget, educational qualifications of CFOs, the tenure of CFOs and the industry) and specific uncertainties (market uncertainty, social uncertainty, operational uncertainty and financial uncertainty) and capital budgeting practices (sophisticated capital budgeting practices, advanced capital budgeting practices and Naive capital budgeting practise). The results are presented in table 6.1.

Table 6.1: Correlations between predictive variables and capital budgeting practices

	1	2	3	4	5	6	7	8	9	10	11
1.Size of the capital budget	1.000										
2.Educational qualification	.194***	1.000									
3.Tenure of CFOs	.170**	.067	1.000								
4.Industry	-.053	.067	.053	1.000							
5.Market_Uncertainty	.140*	-.048	.108	.050	1.000						
6.Social_Uncertainty	.078	.063	.027	-.091	.101	1.000					
7.Operational_Uncertainty	.063	-.050	.063	.185**	-.140*	-.015	1.000				
8.Financial_Uncertainty	.267***	.075	.065	-.188***	.014	.095	-.003	1.000			
9.Sophisticated_CBP	.786***	.196***	.202***	-.018	.126*	-.004	-.003	.324***	1.000		
10.Advanced_CBP	.314***	.663***	.141*	-.028	-.038	.006	-.125*	.248***	.402***	1.000	
11.Naive_CBP	-.466***	-.277***	-.120	-.090	-.050	-.060	-.047	-.188**	-.448***	-.433***	1.000

***. Correlation is significant at the 0.01 level (2-tailed), **. Correlation is significant at the 0.05 level (2-tailed), *. Correlation is significant at the 0.10 level (2-tailed).
Note: Size of the capital budget (1= small, 2 = large), Educational qualification (1=non MBA, 2=MBA), Tenure of CFOs (1=short, 2 =Long), Industry (1=Non Manufacturing, 2 =Manufacturing)

As can be seen in table 6.1, the size of the capital budget has a strong positive association with sophisticated capital budgeting practices at a 1% significance level (r =.786, $p < 0.01$). Moreover, the educational qualifications of CFOs (r =.196, $p < 0.01$), the tenure of CFOs (r =.202, $p < 0.01$), market uncertainty (r = 126, $p < 0.10$) and financial uncertainty (r =.324, $p < 0.01$) are also significantly positively associated with sophisticated capital budgeting practices. In a similar vein, the size of the capital budget (r =.314, $p < 0.01$), the educational qualifications of CFOs (r =.663, $p < 0.01$), the tenure of CFOs (r =.141, $p < 0.10$) and financial uncertainty (r =.248, $p < 0.01$) are significantly positively associated with advanced capital budgeting practices. A negative significant association is observed between operational uncertainties and advanced capital budgeting practices (r = -.125, $p < 0.10$). In contrast, the size of capital budget (r =-.466, $p < 0.01$), the educational qualifications of CFOs (r =-.277, $p < 0.01$) and financial uncertainties (r =-.188, $p < 0.05$) are significantly

negatively associated with naive capital budgeting practices. Types of industry and social uncertainty are not significantly associated with any of the capital budgeting practices.

6.2.2 Correlations between capital budgeting practices and firm performance

A correlation analysis was performed between capital budgeting practices (sophisticated, advanced and naive capital budgeting practices) and firm performance (effectiveness, ROA, ROE, EPS and Tobin_q). Table 6.2 presents the results of the correlation analysis.

Table 6.2 Correlations between capital budgeting practices and firm performance

	1	2	3	4	5	6	7	8
1.Sophisticated_CBP	1.000							
2.Advanced_CBP	.402***	1.000						
3.Naive_CBP	-.448***	-.433***	1.000					
4.Effectiveness	.133*	.237***	-.026	1.000				
5.Return on Assets	.046	-.085	-.046	-.089	1.000			
6.Return on Equity	.159**	.031	-.093	.038	.441***	1.000		
7.Earning per share	.037	-.065	.041	-.035	.377***	.142*	1.000	
8.Tobin_q	.376***	.289***	-.196***	.307***	.081	.033	-.038	1.000

***. Correlation is significant at the 0.01 level (2-tailed), **. Correlation is significant at the 0.05 level (2-tailed), *. Correlation is significant at the 0.10 level (2-tailed).

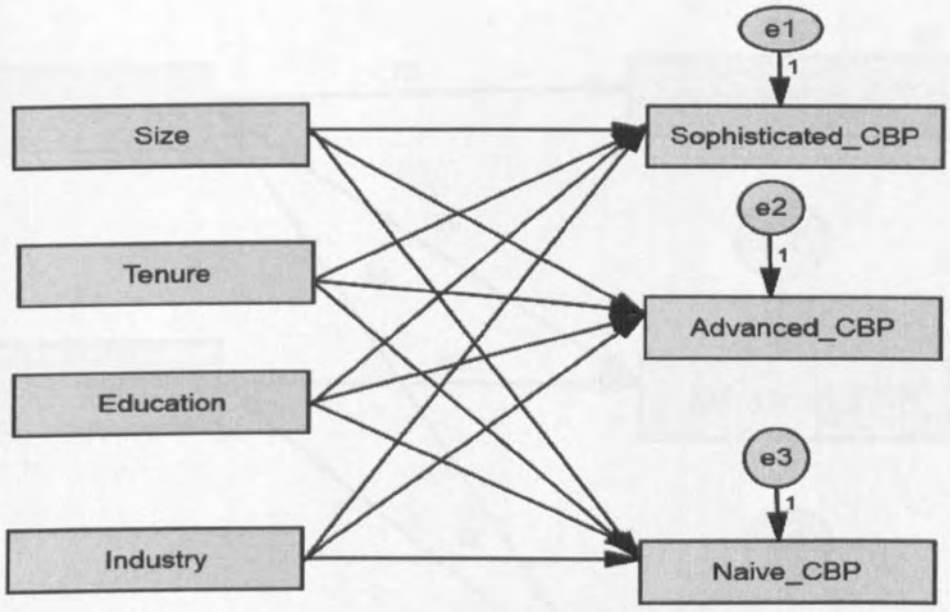
As shown in table 6.2, sophisticated capital budgeting practices are significantly positively associated with effectiveness (r =.133, $p < 0.10$), ROE (r =.159, $p < 0.05$) and Tobin_q (r =.376, $p < 0.01$). ROA and EPS are not significantly associated with sophisticated capital budgeting practices. Advanced capital budgeting practices are significantly positively associated with effectiveness (r =.237, $p < 0.01$) and Tobin_q (r =.289, $p < 0.01$). However, ROA, ROE and EPS are not significantly associated with advanced capital budgeting practices. There is a negative significant association between naive capital budgeting practices and Tobin_q (r = -.196, $p < 0.01$). Nonetheless, naive capital budgeting practices are not significantly associated with Effectiveness, ROA, ROE and EPS.

6.3 Impact of firm characteristics on the application of capital budgeting practices

In chapter 4, the differences of the firms' characteristics on the application of capital budgeting practices were examined. This section examines the impact of firms' characteristics (size of the capital budget, tenure of CFOs, educational qualifications of CFOs

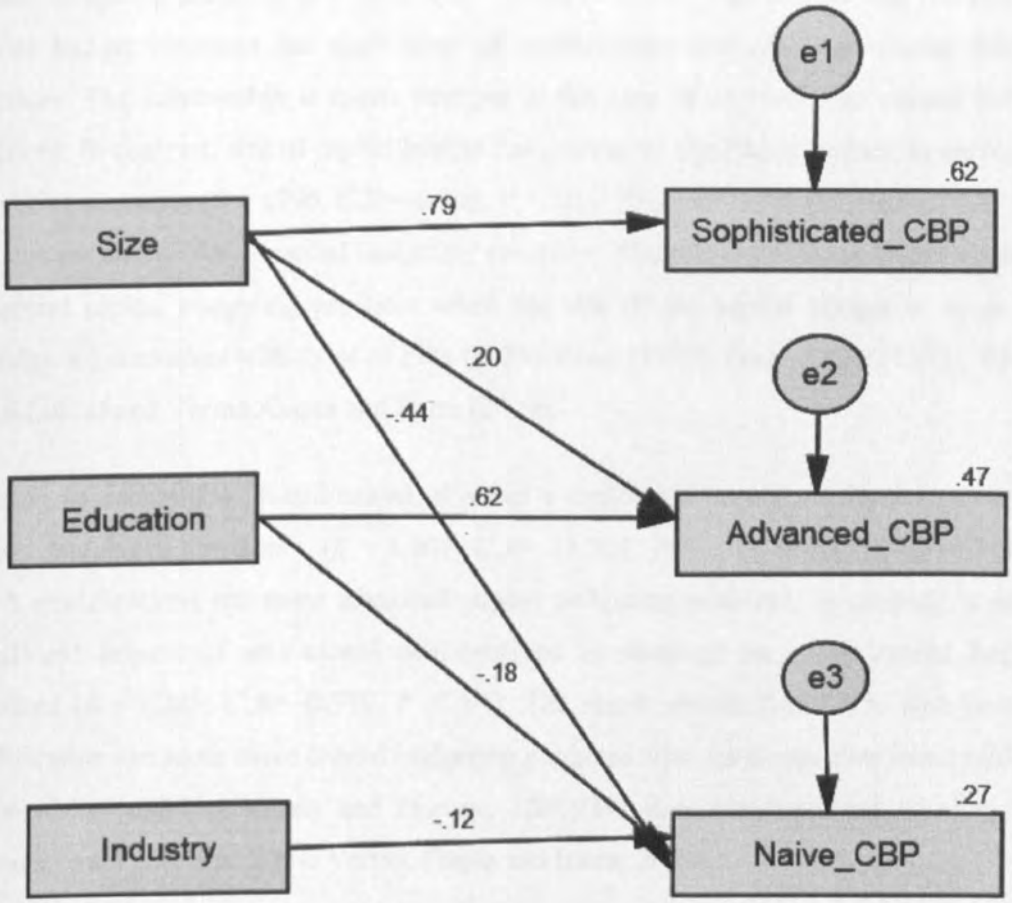
and types of industry) on the application of capital budgeting practices. The model is presented in figure 6.1.

Figure 6.1: Proposed model -the impact of firm characteristics on the application of capital budgeting practices



The results are presented in table 11 (appendix B). Many of the firms' characteristics did not influence any of the three capital budgeting practices and consequently, the non-significant paths were removed one at a time: the lowest CR was first (alternatively, the highest *p* value) in line with Byrne (2010) and Hair et al. (2010). In the second model, Sophisticated <--- Industry was removed and respectively, Naive <--- Tenure, Sophisticated <--- Education, Advanced <--- Tenure, Sophisticated <--- Tenure and Advanced <--- industry were removed in consecutive models 3, 4, 5, 6, and 7. The reduced model is presented in figure 6.2.

Figure 6.2: Reduced model - the impact of firm characteristics on the application of capital budgeting practices



Both the unstandardised and unstandardised solutions with critical ratio and *p* are presented in table 6.3.

Table 6.3: Firms' characteristics and capital budgeting practices - the unstandardised solution and the standardised solution

			Unstandardised solution				Standardised solution
			Estimate	S.E.	C.R.	P	Estimate
Sophisticated CBP	<---	Size	1.083	.063	17.268	***	.786
Advanced CBP	<---	Size	.363	.101	3.602	***	.197
Advanced CBP	<---	Education	1.007	.086	11.726	***	.616
Naive CBP	<---	Size	-.796	.117	-6.806	***	-.438
Naive CBP	<---	Education	-.283	.103	-2.759	.006	-.176
Naive CBP	<---	Industry	-.149	.076	-1.959	.050	-.118

As can be seen in table 6.3, size of capital budget has a significant positive impact on the use of sophisticated capital budgeting practices (β = 1.083, *C.R*= 17.268, $P < .01$), and advanced capital budgeting practices (β = .363, *C.R*= 3.602, $P < .01$). This implies that the size of the capital budget increases the application of sophisticated and advanced capital budgeting practices. The relationship is much stronger in the case of sophisticated capital budgeting practices. In contrast, size of capital budget has a negative significant impact on naive capital budgeting practices (β = -.796, *C.R*= -6.806, $P < .01$). This implies that a larger capital budget reduces the use of naive capital budgeting practices. Therefore, CFOs use sophisticated and advanced capital budgeting practices when the size of the capital budget is large. These findings are consistent with those of Pike (1988), Chen (1995), Ho and Pike (1998), Ryan and Ryan (2002) and Verma, Gupta and Batra (2009).

Turning to educational qualifications, this has a significant impact on the use of advanced capital budgeting practices (β = 1.007, *C.R*= 11.726, $P < .01$), implying that CFOs with MBA qualifications use more advanced capital budgeting practices. In contrast, a negative significant impact of educational qualifications is observed on naive capital budgeting practices (β = -.283, *C.R*= -2.759, $P < .01$). The result reveals that CFOs with non-MBA qualification use more naive capital budgeting practices. The results are consistent with those of previous studies (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004; Hermes, Smid and Yao, 2007; Verma, Gupta and Batra, 2009).

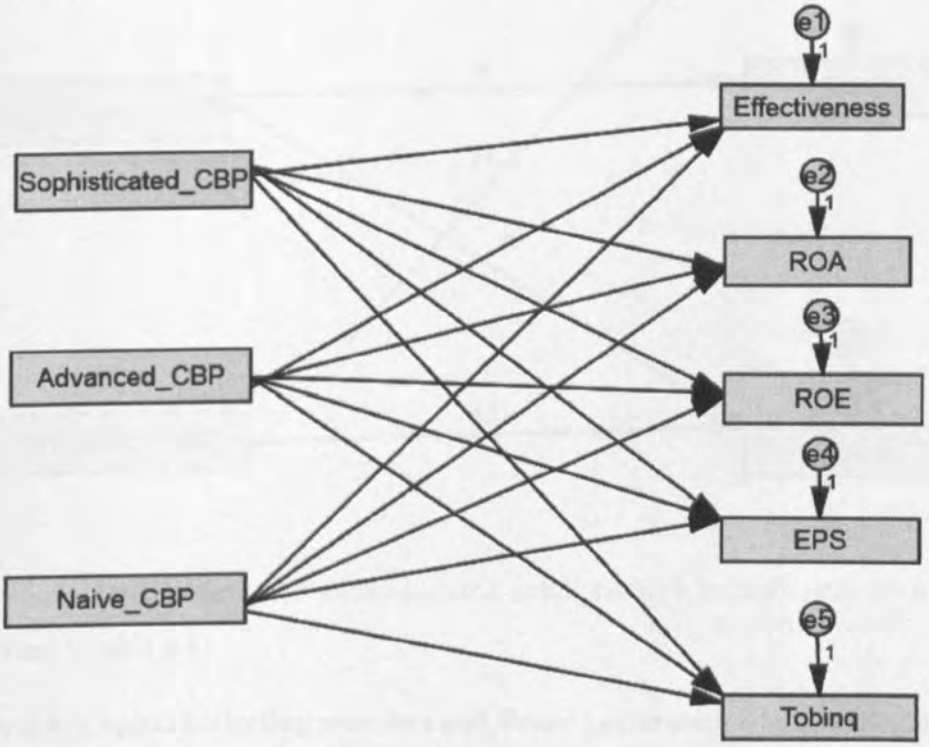
Type of industry has a negative significant impact on naive capital budgeting practices (β = -.149, *C.R*= -1.959, P = .05). This implies that non-manufacturing firms use naive capital budgeting practices. Nonetheless, type of industry does not have any significant impact on sophisticated and advanced capital budgeting practices. Moreover, the experience of CFOs (tenure) does not influence choice of capital budgeting practices. Overall, 61.7% variance in sophisticated capital budgeting practices, 46.5% variance in advanced capital budgeting practices and 26.6 % variance in naive capital budgeting practices are explained by these firm characteristics. With regard to the model fit indices, χ^2 is significant (χ^2 (5) = 4.568, p = 0.471), indicating robust model fit (e.g., Bagozzi and Yi, 1988; Bagozzi and Foxall, 1996; Hair et al., 2010) and CMIN/DF (.914), CFI (1.000), GFI (.992), RMR (.006), SRMR (.0240) and RMSEA (.000) were all indicative of a well-fitted model. Moreover, univariate regression analysis was carried out to ensure the relation between the dependent variables (sophisticated capital budgeting practices, advanced capital budgeting practices and naive

capital budgeting practices) and the independent variables (size, education and industry) (see table 11 in appendix B).

6.4 Impact of capital budgeting practices on firms' performance

This section investigates the impact of three capital budgeting practices (sophisticated, advanced and naive capital budgeting practices) on five performance indicators, namely: effectiveness, ROA, ROE, EPS and Tobin_q. The model examined in the structural equation modelling (SEM) is presented in figure 6.3.

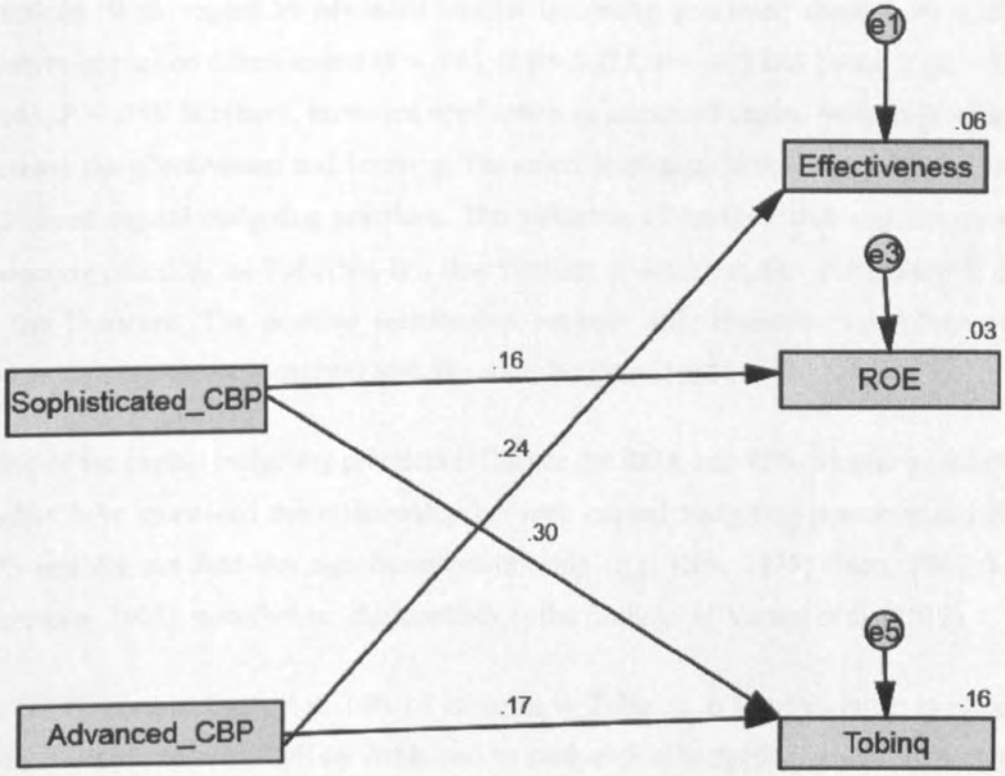
Figure 6.3: Proposed model - the impact of capital budgeting practices on firms' performance



The results are presented in table 12 (appendix B). Many capital budgeting practices were found not to influence the performance variables and consequently, the non-significant paths were removed one at a time: the lowest CR was first (alternatively, the highest *p* value) in line with Byrne (2010) and Hair et al. (2010). In the second model, Tobin_q <--- Naive was removed and respectively, ROE <--- Naive, ROE <--- Advanced, EPS <--- Naive, ROA <--- Sophisticated, EPS <--- Sophisticated, EPS <--- Advanced, Effectiveness <--- Sophisticated, ROA <--- Naive, ROA <--- Advanced and Effectiveness <--- Naive were removed in

consecutive models 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. The reduced model is presented in figure 6.4.

Figure 6.4: Reduced model – the impact of capital budgeting practices on firms' performance



Both the unstandardised and unstandardised solutions with critical ratio (*C.R*) and *p* are presented in table 6.4.

Table 6.4: Capital budgeting practices and firms' performance-both unstandardised solution and standardised solutions

			Unstandardised solution				Standardised solution
			Estimate	S.E.	C.R.	P	Estimate
ROE	<---	Sophisticated CBP	.205	.094	2.188	.029	.159
Tobin_q	<---	Sophisticated CBP	1.392	.331	4.208	***	.300
Effectiveness	<---	Advanced CBP	.143	.043	3.323	***	.237
Tobin_q	<---	Advanced CBP	.582	.252	2.308	.021	.169

As shown in table 6.4, only four significant paths were retained in the final model. Sophisticated capital budgeting practices were found to have a significant positive impact on ROE (β = .205 *C.R*= 2.188 $P < .05$), and Tobin_q (β = 1.392 *C.R*= 4.208 $P < .01$). This implies that increased use of sophisticated capital budgeting practices will increase ROE and Tobin_q. The impact is stronger in the case of Tobin_q <--- Sophisticated capital budgeting practices. With regard to advanced capital budgeting practices, these have a significant positive impact on effectiveness (β = .143, *C.R*= 3.323, $P < .01$) and Tobin_q (β = .582, *C.R*= 2.443, $P < .05$). Similarly, increased application of advanced capital budgeting practices will increase the effectiveness and Tobin_q. The effect is stronger in the case of Effectiveness <--- Advanced capital budgeting practices. The influence of sophisticated and advanced capital budgeting practices on Tobin's q is a new finding; nonetheless, the relationship is supported in the literature. The positive relationship between Effectiveness <--- Advanced capital budgeting practices is consistent with the study by Pike (1988).

None of the capital budgeting practices influence the ROA and EPS. Similarly, many seminal studies have examined the relationship between capital budgeting practices and ROA and EPS and did not find any significant relationship (e.g. Kim, 1975; Chen, 1995; Mooi and Mustapha, 2001); nonetheless, this contradicts the findings of Vadeei et al. (2012).

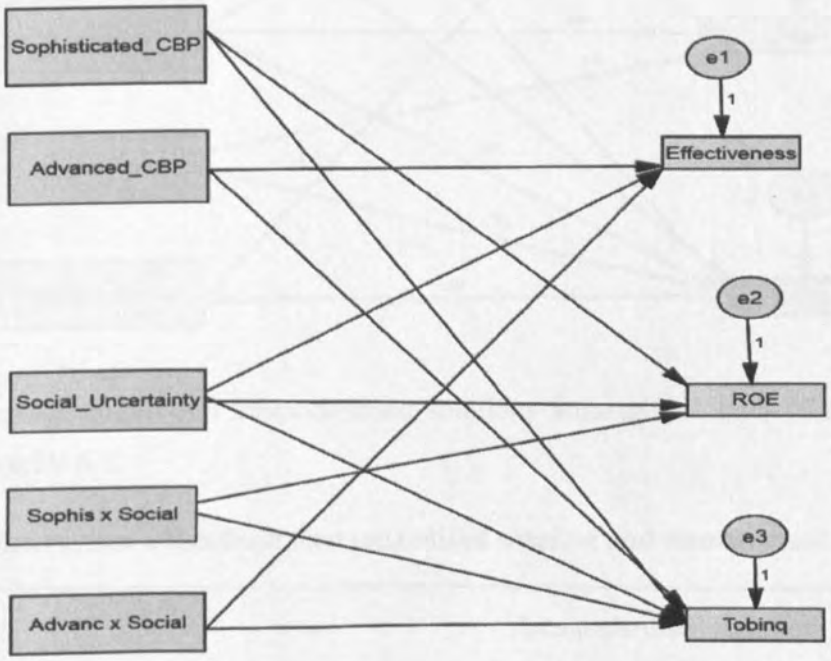
As can be seen in figure 6.4, 16% of variance in Tobin_q, 6 % of variance in effectiveness and 3 % of variance in ROE are explained by such capital budgeting practices. With regard to the model fit indices, χ^2 is significant (χ^2 (4) = .865, p = 0.930), indicating a robust model fit (e.g., Bagozzi and Yi, 1988; Bagozzi and Foxall, 1996; Hair et al., 2010) and CMIN/DF (.216), CFI (1.000), GFI (.998), RMR (.013), SRMR (.0159) and RMSEA (.000) were all indicative of a well-fitted model. Moreover, univariate regression analysis was carried out to ensure the relation between the dependent variable (effectiveness, ROE and Tobinq) and the independent variables (sophisticated capital budgeting practices and advanced capital budgeting practices) (see table 12 in appendix B).

6.5 Assessing the moderating effect of uncertainty between capital budgeting practices and performance using structural equation modelling

In chapter 5, the results revealed that uncertainty consists of: marketing-uncertainty, financial-uncertainty, operational-uncertainty, and social uncertainty. Of these, market, operational and financial uncertainties directly influenced the choice of capital budgeting

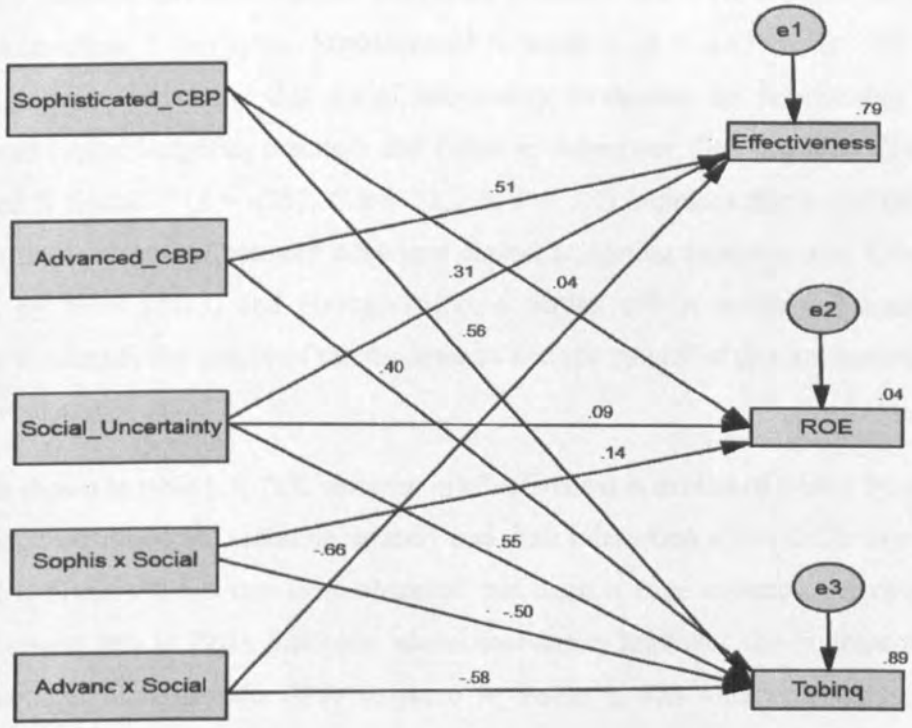
practices (section 5.3). Nonetheless, social uncertainty did not show any direct impact on capital budgeting practice, and the results were analysed further to see whether there was any moderating influence between capital budgeting practices and performance variables. The moderating effect (interaction) was investigated on the basis of two conditions: the specific uncertainty has no direct effect on capital budgeting practices and capital budgeting practices do influence the performance variables (section 6.3 above), in line with Field (2013) and Hayes (2013). The model is presented in figure 6.5.

