IIMB Management Review (2017) **29**, 29–44

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IIMB Management Review

Capital budgeting practices in Indian companies

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Received 21 July 2014; revised 22 June 2015; accepted 13 February 2017; available online 1 March 2017

KEYWORDS
Capital budgeting;
India;
Discounted cash flow;
Risk;
Cost of capital;
Cost of equity;
Non-financial considerations;
India

Abstract The volatility of the global economy, changing business practices, and academic developments have created a need to re-examine Indian corporate capital budgeting practices. Our research is based on a sample of 77 Indian companies listed on the Bombay Stock Exchange. Results reveal that corporate practitioners largely follow the capital budgeting practices proposed by academic theory. Discounted cash flow techniques of net present value and internal rate of return and risk adjusted sensitivity analysis are most popular. Weighted average cost of capital as cost of capital is most favoured. Nevertheless, the theory-practice gap remains in adoption of specialised techniques of real options, modified internal rate of return (MIRR), and simulation. Non-financial criteria are also given due consideration in project selection.

Introduction

India's rapid and growing integration into the world economy has made Indian companies subject to the volatility of global financial markets. Increasingly, the country is exposed to impending risks from various international developments. (http://rajyasabha.nic.in/rsnew/publication_electronic/glob_eco_crisis2009.pdf). The year 2008 was a witness to this wherein the global financial crisis affected the Indian economic situation and curtailed the level of investment activity (Indian Economic Survey, 2013–14).

Post-reforms, in the 1990s, India chose greater integration with the global economy as a part of its development strategy. However, despite the deepening integration, the rates of growth of the economy did not change much. This trend sustained until the first decade of the 21st century, when growing integration accelerated the economic growth with rising investments and exports. Nonetheless, this integration had its own pitfalls. It led to a structural increase in the import intensity of the economy consequent of its dependence on hi-tech imports. The global economic slowdown as a result of the financial crisis of 2008 uncovered these gaps with decelerated growth of Indian economy accompanied by a sharp widening current account deficit. (http://werdiscussion.worldeconomicsassociation.org/?post=india-globalisation-and-growth).

The Indian business environment today has become highly turbulent with companies being exposed to a multitude of risks such as business cycle risk, slowdown in demand, unanticipated actions of competitors, interest rate risk, inflation rate risk, unexpected technological developments, government policy changes, and above all, exchange rate risks. As per RBI report (2013–14), the Indian economy is facing serious

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Peer-review under responsibility of Indian Institute of Management Bangalore.

http://dx.doi.org/10.1016/j.iimb.2017.02.001

challenges emanating from a sinking rupee, stagnating economic growth (low GDP), depleting forex reserves, decreasing foreign institutional investments (FIIs), mounting inflation, and a high fiscal and current account deficit (https://www.rbi.org.in/scripts/AnnualReportPublications.aspx?Id=1119). This economic slowdown and demand destruction have led to companies facing dwindling profitability, shrinking market capitalisation and escalating debts which have made the investment scenario even more risky. Only globally competitive and professionally managed companies can be expected to thrive in such an unstable environment. Amidst a weak Indian economy, where companies are struggling with sales slowdown, sound financial management practices and effective investment decision making are the only keys to the survival and long-term success of these companies.

The high rate of change in the economy and business practices, and the developments in the academic literature, have led to the need to re-examine the extent to which the newer theoretical developments have affected Indian corporate capital budgeting practices. The prime aim of this research is to present evidence on the current Indian investment practices