Figure 6.5: Proposed model - the interacting effect of uncertainty between capital budgeting practices and performance



As can be seen in figure 6.5, the interaction effects are indicated by sophisticated capital budgeting practices x social uncertainty (Sophis x Social) and advanced capital budgeting practices x social uncertainty (Advan x Social). The results are presented in figure 6.6.

Figure 6.6: Interaction effect of social uncertainty between capital budgeting practices and firms' performance



Both the unstandardised and unstandardised solutions with critical ratio (*C.R*) and *p* are presented in table 6.5.

Table 6.5: Interaction effect-both unstandardised solution and standardised solution

			Unstandardised Solution				Standardised Solution
			Estimate	S.E.	C.R.	P	Estimate
Tobin_q	<---	Sophisticated CBP	6.076	.501	12.118	***	.559
Effectiveness	<---	Advanced CBP	.572	.038	14.890	***	.506
Tobin_q	<---	Advanced CBP	3.204	.196	16.311	***	.398
Tobin_q	<---	Social uncertainty	3.566	.157	22.701	***	.554
Effectiveness	<---	Advanced X Social U	-.122	.006	-19.393	***	-.659
Tobin_q	<---	Sophisticated X Social U	-1.253	.116	-10.757	***	-.496
ROE	<---	Sophisticated X Social U	.043	.041	1.058	.290	.144
Tobin_q	<---	Advanced X Social U	-.767	.032	-23.793	***	-.580
ROE	<---	Sophisticated CBP	.048	.175	.277	.782	.038
Effectiveness	<---	Social uncertainty	.280	.031	9.120	***	.310
ROE	<---	Social uncertainty	.066	.055	1.209	.227	.087

As can be seen in table 6.5, the interaction, Effectiveness <--- Advanced X Social U (β = -.122, *C.R*= -19.393, *P* < .01), is significant, indicating that social uncertainty moderates the relationship between advanced capital budgeting practices and effectiveness. In a similar vein, the interaction, Tobin_q <--- Sophisticated X Social U (β = -1.253, *C.R*= -10.757, *P* < .01) is significant, indicating that social uncertainty moderates the relationship between sophisticated capital budgeting practices and Tobin_q. Moreover, the significant Tobin_q <--- Advanced X Social U (β = -.767, *C.R*= -23.793, *P* < .01) indicates that social uncertainty moderates the relationship between advanced capital budgeting practices and Tobin_q. As suggested by Field (2013) and Hayes (2013), a further robust moderator analysis was conducted to identify the nature of the moderators and the results of this are reported in the subsequent section.

Overall, as shown in table 6.5, 79% variance in effectiveness is explained jointly by advanced capital budgeting practices, social uncertainty and their interaction effect (Effectiveness <--- Advanced X Social). It has thus been observed that there is huge variance improvement on the effectiveness (6% to 79%). Similarly, social uncertainty improved the explanatory power of the Tobin_q. To elaborate, 89% variance in Tobin_q was jointly accounted for by sophisticated capital budgeting practices, advanced capital budgeting practices, social uncertainty and their interaction effects (Tobin_q <--- Advanced X Social and Tobin_q <--- Sophisticated X Social).

6.6 Analysis of moderating effect

An additional analysis on the moderating effect was employed by dint of Andrew Hayes' "process.spd", as suggested by Hayes (2013) and Field (2013). Moderation is a combined effect of two variables (interaction effect) and thus the model includes at least one predictor, a moderator and predictor x moderator (interaction term). If the interaction term is significant, the variable is said to be a moderator.

6.6.1 Social uncertainty as a moderator of the relationship between advanced capital budgeting practices and effectiveness

The section examines whether social uncertainty will moderate the relationship between advanced capital budgeting practices and effectiveness (firms' performance) i.e., the relationship between advanced capital budgeting practices and effectiveness will be weakened for firms that experience higher levels of social uncertainty than those that

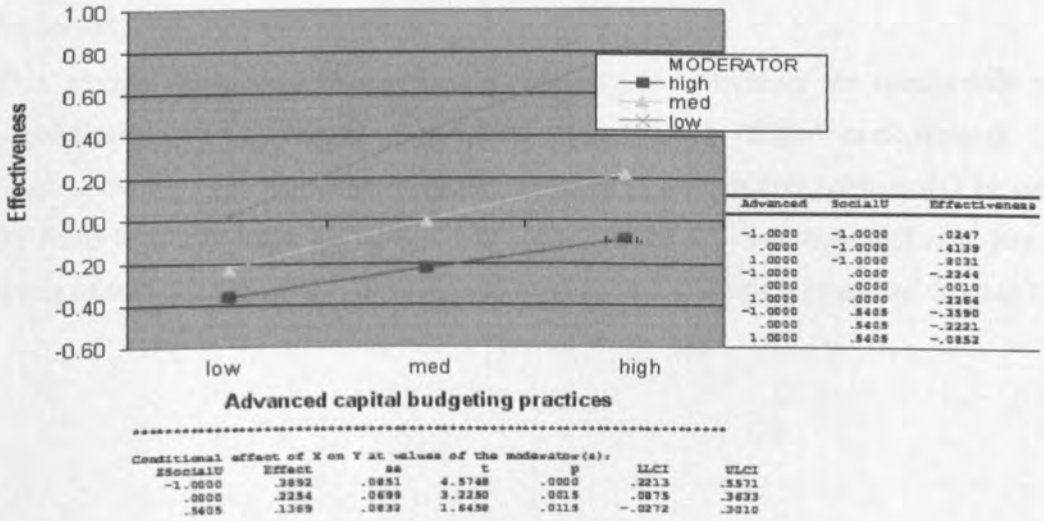
experience lower levels of social uncertainty. The result of the moderator analysis is presented in table 6.6.

Table 6.6: Social uncertainty as a moderator between advanced capital budgeting practices and effectiveness

	b	*SE B*	*t*	*P*
Constant	.01(-.13,.13)	.0651	.0159	$p = .9874$
Social Uncertainty (centred)	-0.41(-.62,-.21)	.1038	-3.975	$p = .0001$
Advanced CBP (centred)	.23(.09,.36)	.0699	3.225	$p = .0015$
Advanced CBP X Social uncertainty	-.16(-.29,-.04)	.0630	-2.599	$p = .0101$

As can be seen in table 6.6, the interaction term (Advanced CBP X Social uncertainty) is significant, $b = -.16$, $t = -2.599$, $p = 0.0101$, indicating that the relationship between advanced capital budgeting practices and effectiveness is moderated by social uncertainty i.e., social uncertainty weakens the positive relationship between advanced capital budgeting practices and effectiveness. Furthermore, the results of the slope analysis and the nature of moderating effect are depicted in figure 6.7.

Figure 6.7: Graphical presentation of Social uncertainty as a moderator between advanced capita budgeting practices and effectiveness



The result of the conditional effect of advanced capital budgeting practices on effectiveness for the different levels of social uncertainty is presented at the bottom of figure 6.7. According to the figure, there are three different regressions: the regression for advanced capital budgeting practices as a predictor of effectiveness (1) when social uncertainty is low (value of social uncertainty is -1.000); (2) at the mean value of social uncertainty (the value is zero because of centred traits); and (3) when the value of social uncertainty is high (value of traits is .5405). When social uncertainty is low, there is a significant positive relationship between advanced capital budgeting practices and effectiveness, b = 0.39, 95 % *CI* (0.22, 0.56), t = 4.5748, $p < 0.05$ whilst at the mean value of social uncertainty, the relationship between advanced capital budgeting practices and effectiveness is significantly positive. However, the relationship is weaker than at a low level of social uncertainty, b = 0.23, 95 % *CI* (0.09, 0.36), t = 3.2250, $p < 0.05$. Similarly, when social uncertainty is high there is still a significant positive relationship between advanced capital budgeting practices and effectiveness. However, this relationship is weaker than at the mean level of social uncertainty, b = 0.14, 95 % *CI* (-.03, 0.30), t = 1.6458, $p < 0.05$. Overall, the results reveal that there is a significant positive relationship between advanced capital budgeting practices and effectiveness at all three levels of social uncertainty; nonetheless, such a positive relationship is weakened when the level of social uncertainty increases. It is shown in figure 6.7 that the positive relationship between advanced capital budgeting practice and effectiveness is stronger at a low level of social uncertainty than at an average or high level of social uncertainty.

6.6.2 Social uncertainty as a moderator of the relationship between sophisticated capital budgeting practices and Tobin_q

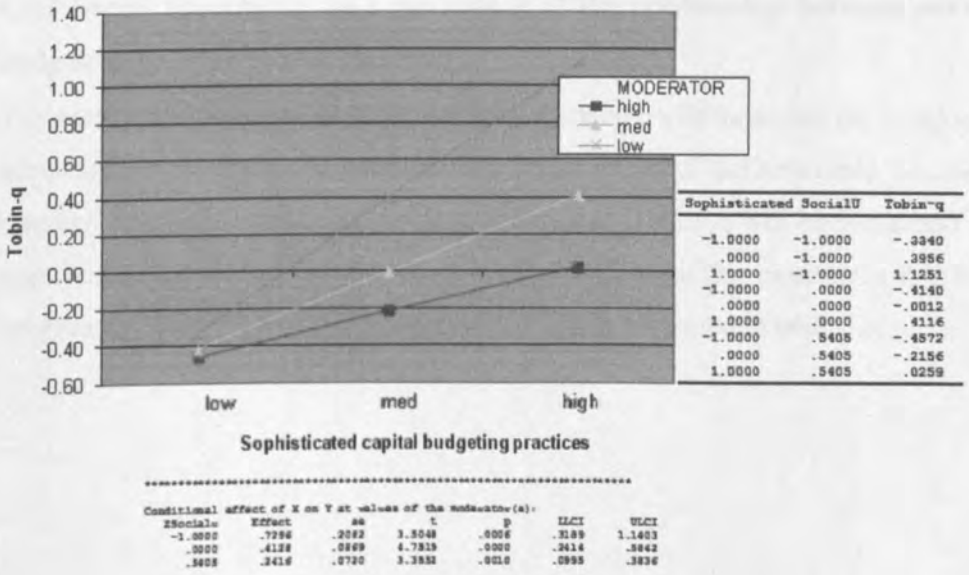
This section examines whether social uncertainty will moderate the relationship between sophisticated capital budgeting practices and Tobin-q (firms' performance) i.e., the relationship between sophisticated capital budgeting practices and Tobin-q will be weakened for firms that experience higher levels of social uncertainty than those that experience lower levels of social uncertainty. The result of the moderator analysis is presented in table 6.7.

Table 6.7: Social uncertainty as a moderator between sophisticated capital budgeting practices and Tobin_q

	b	*SE B*	*t*	*P*
Constant	-.01(-.12,.12)	.0612	-.0196	$p = .9844$
Social Uncertainty (centred)	-.40(-.60,-.20)	.1021	-3.8853	$p = .0001$
Sophisticated CBP (centred)	.41(.24,.58)	.0869	4.7519	$p = .0000$
Sophisticated CBP X Social uncertainty	-.32(-.60,-.04)	.1428	-2.2184	$p = .0278$

As can be seen in table 6.7, the interaction term (Sophisticated CBP X Social uncertainty) is significant, b = -.32, t = -2.2184, p = 0.0278 indicating that the relationship between sophisticated capital budgeting practices and Tobin-q is moderated by social uncertainty i.e., social uncertainty weakens the positive relationship between sophisticated capital budgeting practices and Tobin-q. Furthermore, the results of the slope analysis and the nature of moderating effect are depicted in figure 6.8.

Figure 6.8: Graphical presentation of Social uncertainty as a moderator between sophisticated capita budgeting practices and Tobin_q



Sophisticated	SocialU	Tobin-q
-1.0000	-1.0000	-.3340
.0000	-1.0000	.3956
1.0000	-1.0000	1.1251
-1.0000	.0000	-.4140
.0000	.0000	-.0012
1.0000	.0000	.4116
-1.0000	.5405	-.4572
.0000	.5405	-.2156
1.0000	.5405	.0259

```
Conditional effect of X on Y at values of the moderator(s):
ZSociala      Effect        se         t         p       LLCI       ULCI
-1.0000      .7296      .2082    3.5048    .0006    .3189    1.1403
 .0000      .4138      .0869    4.7519    .0000    .2414    .5862
 .5405      .2416      .0720    3.3552    .0010    .0988    .3836
```

The result of the conditional effect of sophisticated capital budgeting practices on Tobin_q for the different levels of social uncertainty is presented at the bottom of figure 6.8. According to the figure, there are three different regressions: the regression for sophisticated

capital budgeting practices as a predictor of Tobin-q (1) when social uncertainty is low (value of social uncertainty is -1.000); (2) at the mean value of social uncertainty (the value is zero because of centred traits); and (3) when the value of social uncertainty is high (value of traits is .5405). When social uncertainty is low, there is a significant positive relationship between sophisticated capital budgeting practices and Tobin-q, b = .73, 95 % *CI* (0.32, 1.14), t = 3.5048, $p < 0.05$, whilst at the mean value of social uncertainty the relationship between sophisticated capital budgeting practices and Tobin-q is significantly positive. However, this relationship is weaker than at a low level of social uncertainty, b = 0.41, 95 % *CI* (0.24, .58), t = 4.7519, $p < 0.05$. Similarly, when social uncertainty is high there is still a significant positive relationship between sophisticated capital budgeting practices and Tobin-q. However, this relationship is weaker than at the mean level of social uncertainty, b = 0.24, 95 % *CI* (.10, 0.38), t = 3.3552, $p < 0.05$. Overall, the results reveal that there is a significant positive relationship between sophisticated capital budgeting practices and Tobin-q at all three levels of social uncertainty; nonetheless, this positive relationship is weakened when the level of social uncertainty increases. It is shown in figure 6.8 that the positive relationship between sophisticated capital budgeting practices and Tobin-q is stronger at low levels of social uncertainty than at average or higher levels of social uncertainty.

6.6.3 Social uncertainty as a moderator of the relationship between advanced capital budgeting practices and Tobin_q

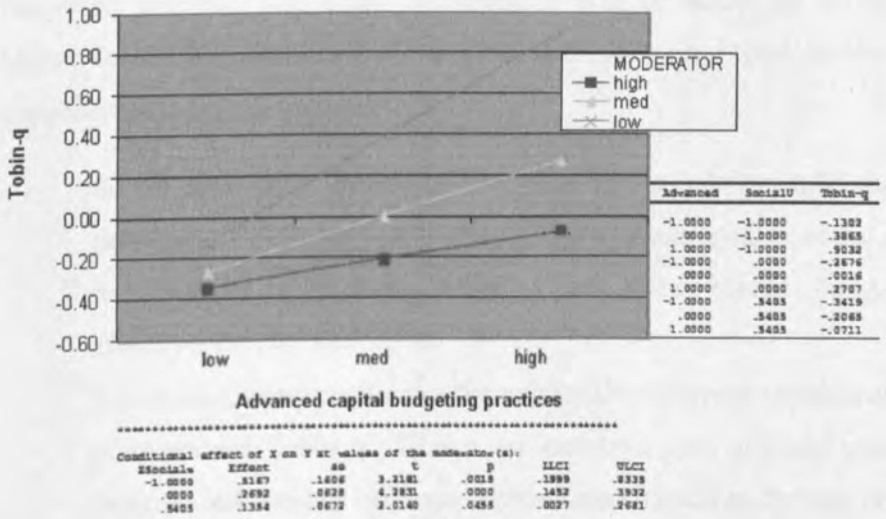
The section examines whether the social uncertainty will moderate the relationship between advanced capital budgeting practices and Tobin_q (firms' performance) i.e., the relationship between advanced capital budgeting practices and Tobin_q will be weakened for firms that experience higher levels of social uncertainty than those that experience low levels of social uncertainty. The result of the moderator analysis is presented in table 6.8.

Table 6.8: Social uncertainty as a moderator between advanced capital budgeting practices and Tobin_q

	b	*SE B*	*t*	*P*
Constant	.01(-.12,.13)	.0641	.0243	$p = .9806$
Social Uncertainty (centred)	-.39(-.57,-.20)	.0956	-4.0288	$p = .0001$
Advanced CBP (centred)	.27(.15,.39)	.0628	4.2831	$p = .0000$
Advanced CBP X Social uncertainty	-.25(-.49,-0.01)	.1219	-2.0307	$p = .0437$

As can be seen in table 6.8, the interaction term (Advanced CBP X Social uncertainty) is significant, b = -.25, t = -2.0307, p = 0.0437 indicating that the relationship between advanced capital budgeting practices and Tobin_q is moderated by social uncertainty i.e., social uncertainty weakens the positive relationship between advanced capital budgeting practices and Tobin_q. Furthermore, the results of the slope analysis and the nature of moderating effect are depicted in figure 6.9.

Figure 6.9: Graphical presentation of Social uncertainty as a moderator between advanced capita budgeting practices and Tobin_q



Advanced	SocialU	Tobin-q
-1.0000	-1.0000	-.1302
.0000	-1.0000	.3865
1.0000	-1.0000	.9032
-1.0000	.0000	-.2676
.0000	.0000	.0016
1.0000	.0000	.2707
-1.0000	.5455	-.3419
.0000	.5455	-.2065
1.0000	.5455	-.0711

Conditional effect of X on Y at values of the moderator(s):

SSocialu	Effect	se	t	p	LLCI	ULCI
-1.0000	.5167	.1606	3.2181	.0018	.1999	.8335
.0000	.2692	.0628	4.2831	.0000	.1452	.3932
.5455	.1384	.0672	2.0140	.0455	.0027	.2681

The result of the conditional effect of advanced capital budgeting practices on effectiveness for the different levels of the social uncertainty is presented at the bottom of figure 6.9. According to the figure, there are three different regressions: the regression for advanced capital budgeting practices as a predictor of Tobin_q (1) when social uncertainty is low (value of social uncertainty is -1.000); (2) at the mean value of social uncertainty (the value is

zero because of centred traits), and (3) when the value of social uncertainty is high (value of traits is .5405). When social uncertainty is low, there is a significant positive relationship between advanced capital budgeting practices and Tobin_q, b = .52, 95 % *CI* (.20, .83), t = 3.2181, $p < 0.05$ whilst at the mean value of social uncertainty, the relationship between advanced capital budgeting practices and Tobin_q is significantly positive. However, this relationship is weaker than at a low level of social uncertainty, b = .27, 95 % *CI* (.15, .39), t = 4.2831 $p < 0.05$. Similarly, when social uncertainty is high there is still a significant positive relationship between advanced capital budgeting practices and Tobin_q. However, this relationship is weaker than at the mean level of social uncertainty, b = .14, 95 % *CI* (.01, .27), t = 2.0140, $p < 0.05$. Overall, the results reveal that there is a significant positive relationship between advanced capital budgeting practices and Tobin_q at all three levels of social uncertainty; nonetheless, this positive relationship is weakened when the level of social uncertainty increases. It is shown in figure 6.9 that the positive relationship between advanced capital budgeting practice and Tobin_q is stronger at a low level of social uncertainty than at the average or a high level of social uncertainty.

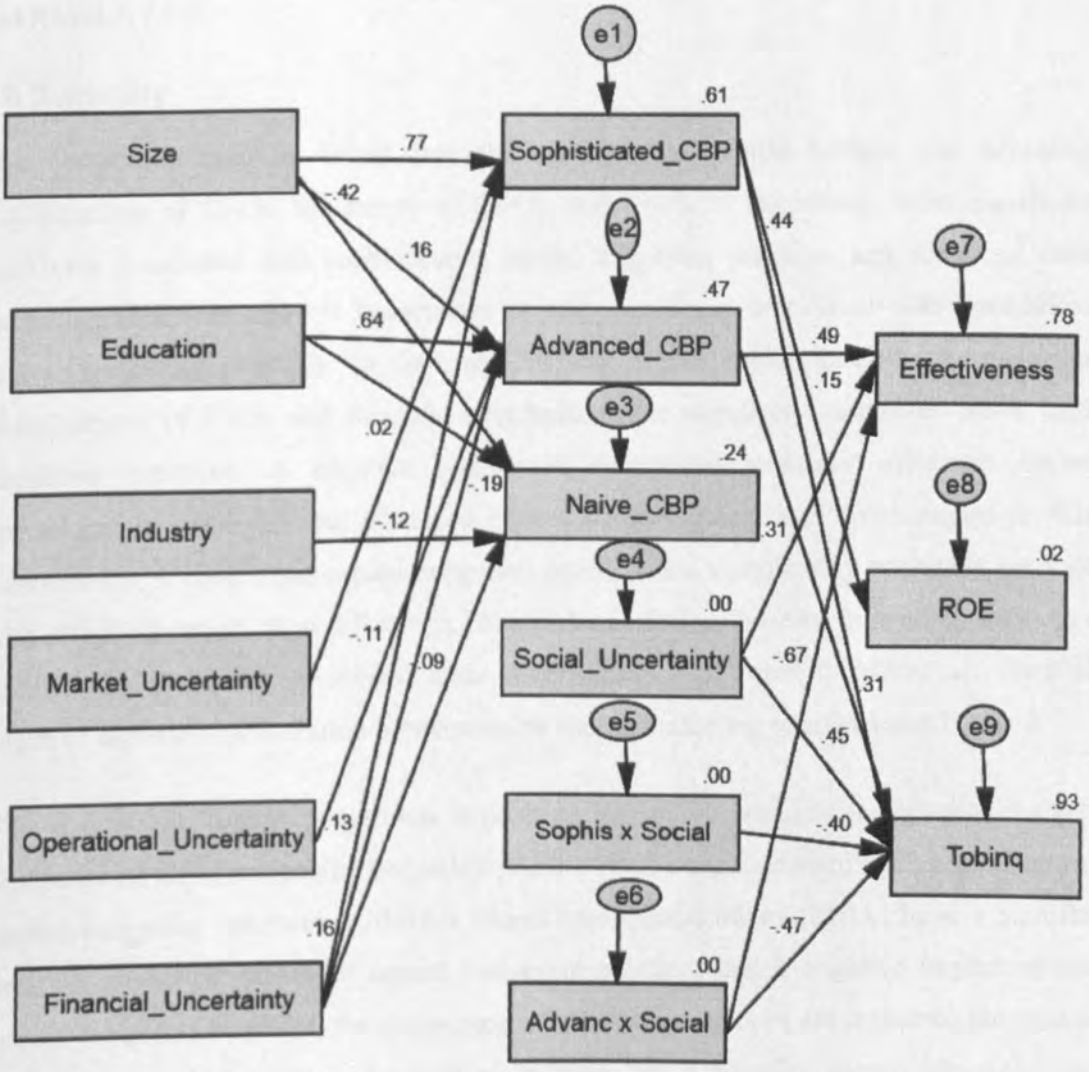
Therefore, hypothesis (H_7) that specific uncertainties moderate the relationship between capital budgeting practices and firms' performance i.e., the relationship between capital budgeting practices and firms' performance will be weakened for firms that experience higher levels of uncertainty than those that experience low levels of uncertainty was supported in the following ways:

- Social uncertainty moderates the relationship between advanced capital budgeting practices and effectiveness. That is, an increase level in social uncertainty weakens the positive relationship between advanced capital budgeting practices and effectiveness and vice versa.
- Social uncertainty moderates the relationship between sophisticated capital budgeting practices and Tobin_q. That is, an increased level of social uncertainty weakens the positive relationship between sophisticated capital budgeting practices and Tobin_q and vice versa.
- Social uncertainty moderates the relationship between advanced capital budgeting practices and Tobin_q. That is, an increased level of social uncertainty weakens the positive relationship between advanced capital budgeting practices and Tobin_q and vice versa.

6.7 Final model

Based on the findings of the previous chapter 5 (section 5.3), which assessed the impact of uncertainty on capital budgeting practices, and the findings of the this chapter (section 6.2) examined the impact of firm characteristics on the application of capital budgeting practices, (section 6.3), examined the impact of capital budgeting practices on firms' performance and section 6.4, which assessed the moderating effect of uncertainty between capital budgeting practices and performance, a final model was developed, which is depicted in figure 6.10.

Figure 6.10: Final model of capital budgeting practices



As can be seen in figure 6.10, sophisticated capital budgeting practices are determined by the size of the capital budget, market uncertainty and financial uncertainty. Advanced capital

budgeting practices are determined by the size of the capital budget, the educational qualifications of CFOs, operational uncertainty and financial uncertainty. Similarly, naive capital budgeting practices are determined by the size of the capital budget, the educational qualifications of CFOs, industry and financial uncertainty. Firms' performance (effectiveness) is determined by advanced capital budgeting practices, social uncertainty and their interaction. ROE is only determined by sophisticated capital budgeting practices. Finally, Tobin-q is determined by sophisticated and advanced capital budgeting practices and social uncertainty and their interaction. The model exhibits good model fit indices: χ^2 (48) = .76.192, p = 0.006; CMIN/DF (1.587); CFI (.986); GFI (.947); RMR (.086); SRMR (.0554); and RMSEA (.056)

6.8 Summary

The correlation analysis found that the size of the capital budget, the educational qualifications of CFOs, the tenure of CFOs, and financial uncertainty were significantly positively associated with sophisticated capital budgeting practices and advanced capital budgeting practices. Market uncertainty is only positively associated with sophisticated capital budgeting practices. In contrast, the size of the capital budget, the educational qualifications of CFOs and financial uncertainties are negatively associated naive capital budgeting practices. A negative significant association was also observed between operational uncertainties and advanced capital budgeting practices. With regard to firms' performance, sophisticated capital budgeting practices are significantly positively associated with effectiveness, ROE, and Tobin_q. Nonetheless, advanced capital budgeting practices are significantly positively associated with effectiveness and Tobin_q. Moreover, there is a negative significant association between naive capital budgeting practices and Tobin_q.

The size of the capital budget has a positive impact on sophisticated capital budgeting practices and advanced capital budgeting practices and a negative significant impact on naive capital budgeting practices. Although educational qualifications (MBA) have a significant positive impact on advanced capital budgeting practices and a negative impact on naive capital budgeting practices, the experience of CFOs (tenure) does not influence the choice of capital budgeting practices. The type of industry has a negative impact on naive capital budgeting practices. Turning to the influence of capital budgeting practices on firms' performance, sophisticated capital budgeting practices have a positive impact on ROE and

Tobin-q whereas advanced capital budgeting practices have a positive impact on effectiveness and Tobin-q.

The moderation analysis found that social uncertainty moderates the relationship in three ways: between advanced capital budgeting practices and effectiveness, between sophisticated capital budgeting practices and Tobin-q and between advanced capital budgeting practices and Tobin-q. At the end of the chapter, a final model describing capital budgeting practices with its predictors, outcome variables and moderating variables was developed.

CHAPTER SEVEN
FINDINGS AND DISCUSSIONS, CONTRIBUTIONS AND CONCLUSIONS

7.1 Chapter overview

This final chapter starts with a brief summary of the previous chapters. This is followed by a discussion of the findings of the previous chapters (4, 5 and 6) and how these findings answer the research questions. The overarching theoretical contributions and practical implications are then considered. In the penultimate section, the limitations of the study are outlined and directions for future research are proposed with a view to strengthening the research in capital budgeting practices. The thesis ends with a conclusion.

7.2 Review of previous chapters

Over the past decades, many theories and models have been developed in the sphere of capital and capital budgeting in financial management: Portfolio Theory (Markowitz, 1952, 1959), Optimal Capital Structure (Modigliani and Miller, 1958; Miller and Modigliani, 1961; Myers, 1977; Jensen, 1986; Ritter, 1991; Graham and Harvey, 2001), Efficient Market Theory (Fama, 1970; Roll, 1977), Option Pricing Theory (Black and Scholes, 1973), Arbitrage Pricing Theory (APT) (Ross, 1976), Agency Theory (Ross, 1976; Myers, 2003; Atkeson and Cole, 2005), Pecking Order Theory (Myers and Majluf, 1984; Halov and Heider, 2004), Real Options Theory (Pindick and Dixit, 1994), and models (e.g., Mean-Variance Model: Markowitz, 1952; Capital Assets Pricing Model: Sharpe, 1964; Linter, 1965; Roll, 1977; Single Index Model: Sharpe, 1963). However, the applicability of these theories and models presents an intriguing conundrum (Slagmulder, Bruggeman and Wassenhove, 1995; Sangster, 1993). Nowadays, the world is more complex and competitive and many uncertainty and environmental factors heavily influence the choice of capital budgeting practice. Consequently, complex methods are used to make capital budgeting decisions rather than depending purely on theories of capital budgeting (Singh, Jain and Yadav, 2012; Zhang, Huang and Tang, 2011; Kersyte, 2011; Bock and Truck, 2011; Byrne and Davis, 2005; Cooper et al., 2002; Arnold and Hatzopoulos, 2000). Ipso facto, many renowned research scholars have suggested that there are gaps in the theory of capital budgeting and its applicability (e.g., Mukherjee and Henderson, 1987; Arnold and Hatzopoulos, 2000; Graham and Harvey, 2001; Cooper et al., 2002; Brounen, de Jong and Koedijk, 2004; Kersyte, 2011; Mutairi et al., 2012; Andres, Fuente and Martin, 2015).

Capital budgeting practices vary from country to country, from company to company and from project to project (e.g. Graham and Harvey, 2001;Hermes, Smid and Yao, 2007). Many of the existing studies were conducted in: the USA (e.g., Ryan and Ryan, 2002, Graham and Harvey, 2001), the UK (e.g., Arnold and Hatzopoulos, 2000), Australia (e.g., Truong, Partington and Peat, 2008), China (e.g., Chen, 2008), Canada (e.g., Bennouna, Meredith and Marchant, 2010), Japan (e.g., Shinoda, 2010), Sweden (e.g., Sandahl and Sjogren, 2003), Indonesia (e.g., Leon, Isa and Kester, 2008), Ireland (e.g., Kester and Robbins, 2011), South Africa (e.g., Maroyi and Poll, 2012), New Zealand (e.g., Lord, Shanahan and Bogd, 2004), Hong Kong (e.g., Lam et al., 2007), Kuwait (e.g., Mutairi et al., 2012), Libya (e.g., Mohammed, 2013), Poland (e.g., Wnuk-Pel, 2013), Kenya (e.g., Kitili and Nganda, 2014), and Spain (e.g., Andres, Fuente and Martin, 2014). The majority of these studies have clarified the use of capital budgeting practices in different countries and claimed to make a geographical contribution.

Although many studies have been conducted in developed countries, there is a dearth of studies in emerging economies. Therefore, the main aim of this study was to develop a capital budgeting model that would meld with the core components of uncertainty, firms' characteristics and firms' performance, based on an emerging country, Sri Lanka. More precisely, the relationship(s) between firms' characteristics, uncertainty, capital budgeting practices and firms' performance were investigated in this study.

The data for this study were garnered from primary data and secondary data collections. The primary data were collected from 186 CFOs working in companies listed on the Colombo stock exchange using self-administered questionnaires. The secondary data were mainly collected from CSE via the Bloomberg website. After the data had been collected, they were analysed using multivariate analysis such as factor analysis, confirmatory factor analysis and structural equation modelling.

7.3 Summary of the findings and discussions

The literature suggests that in the contemporary world, a number of capital budgeting methods and procedures are being practised, including the oft-cited: Adaptation of required return/discount rate, IRR, NPV, uncertainty absorption in cash flows, shorten the PB, Game theory decision rules , real option pricing , Decision trees, CAPM analysis / ß analysis, Adjusting expected values, Sensitivity analysis/break even analysis, and Scenario analysis (e.g., Arnold and Hatzopoulos, 2000; Hall, 2000; Graham and Harvey, 2001; Ryan and Ryan,

2002; Murto and Keppo, 2002; Cooper et al., 2002; Smit, 2003; Sandahl and Sjogren, 2003; Brounen, de Jong, and Koedijk 2004; Lazaridis, 2004; Lord, Shanahan and Bogd, 2004; du Toit and Pienaar, 2005; Verbeeten, 2006; Elumilade, Asaolu and Ologunde, 2006; Hermes, Smid and Yao, 2007; Leon, Isa and Kester, 2008; Verma, Gupta and Batra, 2009; Bennouna, Meredith and Marchant, 2010; Bennouna, Meredith and Marchant, 2010; Shinoda, 2010; Hall and Millard, 2010; Dragota et al., 2010; Poudel et al., 2009; Kester and Robbins, 2011; Maroyi and Poll, 2012; Singh, Jain and Yadav, 2012; Andres, Fuente and Martin,2015).

The study grouped the prevalent capital budgeting practices into three categories: Advanced/ NPV based capital budgeting practices including probability analysis, IRR, scenario analysis, adjusting required return, uncertainty absorption in cash flows, sensitivity analysis and NPV; sophisticated capital budgeting practices including real option, CAPM/B analysis, game theory decisions and decision trees; and simple / NAIVE capital budgeting practices including DPB, ARR and PB. This categorisation is consistent with that of Verbeeten (2006) and Wolffsen (2012). Of these methods, this study found that the primary method for evaluating capital budgets is NPV followed by IRR, PB, and DPB, whereas DPB is the most popular secondary method for evaluating capital budgets, followed by PI, ARR, PB, IRR and MIRR.

The most popular capital budgeting practice used in Sri Lanka is NPV, followed by IRR, PB, ARR and DPB. Nonetheless, the application of these capital budgeting practices varies from country to country: in the USA, the most prevalent method is IRR, followed by NPV and PB (Graham and Harvey, 2001), but in the UK, the most prevalent methods are PB, IRR, NPV and ARR. In the Netherlands the most preferred methods are NPV, PB, IRR and DPB. In Germany PB, NPV, IRR and ARR are the most prevalent methods. In France, the most preferred methods are PB, IRR, PI and NPV (Brounen, de Jong and Koedijk, 2004) and in India there is a preference for PB, IRR and NPV (Verma, Gupta and Batra, 2009). Nonetheless, it has been argued in the literature that IRR is superior to NPV analysis in uncertainty milieu (e.g., Klammer, Koch and Wilner, 1991, Ryan and Ryan, 2002). Emerging real options are at an embryonic stage in Sri Lanka (sometimes only 6.5%), but this method is practised more widely in well-developed countries such as France (53.6%), Germany (44.04%), the Netherlands (34.69%), the UK (29.03%) (Brounen, de Jong and Koedijk, 2004) and the USA (26.56%) (Graham and Harvey, 2001). However, it is fair to say

that the use of real options in Sri Lanka is somewhat similar to India (Verma, Gupta and Batra, 2009).

In addition, as discussed in the literature, a number of tools incorporating risk are widely used to make capital budgeting decisions. The most preferred method among Sri Lankan firms is uncertainty absorption in cash flows, followed by sensitivity analysis, probability analysis, scenario analysis and adjusting the required return. Nonetheless, the tools that are in use that incorporate risk vary across many countries: for example, in the USA, the most preferred method is high cut off rate followed by sensitivity analysis and value at risk/other simulation analysis (Graham and Harvey, 2001); in the UK, the most preferred method is sensitivity analysis followed by high cut off rate and value at risk/other simulation analysis (Brounen, de Jong and Koedijk, 2004); in India, it is sensitivity analysis, followed by shorter payback period and CAPM (Verma, Gupta and Batra, 2009); in the Netherlands the most preferred method is high cut off rate, followed by sensitivity analysis and value at risk/other simulation analysis (Brounen, de Jong and Koedijk, 2004); in Germany, high cut off rate is preferred, followed by sensitivity analysis and value at risk/other simulation analysis (Brounen, de Jong and Koedijk, 2004); in France value at risk/other simulation analysis is preferred followed by sensitivity analysis and high cut off rate (Brounen, de Jong and Koedijk, 2004).

Estimating the cost of equity is necessary when a firm applies discounting techniques such as the NPV or IRR method (Hermes, Smid and Yao, 2007). This study found that the most popular method for calculating the cost of equity is the CAPM model followed by average historical returns on common stock. Furthermore, the CAPM model is more popular in the UK (Brounen, de Jong and Koedijk, 2004), the USA (Graham and Harvey, 2001), the Netherlands (Brounen, de Jong and Koedijk, 2004), India (Verma, Gupta and Batra, 2009) and France (Brounen, de Jong and Koedijk, 2004). Although the CAPM is a popular method in Sri Lanka, the rate of usage is lower in comparison with the USA and Europe but higher in comparison with India.

This study revealed that simple/naive capital budgeting practices are used mostly by small firms. Nonetheless, advanced and sophisticated capital budgeting practices are used mostly by large firms, to wit PB, DPB and ARR were applied to a large extent by small firms, whereas NPV, IRR, RO, GTD, sensitivity analysis, uncertainty absorption in cash flows, adjusting required return, CAPM/ βanalysis and decision trees were used more by large firms. The size of a firm's capital budget has a significant positive impact on the use of

sophisticated capital budgeting practices and advanced capital budgeting practices and a negative impact on simple/naive capital budgeting practices. This implies that the size of the capital budget increases the application of sophisticated and advanced capital budgeting practices. The relationship is much stronger in the case of sophisticated capital budgeting practices. These findings are consistent with those of Pike (1988), Chen (1995), Ho and Pike (1998), Ryan and Ryan (2002) and Verma, Gupta and Batra (2009).

This study further identified that simple/naive capital budgeting practices are mostly used by CFOs with non-MBA qualifications and advanced/sophisticated are mostly used by MBA qualified CFOs, to wit PB, DPB and ARR were highly applied by non MBA CFOs, whereas NPV, IRR RO, GTD, sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return, probability analysis, CAPM/ βanalysis and decision trees are applied more frequently by CFOs who have an MBA. These results are consistent with those of previous studies (Graham and Harvey, 2001; Brounen, deJong and Koedijk, 2004; Hermes, Smid and Yao, 2007; Verma, Gupta and Batra, 2009).

Moreover, this study revealed that simple/naive capital budgeting practices (PB, DPB and ARR) are applied by CFOs with a short tenure. Nonetheless, sophisticated and advanced capital budgeting practices (RO, GTD, NPV, IRR, CAPM/ βanalysis and decision trees) are applied more often by CFOs with a long tenure. Nonetheless, the experience of CFOs (tenure) does not influence their choice of capital budgeting practices. This study found that simple capital budgeting practice i.e. ARR, is statistically significant and mostly applied by non-manufacturing firms and all other capital budgeting practices are not statistically significant with regard to industry type. Although industry type (non-manufacturing firms) influences the use of naive capital budgeting practices, it does not have a significant impact on the use of sophisticated and advanced capital budgeting practices.

This study developed a model of uncertainty based on the uncertainty framework originally provided by Miller (1992). Uncertainty varies from region to region and culture to culture, as does the behaviour of decision makers (Verbeeten, 2006). This study identified new four types of uncertainty: operational uncertainties (input, labour and production), financial uncertainties (interest rate, inflation and exchange rate), social uncertainty (policy, political and social) and market uncertainty (competitive, output market and input market). The model developed in this study is somewhat similar to Verbeeten's four level model (2006). Some uncertainties found in other countries were not prevalent in Sri Lanka such as liability

(product liability, emission of pollutants), R & D (R & D activities, regulatory approval of new product), credit & fraud (problems with collectibles, fraudulent behaviour of employees), cultural (cultural friction) and behavioural (agency problems, emotions, overconfidence). A four-factor model of uncertainty is presented in table 7.1.

Table 7.1: A four factor uncertainty model

Miller's (1992) model	Verbeeten's (2006) model	This study's model
A three level model	A four level model	A four level model
General environment uncertainties Political Government policy Macro Economic Social	**Input uncertainties** Raw material Input market Production Labour Liability	**Operational uncertainties** Input Labour Production
Industry specific uncertainties Input market Product market Competition	**Financial uncertainties** Inflation Interest Exchange rate	**Financial uncertainties** Interest rate Inflation Exchange rate
Firm specific uncertainties Operations Liability R & D Credit & fraud Cultural Behavioural	**Social uncertainties** Political Society Policy **Market uncertainties** Competition Output market	**Social Uncertainty** Policy Political Social **Market uncertainty** Competitive Output market Input market

Of these four specific uncertainties, market uncertainty and financial uncertainty are positively related to sophisticated capital budgeting practices. That is, the use of sophisticated capital budgeting increases with increased uncertainties in interest rate, inflation and exchange rate, as well as with competitive market, output market and input market. Although financial uncertainty positively impacted on the used of sophisticated and advanced capital

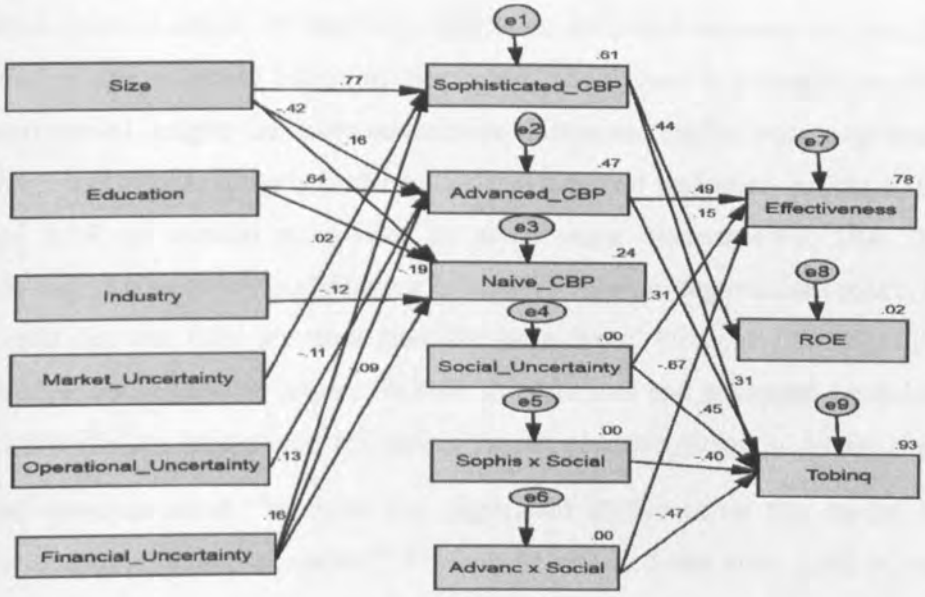
budgeting practices, it negatively impacted on the use of naive/simple capital budgeting practices. Thus, the results lend credence to the notion that firms use advanced and sophisticated capital budgeting practices when there is a high level of financial uncertainty. In contrast, operational uncertainty such as input, labour and production decreases the use of advanced capital budgeting practices. The positive impact of operational uncertainty on sophisticated capital budgeting practices is not significant.

Social uncertainty such as policy (regulations affecting the business sector, tax policy), political issues (terrorism, war, changes in government, political instability) and social factors (social unrest, shift in social concerns, beliefs, values and attitudes reflected in current government policy or business practice) does not predict the choice of capital budgeting. However it does moderate firms' performance together with their capital budgeting practices in three ways:

- Social uncertainty moderates the relationship between advanced capital budgeting practices and effectiveness. That is, an increased level of social uncertainty weakens the positive relationship between advanced capital budgeting practices and effectiveness and vice versa.
- Social uncertainty moderates the relationship between sophisticated capital budgeting practices and Tobin_q. That is, an increased level of social uncertainty weakens the positive relationship between sophisticated capital budgeting practices and Tobin_q and vice versa.
- Social uncertainty moderates the relationship between advanced capital budgeting practices and Tobin_q. That is, an increased level of social uncertainty weakens the positive relationship between advanced capital budgeting practices and Tobin_q and vice versa.

Based on all of the findings, a model of capital budgeting practices was developed, and this is depicted in figure 7.1

Figure 7.1: Capital budgeting model



Apropos of the model in Figure 7.1, sophisticated capital budgeting practices are determined by the size of the capital budget, market uncertainty and financial uncertainty. Advanced capital budgeting practices are determined by the size of the capital budget, the educational qualifications of CFOs, operational uncertainty and financial uncertainty. Similarly, naive capital budgeting practices are determined by the size of the capital budget, the educational qualifications of CFOs, industry and financial uncertainty. Firms' performance (effectiveness) is determined by advanced capital budgeting practices and social uncertainty, as well as their interaction. ROE is only determined by sophisticated capital budgeting practices. Finally, Tobin-q is determined by sophisticated and advanced capital budgeting practices and social uncertainty, as well as their interaction. The model exhibits good model fit indices: χ^2 (48) = .76.192, p = 0.006; CMIN/DF (1.587); CFI (.986); GFI (.947); RMR (.086); SRMR (.0554); and RMSEA (.056).

7.4 Answering the research questions- a summary

The research questions developed in chapter two were answered with the help of the findings procured through the various stages of analysis. The first question asked, "To what extent are capital budgeting practices prevalent in Sri Lanka?" The findings revealed that advanced capital budgeting practices are prevalent in Sri Lanka. More specifically, NPV, IRR, uncertainty absorption in cash flows, sensitivity Analysis probability analysis, scenario

analysis and adjusting required return are more prevalent in comparison with other sophisticated and naive capital budgeting practices.

The second question asked, "Is there any significant difference between the size of a firm's capital budget and its capital budgeting practices?" The answer is assuredly yes. Firms with large sized capital budgets use more advanced/sophisticated capital budgeting practices and firms with small capital budgets prefer to use naive capital budgeting practices, to wit PB, DPB and ARR are applied more often by small firms whereas NPV, IRR, RO, GTD, sensitivity analysis, uncertainty absorption in cash flows, adjusting required return, CAPM/ β analysis and decision trees are used more by large firms. Moreover, the size of a firm's capital budget had a positive impact on both sophisticated and advanced capital budgeting practices; nonetheless it negatively influenced the use of native capital budgeting practices.

The third question asked, "Is there any significant difference in the capital budgeting practices used in different industries?" The results revealed that only ARR is statistically applied significantly more by non-manufacturing firms and all other capital budgeting practices are not statistically significant with regard to industry type. Although non-manufacturing firms influence the use of naive capital budgeting practices, industry type does not have any significant impact on the use of sophisticated and advanced capital budgeting practices.

The fourth question asked, "Is there any significant difference between the educational qualification of the chief financial officers' and a firm's capital budgeting practices?" This study revealed that simple/naive capital budgeting practices are used mostly by CFOs with non-MBA qualifications; nonetheless, advanced/sophisticated are used mostly by MBA qualified CFOs, to wit PB, DPB and ARR are applied more by non-MBA CFOs whereas NPV, IRR RO, GTD, sensitivity analysis, scenario analysis, uncertainty absorption in cash flows, adjusting required return, probability analysis, CAPM/ βanalysis and decision trees are applied more often by CFOs who have an MBA. Moreover, the CFO having an MBA qualification positively influences the use of advanced capital budgeting; however it negatively influences the use of naive capital budgeting practices.

The fifth question enquired, "Is there any significant difference between the years of experience of chief financial officers and their capital budgeting practices?" This study found that simple/naive capital budgeting practices (PB, DPB and ARR) are applied by CFOs with a short tenure, whereas sophisticated and advanced capital budgeting practices (RO, GTD,

NPV, IRR, CAPM/ βanalysis and decision trees) are applied more by CFOs with a long tenure. Although there is a significant difference between the years of experience of chief financial officers and their capital budgeting practices, it did not influence the choice of capital budgeting practices.

The sixth question asked, "What factors make up uncertainty and to what extent does each specific uncertainty influence the choice of capital budgeting practices in Sri Lanka?" This study identified that four new specific uncertainties contribute to uncertainty: operational uncertainties (input, labour and production), financial uncertainties (interest rate, inflation and exchange rate), social uncertainty (policy, political and social) and market uncertainty (competitive, output market and input market). Of these uncertainties, market uncertainty and financial uncertainty influence sophisticated capital budgeting practices. Similarly, financial uncertainty and operational uncertainty influence advanced capital budgeting practices. In contrast, financial uncertainty negatively influences naive capital budgeting practices.
The last question asked, "Do specific uncertainties moderate the relationship between capital budgeting practices and performance?" This study identified that social uncertainty moderates the relationship: between advanced capital budgeting practices and effectiveness, between sophisticated capital budgeting practices and Tobin_q, and between advanced capital budgeting practices and Tobin_q.

Overall, the answers to the research questions culminated in the attainment of research aim and the objectives.

7.5 Contributions

In the era of globalization, the standalone application of capital budgeting theory is challenging, and some theories do not hold water today because they do not account for the influence of uncertainty factors. Nonetheless, these uncertainty factors and their influence vary across countries. As discussed earlier, this study identified four specific uncertainties (market uncertainty, operational uncertainty, social uncertainty and financial uncertainty) and examined their influence in an emerging market, Sri Lanka. Although empirical studies have identified the uncertainty factors based on European countries (Verbeeten, 2006), no studies have been conducted in an Asian based emerging market. Since uncertainty factors vary from country to country and culture to culture and this affects the behaviour of decision makers, the uncertainty model developed for Sri Lankan market (emerging market) is the one of the

greatest contribution of this study. Moreover, the uncertainty model developed can be applied and replicated across many Asian countries.

Besides the model of uncertainty, this study also investigated the influence of uncertainty factors on capital budgeting practices. The results show that uncertainty factors, both on their own and in combination with firms' characteristics, impact capital budgeting practices and not directly influencing specific uncertainties were identified as moderators between capital budgeting practices and firms' performance. Consequently, this study focused on the influence of uncertainty through different lenses. The study has made a robust theoretical and parametric contribution with regard to fact that social uncertainty interacts with the relationship between capital budgeting practices and firms' performance. And a model melding with uncertainty factors has been developed for Sri Lankan emerging market is another significant aspect.

Furthermore, this study has investigated the prevalent choice of capital budgeting techniques and identified the influence of firms' characteristics on their use in an emerging market, Sri Lanka. This study has shed new light on how theoretical concepts of capital budgeting are applied by finance professionals in Sri Lanka and it has identified the influence of firms' characteristics on their choice of capital budgeting practices. Moreover, the current study compares the results with those of previous studies carried out in developed economies that have highly developed capital markets with high levels of liquidity, meaningful regulatory bodies, large market capitalization, and high levels of per capita income (Geary, 2012), such as the USA and the UK, and an emerging economy that is in the process of rapid growth and development with lower per capita income, less mature capital markets and very small capital projects than developed countries. Consequently, the findings of the study make a geographical contribution to the existing literature in the terrain of capital budgeting in situ (e.g. Graham and Harveys, 2001; Verbeeten, 2006).

This study identified that firms in uncertain environments use more sophisticated capital budgeting practices (i.e., the use of capital budgeting techniques from traditional capital budgeting theory to emerging theories, different kinds of supplementary capital budgeting tools incorporating risk and uncertainty, adjustment methods for uncertainty and risk). The sophistication of capital budgeting practices is operationalised by the intense application of several methods and techniques used in the capital budgeting process. Traditional financial theory states that the implementation of sophisticated capital budgeting techniques results in improved corporate performance. The current study revealed that the relationship between

capital budgeting practices and firms' performance with interacting effect of social uncertainty. Thus, this study extended upon all of the other studies carried out in the past.

Beyond the overarching contributions and originality of this study, it is important to acknowledge the limitations of this study. This research assumed that the participating CFOs responded to the questionnaire with honesty and credibility. Thus the data were treated as complete true information in situ. As a result, the research project has relied on perceptions rather than 'hard data'. Although the research has provided useful insights into capital budgeting theory and practice, there is a methodological limitation in generalizing the findings to other similar nations (country effect). Therefore, a more detailed study across nations with a similar culture is warranted for further validation, replication and generalisation. This study has not focused on the influence of behavioural factors in making capital budgeting choices.

7.6 Directions for future research

Many studies conducted in developed counties have found that firms use more sophisticated capital budgeting practices (Graham and Harvey, 2001; Brounen, de Jong and Koedijk, 2004). Nonetheless, in Sri Lanka, advanced capital budgeting practices are more prevalent. Thus, future research scholars need to consider the challenges faced by CFOs with regard to the use of sophisticated capital budgeting practices (i.e. organisational barriers/knowledge gap of CFOs, technological challenges) as they lead to increased performance.

Another opportunity for future research is the investigation of other organisational characteristics (e.g. business unit strategies, reward and incentive structures, distribution of decision rights and financial structure) that have been shown to affect capital budgeting practices. Moreover, behavioural finance comes into play in capital budgeting decision-making and this has not been studied in any developing countries (Leon, Isa and Kester, 2008; Tayib and Hussin, 2011). As this study focused on capital budgeting practices and the influence of firms' characteristics and uncertainties, future researchers could focus on studies through a behavioural lens.

No studies have attempted to identify the relationship between supportive capital information systems (software products that make the required analysis easier in comparison with manual systems) and capital budgeting decision-making. Thus this has been identified as a gap between information systems and choice and practice of capital budgeting (Bennouna, Meredith and Marchant, 2010). Similarly, the environment in which organisations work

impacts on their ability to make quality decisions. Thus, researchers should concentrate on scanning organisational environments to make good investment decisions rather than depending purely on financial theory. This is of paramount importance in the current context.

Almost all of the research carried out during the last two decades has adopted a limited methodological stream. For example, cross-sectional research design, case study and qualitative study have been more popular (e.g., Butler et al., 1993; Verbeeten, 2006; Hermes, Smid and Yao, 2007; Maquieira , Preve and Allende, 2012). However, in the modern world, there is the need for an event study methodology that can provide greater insights into capital budgeting practices in combination with uncertainty.

Albeit traded bonds can be considered to the market value of the debt on the calculation of the Tobin Q, Sri Lankan companies are highly dependent on bank loan and other means of debt financing such as intra- group financing rather than exposing themselves into corporate debt market (Manawaduge, De Zoysa and Chandrakumara, 2010). Moreover, corporate bond market was inactive in 2011. As this study was considered the calculation of performance in terms of 5 years average value, the information regarding the market value of the bonds for 5 years was not available. Thus this study considered Tobin-q calculation was in line with Manawaduge, De Zoysa and Chandrakumara (2010).

Renowned researchers have found that nowadays, most large companies are inclined to use sophisticated capital budgeting practices (SCBP). However, it is intriguing question as to whether SCBP are important to all types of investment (e.g. expansion, replacements, mergers and takeovers) and all types of industries, and whether those techniques outperform non-SCBP. Thus, these conundrums still require investigation.

Many research scholars have argued that capital budgeting is influenced by a "country effect" (e.g., Graham and Harvey, 2001; Shahrokh, 2002; Hermes, Smid and Yao, 2007), for example, economic policies, the taxation system, accounting policies, the conductive social climate, the culture of the people, technological factors (i.e., decision support system), government control, political factors, and infrastructure facilities. Therefore, more extensive studies are needed in under-researched countries in order to build robust knowledge.

7.7 Implications

This research has provided valuable insights into the capital budgeting practices that are practised in the Sri Lankan context. Since Sri Lanka is an under-researched country in this field, this research has made an original contribution to the literature. Moreover, practitioners

will be able to understand the prevailing capital budgeting practices, including capital budgeting techniques, risk taking tools for incorporating risk and uncertainty, cost of capital method, differences across many firms/ many countries and differences in terms of size, CFOs' qualification, experience and industry type and consequently, this research has created a platform from which to increase shareholders' wealth by using appropriate capital budgeting methods.

This is the very first study on capital budgeting practice to incorporate firms' characteristics together with uncertainty factors in an emerging Asian country, compared with many previous studies that have been conducted in advanced developed economies and ipso facto this research will enable an awareness for top management, policy makers, practitioners and stakeholders of companies with regard to the use of capital budgeting practices in order to make successful investment decisions that enhance shareholders' wealth.

This study has identified the uncertainty factors and their influence on capital budgeting practices and firms' performance and consequently, practitioners should assess these uncertainty factors before choosing their capital budgeting methods. For example, practitioners can use this uncertainty model and examine the level of uncertainty and consequently they can use appropriate methods in order to make long-term investment decisions.

Many research scholars have criticised the fact that many studies on capital budgeting opt-test the methods of capital budgeting and their practice. These studies have only identified the methods that are being practised. However, in practice, there are many factors that affect the capital budgeting practices. In line up with this argument, this research was well thought out in its design and it has shed new light on the unknown area of capital budgeting.

This research would be of benefit to managers, practitioners and academics in many ways. It also provides avenues for future academic research scholars as discussed under 'Directions for Future Research' and thus, it serves as a springboard for future research.

7.8 Conclusion

In sum, the use of the payback method was preferred by small firms and mainly managed by CFOs with non- MBA educational qualifications and a short tenure. Industry differences did not make any significant difference to the use of PB. DPB was more significantly used by small firms than large firms and managed by CFOs with non-MBA educational qualifications. ARR was primarily applied by non-MBA CFOs and was also preferred by

non-manufacturing firms. NPV and IRR were used more by large firms than small firms; these were mainly managed by MBA qualified CFOs with a long tenure. Sophisticated capital budgeting practices, in particular RO and GTD, were significantly preferred by large companies more than by small companies and those were managed by MBA qualified CFOs who had a long tenure.

When the underlying firm characteristics were considered with regard to their influence on the usage of risk taking tools in capital budgeting practice, the use of sensitivity analysis, uncertainty absorption in cash flows and adjusting the required return were significantly preferred by large firms more than by small firms and those were significantly managed by MBA qualified CFOs rather than non-MBA qualified CFOs. Scenario and probability analysis were significantly managed by MBA qualified CFOs rather than non-MBA CFOs. It was also noticed that the usage of decision tress and CAPM/β analysis was significantly most frequently cited by large firms rather than by small firms, and these were significantly managed by MBA qualified CFOs who had a significantly long tenure.

With regard to discount rate/cut off rates, WACC and CAPM were preferred more by large firms than by small firms and WACC was managed by MBA qualified CFOs. In order to calculate the discount rate, cost of debt was significantly used by small firms more than by large firms, and preferred more by manufacturing companies in Sri Lanka. Average historical return on stock was used by long tenure CFOs. Overall, WACC was the most preferred method to calculate the cut-off rate in Sri Lanka. Moreover, in Sri Lanka, CAPM (the beta approach) was the most prevalent method for calculating the cost of equity capital. It was mainly used by large firms that were managed by MBA qualified CFOs and next to CAPM, average historical returns on common stock was the second most popular method in Sri Lanka. Judgment of opportunity cost was used at a low level and that was more prevalent in small firms handled by long tenure CFOs.

Generally, risk factors including the risk of unexpected inflation, interest rate risk, term structure risk, business cycle risk, commodity price risk, and foreign exchange risk were adjusted by either increasing the discount rate or reducing cash flows or both. Sri Lankan firms mainly use cash flow for adjusting the risk of unexpected inflation, interest rate risk, commodity price risk and foreign exchange. However, term structure risk was mainly adjusted by discount rate. In the case of Sri Lanka, almost all of the companies made an adjustment for the risk of unexpected inflation, commodity price risk and foreign exchange rate risk. However, firms in the USA and Europe did not take specific risk factors into

account when evaluating individual investment projects. This study also identified that firms use a discount rate for the entire company to evaluate a new project in an overseas market. Risk-matched discount rate was the next most popular method. The results were consistent with the USA, the UK, the Netherlands, Germany and France.

This study identified four new specific uncertainties: operational uncertainties (input, labour and production), financial uncertainties (interest rate, inflation and exchange rate), social uncertainty (policy, political and social) and market uncertainty (competitive, output market and input market). Apropos of the final model, sophisticated capital budgeting practices were determined by the size of the capital budget, market uncertainty and financial uncertainty. Moreover, advanced capital budgeting practices were determined by the size of the capital budget, the educational qualifications of the CFOs, operational uncertainty and financial uncertainty. Similarly, naive capital budgeting practices were determined by the size of the capital budget, the educational qualifications of the CFOs, as well as industry and financial uncertainty. Firms' performance (effectiveness) was determined by advanced capital budgeting practices and social uncertainty as well as their interaction. ROE was determined solely by sophisticated capital budgeting practices. Tobin-q was determined by sophisticated and advanced capital budgeting practices and social uncertainty as well as their interaction.

Overall, this study has made a geographical and parametric contribution. The directions for future research have been clearly discussed. In a nutshell, this study serves as a springboard for future research.

References

Adams, J., Khan, H.T., Raeside, R. and White, D. (2007) *Research methods for graduate business and social science students.* London: Sage publications Ltd

Aggarwal, R. (1980) 'Corporate Use of Sophisticated Capital Budgeting Techniques: A Strategic Perspective and a Critique of Survey Results', *Interfaces,* 10(2), pp.31-34.

Al-Ajmi,J.,Al-Saleh,N. and Hussain,H.A. (2011)'Investment appraisal practices: A comparative study of conventional and Islamic Financial Institution', *Advances in accounting, incorporating advances in international accounting,*27(1), pp.111-124

Al-Harthy,M.H. (2010) 'Number of Development Wells: A Decision Under Uncertainty', *The Engineering Economist: A Journal Devoted to the Problems of Capital Investment,*55(4), pp.328-349

Alkaraan, F. and Northcott, D. (2006) 'Strategic capital investment decision-making: A role for emergent analysis tools?: A study of practice in large UK manufacturing companies', *The British Accounting Review*, 38(2), pp.149-173.

Amram, M. and Howe, K.M. (2002) 'Capturing the value of flexibility', *Strategic Finance*, 84(6), pp.10-13.

Andor, G., Mohanty, S.and Toth, T. (2011) 'Capital budgeting practices: a survey of Central and Eastern European firms', *Word Bank (January)*, pp.1-45.

Andrés, P.de, Fuente, G.de.and Martín, P.S. (2015) 'Capital budgeting practices in Spain', *BRQ Business Research Quarterly*, 18(1), pp.37-56

Arbuckle,J.L.(2010) *IBM SPSS AMOS 19 user's guide.* Crawfordville, FL: AMOS Development Corporation.

Arnold, G.C. and Hatzopoulos, P.D. (2000) 'The theory-practice gap in capital budgeting: evidence from the United Kingdom', *Journal of Business Finance and Accounting*, 10(5), pp. 603-626.

Ary, D., Jacobs, L.C., Sorensen, C. and Walker, D.A. (2013) *Introduction to research in education.* 9th edn. USA: Wansworth Cengage Learning.

Atkeson, A. and Cole, H. (2005) *A Dynamic Theory of Optimal Capital Structure and Executive Compensation (No.w11083)*, National Bureau of Economic Research.

Atrill,P.(2009)*Financial management for decision makers,*5thedn., England: FT Prentice Hall.

Aziz, A. and Lawson,G.H. (1989) 'Cash Flow Reporting and Financial Distress Models: Testing of Hypotheses', *Journal of Financial Management*,18(1), pp.55-63.

Babu, C. P. and Sharma, A. (1995) 'Capital Budgeting Practices in Indian Industry-An Empirical Study', *ASCI Journal of Management,* 25(1), pp. 34-43.

Bagozzi, R.P. and Foxall, G.R. (1996) 'Construct validation of a measure of adaptive innovative cognitive styles in consumption', *International Journal of Research in Marketing*, 13(3), pp.201-213.

Baker, H.K., Dutta, S. and Saadi, S. (2011) 'Management Views on Real Options in Capital Budgeting', *Journal of Applied Finance*, 12(1), pp.18-29.

Baril,C.P., Benke, R.L. and Buetow,G.W. (1996) 'Managing Risk with Derivatives', *Management Accounting*, 78(5), pp.20-27.

Beckett-Camarata,J.(2003) 'An Examination of the Relationship between the Municipal Strategic Plan and the Capital Budget and Its Effect on Financial Performance', *Journal of Public Budgeting, Accounting and Financial Management*,15(1), pp.23-41.

Bennouna, K.,Meredith,G.G. and Marchant,T. (2010) 'Improved capital budgeting decision making: evidence from Canada', *Management Decision*, 48(2), pp.225-247.

Bierman, H. (1993) 'Capital Budgeting in 1992: A Survey', *Financial Management,* 22(3), pp. 24-24.

Bierman, H. and Smidt, S. (1993) *The Capital Budgeting Decision: Economic Analysis of Investment Projects*, 8th edn.,Toronto, Prentice Hall.

Billington, C., Johnson, B. and Triantis, A.(2003) 'A real options perspective on supply chain management in high technology', *Journal of Applied Corporate Finance*,15(2), pp.32–43.

Black, F. and Scholes,M. (1973) 'The pricing of options and corporate liabilities', *The Journal of Political Economics*, 81(3), pp.637-654

Block, S. (2007) 'Are real options actually used in the real world?', *The Engineering Economist*, 52(3), pp.255-267.

Blumberg, B., Cooper, D. and Schindler, P. (2008) *Business research method.* 2nd European edn. Maidenhead: McGraw-Hill Education.

Bock,K. and Truck,S. (2011) 'Assessing uncertainty and risk in public sector investment projects', *Technology and Investment*, 2(2), pp.105-123.

Bollen, K. and Lennox, R. (1991) 'Conventional wisdom on measurement: A structural equation perspective', *Psychological bulletin*, 110(2), pp.305-314.

Bowman, E.H. and Moskowitz, G.T. (2001) 'Real options analysis and strategic decision making', *Organizations Science* ,12(6), pp.772-777.

Brealey,R.A. and Myers,S.C.(2003) *Principles of Corporate Finance*,7th edn, International Edition, McGraw-Hill.

Brigham, E.F. and Ehrhardt, M.C. (2002) *Financial Management: Theory and Practice*,10th edn.,Ohio, Thomson/South-Western.

Brounen, D., de Jong, A. and Koedijk, K. (2004) 'Corporate finance in Europe: Confronting theory with practice', *Financial Management*, 33(4), pp.71-101.

Brown, R. and Sarma, N. (2007) 'CEO Overconfidence, CEO Dominance and Corporate Acquisitions', *Journal of Economics and Business*, 59(5), pp.358-379.

Bryman, A. and Bell, E. (2007) *Business research methods*. 2nd edn. United Kingdom: Oxford University press.

Bulan,L.T. (2005) 'Real options, irreversible investment and firm uncertainty : New evidence from U.S.firms', *Review of Financial Economics*,14(3), pp.255-279

Burkell, J. (2003) 'The dilemma of survey nonresponse', *Library & Information Science Research*, 25(3), pp.239-263.

Busby, J.S. and Pitts, C.G.C. (1997) 'Real options in practice: an exploratory survey of how finance officers deal with flexibility in capital appraisal', *Management Accounting Research*, 8(2), pp.169–186.

Byrne, B.M. (2010) *Structural equation modelling with Amos: Basic concepts, applications, and programming*. 4th edn. USA: Taylor and Francis group.

Byrne, J.P and Davis, E.P. (2005) 'Investment and Uncertainty in the G7', *Review of World Economics*, 141(1), pp.1-32

Cary, D. (2008) 'An integrated approach to alternative capital budgeting techniques, mutually exclusive projects, and consistency with the net present value rule', *Journal of American Academy of Business*, 13(2), pp.14-19.

Cattell, R.B. (1966) 'The scree test for number of factors', *Multivariate Behavioral Research*, 1(2), pp.245-276.

Cavana, R., Delahye, B.L. and Sekaran, U. (2001) *Applied Business Research: Qualitative and Quantitative methods.* Australia: Wiley.

Central Bank of Sri Lanka (2011) *Annual Report*, Colombo, Sri Lanka: Available at www.cbsl.lk (Accessed:15.05.2012)

Cescon,F.(1998) 'Investment Appraisal and Measures of Performance in Italian Divisionalised Companies', *Journal of Management and Governance*,2(2), pp.191-212.

Chadwell-Hatfield, P., Goitein, B., Horvath, P. and Webster, A. (1997) 'Financial criteria, capital budgeting techniques, and risk analysis of manufacturing firms', *Journal of Applied Business Research (JABR)*, 13(1), pp.95-104.

Chen, S. (1995) 'An Empirical Examination of Capital Budgeting Techniques: Impact of Investment Types and Firm Characteristics', *The Engineering Economist*, 40(2), pp.145-170.

Chen, S. (2008) 'DCF Techniques and Nonfinancial Measures in Capital Budgeting: A Contingency Approach Analysis', *Behavioral Research in Accounting*, 20(1), pp.13-29

Cherukuri, U, R. (1996) 'Capital Budgeting Practices: A Comparative Study of India and Select South East Asian Countries', *ASCI Journal of Management*, 25(2), pp.30-46.

Cho,D. (1996) 'An alternative and practical theory of capital budgeting: Stockholder wealth maximization approach', *The Mid - Atlantic Journal of Business*,32(2), pp.93-104

Christy, G. A. (1966) *Capital Budgeting – Current Practices and their Efficiency*, Bureau of Business and Economic Research, University of Oregon.

Colombo Stock Exchange (2012) *Annual Report*, Sri Lanka: Available at www.cse.lk (Accessed: 05.01.2013)

Cooper, W.D., Morgan,R.G., Redman ,A. and Smith,M. (2002) 'Capital Budgeting Models: Theory vs. Practice', *Business Forum- Los Angeles (California State University)*, 26(1/2), pp.15-19.

Costello, A.B. and Osborne, J.W. (2005) 'Best Practices in exploratory factor analysis: Four recommendations for getting the most from your analysis', *Practical Assessment Research & Evaluation*, 10(7), pp.1-9.

Dardenne, P.(1998) 'Capital budgeting practices, procedures and techniques by large companies in Belgium', paper presented at the 21st Annual Congress of the European Accounting Association, Antwerp, Belgium

Daunfeldt, S. O. and Hartwig, F. (2014) 'What determines the use of capital budgeting methods? Evidence from Swedish listed companies', *Journal of Finance and Economics*, *2*(4),101-112.

Dayananda, D., Irons, R., Harrison, S., Herbohn, J. and Rowland, P. (2002) *Capital Budgeting: Financial Appraisal of Investment Projects*, Edinburgh: Cambridge University Press.

Dedi,L. and Orsag,S. (2007) 'Capital Budgeting Practices: A Survey of Croatian Firms', *South East European Journal of Economics and Business,*2(1), pp.59-67

Dess, G. G. and Davis, P. S. (1984) 'Porter's (1980) generic strategies as determinants of strategic group membership and organizational performance', *Academy of Management Journal*, 27(3), pp.467-488.

Dickerson,P.J. (1963) 'Capital Budgeting- Theory and Practice', *California Management Review,* pp.53-60.

Dixit, A.K. and Pindyck, R.S.(1994) *Investment under Uncertainty*, Princeton, New Jersey: Princeton University Press,.

Donker, H., Santen, B. and Zahir, S. (2009) 'Ownership structure and the likelihood of financial distress in the Netherlands', *Applied Financial Economics*, 19(21), pp.1687-1696.

Dooley, L.M. and Lindner, J.R. (2003) 'The handling of nonresponse error', *Human Resource Development Quarterly*, 14(1), pp.99-110.

Dragota,V., Tatu,L., Pele, D., Vintila, N. and Semenescu,A.(2010) 'Capital Budgeting: The Romanian University Professors' Points of View', *The Review of Finance and Banking,* 2(2), pp.95-102.

Drazin, R., and Ven, A.H.V.(1985) 'Alternative Forms of Fit in Contingency Theory',*Administrative Science Quarterly*, 30, pp. 514-539.

Drury, C., Braund, S. and Tayles, M. (1993) 'A Survey of Management Accounting Practices in UK Manufacturing Companies', *ACCA Research Paper,* 32, Chartered Association of Certified Accountants

du Toit,M.J and Pienaar,A. (2005) 'A review of the capital budgeting behaviour of large South African firms', *Meditari Accountancy Research,*13(1), pp.19-27.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (2002) '*Management Research an Introduction'*. 2nd edn. Thousand Oaks: Sage Publications.

Ekeha,G.E.(2011) '*Capital budgeting practices and economic development: A comparative study of companies in Western Europe and West Africa'*. Available at http:// www.amazon.com/Capital-Budgeting-Pratices-Economic Development/dp/3844382593 (Accessed : 15.03.2011)

Elumilade,D.O., Asaolu,T.O. and Ologunde, A.O. (2006) 'Capital budgeting and economic development in the third world: The case of Nigeria', *International Research Journal of Finance and Economics* ,2(2), pp.136-152

Emmanuel,C., Harris,E. and Komakech,S. (2010) ' Towards a better understanding of capital investment decisions', *Journal of Accounting and Organizational Change*, 6(4), pp.477-504.

Fabrigar, L.R., Wegener, D.T., MacCallum, R.C. and Strahan, E.J. (1999) 'Evaluating the use of exploratory factor analysis in psychological research', *Psychological Methods*, 4(3), pp.272-299.

Fama, E. (1970) 'Efficient Capital Market: A Review of Theory and Empirical Work', *Journal of Finance,* 25(2), pp.383-417.

Farragher, E.J., Kleiman, R.T. and Sahu, A.P. (1999) 'Current Capital Investment Practices', *The Engineering Economist*, 44(2), pp. 137-150.

Farragher, E.J., Kleiman, R.T. and Sahu, A.P. (2001) 'The association between the use of sophisticated capital budgeting practices and corporate performance',*The Engineering Economist*, 46(4), pp.300-311.

Field, A. (2013) *Discovering statistics using IBM SPSS statistics.* 4th edn. London: Sage Publications.

Fisher, C. (2010). *Researching and writing a dissertation, an essential guide for business students,*3rd edn, Pearson Education Limited.

Folta, T.B.(1998) 'Governance and Uncertainty: The Trade-Off Between Administrative Control and Commitment', *Strategic Management Journal,* 19(11), pp.1007-1028.

Ford, J.K., MacCallum, R.C. and Tait, M. (1986) 'The application of exploratory factor analysis in applied psychology: A critical review and analysis', *Personnel Psychology*, 39(2), pp.291-314.

Freeman, M. and Hobbes, G. (1991) 'Capital budgeting: theory versus practice', *Australian Accountant*, 61(8), pp.36-41.

Geary,S. (2012) 'What is the difference between a developed, emerging, and frontier market?', Available at :http://emergingmoney.com/bric/what-is-the-difference-between-a-developed-emerging-and-frontier-market-anyway/#sthash.BJbHxpMK.dpuf, Accessed (14.06.2014).

Ghahremani,M., Aghaie,A. and Abedzadeh,M (2012) 'Capital Budgeting Technique Selection through Four Decades: With a Great Focus on Real Option', *International Journal of Business and Management* ,7(17), pp.98-119

Ghauri, P. and Gronhaug, K. (2010) *Research methods in business studies*,4th edn. Great Britain: Pearson Education Limited.

Gilbert, E. (2005) 'Capital budgeting: A case study analysis of the role of formal evaluation techniques in the decision making process', *SA Journal of Accounting Research*, 19(1), pp.19-36.

Gilbert, E. and Reichert,A. (1995) 'The practice of financial management among large United States corporations', *Financial Practice and Education*,5(1), pp.16-23.

Gitman, L. J., Juchau, R.and Flanagan, J. (2010) '*Principles of managerial finance'*, Pearson Higher Education AU.

Gitman,L.J.,and Forrester,J.(1977) 'A survey of capital budgeting techniques used by major U.S. Firms', *Financial Management*, 6(3), pp.66-71.

Gliner, J.A. and Morgan, G.A. (2000) *Research methods in applied settings: an integrated approach to design & analysis*,Morwah, NJ: Lawrence Erlbaum

Gomes,C.F., Yasin,M.M. and Lisboa,J.V. (2010) 'Performance measurement practices in manufacturing firms revisited', *International Journal of Operations and Production Management*,31(1), pp.5-30

Gorsuch, R.L. (2014) *Factor Analysis*. 2nd edn. London: Routledge

Govindarajan, V. (1984) 'Appropriateness of Accounting Data in Performance Evaluation: An Empirical Examination of Environmental Uncertainty as an Intervening Variable, *Accounting, Organizations and Society*, 9(2), pp.125-135.

Govindarajan, V. and Gupta,A.K. (1985) 'Linking control systems to business unit strategy: Impact on performance', *Accounting, Organizations and Society*, 10(1), pp.51–66.

Graham,J. and Harvey,C. (2002), ' How do CFOs make capital budgeting and capital structure decisions', *Journal of Applied Corporate Finance*,15(1), pp. 8-23.

Graham, J. and Harvey, C. (2001) 'The theory and practice of corporate finance: evidence from the field', *Journal of Financial Economics*, 60(2-3), pp. 187-243.

Greenberg,D. (2013) Sri Lanka – An Emerging Economy that is Increasingly Attractive to Foreign Investors, Available at:https://bigemergingeconomies.wordpress.com/2011/07/13/sri-lanka-an-emerging-economy that-is-increasingly-attractive-to-foreign-investors/ Accessed (14.06.2014)

Guadagnoli, E. and Velicer, W.F. (1988) 'Relation to sample size to the stability of component patterns', *Psychological bulletin*, 103(2), pp.265-275.

Haddad, K., Sterk, W. and Wu, A. (2010) 'Capital budgeting practices of Taiwanese firms', *Journal of International Management Studies*, 5(1), pp.178-182

Hair, J.F., Black, W.C., Babin. B.J. and Anderson, R.E. (2010) *Multivariate Data Analysis*. 7th edn. Englewood Cliffs, NJ: Prentice Hall.

Haka, S. F. (2006) 'A review of the literature on capital budgeting and investment appraisal: past, present, and future musings', *Handbooks of Management Accounting Research*, 2, pp.697-728.

Haka,S.F.(1987) 'Capital Budgeting Techniques and Firm Specific Contingencies: A Correlational Analysis', *Accounting, Organizations and Society*, 12(1), pp.31-48.

Haka,S.F., Gordon,L.A. and Pinches,G.E.(1985) 'Sophisticated capital budgeting selection techniques and firm performance', *The Accounting Review*, LX (4), pp.651-668.

Hall, J, and Millard ,S. (2010) 'Capital budgeting practices used by selected listed South African firms', *South African Journal of Economics Management Science*, 13(1), pp. 85-97

Halov, N. and Heider, F. (2011) 'Capital structure, risk and asymmetric information', *The Quarterly Journal of Finance*, 1(4), pp.767-809.

Hayes, A. F. (2013), *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Press.

Hermes, N., Smid, P. and Yao,L. (2007) 'Capital budgeting practices: A comparative study of the Netherlands and China', *International Business Review*, 16(5), pp.630-654.

Ho, S.S.M. and Pike,R.H. (1992) 'Adoption of Probabilistic Risk Analysis in capital Budgeting and corporate Investment', *Journal of Business Finance & Accounting*, 19(3), pp.387-405.

Ho,S.S.M. and Pike,R.H. (1998) 'Organizational characteristics influencing the use of risk analysis in strategic capital investment', *The Engineering Economist*, 43(3), pp.247-268

Hoelter, J. W. (1983) 'The analysis of covariance structures goodness-of-fit indices', *Sociological Methods & Research*, 11(3), pp.325-344.

Hornstein,A.S.(2013) 'Corporate capital budgeting and CEO turnover', *Journal of corporate finance*,20, pp.41-58

Hu, L. T. and Bentler, P. M. (1999) 'Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives', *Structural equation modelling: a multidisciplinary journal*, 6(1), pp.1-55.

Hubbard, R. and Allen, S.J. (1987) 'An empirical comparison of alternative methods for principal component extraction', *Journal of Business Research*, 15(2), pp.173-190.

Hurley, A.E., Scandura, T.A., Schriesheim, C.A., Brannick, M.T., Seers, A., Vandenberg, R.J. and Williams, L.J. (1997) 'Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives', *Journal of Organizational Behavior*, 18(6), pp.667-683.

Hussain, A. and Shafique, I. (2013) 'Capital Budgeting Practices in Islamic Banking: Evidence from Pakistan', *Euro-Asian Journal of Economics and Finance*, 1(1), pp. 9-23.

Ingersoll, J. and Ross,S. (1992) 'Waiting to Invest: Investment and Uncertainty', *The Journal of Business*, 65(1), pp.1-29.

International Federation of Accountants (IFAC) (2011) 'Sustainability Framework 2.0: Professional Accountants as Integrators' (March 2011).

Jensen, M. C.(1986) 'Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers', *American Economic Review,* 76(2), pp.323-329

Jiang, C.H., Chen, H.L. and Huang, Y.S. (2006) 'Capital Expenditures and Corporate Earnings: Evidence from the Taiwan Stock Exchange', *Managerial Finance*, 32 (11), 853-861

Jog, M.J. and Srivastava, A.K. (1995) 'Capital Budgeting Practices in Corporate Canada', *Financial Practice and Education,* 5(2), pp.37-43.

Jorion, P. (2006) *Value at Risk – The New Benchmark for Managing Financial Risk*, 3rd edn, New York: McGraw-Hill Higher Education.

Keasey, K. and Watson.R. (1989)'Consensus and accuracy in accounting studies of decision-making: A note on a new measure of consensus', *Accounting, Organizations and Society,* 14 (4), pp.337-345.

Ken, L. K. and Cherukuri, U. R. (1991) 'Current Practices in Capital Budgeting; Cost of Capital and Risk Adjustment', ASCI Journal of Management, 21(1), pp.26-44

Kersyte, A. (2011) 'Capital budgeting process: Theoretical Aspects', *Journal of Economics and Management,* 16(1), pp.1130-1134.

Kester G.W. and Chong T.K. (1998) 'Capital Budgeting Practices of Listed Firms in Singapore', *Singapore Management Review,* 20(1), pp. 9-23.

Kester, G.,Chang,R.P., Echanis, E.S., Haikal, S., ,Md.Isa, M ., Skully, M.T., Tsui,K.C. and Wang, C.J. (1999) 'Capital budgeting practices in the Asia-Pacific region: Australia, Hong Kong, Indonesia, Malaysia, Philippines, and Singapore, *Financial Practice and Education,* 9(1), pp.25-33.

Kester,G. and Robbins,G. (2011) 'The Capital Budgeting Practices of Listed Irish Companies Insights from CFOs on their investment appraisal techniques', *Accountancy Ireland,* 43(1), pp.28-30.

Khamees, B. A., Al-Fayoumi, N. and Al-Thuneibat, A. A. (2010) 'Capital Budgeting Practices in the Jordanian Industrial Corporations', *International Journal of Commerce and Management*, 20(1), pp.49-63.

Kim, S. H. and Farragher, E. J. (1981) 'Current Capital Budgeting Practices', *Management Accounting*, 62(12), pp.26-30.

Kim, S.H. (1981) 'An Empirical Study on the Relationship between Capital Budgeting practices and Earnings Performance', *The Engineering Economist*, 27(3), pp.185-196.

Kitili, E. and Nganda, J. (2014) 'A Survey of Capital Budgeting Techniques Applied by Sugar Companies in Western Kenya', *Asian Journal of Education and e-Learning*, 2(2), pp.140-145

Klammer, T. P. (1972) 'Empirical Evidence on the Application of Sophisticated Capital Budgeting Techniques', *Journal of Business*, 45(3), pp.387-397.

Klammer, T.P., and Walker, M.C. (1984) 'The Continuing Increase in the use of Sophisticated Capital Budgeting Techniques', *California Management Review*, 27(1), pp. 137-148.

Klammer,T.(1973) 'The Association of Capital Budgeting Techniques with Firm Performance', *Accounting Review*,48(2), pp.353-364.

Klammer,T., Koch, B. and Wilner, N.(1991) 'Capital Budgeting Practice- A Survey of Corporate Use', *Journal of Management Accounting Research*,3(1), pp.113-130

Kline, R.B. (2005) *Principles and Practice of Structural Equation Modeling*. 2nd edn. New York: The Guilford Press.

Knight, F.H. (1921) *Risk, Uncertainty and Profit*, Boston, MA: Houghton Mifflin Co.

Lam,K.C., Wang,D. and Lam,M.C.K. (2007) 'The Capital Budgeting Evaluation Practices (2004) of Building Contractors in Hong Kong', *International Journal of Project Management*,25(8),pp.824-834.

Lawrence, P.R. and Lorsch, J.W.(1967) 'Differentiation and Integration in Complex Organizations', *Administrative Science Quarterly*,12(1) pp. 1-48.

Lazaridis, I.T. (2004) 'Capital Budgeting practices: A Survey in the Firms in Cyprus', *Journal of Small Business Management*, 42(4), pp.427-433.

Lefley, F.(1996) 'The Payback Method of Investment Appraisal: A Review and Synthesis', *International Journal of Production Economics*, 44(3), pp.207-224.

Leon,F.M., Isa, M and Kester,G.W. (2008) 'Capital Budgeting Practices of Listed Indonesian Companies', *Asian Journal of Business and Accounting*, 1(2), pp.175-192.

Lintner, J.(1965) 'The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets', *Review of Economics and Statistics,* 47(1), pp.13-37

Liua,Y. and Salvend, G. (2009) 'Effects of Measurement Errors on Psychometric Measurements in Ergonomics Studies: Implications for Correlations, ANOVA, Linear Regression, Factor Analysis, and Linear Discriminant Analysis', *Ergonomics*, 52(5),pp. 499–511

Lord, B.R., Shanahan, Y.P. and Boyd, J.R. (2004) 'Capital Budgeting in New Zealand Local Authorities: An Examination of Practice', *Accepted for Presentation at the Fourth Asia Pacific Interdisciplinary Research in Accounting Conference*, July 4-6, Singapore , pp.1-18

MacCallum, R.C. (1990) 'The Need for Alternative Measures of Fit in Covariance Structure Modeling', *Multivariate Behavioral Research*, 25(2), pp.157-162.

MacCallum, R.C., Widaman, K.F., Zhang, S. and Hong, S. (1999) 'Sample Size in Factor Analysis', *Psychological Methods*, 4(1), pp.84-99.

Macmillan,F. (2000) ' Risk, Uncertainty and Investment Decision Making in the Oil and Gas Industry', unpublished PhD Thesis, University of Aberdeen. Available at http://www.oilit.com/papers/macmillan.pdf (Accessed: 12.12.2012)

Magni, C.A. (2009) 'Correct or Incorrect Application of CAPM? Correct or Incorrect Decisions with CAPM?', *European Journal of Operational Research*, 192(2), pp.549-560

Manawaduge,A.S., De Zoysa,A and Chandrakumar,P. (2010) 'Capital Structure and Its Implications: Empirical Evidence from Emerging Market in South Asia.GSMI Third Annual International Business Conference (pp.104-116). Michigan , USA: Global Strategic Management Inc.

Mao, J.C.T. (1970) 'Survey of Capital Budgeting: Theory and Practice', *Journal of Finance*, 25(2), pp.349-360.

Maquieira, C. P., Preve, L. A. and Sarria-Allende, V. (2012) 'Theory and Practice of Corporate Finance: Evidence and Distinctive Features in Latin America', *Emerging Markets Review*, 13(2), pp.118-148.

Markowitz, H. (1952) 'Portfolio Selection', *Journal of Finance,* 7(1), pp.77-91.

Markowitz, H. (1959) '*Portfolio Selection: Efficient Diversification of Investments'*, New York: Wiley.

Maroyi,V. and Poll,H.M. (2012) 'A Survey of Capital Budgeting Techniques used by Listed Mining Companies in South Africa', *African Journal of Business Management,*6(32), pp. 9279-9292.

Matthews, R.A., Kath, L.M. and Barnes-Farrell, J.L. (2010) 'A Short, Valid, Predictive Measure of Work–Family Conflict: Item Selection and Scale Validation', *Journal of Occupational Health Psychology*, 15(1), pp.75-90.

Matthews, R.A., Kath, L.M. and Barnes-Farrell, J.L. (2010) 'A Short, Valid, Predictive Measure of Work–Family Conflict: Item Selection and Scale Validation', *Journal of Occupational Health Psychology*, 15(1), pp.75-90.

Mavridis, D. and Moustaki, I. (2008) 'Detecting Outliers in Factor Analysis Using the Forward Search Algorithm', *Multivariate Behavioral Research*, 43(3), pp.453-475.

McGrath, R.G. (1997) 'A Real Options Logic for Initiating Technology Positioning Investments', *Academy of Management Review*, 22(4), pp.974-996.

McGrath, R.G. and Nerkar, A. (2004) 'Real options reasoning and a new look at the R&D investment strategies of pharmaceutical firms', *Strategic Management Journal*, 25(1), pp.1-21.

Megginson, W. L., Smart, S. B.and Lucey, B. M. (2008) *Introduction to Corporate Finance.* London: Cengage Learning EMEA.

Miller, K.D. (1992) 'A Framework for Integrated Risk Management in International Business', *Journal of International Business Studies*, 23(2), pp.311-331.

Miller,E.M.(2000) 'Capital Budgeting Errors Seldom Cancel', *Financial Practice and Education,*10(2), pp.128-135

Miller, M. and Modigliani. F. (1961) 'Dividend Policy, Growth, and the Valuation of Shares', *Journal of Business*, 34 (4), pp. 411-433.

Modigliani, F. and Miller, M.H. (1958) 'The Cost of Capital, Corporation Finance, and the Theory of Investment', *American Economic Review*, 48(3), pp.261-297.

Mohammed, M. (2013) *The Capital Investment Appraisal Process: The Case of Libya* (Doctoral dissertation, University of Dundee).

Mukheijee, T.K. and Henderson,G.V.(1987) 'Capital Budgeting Process: Theory and Practice', *Interfaces*, 17(2), pp.78-90.

Murto, P. and Keppo, J.(2002) 'A Game Model of Irreversible Investment under Uncertainty', *International Game Theory Review*, 4(2), pp.127-140

Mustapha, M.Z. and Mooi, S.T.L. (2001) 'Firm Performance and Degree of Sophistication of Capital Budgeting Practice: Some Malaysian Evidence',*Proceedings of the Asia Pacific Management Conference*, pp. 279-290.

Mutairi, M. Al., Tian, G., Hasan, H. and Tan, A. (2012) 'Corporate Governance and Corporate Finance Practices in a Kuwait Stock Exchange Market Listed Firm: A Survey to Confront Theory with Practice', *Corporate Governance: The International Journal of Business in Society*,12 (5), pp.595-615

Myers, S. C. (1977) 'The Determinants of Corporate Borrowing', *Journal of Financial Economics*, 5(2), pp.147-175.

Myers, S. C. and Majluf, N. S. (1984) 'Corporate Financing and Investment Decisions when Firms have Information that Investors do not have', *Journal of Financial Economics*, 13(2), pp.187-221.

Myers, S.C. (2003) 'Financing of Corporations', *Handbook of the Economics of Finance*',1(A), pp.215-253.

Neuman, W. L. and Kreuger, L. W. (2003) *Social Work Research Methods: Qualitative and* Quantitative *applications*, 1st edn, USA:Pearson Education.

Nutt, P.C. (1993) 'Flexible Decision Styles and the Choices of Top Executives', *Journal of Management Studies*, 30(5), pp. 695-721.

Pallant, J. (2010) *SPSS: Survival Manual.* 4th edn. England: Open University press

Pandey, I, M. (1989)'Capital Budgeting Practices of *Indian* Companies', *Management Journal*, 2(1), pp.1-15

Payne, J. D., Heath, W. C. and Gale, L. R. (1999) 'Comparative Financial Practice in the US and Canada: Capital Budgeting and Risk Assessment Techniques', *Financial Practice and Education*, 9(1), pp.16-24.

Pereiro, L. E. (2006) 'The Practice of Investment Valuation in Emerging Markets: Evidence from Argentina', *Journal of Multinational Financial Management*,16(2), pp.160-183.

Perfect, S. B. and Wiles, K.W. (1994) 'Alternative Constructions of Tobin's q: An Empirical Comparison', *Journal of Empirical Finance*, 1, pp.313-341

Peterson, P. P. and Fabozzi, F. J. (2002) *Capital Budgeting: Theory and Practice*, Vol. 10, John Wiley & Sons

Pierce, B. J. and Tsay, J. J. (1992) 'A Study of the Post-Completion Audit Practices of Large American Corporations: Experience from 1978 and 1988',*Journal of Management Accounting Research*, 4(1), pp.131-155.

Pike, R., and Neale,B. (2009) *Corporate Finance and Investment Decisions and Strategies*, 6th edn., Harlow: Pearson Prentice Hall.

Pike, R.H. (1984) 'Sophisticated Capital Budgeting Systems and Their Association with Corporate Performance', *Managerial and Decision Economics*, 5(2), pp. 91-97.

Pike,R.(1996) 'A Longitudinal Survey on Capital Budgeting Practices', *Journal of Business Financing and Accounting*, 23(1), pp.79-92.

Pike,R.H.(1988) 'An Empirical Study of the Adoption of Sophisticated Capital Budgeting Practices and Decision Making Effectiveness', *Accounting and Business Research* , 18(72), pp.341-351.

Poudel, K. L., Nepal, A. P., Dhungana, B., Sugimoto, Y., Yamamoto, N. and Nishiwaki, A. (2009) 'Capital Budgeting Analysis of Organic Coffee Production in Gulmi District of Nepal', In *2009 Conference, August 16-22, 2009, Beijing, China* (No. 51559). International Association of Agricultural Economists.

Prahalad, C.K. (1994) 'Corporate Governance or Corporate Value Added?. Rethinking the Primacy of Shareholder Value', *Journal of Applied Corporate Finance*, 6(4), pp. 40-50.

Pruitt, S. W. and Gitman, L. J. (1987) 'Capital Budgeting Forecast Biases: Evidence from the Fortune 500', *Financial Management*, 16(1), pp.46-51.

Quirin, G.D.(1967) *The Capital Expenditure Decision*, New York: Richard D.Irwin Publication.

Rigopoulos, G. (2014) 'Real Options Adoption in Capital Budgeting: A Highlight of Recent Literature', *Journal of Economics and Business Research*, 20(2), pp. 41-51.

Ritter, J. R. (1991) 'The Long Run Performance of Initial Public Offerings', *Journal of Finance*, 46(1), pp. 3-27.

Roll, R. (1977) 'A Critique of the Asset Pricing Theory's Tests' Part I: On Past and Potential Testability of the Theory', *Journal of Financial Economics*, 4(2), pp.129-176

Ross, M. (1986) 'Capital Budgeting Practices of Twelve Large Manufacturers ' *Financial Management*, 15(4), pp.15-22.

Ross, S.A., Westerfield, R.W., Jordan, B.D. and Roberts, G.S. (2005) *Fundamentals of Corporate Finance*, 5th Canadian edn., Ryerson, Toronto: McGraw Hill,.

Ross,S.A. (1976) 'The Arbitrage Theory of Capital Assets Pricing', *Journal of Economic Theory*, 13(3), pp.341-360.

Ryan,P.A. and Ryan,G.P.(2002) 'Capital Budgeting Practices of the Fortune 1000: How have things changed?', *Journal of Business and Management*, 8(4), pp.355-364.

Sandahl, G. and Sjogren,S. (2003) 'Capital Budgeting Methods among Sweden's Largest Groups of Companies. The State of the Art and a Comparison with Earlier Studies', *International Journal of Production Economics*, 84(1), pp.51-69

Sangster, A. (1993) 'Capital Investment Appraisal Techniques: A Survey of Current Usage', *Journal of Business Finance and Accounting*, 20(3), pp.307-332.

Saunders, M., Lewis, P. and Thornhill, A. (2007) *Research Methods for Business Students*. London: Prentice Hall.

Scapens, R.W. and Sale, J.T. (1981) 'Performance Measurement and Formal Capital Expenditure Controls in Divisionalized Companies', *Journal of Business Finance and Accounting*, 8(3), pp. 389 419.

Schall, L.D. and Sundem,G.L (1980) 'Capital Budgeting Methods and Risk: A Further Analysis', *Financial Management*, 9(1), pp.7-11

Schreiber, J., James, B., Nora, A., Stage, F. K., Barlow, E. and King, J. (2006) 'Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review', *The Journal of Educational Research*, 99(6), pp. 323-337.

Schriesheim, C.A., Powers, K.J., Scandura, T.A., Gardiner, C.C. and Lankau, M.J. (1993) 'Improving Construct Measurement in Management Research: Comments and Quantitative Approach for Assessing the Theoretical content adequacy of Paper-and-Pencil Survey-Type Instruments', *Journal of Management*, 19(2), pp.385-417.

Schuyler, J. R. (1997) 'Best Practices in Project Evaluation and Influence on Company Performance', *Journal of Petroleum Technology*, 49(8), pp.818-823.

Segelod, E. (1998) 'Capital Budgeting in a Fast-Changing World', *Long Range Planning*, 31 (4), pp.529-541.

Sekwat, A. (1999) ' Capital Budgeting Practices among Tennessee Municipal Government', *Government Finance Review (June)*,pp.15-19

Shao, L.P. and Shao, A.T.(1996) 'Risk Analysis and Capital Budgeting Techniques of U.S. Multinational Enterprises', *Managerial Finance*, 22(1), pp. 41-57.

Sharpe,W.F.(1963)'A Simplified Model of Portfolio Analysis', *Management Science* ,9(2), pp.277-293.

Sharpe,W.F.(1964) 'Capital Assets Prices: A Theory of Market Equilibrium under Conditions of Risk', *Journal of Finance*, 19(3), pp.425-442.

Shinoda,T.(2010) 'Capital Budgeting Management Practices in Japan— A Focus on the Use of Capital Budgeting Methods' , *Economic Journal of Hokkaido University*, 39(6), pp. 39-50.

Simerly, R.L. and Li, M. (2000) 'Environmental Dynamism, Capital Structure and Performance: A Theoretical Integration and an Empirical Test', *Strategic Management Journal*, 21(1), pp.31-49.

Singh,S., Jain,P.K. and Yadav,S.S. (2012) 'Capital Budgeting Decisions : Evidence from India', *Journal of Advances in Management Research*, 9(1), pp.96-112

Slagmulder, R.(1997) 'Using Management Control Systems to Achieve Alignment between Strategic Investment Decisions and Strategy, *Management Accounting Research*, 8, pp.103-139.

Slagmulder, R., Bruggeman,W. and Wassenhove,L.(1995) 'An Empirical Study of Capital Budgeting Practices for Strategic Investments in CIM Technologies', *International Journal of Production Economics*, 40(2), pp.121-152.

Smit, H.T.J.(2003) ' Infrastructure Investment as a Real Options Game: The Case of European Airport Expansion', *Financial Management*, 32(4), pp. 27-57.

Smit, H.T.J., and Ankum,L.A.(1993) 'A Real Options and Game-Theoretic Approach to Corporate Investment Strategy under Competition', *Financial Management*, 22(3), pp. 241-250.

Smith, C. W., Smithson, C. W.and Wilford, D. S. (1989) 'Managing Financial Risk', *Journal of Applied Corporate Finance*, 1(4), pp. 27-48.

Staw, B. M., (1991) 'Dressing Up Like an Organization: When Psychological Theories Can Explain Organizational Action', *Journal of Management*, 17(4), pp. 805-819.

Stevens, J.P. (2002) *Applied Multivariate Statistics for the Social Sciences.* 4th edn.. Hillsdale, NJ: Lawrence Erlbaum Associates.

Tabachnick, B.G. and Fidell, L.S. (2007) *Using Multivariate Statistics.* 4thedn. New York: Harper Collins.

Trahan, E. A. and Gitman, L. J. (1995) 'Bridging the Theory-Practice Gap in Corporate Finance: A Survey of Chief Financial Officers', *The Quarterly Review of Economics and Finance*, 35(1), pp.73-87.

Trigeorgis, L. (1993) 'Real Options and Interactions with Financial Flexibility', *Financial Management*, 22(3), pp.202–224.

Truong, G., Partington,G. and Peat,M.(2008) 'Cost of Capital Estimation and Capital Budgeting Practice in Australia', *Australian Journal of Management*, 33(1), pp.95-121.

Tversky, A., Slovic, P.and Kahneman, D. (1990) 'The Causes of Preference Reversal', *The American Economic Review*,80(1), pp.204-217.

Vadeei,M., Mahmoudi,P., Khatibi,S.A. and Mohammadi,J. (2012) 'An Analysis and Explanation of the Relationship between Techniques of Capital Budgeting and the Performance of Companies Admitted to Tehran Stock Exchange (Iran)', *Journal of Basic and Applied Scientific Research,* 2(7), pp.6420-6423.

Van der Stede, W.A., Young, S.M. and Chen, C.X. (2005) 'Assessing the Quality of Evidence in Empirical Management Accounting Research: The Case of Survey Studies', *Accounting, Organizations and Society*, 30(7), pp.655-684.

Velicer, W.F. and Fava, J.L. (1998) 'Affects of Variable and Subject Sampling on Factor Pattern Recovery', *Psychological Methods*, 3(2), pp.231-251.

Velicer, W.F. and Jackson, D.N. (1990) 'Component Analysis versus Common Factor Analysis: Some Issues in Selecting an Appropriate Procedure', *Multivariate Behavioral Research*, 25(1), pp.1-28.

Verbeeten, F.H.M. (2006) 'Do Organizations Adopt Sophisticated Capital Budgeting Practices to deal with Uncertainty in the Investment Decision? A Research Note', *Management Accounting Research*, 17(1), pp.106-120.

Verma,S., Gupta,S. and Batra,R. (2009) 'A Survey of Capital Budgeting Practices in Corporate India', *The Journal of Business Perspective*, 13(3), pp.1-17

Vojta, GJ. (1992) 'Build a Framework for Risk Management', *Financial Executive*, 6, pp.3-6.

Wallace, R.O. and Mellor, C.J. (1988) 'Nonresponse Bias in Mail Accounting Surveys: Pedagogical Note', *The British Accounting Review*, 20(2), pp.131-139.

Wernerfelt, B. and Karnani, A. (1987) 'Competitive Strategy under Uncertainty', *Strategic Management Journal*, 8(2), pp.187-194.

West, S.G., Finch, J.F. and Curran, P.J. (1995) 'Structural Equation Models with Nonnormal Variables: Problems and Remedies', in R.H. Hoyle (ed.), *Structural equation modelling: concepts, issues, and applications.* Thousand Oaks, CA: Sage, pp.56-75.

Williams, J.J. and Seaman, A.E. (2001) 'Predicting Change in Management Accounting Systems: National Culture and Industry Effects', *Accounting, Organizations and Society*, 26(4), pp. 443–460.

Wilner, N., Koch,B. and Klammer,T.(1992) 'Justification of High Technology Capital Investment - An Empirical Study', *The Engineering Economist*, 37(4), pp. 341-353.

Wnuk-Pel, T. (2014) 'Capital Budgeting Practices in Non-manufacturing Companies in Poland', *Social Sciences*, 82(4), pp. 59-69.

Wolffsen, P. (2012) 'Modification of Capital Budgeting under Uncertainty',*Taikomoji ekonomika: sisteminiai tyrimai*, (6/2), pp.143-159.

Wong, K.A., Farragher, E. J. and Leung, R. K. C. (1987) 'Capital Investment Practices: A Survey of Large Corporations in Malaysia, Singapore and Hong Kong', *Asia-Pacific Journal of Management*, 4(2), pp.112-123.

Worthington, R.L. and Whittaker, T.A. (2006) 'Scale Development Research a Content Analysis and Recommendations for Best Practices', *The Counseling Psychologist*, 34(6), pp. 806-838.

Zhang, Q., Huang, X. and Tang, L.(2011) 'Optimal Multinational Capital Budgeting under Uncertainty', *Computers and Mathematics with Applications* ,62(12), pp.4557-4568.

Zhu, K. and Weyant, J.P. (2003) 'Strategic Decisions of New Technology Adoption under Asymmetric Information: A Game-Theoretic Model', *Decision Science* ,34(4), pp. 643-675.

Zubairi,H.J. (2008) 'Capital Budgeting - Decision Making Practices in Pakistan', Available at SSRN: http://ssrn.com/abstract=1308662 or http://dx.doi.org/10.2139/ssrn.1308662,pp1-11 (Accessed: 02.01.2013)

Appendices

Appendix A: Survey Questionnaire

Kingston University London

Survey on Capital budgeting Theory and Practices

Dear Chief Financial Officers,

I am Lingesiya Yasotharalingam, Lecturer, University of Jaffna, Sri Lanka, presently a PhD student (K1115350) at the Kingston University, London and doing a research on **'Capital Budgeting Theory and Practices in Sri Lanka'** which focus on listed companies of Colombo Stock Exchange under supervision of Dr. Mohamed Nurullah, Reader in Banking and Finance and Prof. Giampero Favato, Head, Department of Accounting and Finance, Kingston University, London. This study is expected to build a robust knowledge in the area of capital budgeting theory and its practices by identifying uncertainty factors and its influences on the capital budgeting practices and performance of the firm. The success of the research is dependent on the cooperation of people like you, who can provide valuable information on this study.

The survey will take you no more than 20 minutes to complete. All information will be kept completely confidential and will be used only for the academic purpose and subject to the strict professional ethical codes of the Kingston University, UK. I shall be thankful if you could fill in this questionnaire patiently and promptly. If you require a report on this study, I will send it to you once the study is completed. If you prefer filling in this same questionnaire via online it is available at : http://kingston.eu.qualtrics.com/SE/?SID=SV_03txeyoyHiBRDIX

If you have any questions or need any information, please do not hesitate to contact me

Thanking for your kind co-operation
Yours faithfully

Y. Lingesiya

Y.Lingesiya
PhD Student
Dept.of Accounting and Finance
Kingston University, London
Email:K1115350@kingston.ac.uk/lingesiya@jfn.ac.lk
Contact Number: 00447404949304

PART 1: ASSESSING COMPANY'S DEMOGRAPHIC INFORMATION AND CORPORATE PRACTICES REGARDING CAPITAL BUDGETING

1. I)Please answer to the following questions for general information of your company

a. Name and age of your company:

b. Ownership of company: Public ☐ Private ☐

c. What is your company's planning horizon for capital expenditure budgets': (choose best option)

1 year ahead ☐ 2 years ahead ☐ 3 years ahead ☐ 4 years ahead ☐ More than 4 years ahead ☐

d. Size of capital budget in LKR:

<10 Million ☐ 10-99 Million ☐ 100- 499 Million ☐ 500 – 999 Million ☐ > 1 Billion ☐

II)Please answer to the following questions for general information of respondents

e. Please specify length of your experience in capital budgeting practices (in years):

f. Your educational qualifications:

Undergraduate ☐ Bachelor degree ☐ MBA ☐ Non- MBA Masters ☐ PhD ☐ Professional ☐ Any other ☐

Specify the purpose of your company's capital budgeting (check all that apply)

Expansion into new business	☐	Equipment replacement	☐
Investing new facilities	☐	Modernization	☐
New product development	☐	Employing new technology	☐
Expansion of existing business	☐	Research and development	☐
Diversification	☐	Training and development	☐
Mergers and acquisition	☐	Any other capital projects	☐

a. From the following list of common capital budgeting methods (investment appraisal techniques), please tick *one* box for each question to indicate primary and secondary capital budgeting techniques. If you have extra comments, please leave them to the end of the questionnaire.

Capital budgeting methods	Primary	Secondary	Neither	Capital budgeting methods	Primary	Secondary	Neither
Simple payback period (PB)	☐	☐	☐	Adjusted present value (APV)	☐	☐	☐
Discounted payback period (DPB)	☐	☐	☐	Profitability Index (PI)	☐	☐	☐
Accounting rate of return (ARR)	☐	☐	☐	Real option theory	☐	☐	☐
Net present value (NPV)	☐	☐	☐	Game theory decision	☐	☐	☐
Internal rate of return (IRR)	☐	☐	☐	Non financial decision rules (please specify)	☐	☐	☐
Modified internal rate of return (MIRR)	☐	☐	☐	Please state if you use any other methods			

b. Please assign the capital budgeting techniques /methods presented below a number between (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always) depending on the degree of usage of capital budgeting tools for a particular investment.

Capital budgeting methods	1	2	3	4	5	Capital budgeting methods	1	2	3	4	5
Simple payback period (PB)	☐	☐	☐	☐	☐	Adjusted present value (APV)	☐	☐	☐	☐	☐
Discounted payback period (DPB)	☐	☐	☐	☐	☐	Profitability index (PI)	☐	☐	☐	☐	☐
Accounting rate of return (ARR)	☐	☐	☐	☐	☐	Real option theory	☐	☐	☐	☐	☐
Net present value (NPV)	☐	☐	☐	☐	☐	Game theory decision	☐	☐	☐	☐	☐
Internal rate of return (IRR)	☐	☐	☐	☐	☐	Non financial decision rules (please specify:)	☐	☐	☐	☐	☐
Modified internal rate of return (MIRR)	☐	☐	☐	☐	☐	Please state if you use any other methods:					

c.Please specify the relative usage of various supplementary capital budgeting methods /tools for incorporating risk and uncertainties (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = Always)

Supplementary capital budgeting methods	1	2	3	4	5	Supplementary capital budgeting methods	1	2	3	4	5
Sensitivity analysis/Break even	☐	☐	☐	☐	☐	Market Value Added	☐	☐	☐	☐	☐
Scenario analysis	☐	☐	☐	☐	☐	Complex mathematical model	☐	☐	☐	☐	☐
Monte Carlo simulations	☐	☐	☐	☐	☐	Linear programming	☐	☐	☐	☐	☐
Decision trees	☐	☐	☐	☐	☐	Shorter payback period (Adjusting the payback period)	☐	☐	☐	☐	☐

High cut off rates	☐	☐	☐	☐	☐	Use of certainty equivalents instead of expected cash flows	☐	☐	☐	☐	☐
Uncertainty absorption in cash flows	☐	☐	☐	☐	☐	Probability analysis	☐	☐	☐	☐	☐
Adjusting the required return	☐	☐	☐	☐	☐	Other (please specify.....)					
Inflation adjusted cash flows	☐	☐	☐	☐	☐						

4. **a.** Specify methods your company uses to derive the discount/cut off rate (minimum rate of return) used in the appraisal of major capital investment (1 = never,2 = rarely,3= sometimes,4= often , = always)

Methods to derive the discount rate	1	2	3	4	5	Methods to derive the discount rate	1	2	3	4	5
Weighted Average Cost of Capital	☐	☐	☐	☐	☐	Earnings yields on shares	☐	☐	☐	☐	☐
Cost of capital derived from the CAPM model	☐	☐	☐	☐	☐	Average historical return on stock	☐	☐	☐	☐	☐
Cost of Debt (CD)/ Interest payable on debt capital	☐	☐	☐	☐	☐	Other method(s):	☐	☐	☐	☐	☐
An arbitrary rate	☐	☐	☐	☐	☐						

b. Specify factors influencing the choice of the capital budgeting method (1 = not at all important, 2= not that important, 3= neutral, 4 = important, 5 = very important

Factors	1	2	3	4	5	Factors	1	2	3	4	5
Finance theory	☐	☐	☐	☐	☐	Easy understandability	☐	☐	☐	☐	☐
Experience and competency	☐	☐	☐	☐	☐	Top management familiarity	☐	☐	☐	☐	☐
Informal rule of thumb	☐	☐	☐	☐	☐	Other factor(s):	☐	☐	☐	☐	☐
Importance of the project	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐

c. Specify methods used by companies to calculate cost of equity capital (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always)

Methods	1	2	3	4	5	Methods	1	2	3	4	5
Average historical returns on common stock	☐	☐	☐	☐	☐	Regulatory decisions	☐	☐	☐	☐	☐
CAPM model (The Beta Approach)	☐	☐	☐	☐	☐	Discounted dividend/earnings model	☐	☐	☐	☐	☐
CAPM with some extra risk factors	☐	☐	☐	☐	☐	Any other method(s):	☐	☐	☐	☐	☐
As per the choice of the investors	☐	☐	☐	☐	☐						

d. How frequently would your company use the following discount rates when evaluating a new project in an overseas market (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always)

Discount rates	1	2	3	4	5	Discount rates	1	2	3	4	5
The discount rate for our entire company	☐	☐	☐	☐	☐	A risk matched discount rate for this particular project(considering both country and industry)	☐	☐	☐	☐	☐
The discount rate for the overseas market (country discount rate)	☐	☐	☐	☐	☐	A different discount rate for each component cashflow that has a different risk characteirtics(e.g: depreciation Vs.operating cashflows)	☐	☐	☐	☐	☐
A divisional discount rate (if the project line of business matches a domestic division)	☐	☐	☐	☐	☐	Any other method(s):	☐	☐	☐	☐	☐

e) When valuing a project, do you adjust either the discount rate or cash flows for the following risk factors?(1= Adjust discount rate, 2= Adjust cash flow, 3= Both, 4 = Neither)

	1	2	3	4		1	2	3	4
Risk of unexpected inflation	☐	☐	☐	☐	Foreign exchange risk	☐	☐	☐	☐
Interest rate risk (change in general level of interest rates)	☐	☐	☐	☐	Distress risk (probability of bankruptcy)	☐	☐	☐	☐
Term structure risk (change in the long term Vs. short term interest rate)	☐	☐	☐	☐	Size (small firms being riskier)	☐	☐	☐	☐
GDP or business cycle risk	☐	☐	☐	☐	Market to book ratio (ratio of market value of firm to book value of assets)	☐	☐	☐	☐
Commodity price risk	☐	☐	☐	☐	Momentum (recent stock price performance)	☐	☐	☐	☐
					Any other risk :	☐	☐	☐	☐

PART II: IDENTIFYING UNCERTAINTY THAT AFFECT CAPITAL BUDGETING PRACTICES

a) Please specify how important the following risk and uncertainties affect your company's capital budgeting decision? (1 = Not at all important, 2 = not that important, 3 = neutral, 4 = important, 5 = very important)

General uncertainties and its components	1	2	3	4	5	**Industry specific uncertainties and its components**	1	2	3	4	5
Political uncertainties (Terrorism, war, changes in political regime)	☐	☐	☐	☐	☐	Uncertainties about input market (strong variations in quality and / or quantity of inputs, such as raw materials and staff/supply relative to the industry demand)	☐	☐	☐	☐	☐
Policy uncertainties (changes in Government policy, company policies, accounting policies, fiscal & monetary policies, tax policy, trade restrictions and regulations affecting business sector)	☐	☐	☐	☐	☐	Uncertainties about the output market (strong fluctuations in the demand for products in general , at sector level, consumer preferences, market demand, availability of substitutes and complements)	☐	☐	☐	☐	☐
Macro economic uncertainties including						Competitive uncertainties (intensifying competition, competitor attitudes , low entry barriers)	☐	☐	☐	☐	☐
• Interest rate uncertainties	☐	☐	☐	☐	☐	Other industry specific uncertainties (please specify.....)	☐	☐	☐	☐	☐
• Inflation uncertainties	☐	☐	☐	☐	☐	**Organizational specific uncertainties and its components**					
• Exchange rate uncertainties	☐	☐	☐	☐	☐	Operational uncertainties as					
Other macro economic uncertainties, (please specify.....)	☐	☐	☐	☐	☐	• Labour uncertainties (changes in labour productivity, strikes)	☐	☐	☐	☐	☐
Social uncertainties (e.g: changes in beliefs, values and attitudes reflected in business practice)	☐	☐	☐	☐	☐	• Input uncertainties (changes in quality and quantity)	☐	☐	☐	☐	☐
Natural uncertainties (e.g: variation in rainfall, earthquakes, Tsunami)	☐	☐	☐	☐	☐	• Production uncertainties (Changes in output , manufacturing faults)	☐	☐	☐	☐	☐
Other general uncertainties (please specify.....)	☐	☐	☐	☐	☐	Liability uncertainties (environment/product)	☐	☐	☐	☐	☐
						Research and Development (fluctuating results under research projects)	☐	☐	☐	☐	☐
						Credit uncertainties (payment behaviour of customer)	☐	☐	☐	☐	☐
						Behavioural uncertainties (pursuing personal interests rather than business interests, fraud, overconfidence, emotions)	☐	☐	☐	☐	☐
						Other industry specific uncertainties (please specify .....)	☐	☐	☐	☐	☐

b) What are the importance of the following methods for identifying risks and uncertainties in potential investment projects for your organization? (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always)

Methods for identifying uncertainty and risk	1	2	3	4	5	Methods for identifying uncertainty and risk	1	2	3	4	5
Use of checklists with potential loss sources by type of project	☐	☐	☐	☐	☐	Consultation with external parties (accountants, consultants, bankers, lawyers)	☐	☐	☐	☐	☐
Analysis of (expected) project balance and / or results (account)	☐	☐	☐	☐	☐	Analysis of contracts that are linked to the investment project	☐	☐	☐	☐	☐
Use flowcharts to risks in the process input mapping	☐	☐	☐	☐	☐	Analysis of statistical data	☐	☐	☐	☐	☐
Site inspections with similar projects	☐	☐	☐	☐	☐	Analysis of environmental developments	☐	☐	☐	☐	☐
Consultation with other organizational units (engineers, marketing, production)	☐	☐	☐	☐	☐	Other(please specify.....)	☐	☐	☐	☐	☐

c. How important is the use of the following risk mitigation for your organization for the long term investment? (1 = Not at all important, 2 = not that important, 3 = neutral, 4 = important, 5 = very important)

Measures for response to risk and uncertainties	1	2	3	4	5	Measures for response to risk and uncertainties	1	2	3	4	5
Insurance underwriting	☐	☐	☐	☐	☐	Spreading activities (Geographically or in different industries)	☐	☐	☐	☐	☐
Using financial instruments (options, forward contract, etc)	☐	☐	☐	☐	☐	Undertaking political activities	☐	☐	☐	☐	☐
Reduce leverage (equity/total assets)	☐	☐	☐	☐	☐	Collaborate with other organizations (joint ventures, strategic alliances)	☐	☐	☐	☐	☐
Withdrawing from or outsource certain activities	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐

PART III: ASSESSING EFFECTIVENESS OF INVESTMENT DECISIONS

How satisfied are you with how your investment decisions affect the success of your organization in the followings. (1 = very dissatisfied, 2 = dissatisfied, 3 = sometimes satisfied, 4 = satisfied, 5 = very satisfied)

	1	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Profit, profit margin	☐	☐	☐	☐	☐	Development of new markets and products	☐	☐	☐	☐	☐
Operating cash flows	☐	☐	☐	☐	☐	Research and development	☐	☐	☐	☐	☐
Market capitalization, share price, dividend	☐	☐	☐	☐	☐	Quality of products, service customers	☐	☐	☐	☐	☐
Cost of control/ reduction	☐	☐	☐	☐	☐	Personnel development / development of human capital	☐	☐	☐	☐	☐
Sales growth	☐	☐	☐	☐	☐	Political and social effects	☐	☐	☐	☐	☐
Market share	☐	☐	☐	☐	☐	Ethical integrity of the organizational component/ Ethical performance					

7. Please write any comments (If you need please use additional page)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

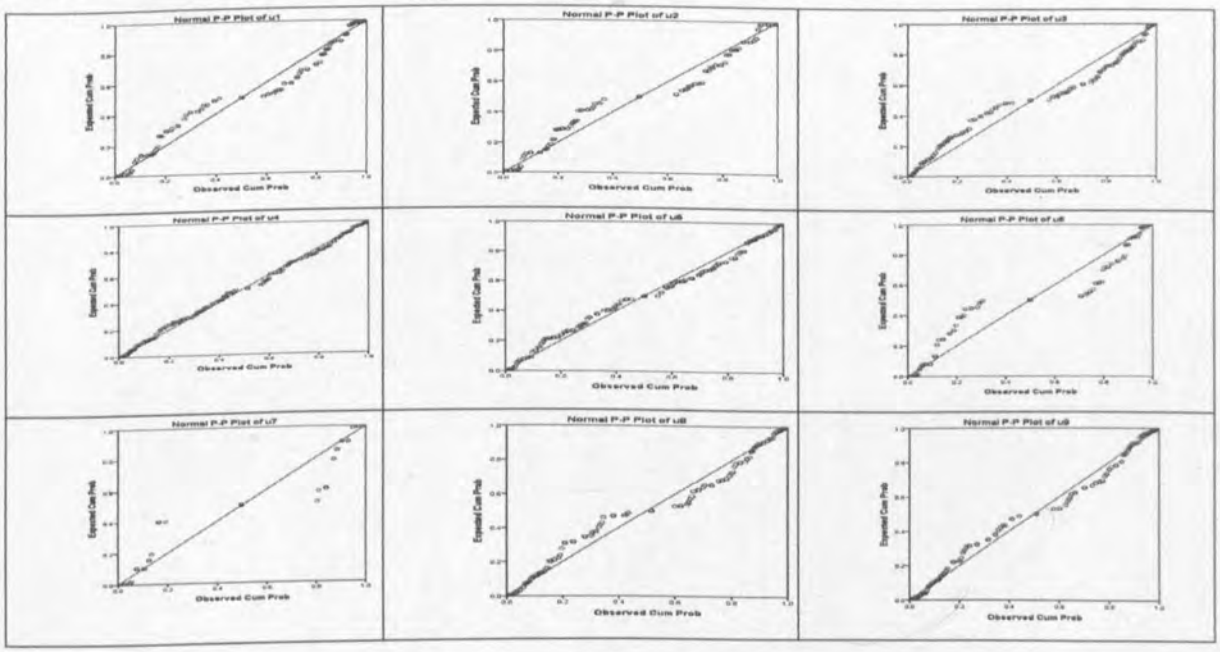
Thank You in Advance

Appendix B- Statistical results

Table 1: Uncertainty measure – Skewness and Kurtosis

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
u1-Political uncertainty	186	-1.863	.178	2.090	.355
u2- Policy uncertainty	186	-1.648	.178	1.165	.355
u3- Interest rate uncertainty	186	-1.755	.178	3.023	.355
u4- Inflation uncertainty	186	-1.162	.178	.783	.355
u5- Exchange rate uncertainty	186	-1.504	.178	1.927	.355
u6 – Social uncertainty	186	-2.347	.178	4.358	.355
u7 –Natural uncertainty	186	2.792	.178	7.242	.355
u8 – Input market uncertainty	186	-.979	.178	.952	.355
u9 – Output market uncertainty	186	-.945	.178	.900	.355
u10 – Competitive uncertainty	186	-1.170	.178	1.749	.355
u11 – Labour uncertainty	186	-.128	.178	-1.384	.355
u12- Input uncertainty	186	.068	.178	-1.341	.355
u13 -Production uncertainty	186	-.536	.178	-1.157	.355
u14 – Liability uncertainty	186	.548	.178	-.034	.355
u15 – Research uncertainty	186	-.515	.178	7.494	.355
u16- Credit uncertainty	186	.114	.178	-.328	.355
u17 – Behaviour uncertainty	186	.654	.178	-1.159	.355
Valid N (listwise)	186				

Figure 1: Normality Test P_P Plots for uncertainty measure



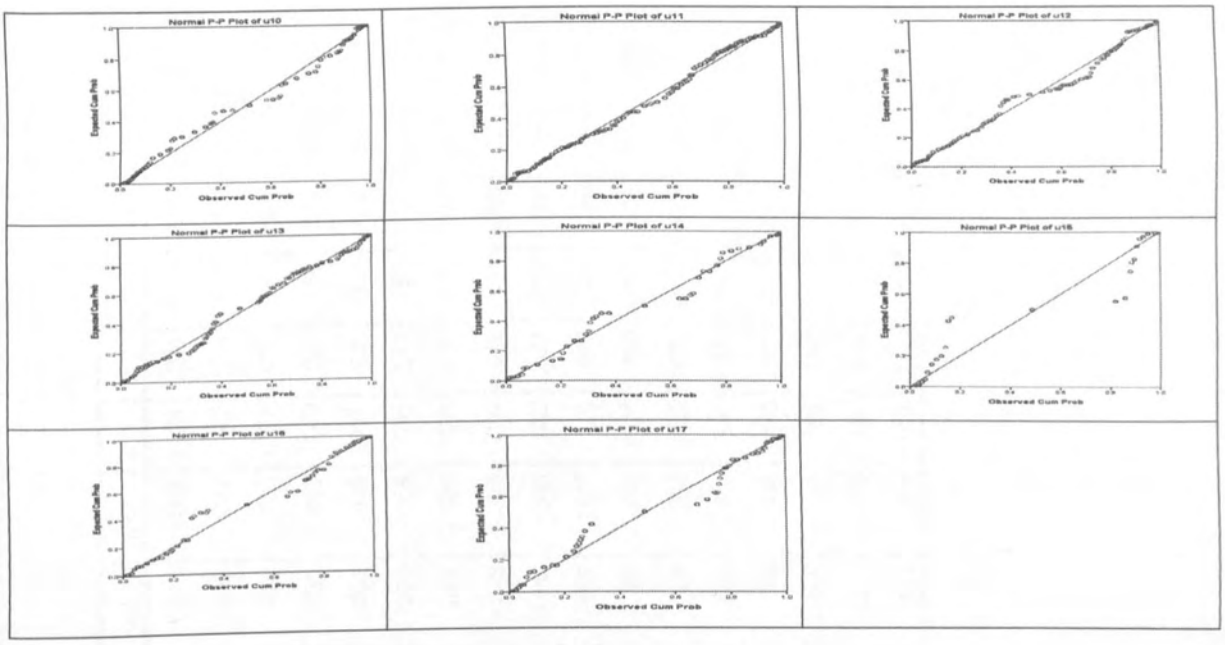

Normal P-P Plot of u10
Normal P-P Plot of u11
Normal P-P Plot of u12
Normal P-P Plot of u13
Normal P-P Plot of u14
Normal P-P Plot of u15
Normal P-P Plot of u16
Normal P-P Plot of u17
Expected Cum Prob
Observed Cum Prob

Table 2a uncertainty measure Anti-image Correlations Matrix

		u1	u2	u3	u4	u5	u6	u7	u8	u9	u10	u11	u12	u13	u14	u15	u16	u17
Anti-image Correlation	u1	**.703**[a]	-.593	-.002	-.004	-.062	-.232	-.133	-.028	.014	-.009	-.129	.144	.006	.038	.010	-.068	.040
	u2	-.593	**.620**[a]	**-.077**	-.038	.126	-.422	.290	.038	-.089	.024	.142	-.154	-.103	-.037	.007	-.022	.046
	u3	-.002	-.077	**.627**[a]	-.500	-.320	.076	-.068	-.032	.038	.123	-.173	.010	.198	.061	.091	-.139	.086
	u4	-.004	-.038	-.500	**.655**[a]	-.308	.066	.038	.024	-.035	-.085	.149	.050	-.186	.134	-.134	.008	.043
	u5	-.062	.126	-.320	-.308	**.725**[a]	-.131	-.014	.034	-.031	-.025	.017	-.122	.031	-.082	.044	.044	-.033
	u6	-.232	-.422	.076	.066	-.131	**.748**[a]	-.141	-.014	.078	-.056	.036	-.012	.080	.107	-.060	.127	-.099
	u7	-.133	.290	-.068	.038	-.014	-.141	**.403**[a]	.025	.011	-.089	.088	-.105	-.078	.040	-.241	-.318	.300
	u8	-.028	.038	-.032	.024	.034	-.014	.025	**.824**[a]	-.343	-.308	-.049	-.027	-.011	-.046	.027	.109	-.182
	u9	.014	-.089	.038	-.035	-.031	.078	.011	-.343	**.711**[a]	-.642	.032	.024	.032	-.108	-.094	.077	.084
	u10	-.009	.024	.123	-.085	-.025	-.056	-.089	-.308	-.642	**.701**[a]	-.116	.063	.105	.166	.116	-.220	.034
	u11	-.129	.142	-.173	.149	.017	.036	.088	-.049	.032	-.116	**.613**[a]	-.425	-.391	.028	-.085	.157	-.071
	u12	.144	-.154	.010	.050	-.122	-.012	-.105	-.027	.024	.063	-.425	**.696**[a]	-.331	-.008	-.060	.034	-.089
	u13	.006	-.103	.198	-.186	.031	.080	-.078	-.011	.032	.105	-.391	-.331	**.663**[a]	-.113	.163	-.160	.106
	u14	.038	-.037	.061	.134	-.082	.107	.040	-.046	-.108	.166	.028	-.008	-.113	**.640**[a]	.081	-.127	.075
	u15	.010	.007	.091	-.134	.044	-.060	-.241	.027	-.094	.116	-.085	-.060	.163	.081	**.502**[a]	-.183	.092
	u16	-.068	-.022	-.139	.008	.044	.127	-.318	.109	.077	-.220	.157	.034	-.160	-.127	-.183	**.462**[a]	-.780
	u17	.040	.046	.086	.043	-.033	-.099	.300	-.182	.084	.034	-.071	-.089	.106	.075	.092	-.780	**.454**[a]

a. Measures of Sampling Adequacy(MSA)

Table 2b: uncertainty measure Anti-image Correlations After removal of U7

		u1	u2	u3	u4	u5	u6	u8	u9	u10	u11	u12	u13	u14	u15	u16	u17
Anti-image Correlation	u1	**.706**[a]	-.584	-.012	.001	-.064	-.256	-.024	.015	-.021	-.119	.132	-.004	.044	-.023	-.118	.084
	u2	-.584	**.652**[a]	-.061	-.051	.135	-.402	.033	-.097	.052	.122	-.129	-.085	-.051	.082	.077	-.045
	u3	-.012	-.061	**.624**[a]	-.499	-.322	.067	-.030	.038	.118	-.168	.003	.194	.063	.077	-.170	.112
	u4	.001	-.051	-.499	**.654**[a]	-.308	.072	.023	-.036	-.082	.147	.054	-.183	.133	-.129	.021	.033
	u5	-.064	.135	-.322	-.308	**.719**[a]	-.134	.034	-.031	-.026	.018	-.124	.030	-.081	.042	.042	-.030
	u6	-.256	-.402	.067	.072	-.134	**.765**[a]	-.010	.081	-.069	.049	-.027	.070	.114	-.097	.088	-.060
	u8	-.024	.033	-.030	.023	.034	-.010	**.819**[a]	-.343	-.307	-.051	-.025	-.009	-.047	.034	.123	-.198
	u9	.015	-.097	.038	-.036	-.031	.081	-.343	**.709**[a]	-.643	.031	.025	.033	-.109	-.094	.085	.084
	u10	-.021	.052	.118	-.082	-.026	-.069	-.307	-.643	**.695**[a]	-.109	.054	.098	.171	.098	-.262	.064
	u11	-.119	.122	-.168	.147	.018	.049	-.051	.031	-.109	**.617**[a]	-.420	-.387	.024	-.066	.196	-.102
	u12	.132	-.129	.003	.054	-.124	-.027	-.025	.025	.054	-.420	**.706**[a]	-.342	-.004	-.088	.000	-.060
	u13	-.004	-.085	.194	-.183	.030	.070	-.009	.033	.098	-.387	-.342	**.661**[a]	-.110	.150	-.195	.136
	u14	.044	-.051	.063	.133	-.081	.114	-.047	-.109	.171	.024	-.004	-.110	**.633**[a]	.093	-.120	.066
	u15	-.023	.082	.077	-.129	.042	-.097	.034	-.094	.098	-.066	-.088	.150	.093	**.298**[a]	-.282	.177
	u16	-.118	.077	-.170	.021	.042	.088	.123	.085	-.262	.196	.000	-.195	-.120	-.282	**.446**[a]	-.757
	u17	.084	-.045	.112	.033	-.030	-.060	-.198	.084	.064	-.102	-.060	.136	.066	.177	-.757	**.481**[a]

a. Measures of Sampling Adequacy(MSA)

Table 2c: uncertainty measure Anti-image Correlations After removal of U15

		u1	u2	u3	u4	u5	u6	u8	u9	u10	u11	u12	u13	u14	u16	u17
Anti-image Correlation	u1	**.703**[a]	-.584	-.010	-.002	-.063	-.259	-.024	.013	-.018	-.121	.131	-.001	.046	-.130	.090
	u2	-.584	**.654**[a]	-.067	-.041	.132	-.397	.030	-.090	.044	.128	-.123	-.098	-.059	.105	-.061
	u3	-.010	-.067	**.632**[a]	-.494	-.326	.075	-.033	.046	.111	-.164	.010	.185	.057	-.155	.100
	u4	-.002	-.041	-.494	**.664**[a]	-.305	.060	.028	-.048	-.071	.140	.043	-.167	.147	-.017	.057
	u5	-.063	.132	-.326	-.305	**.719**[a]	-.131	.033	-.027	-.031	.021	-.121	.024	-.086	.057	-.038
	u6	-.259	-.397	.075	.060	-.131	**.773**[a]	-.007	.072	-.060	.043	-.036	.086	.124	.063	-.044
	u8	-.024	.030	-.033	.028	.033	-.007	**.815**[a]	-.342	-.312	-.049	-.022	-.014	-.050	.138	-.208
	u9	.013	-.090	.046	-.048	-.027	.072	-.342	**.714**[a]	-.640	.025	.017	.047	-.101	.061	.103
	u10	-.018	.044	.111	-.071	-.031	-.060	-.312	-.640	**.704**[a]	-.104	.064	.085	.163	-.246	.048
	u11	-.121	.128	-.164	.140	.021	.043	-.049	.025	-.104	**.622**[a]	-.429	-.382	.031	.185	-.092
	u12	.131	-.123	.010	.043	-.121	-.036	-.022	.017	.064	-.429	**.712**[a]	-.334	.004	-.026	-.045
	u13	-.001	-.098	.185	-.167	.024	.086	-.014	.047	.085	-.382	-.334	**.686**[a]	-.126	-.161	.112
	u14	.046	-.059	.057	.147	-.086	.124	-.050	-.101	.163	.031	.004	-.126	**.634**[a]	-.098	.051
	u16	-.130	.105	-.155	-.017	.057	.063	.138	.061	-.246	.185	-.026	-.161	-.098	**.468**[a]	-.749
	u17	.090	-.061	.100	.057	-.038	-.044	-.208	.103	.048	-.092	-.045	.112	.051	-.749	**.498**[a]

a. Measures of Sampling Adequacy(MSA)

Table 2d: uncertainty measure Anti-image Correlations After removal of U16

		u1	u2	u3	u4	u5	u6	u8	u9	u10	u11	u12	u13	u14	u17
Anti-image Correlation	u1	**.720**[a]	-.579	-.030	-.004	-.057	-.254	-.006	.021	-.052	-.099	.128	-.022	.034	-.011
	u2	-.579	**.661**[a]	-.052	-.039	.127	-.407	.016	-.097	.073	.111	-.121	-.083	-.049	.027
	u3	-.030	-.052	**.656**[a]	-.503	-.322	.086	-.012	.056	.076	-.140	.006	.164	.042	-.024
	u4	-.004	-.039	-.503	**.657**[a]	-.305	.061	.030	-.048	-.077	.145	.043	-.172	.146	.068
	u5	-.057	.127	-.322	-.305	**.727**[a]	-.135	.025	-.031	-.017	.011	-.120	.034	-.081	.007
	u6	-.254	-.407	.086	.061	-.135	**.771**[a]	-.016	.068	-.046	.032	-.034	.097	.132	.005
	u8	-.006	.016	-.012	.030	.025	-.016	**.835**[a]	-.354	-.289	-.077	-.018	.008	-.037	-.158
	u9	.021	-.097	.056	-.048	-.031	.068	-.354	**.694**[a]	-.646	.014	.018	.058	-.095	.225
	u10	-.052	.073	.076	-.077	-.017	-.046	-.289	-.646	**.711**[a]	-.061	.059	.048	.144	-.212
	u11	-.099	.111	-.140	.145	.011	.032	-.077	.014	-.061	**.658**[a]	-.431	-.363	.050	.071
	u12	.128	-.121	.006	.043	-.120	-.034	-.018	.018	.059	-.431	**.704**[a]	-.343	.002	-.098
	u13	-.022	-.083	.164	-.172	.034	.097	.008	.058	.048	-.363	-.343	**.714**[a]	-.145	-.013
	u14	.034	-.049	.042	.146	-.081	.132	-.037	-.095	.144	.050	.002	-.145	**.662**[a]	-.035
	u17	-.011	.027	-.024	.068	.007	.005	-.158	.225	-.212	.071	-.098	-.013	-.035	**.413**[a]

a. Measures of Sampling Adequacy(MSA)

Table 2e: uncertainty measure Anti-image Correlations After removal of U17

		u1	u2	u3	u4	u5	u6	u8	u9	u10	u11	u12	u13	u14
Anti-image Correlation	u1	**.720**[a]	-.579	-.031	-.003	-.057	-.254	-.008	.024	-.056	-.099	.128	-.022	.034
	u2	-.579	**.660**[a]	-.051	-.041	.127	-.407	.020	-.106	.080	.110	-.119	-.083	-.048
	u3	-.031	-.051	**.656**[a]	-.503	-.322	.086	-.016	.063	.073	-.138	.003	.164	.041
	u4	-.003	-.041	-.503	**.657**[a]	-.306	.061	.041	-.065	-.064	.141	.050	-.172	.149
	u5	-.057	.127	-.322	-.306	**.726**[a]	-.135	.026	-.033	-.016	.010	-.120	.034	-.080
	u6	-.254	-.407	.086	.061	-.135	**.771**[a]	-.016	.069	-.046	.031	-.034	.097	.132
	u8	-.008	.020	-.016	.041	.026	-.016	**.837**[a]	-.331	-.335	-.066	-.034	.006	-.043
	u9	.024	-.106	.063	-.065	-.033	.069	-.331	**.723**[a]	-.628	-.002	.042	.063	-.090
	u10	-.056	.080	.073	-.064	-.016	-.046	-.335	-.628	**.722**[a]	-.047	.040	.046	.140
	u11	-.099	.110	-.138	.141	.010	.031	-.066	-.002	-.047	**.665**[a]	-.428	-.363	.053
	u12	.128	-.119	.003	.050	-.120	-.034	-.034	.042	.040	-.428	**.709**[a]	-.346	-.002
	u13	-.022	-.083	.164	-.172	.034	.097	.006	.063	.046	-.363	-.346	**.712**[a]	-.145
	u14	.034	-.048	.041	.149	-.080	.132	-.043	-.090	.140	.053	-.002	-.145	**.665**[a]

a. Measures of Sampling Adequacy(MSA)

Table 3a: Correlation Matrix[a]- R Matrix for the uncertainty variables

		u1	u2	u3	u4	u5	u6	u7	u8	u9	u10	u11	u12	u13	u14	u15	u16	u17
Correlation	u1	1.000																
	u2	.770	1.000															
	u3	.095	.060	1.000														
	u4	.111	.080	.655	1.000													
	u5	.108	.045	.571	.564	1.000												
	u6	.660	.695	.019	.040	.097	1.000											
	u7	.005	-.168	.114	.110	.102	.002	1.000										
	u8	.091	.051	-.081	.034	.006	.062	.033	1.000									
	u9	.117	.087	-.069	.098	.043	.074	.076	.756	1.000								
	u10	.124	.062	-.067	.103	.045	.094	.135	.757	.849	1.000							
	u11	-.005	-.022	.029	-.062	.031	-.074	-.016	.038	-.054	-.038	1.000						
	u12	-.022	.055	.021	-.037	.079	-.019	.050	-.080	-.174	-.172	.631	1.000					
	u13	-.007	.043	-.051	-.017	-.007	-.080	.032	-.125	-.209	-.211	.588	.614	1.000				
	u14	-.138	-.092	-.147	-.198	-.075	-.182	-.065	-.048	-.068	-.143	.074	.110	.189	1.000			
	u15	.040	-.019	.054	.125	.037	.061	.331	-.005	.052	.043	-.018	.015	-.085	-.112	1.000		
	u16	.015	-.059	.059	.042	.020	-.053	.267	.158	.098	.247	-.047	.026	.043	.045	.199	1.000	
	u17	-.015	-.036	-.057	-.077	-.037	-.012	-.018	.204	.062	.189	.026	.073	.020	.022	.037	.752	1.000

Table 3b: Correlation Matrix[a]- R Matrix for the uncertainty variables

		u1	u2	u3	u4	u5	u6	u8	u9	u10	u11	u12	u13
Correlation	u1	1.000											
	u2	.770	1.000										
	u3	.095	.060	1.000									
	u4	.111	.080	.655	1.000								
	u5	.108	.045	.571	.564	1.000							
	u6	.660	.695	.019	.040	.097	1.000						
	u8	.091	.051	-.081	.034	.006	.062	1.000					
	u9	.117	.087	-.069	.098	.043	.074	.756	1.000				
	u10	.124	.062	-.067	.103	.045	.094	.757	.849	1.000			
	u11	-.005	-.022	.029	-.062	.031	-.074	.038	-.054	-.038	1.000		
	u12	-.022	.055	.021	-.037	.079	-.019	-.080	-.174	-.172	.631	1.000	
	u13	-.007	.043	-.051	-.017	-.007	-.080	-.125	-.209	-.211	.588	.614	1.000

a Determinant = .002

Table 4: Rotated Component Matrix with factor loadings

	Component			
	1	2	3	4
u10	.931			
u9	.929			
u8	.903			
u2		.914		
u1		.893		
u6		.872		
u12			.861	
u11			.859	
u13			.842	
u3				.868
u4				.866
u5				.813
u14				**-.258**

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 5 iterations.

Table 5: Communalities

	Initial	Extraction
u1	1.000	.817
u2	1.000	.846
u3	1.000	.770
u4	1.000	.759
u5	1.000	.687
u6	1.000	.764
u8	1.000	.818
u9	1.000	.880
u10	1.000	.882
u11	1.000	.759
u12	1.000	.761
u13	1.000	.727

Extraction Method: Principal Component Analysis.

Table 6 – Full details of inter –item correlations of the four factors.

Table 6.1 Market uncertainty

Reliability Statistics

Cronbach's Alpha	N of Items
.915	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
u10	8.49	2.013	.855	.860
u9	8.62	1.881	.852	.856
u8	8.72	1.837	.786	.917

Inter-Item Correlation Matrix

	u10	u9	u8
u10	1.000	.849	.757
u9	.849	1.000	.756
u8	.757	.756	1.000

Table 6.2 Social uncertainty

Reliability Statistics

Cronbach's Alpha	N of Items
.876	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
u1	7.16	2.651	.783	.805
u2	7.21	2.415	.807	.787
u6	7.01	3.276	.721	.869

Inter-Item Correlation Matrix

	u1	u2	u6
u1	1.000	.770	.660
u2	.770	1.000	.695
u6	.660	.695	1.000

Table 6.3: Operational uncertainty

Reliability Statistics

Cronbach's Alpha	N of Items
.825	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
u11	6.17	2.165	.678	.761
u12	6.28	2.170	.698	.740
u13	5.97	2.194	.665	.774

Inter-Item Correlation Matrix

	u12	u11	u13
u12	1.000	.631	.614
u11	.631	1.000	.588
u13	.614	.588	1.000

Table 6.4 Financial uncertainty

Reliability Statistics

Cronbach's Alpha	N of Items
.816	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
u3	8.76	2.249	.694	.721
u4	8.88	2.289	.689	.726
u5	8.76	2.541	.624	.791

Inter-Item Correlation Matrix

	u3	u4	u5
u3	1.000	.655	.571
u4	.655	1.000	.564
u5	.571	.564	1.000

Table 7:Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
Market_Uncer	.410	.061	6.662	***	par_15
Social_Uncer	.354	.059	5.962	***	par_16
Operational_U	.394	.071	5.515	***	par_17
Financial_Uncer	.334	.067	4.976	***	par_18
e3	.201	.025	8.069	***	par_19
e2	.080	.017	4.677	***	par_20
e1	.069	.015	4.673	***	par_21
e6	.240	.031	7.768	***	par_22
e5	.226	.040	5.630	***	par_23
e4	.192	.045	4.250	***	par_24
e9	.284	.043	6.553	***	par_25
e8	.281	.043	6.454	***	par_26
e7	.220	.042	5.250	***	par_27
e12	.343	.046	7.503	***	par_28
e11	.264	.050	5.271	***	par_29
e10	.264	.051	5.125	***	par_30

Table 8: Model Fit summary of the uncertainty model

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	53.918	48	.258	1.123
Saturated model	78	.000	0		
Independence model	12	1176.480	66	.000	17.825

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.028	.957	.931	.589
Saturated model	.000	1.000		
Independence model	.189	.502	.412	.425

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.954	.937	.995	.993	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.727	.694	.723
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	5.918	.000	28.143
Saturated model	.000	.000	.000
Independence model	1110.480	1002.900	1225.466

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.291	.032	.000	.152
Saturated model	.000	.000	.000	.000
Independence model	6.359	6.003	5.421	6.624

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.026	.000	.056	.892
Independence model	.302	.287	.317	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	113.918	118.453	210.691	240.691
Saturated model	156.000	167.791	407.608	485.608
Independence model	1200.480	1202.294	1239.189	1251.189

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.616	.584	.736	.640
Saturated model	.843	.843	.843	.907
Independence model	6.489	5.908	7.111	6.499

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	224	253
Independence model	14	16

Table 9:Standardized Residual Covariances (Group number 1 - Default model)

	Interest	Inflation	Exchange	Input	Labour	Production	Policy	Political	Social	Competetive	Outputmarket	Inputmarket
Interest	.000											
Inflation	.003	.000										
Exchange	.014	-.020	.000									
Input	.355	-.433	1.132	.000								
Labour	.464	-.769	.482	.064	.000							
Production	-.621	-.164	-.030	-.094	.038	.000						
Policy	-.261	.012	-.328	.772	-.278	.601	.000					
Political	.250	.476	.573	-.278	-.049	-.071	-.004	.000				
Social	-.665	-.374	.514	-.237	-.986	-1.074	.028	-.028	.000			
Competetive	-1.121	1.187	.420	-.453	1.244	-1.100	-.426	.472	.194	.000		
Outputmarket	-1.155	1.123	.395	-.487	1.022	-1.073	-.080	.380	-.080	-.010	.000	
Inputmarket	-1.287	.271	-.086	.580	2.079	-.136	-.432	.165	-.125	.016	.009	.000

Table 10: Impact of Uncertainty Factors on CBP

Model 1

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.091	.049	1.868	.062	
Advanced	<---	Marketun	-.055	.067	-.823	.410	
NAIVE	<---	Marketun	-.048	.067	-.722	.470	
Sophis	<---	Socialun	-.028	.041	-.693	.488	
Sophis	<---	Operaun	.010	.047	.224	.823	
Sophis	<---	Finance	.213	.045	4.744	***	
Advanced	<---	Socialun	-.011	.056	-.192	.848	
Advanced	<---	Operaun	-.121	.064	-1.873	.061	
Advanced	<---	Finance	.219	.062	3.535	***	
NAIVE	<---	Operaun	-.050	.064	-.776	.438	
NAIVE	<---	Socialun	-.030	.056	-.527	.598	
NAIVE	<---	Finance	-.158	.062	-2.552	.011	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.128
Advanced	<---	Marketun	-.058
NAIVE	<---	Marketun	-.052
Sophis	<---	Socialun	-.048
Sophis	<---	Operaun	.015
Sophis	<---	Finance	.326
Advanced	<---	Socialun	-.014
Advanced	<---	Operaun	-.132
Advanced	<---	Finance	.249
NAIVE	<---	Operaun	-.056
NAIVE	<---	Socialun	-.038
NAIVE	<---	Finance	-.184

Model 2

After removing Social uncertainty > Advanced CBP with minimum CR value

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.091	.049	1.861	.063	
Advanced	<---	Marketun	-.057	.067	-.842	.400	
NAIVE	<---	Marketun	-.048	.067	-.714	.475	
Sophis	<---	Socialun	-.025	.038	-.670	.503	
Sophis	<---	Operaun	.010	.047	.224	.823	
Sophis	<---	Finance	.213	.045	4.737	***	
Advanced	<---	Operaun	-.121	.065	-1.873	.061	
Advanced	<---	Finance	.218	.062	3.517	***	
NAIVE	<---	Operaun	-.050	.064	-.776	.438	
NAIVE	<---	Socialun	-.034	.051	-.670	.503	
NAIVE	<---	Finance	-.157	.062	-2.544	.011	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.128
Advanced	<---	Marketun	-.059
NAIVE	<---	Marketun	-.051
Sophis	<---	Socialun	-.043
Sophis	<---	Operaun	.015
Sophis	<---	Finance	.326
Advanced	<---	Operaun	-.132
Advanced	<---	Finance	.248
NAIVE	<---	Operaun	-.056
NAIVE	<---	Socialun	-.044
NAIVE	<---	Finance	-.183

Model 3

After Removing Operational Uncertainty > Sophisticated CBP with minimum CR value

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.089	.049	1.829	.067	
Advanced	<---	Marketun	-.058	.067	-.854	.393	
NAIVE	<---	Marketun	-.047	.067	-.701	.483	
Sophis	<---	Socialun	-.025	.038	-.670	.503	
Sophis	<---	Finance	.213	.045	4.736	***	

			Estimate	S.E.	C.R.	P	Label
Advanced	<---	Operaun	-.126	.060	-2.100	.036	
Advanced	<---	Finance	.218	.062	3.517	***	
NAIVE	<---	Operaun	-.044	.058	-.751	.453	
NAIVE	<---	Socialun	-.034	.051	-.670	.503	
NAIVE	<---	Finance	-.157	.062	-2.544	.011	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.126
Advanced	<---	Marketun	-.060
NAIVE	<---	Marketun	-.050
Sophis	<---	Socialun	-.043
Sophis	<---	Finance	.326
Advanced	<---	Operaun	-.138
Advanced	<---	Finance	.247
NAIVE	<---	Operaun	-.049
NAIVE	<---	Socialun	-.044
NAIVE	<---	Finance	-.183

Model 4

(Deleted variables Social > Sophisticated CBP which have same CR value and p value)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.086	.049	1.765	.078	
Advanced	<---	Marketun	-.058	.067	-.854	.393	
NAIVE	<---	Marketun	-.046	.067	-.682	.495	
Sophis	<---	Finance	.210	.045	4.671	***	
Advanced	<---	Operaun	-.126	.060	-2.100	.036	
Advanced	<---	Finance	.218	.062	3.517	***	
NAIVE	<---	Operaun	-.044	.058	-.751	.453	
NAIVE	<---	Socialun	-.045	.048	-.925	.355	
NAIVE	<---	Finance	-.156	.062	-2.526	.012	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.122
Advanced	<---	Marketun	-.060
NAIVE	<---	Marketun	-.049
Sophis	<---	Finance	.322
Advanced	<---	Operaun	-.138
Advanced	<---	Finance	.247
NAIVE	<---	Operaun	-.049
NAIVE	<---	Socialun	-.057
NAIVE	<---	Finance	-.182

Model 5

After removing market uncertainty> Naïve CBP

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.073	.044	1.637	.102	
Advanced	<---	Marketun	-.077	.061	-1.255	.209	
Sophis	<---	Finance	.210	.045	4.674	***	
Advanced	<---	Operaun	-.128	.060	-2.127	.033	
Advanced	<---	Finance	.219	.062	3.520	***	
NAIVE	<---	Operaun	-.039	.058	-.664	.507	
NAIVE	<---	Socialun	-.048	.048	-.984	.325	
NAIVE	<---	Finance	-.156	.062	-2.527	.012	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.103
Advanced	<---	Marketun	-.080
Sophis	<---	Finance	.323
Advanced	<---	Operaun	-.139
Advanced	<---	Finance	.247
NAIVE	<---	Operaun	-.043
NAIVE	<---	Socialun	-.061
NAIVE	<---	Finance	-.182

Model 6

After removing Operational uncertainty > Naive CBP

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.074	.044	1.676	.094	
Advanced	<---	Marketun	-.076	.061	-1.247	.213	
Sophis	<---	Finance	.210	.045	4.674	***	
Advanced	<---	Operaun	-.140	.057	-2.467	.014	
Advanced	<---	Finance	.218	.062	3.519	***	
NAIVE	<---	Socialun	-.047	.048	-.975	.329	
NAIVE	<---	Finance	-.156	.062	-2.522	.012	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.105
Advanced	<---	Marketun	-.079
Sophis	<---	Finance	.323
Advanced	<---	Operaun	-.153
Advanced	<---	Finance	.247
NAIVE	<---	Socialun	-.061
NAIVE	<---	Finance	-.182

Model 7

After removing Social uncertainty > Naïve CBP

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.073	.044	1.637	.102	
Advanced	<---	Marketun	-.079	.061	-1.284	.199	
Sophis	<---	Finance	.210	.045	4.674	***	
Advanced	<---	Operaun	-.140	.057	-2.466	.014	
Advanced	<---	Finance	.218	.062	3.519	***	
NAIVE	<---	Finance	-.161	.062	-2.600	.009	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.103
Advanced	<---	Marketun	-.082
Sophis	<---	Finance	.323
Advanced	<---	Operaun	-.153
Advanced	<---	Finance	.247
NAIVE	<---	Finance	-.188

Model 8

After removing market uncertainty > advanced CBP

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Marketun	.086	.043	1.982	.047	
Sophis	<---	Finance	.210	.045	4.672	***	
Advanced	<---	Operaun	-.130	.057	-2.278	.023	
Advanced	<---	Finance	.218	.062	3.498	***	
NAIVE	<---	Finance	-.161	.062	-2.600	.009	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Marketun	.121
Sophis	<---	Finance	.322
Advanced	<---	Operaun	-.142
Advanced	<---	Finance	.247
NAIVE	<---	Finance	-.188

Final Model (8) Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	14	6.346	7	.500	.907
Saturated model	21	.000	0		
Independence model	6	131.532	15	.000	8.769

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.017	.989	.967	.330
Saturated model	.000	1.000		
Independence model	.072	.788	.703	.563

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.952	.897	1.005	1.012	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.467	.444	.467
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	9.399
Saturated model	.000	.000	.000
Independence model	116.532	83.559	156.978

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.034	.000	.000	.051
Saturated model	.000	.000	.000	.000
Independence model	.711	.630	.452	.849

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.085	.756
Independence model	.205	.174	.238	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	34.346	35.447	79.506	93.506
Saturated model	42.000	43.652	109.741	130.741
Independence model	143.532	144.004	162.887	168.887

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.186	.189	.240	.192
Saturated model	.227	.227	.227	.236
Independence model	.776	.598	.994	.778

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	411	539
Independence model	36	44

Table 11 :Impact of firm characteristics on CBP

Results for the proposed model

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.057	.064	16.469	***	
Sophis	<---	Expe_Groups	.091	.061	1.484	.138	
Sophis	<---	Educa	.051	.056	.913	.361	
Sophis	<---	Industry	.015	.043	.358	.721	
Advanced	<---	Size_CP	.328	.102	3.226	.001	
Advanced	<---	Expe_Groups	.132	.097	1.367	.172	
Advanced	<---	Educa	1.037	.089	11.682	***	
Advanced	<---	Industry	-.084	.068	-1.226	.220	
NAIVE	<---	Size_CP	-.782	.118	-6.616	***	
NAIVE	<---	Expe_Groups	-.051	.112	-.457	.648	
NAIVE	<---	Educa	-.298	.103	-2.881	.004	
NAIVE	<---	Industry	-.125	.080	-1.572	.116	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.767
Sophis	<---	Expe_Groups	.068
Sophis	<---	Educa	.042
Sophis	<---	Industry	.016
Advanced	<---	Size_CP	.176
Advanced	<---	Expe_Groups	.073
Advanced	<---	Educa	.629
Advanced	<---	Industry	-.065
NAIVE	<---	Size_CP	-.430
NAIVE	<---	Expe_Groups	-.029
NAIVE	<---	Educa	-.185
NAIVE	<---	Industry	-.099

Model 2. After removing highly insignificant relationship (Sophisticated CBP <--- Industry)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.055	.064	16.436	***	
Sophis	<---	Expe_Groups	.092	.061	1.505	.132	
Sophis	<---	Educa	.053	.056	.940	.347	
Advanced	<---	Size_CP	.327	.102	3.219	.001	
Advanced	<---	Expe_Groups	.133	.097	1.373	.170	
Advanced	<---	Educa	1.038	.089	11.689	***	
Advanced	<---	Industry	-.091	.065	-1.384	.166	
NAIVE	<---	Size_CP	-.782	.118	-6.613	***	
NAIVE	<---	Expe_Groups	-.052	.112	-.459	.646	
NAIVE	<---	Educa	-.298	.103	-2.885	.004	
NAIVE	<---	Industry	-.121	.079	-1.538	.124	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.766
Sophis	<---	Expe_Groups	.069
Sophis	<---	Educa	.043
Advanced	<---	Size_CP	.176
Advanced	<---	Expe_Groups	.074
Advanced	<---	Educa	.629
Advanced	<---	Industry	-.070
NAIVE	<---	Size_CP	-.430

			Estimate
NAIVE	<---	Expe_Groups	-.029
NAIVE	<---	Educa	-.185
NAIVE	<---	Industry	-.096

Model 3. After removing highly insignificant relationship (Naive CBP <--- Tenure)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.056	.064	16.449	***	
Sophis	<---	Expe_Groups	.088	.061	1.457	.145	
Sophis	<---	Educa	.053	.056	.942	.346	
Advanced	<---	Size_CP	.329	.101	3.243	.001	
Advanced	<---	Expe_Groups	.120	.093	1.297	.195	
Advanced	<---	Educa	1.038	.089	11.693	***	
Advanced	<---	Industry	-.090	.065	-1.377	.169	
NAIVE	<---	Size_CP	-.791	.117	-6.772	***	
NAIVE	<---	Educa	-.300	.103	-2.899	.004	
NAIVE	<---	Industry	-.123	.079	-1.564	.118	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.766
Sophis	<---	Expe_Groups	.066
Sophis	<---	Educa	.043
Advanced	<---	Size_CP	.177
Advanced	<---	Expe_Groups	.067
Advanced	<---	Educa	.630
Advanced	<---	Industry	-.070
NAIVE	<---	Size_CP	-.435
NAIVE	<---	Educa	-.186
NAIVE	<---	Industry	-.098

Model 4. After removing highly insignificant relationship (Sophisticated CBP <--- Educational qualification)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.067	.063	16.880	***	
Sophis	<---	Expe_Groups	.090	.061	1.487	.137	
Advanced	<---	Size_CP	.334	.101	3.297	***	
Advanced	<---	Expe_Groups	.121	.093	1.305	.192	

			Estimate	S.E.	C.R.	P	Label
Advanced	<---	Educa	1.014	.085	11.912	***	
Advanced	<---	Industry	-.090	.065	-1.377	.169	
NAIVE	<---	Size_CP	-.793	.117	-6.798	***	
NAIVE	<---	Educa	-.287	.102	-2.799	.005	
NAIVE	<---	Industry	-.123	.079	-1.565	.118	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.774
Sophis	<---	Expe_Groups	.068
Advanced	<---	Size_CP	.181
Advanced	<---	Expe_Groups	.068
Advanced	<---	Educa	.621
Advanced	<---	Industry	-.070
NAIVE	<---	Size_CP	-.437
NAIVE	<---	Educa	-.178
NAIVE	<---	Industry	-.098

Model 5. After removing highly insignificant relationship (Advanced CBP <--- Tenure)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.070	.063	16.943	***	
Sophis	<---	Expe_Groups	.070	.059	1.191	.233	
Advanced	<---	Size_CP	.355	.101	3.528	***	
Advanced	<---	Educa	1.017	.086	11.895	***	
Advanced	<---	Industry	-.085	.066	-1.299	.194	
NAIVE	<---	Size_CP	-.793	.117	-6.798	***	
NAIVE	<---	Educa	-.287	.102	-2.797	.005	
NAIVE	<---	Industry	-.123	.079	-1.562	.118	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.777
Sophis	<---	Expe_Groups	.052
Advanced	<---	Size_CP	.192
Advanced	<---	Educa	.621
Advanced	<---	Industry	-.067
NAIVE	<---	Size_CP	-.437
NAIVE	<---	Educa	-.178

			Estimate
NAIVE	<---	Industry	-.098

Model 6. After removing highly insignificant relationship (Sophisticated CBP <--- Tenure)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.083	.063	17.268	***	
Advanced	<---	Size_CP	.355	.101	3.530	***	
Advanced	<---	Educa	1.016	.085	11.882	***	
Advanced	<---	Industry	-.087	.066	-1.324	.185	
NAIVE	<---	Size_CP	-.794	.117	-6.799	***	
NAIVE	<---	Educa	-.286	.103	-2.786	.005	
NAIVE	<---	Industry	-.122	.079	-1.552	.121	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.786
Advanced	<---	Size_CP	.192
Advanced	<---	Educa	.619
Advanced	<---	Industry	-.068
NAIVE	<---	Size_CP	-.437
NAIVE	<---	Educa	-.178
NAIVE	<---	Industry	-.097

Model 7. After removing highly insignificant relationship (Advanced CBP <--- Industry)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Sophis	<---	Size_CP	1.083	.063	17.268	***	
Advanced	<---	Size_CP	.363	.101	3.602	***	
Advanced	<---	Educa	1.007	.086	11.726	***	
NAIVE	<---	Size_CP	-.796	.117	-6.820	***	
NAIVE	<---	Educa	-.283	.103	-2.759	.006	
NAIVE	<---	Industry	-.149	.076	-1.959	.050	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Sophis	<---	Size_CP	.786
Advanced	<---	Size_CP	.197
Advanced	<---	Educa	.616
NAIVE	<---	Size_CP	-.438
NAIVE	<---	Educa	-.176
NAIVE	<---	Industry	-.118

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
NAIVE	.266
Advanced	.465
Sophis	.617

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	16	4.568	5	.471	.914
Saturated model	21	.000	0		
Independence model	6	397.009	15	.000	26.467

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.006	.992	.965	.236
Saturated model	.000	1.000		
Independence model	.079	.589	.425	.421

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.988	.965	1.001	1.003	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.329	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	8.818
Saturated model	.000	.000	.000
Independence model	382.009	320.750	450.691

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.025	.000	.000	.048
Saturated model	.000	.000	.000	.000
Independence model	2.146	2.065	1.734	2.436

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.098	.697
Independence model	.371	.340	.403	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	36.568	37.827	88.180	104.180
Saturated model	42.000	43.652	109.741	130.741
Independence model	409.009	409.481	428.364	434.364

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.198	.200	.248	.204
Saturated model	.227	.227	.227	.236
Independence model	2.211	1.880	2.582	2.213

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	449	611
Independence model	12	15

Table 12: Impact of CBP on firm performance

1. Results for the proposed model

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.069	.067	1.034	.301	
ROE	<---	Sophis	.207	.108	1.907	.057	
Tobinq	<---	Sophis	1.472	.364	4.044	***	
Effectiv	<---	Advanced	.155	.049	3.145	.002	
ROA	<---	Advanced	-.023	.013	-1.783	.075	
EPS	<---	Advanced	-2.933	3.007	-.975	.329	
Effectiv	<---	NAIVE	.076	.052	1.468	.142	
ROA	<---	NAIVE	-.013	.014	-.927	.354	
Tobinq	<---	NAIVE	.069	.281	.247	.805	
ROA	<---	Sophis	.015	.018	.844	.399	
ROE	<---	Advanced	-.050	.080	-.629	.529	
EPS	<---	Sophis	4.368	4.095	1.067	.286	
Tobinq	<---	Advanced	.587	.267	2.197	.028	
EPS	<---	NAIVE	1.683	3.157	.533	.594	
ROE	<---	NAIVE	-.043	.084	-.518	.605	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.085
ROE	<---	Sophis	.160
Tobinq	<---	Sophis	.315
Effectiv	<---	Advanced	.256
ROA	<---	Advanced	-.149
EPS	<---	Advanced	-.082
Effectiv	<---	NAIVE	.123
ROA	<---	NAIVE	-.079
Tobinq	<---	NAIVE	.020
ROA	<---	Sophis	.071
ROE	<---	Advanced	-.052
EPS	<---	Sophis	.090
Tobinq	<---	Advanced	.170
EPS	<---	NAIVE	.046
ROE	<---	NAIVE	-.044

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.163
EPS	.011
ROE	.028
ROA	.020
Effectiv	.069

Model 2. After removing highly insignificant relationship (Tobin_q <--- Naïve CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.016	.310	
ROE	<---	Sophis	.207	.108	1.907	.057	
Tobinq	<---	Sophis	1.442	.343	4.200	***	
Effectiv	<---	Advanced	.154	.049	3.136	.002	
ROA	<---	Advanced	-.024	.013	-1.794	.073	
EPS	<---	Advanced	-2.933	3.007	-.975	.329	
Effectiv	<---	NAIVE	.072	.050	1.455	.146	
ROA	<---	NAIVE	-.013	.014	-.969	.332	
ROA	<---	Sophis	.015	.018	.833	.405	
ROE	<---	Advanced	-.050	.080	-.629	.529	
EPS	<---	Sophis	4.368	4.095	1.067	.286	
Tobinq	<---	Advanced	.567	.254	2.229	.026	
EPS	<---	NAIVE	1.683	3.157	.533	.594	
ROE	<---	NAIVE	-.043	.084	-.518	.605	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.160
Tobinq	<---	Sophis	.309
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.150
EPS	<---	Advanced	-.082
Effectiv	<---	NAIVE	.117
ROA	<---	NAIVE	-.082
ROA	<---	Sophis	.070
ROE	<---	Advanced	-.052
EPS	<---	Sophis	.090
Tobinq	<---	Advanced	.164

			Estimate
EPS	<---	NAIVE	.046
ROE	<---	NAIVE	-.044

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.163
EPS	.011
ROE	.028
ROA	.020
Effectiv	.068

Model 3. After removing highly insignificant relationship (ROE <--- Naïve CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.016	.310	
ROE	<---	Sophis	.225	.102	2.202	.028	
Tobinq	<---	Sophis	1.442	.343	4.200	***	
Effectiv	<---	Advanced	.154	.049	3.136	.002	
ROA	<---	Advanced	-.023	.013	-1.743	.081	
EPS	<---	Advanced	-2.933	3.007	-.975	.329	
Effectiv	<---	NAIVE	.072	.050	1.455	.146	
ROA	<---	NAIVE	-.010	.012	-.830	.406	
ROA	<---	Sophis	.016	.018	.911	.362	
ROE	<---	Advanced	-.037	.076	-.493	.622	
EPS	<---	Sophis	4.368	4.095	1.067	.286	
Tobinq	<---	Advanced	.567	.254	2.229	.026	
EPS	<---	NAIVE	1.683	3.157	.533	.594	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.174
Tobinq	<---	Sophis	.309
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.145
EPS	<---	Advanced	-.082
Effectiv	<---	NAIVE	.117
ROA	<---	NAIVE	-.064
ROA	<---	Sophis	.076

			Estimate
ROE	<---	Advanced	-.039
EPS	<---	Sophis	.090
Tobinq	<---	Advanced	.164
EPS	<---	NAIVE	.046

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.163
EPS	.011
ROE	.026
ROA	.018
Effectiv	.068

Model 4. After removing highly insignificant relationship (ROE <--- Advanced CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.016	.310	
ROE	<---	Sophis	.205	.094	2.188	.029	
Tobinq	<---	Sophis	1.442	.343	4.200	***	
Effectiv	<---	Advanced	.154	.049	3.136	.002	
ROA	<---	Advanced	-.020	.012	-1.684	.092	
EPS	<---	Advanced	-2.933	3.007	-.975	.329	
Effectiv	<---	NAIVE	.072	.050	1.455	.146	
ROA	<---	NAIVE	-.010	.012	-.830	.406	
ROA	<---	Sophis	.015	.018	.845	.398	
EPS	<---	Sophis	4.368	4.095	1.067	.286	
Tobinq	<---	Advanced	.567	.254	2.229	.026	
EPS	<---	NAIVE	1.683	3.157	.533	.594	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.159
Tobinq	<---	Sophis	.309
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.129
EPS	<---	Advanced	-.082
Effectiv	<---	NAIVE	.117
ROA	<---	NAIVE	-.064

			Estimate
ROA	<---	Sophis	.070
EPS	<---	Sophis	.090
Tobinq	<---	Advanced	.164
EPS	<---	NAIVE	.046

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.163
EPS	.011
ROE	.025
ROA	.015
Effectiv	.068

Model 5. After removing highly insignificant relationship (EPS <--- Naive CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.016	.310	
ROE	<---	Sophis	.205	.094	2.188	.029	
Tobinq	<---	Sophis	1.442	.343	4.200	***	
Effectiv	<---	Advanced	.154	.049	3.136	.002	
ROA	<---	Advanced	-.021	.012	-1.754	.080	
EPS	<---	Advanced	-3.427	2.863	-1.197	.231	
Effectiv	<---	NAIVE	.072	.050	1.455	.146	
ROA	<---	NAIVE	-.013	.012	-1.099	.272	
ROA	<---	Sophis	.014	.017	.790	.429	
EPS	<---	Sophis	3.642	3.865	.942	.346	
Tobinq	<---	Advanced	.567	.254	2.229	.026	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.159
Tobinq	<---	Sophis	.309
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.133
EPS	<---	Advanced	-.096
Effectiv	<---	NAIVE	.117
ROA	<---	NAIVE	-.079
ROA	<---	Sophis	.065
EPS	<---	Sophis	.075

			Estimate
Tobinq	<---	Advanced	.164

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.163
EPS	.009
ROE	.025
ROA	.017
Effectiv	.068

Model 6. After removing highly insignificant relationship (ROA <--- Sophisticated CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.019	.308	
ROE	<---	Sophis	.179	.088	2.040	.041	
Tobinq	<---	Sophis	1.407	.340	4.133	***	
Effectiv	<---	Advanced	.154	.049	3.139	.002	
ROA	<---	Advanced	-.018	.012	-1.601	.109	
EPS	<---	Advanced	-3.136	2.840	-1.105	.269	
Effectiv	<---	NAIVE	.073	.050	1.466	.143	
ROA	<---	NAIVE	-.015	.011	-1.385	.166	
EPS	<---	Sophis	2.666	3.663	.728	.467	
Tobinq	<---	Advanced	.577	.254	2.273	.023	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.139
Tobinq	<---	Sophis	.302
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.118
EPS	<---	Advanced	-.088
Effectiv	<---	NAIVE	.118
ROA	<---	NAIVE	-.096
EPS	<---	Sophis	.055
Tobinq	<---	Advanced	.167

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.159
EPS	.007
ROE	.019
ROA	.013
Effectiv	.068

Model 7. After removing highly insignificant relationship (EPS <--- Sophisticated CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.018	.309	
ROE	<---	Sophis	.187	.087	2.153	.031	
Tobinq	<---	Sophis	1.418	.340	4.169	***	
Effectiv	<---	Advanced	.154	.049	3.138	.002	
ROA	<---	Advanced	-.018	.012	-1.560	.119	
EPS	<---	Advanced	-2.343	2.628	-.892	.373	
Effectiv	<---	NAIVE	.073	.050	1.463	.144	
ROA	<---	NAIVE	-.015	.011	-1.319	.187	
Tobinq	<---	Advanced	.574	.254	2.261	.024	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.145
Tobinq	<---	Sophis	.304
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.115
EPS	<---	Advanced	-.065
Effectiv	<---	NAIVE	.118
ROA	<---	NAIVE	-.091
Tobinq	<---	Advanced	.166

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.160
EPS	.004
ROE	.021
ROA	.012
Effectiv	.068

Model 8. After removing highly insignificant relationship (EPS <--- **Advanced CBP)**

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Effectiv	<---	Sophis	.068	.067	1.019	.308	
ROE	<---	Sophis	.175	.086	2.022	.043	
Tobinq	<---	Sophis	1.409	.341	4.132	***	
Effectiv	<---	Advanced	.154	.049	3.138	.002	
ROA	<---	Advanced	-.017	.012	-1.497	.134	
Effectiv	<---	NAIVE	.073	.050	1.465	.143	
ROA	<---	NAIVE	-.013	.012	-1.106	.269	
Tobinq	<---	Advanced	.577	.254	2.272	.023	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Effectiv	<---	Sophis	.083
ROE	<---	Sophis	.136
Tobinq	<---	Sophis	.302
Effectiv	<---	Advanced	.255
ROA	<---	Advanced	-.109
Effectiv	<---	NAIVE	.118
ROA	<---	NAIVE	-.081
Tobinq	<---	Advanced	.167

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.160
ROE	.018
ROA	.011
Effectiv	.068

Model 9. After removing highly insignificant relationship (Effectiveness <--- Sophisticated CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ROE	<---	Sophis	.174	.086	2.020	.043	
Tobinq	<---	Sophis	1.320	.330	4.005	***	
Effectiv	<---	Advanced	.167	.047	3.530	***	
ROA	<---	Advanced	-.017	.012	-1.492	.136	
Effectiv	<---	NAIVE	.057	.047	1.198	.231	
ROA	<---	NAIVE	-.013	.012	-1.095	.274	
Tobinq	<---	Advanced	.603	.253	2.388	.017	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
ROE	<---	Sophis	.135
Tobinq	<---	Sophis	.284
Effectiv	<---	Advanced	.277
ROA	<---	Advanced	-.109
Effectiv	<---	NAIVE	.091
ROA	<---	NAIVE	-.080
Tobinq	<---	Advanced	.175

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.152
ROE	.018
ROA	.011
Effectiv	.063

Model 10. After removing highly insignificant relationship (ROA <--- Naive CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ROE	<---	Sophis	.162	.085	1.891	.059	
Tobinq	<---	Sophis	1.308	.329	3.969	***	
Effectiv	<---	Advanced	.167	.047	3.514	***	
ROA	<---	Advanced	-.012	.011	-1.140	.254	
Effectiv	<---	NAIVE	.055	.047	1.161	.246	
Tobinq	<---	Advanced	.607	.253	2.402	.016	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
ROE	<---	Sophis	.126
Tobinq	<---	Sophis	.282
Effectiv	<---	Advanced	.276
ROA	<---	Advanced	-.076
Effectiv	<---	NAIVE	.089
Tobinq	<---	Advanced	.177

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.151
ROE	.016
ROA	.006
Effectiv	.063

Model 11. After removing highly insignificant relationship (ROA <--- Advanced CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ROE	<---	Sophis	.205	.094	2.188	.029	
Tobinq	<---	Sophis	1.358	.332	4.091	***	
Effectiv	<---	Advanced	.167	.047	3.524	***	
Effectiv	<---	NAIVE	.056	.047	1.186	.236	
Tobinq	<---	Advanced	.592	.252	2.347	.019	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
ROE	<---	Sophis	.159
Tobinq	<---	Sophis	.293
Effectiv	<---	Advanced	.277
Effectiv	<---	NAIVE	.091
Tobinq	<---	Advanced	.172

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.156
ROE	.025
Effectiv	.063

Model 12. After removing highly insignificant relationship (Effectiveness<--- Naive CBP)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ROE	<---	Sophis	.205	.094	2.188	.029	
Tobinq	<---	Sophis	1.392	.331	4.208	***	
Effectiv	<---	Advanced	.143	.043	3.323	***	
Tobinq	<---	Advanced	.582	.252	2.308	.021	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
ROE	<---	Sophis	.159
Tobinq	<---	Sophis	.300
Effectiv	<---	Advanced	.237
Tobinq	<---	Advanced	.169

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Advanced	<-->	NAIVE	-.176	.033	-5.400	***	
Sophis	<-->	NAIVE	-.135	.024	-5.564	***	
Sophis	<-->	Advanced	.124	.024	5.072	***	
w1	<-->	w5	.197	.059	3.370	***	

Correlations: (Group number 1 - Default model)

			Estimate
Advanced	<-->	NAIVE	-.433
Sophis	<-->	NAIVE	-.448
Sophis	<-->	Advanced	.402
w1	<-->	w5	.256

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
Sophis	.228	.024	9.618	***	
Advanced	.416	.043	9.618	***	
NAIVE	.396	.041	9.618	***	
w1	.144	.015	9.618	***	
w3	.372	.039	9.618	***	
w5	4.147	.431	9.618	***	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Tobinq	.159
ROE	.025
Effectiv	.056

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	11	.865	4	.930	.216
Saturated model	15	.000	0		
Independence model	5	94.465	10	.000	9.447

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.013	.998	.993	.266
Saturated model	.000	1.000		
Independence model	.169	.811	.716	.541

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.991	.977	1.035	1.093	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.400	.396	.400
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	.795
Saturated model	.000	.000	.000
Independence model	84.465	56.998	119.400

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.005	.000	.000	.004
Saturated model	.000	.000	.000	.000
Independence model	.511	.457	.308	.645

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.033	.968
Independence model	.214	.176	.254	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	22.865	23.602	58.348	69.348
Saturated model	30.000	31.006	78.386	93.386
Independence model	104.465	104.800	120.594	125.594

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.124	.141	.145	.128
Saturated model	.162	.162	.162	.168
Independence model	.565	.416	.754	.566

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	2030	2841
Independence model	36	46

Table 11

Results of univariate regression analysis with sophisticated capital budgeting practices as dependent variables and size of the capital budget as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.075	.075		1.005	.316
	Size of the capital budget	1.083	.063	.786	17.221	.000
R^2 0 .617			$F = 296.562$		$P = 0.000$	

Results of univariate regression analysis with advanced capital budgeting practices as dependent variables and size of the capital budget as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.255	.155		20.981	.000
	Size of the capital budget	.584	.130	.314	4.482	.000
R^2 0 .098			$F = 20.092$		$P = 0.000$	

Results of univariate regression analysis with naive capital budgeting practices as dependent variables and size of the capital budget as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.155	.141		29.457	.000
	Size of the capital budget	-.847	.118	-.466	-7.152	.000
R^2 0 .218			$F = 51.153$		$P = 0.000$	

Results of univariate regression analysis with advanced capital budgeting practices as dependent variables and education as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.939	.169		11.477	.000
	Education	1.094	.091	.663	12.007	.000
R^2 0 .439		*F = 144.164*			*P = 0.000*	

Results of univariate regression analysis with naive capital budgeting practices as dependent variables and education as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.999	.211		18.908	.000
	Education	-.446	.114	-.277	-3.912	.000
R^2 0 .077		*F = 15.306*			*P = 0.000*	

Results of univariate regression analysis with naive capital budgeting practices as dependent variables and industry as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.364	.149		22.618	.000
	Industry	-.114	.093	-.090	-1.230	.220
R^2 0 .008		*F = 1.514*			*P = 0.220*	

Table 12

Results of univariate regression analysis with ROE as dependent variables and sophisticated capital budgeting practices as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.220	.131		-1.675	.096
	Sophisticated capital budgeting practices	.205	.094	.159	2.182	.030
R^2 0 .025		$F = 4.760$			$P = 0.030$	

Results of univariate regression analysis with Tobinq as dependent variables and sophisticated capital budgeting practices as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.190	.444		.428	.669
	Sophisticated capital budgeting practices	1.750	.318	.376	5.497	.000
R^2 0 .141		$F = 30.213$			$P = 0.000$	

Results of univariate regression analysis with effectiveness as dependent variables and advanced capital budgeting practices as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.365	.172		19.566	.000
	Advanced capital budgeting practices	.143	.043	.237	3.314	.001
R^2 0 .56		$F = 10.980$			$P = 0.001$	

Results of univariate regression analysis with Tobinq capital budgeting practices as dependent variables and advanced capital budgeting practices as predictor variable

Model	independent Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.426	.968		-1.473	.143
	Advanced capital budgeting practices	.996	.244	.289	4.090	.000
R^2 0 .083		$F = 16.728$			$P = 0.000$	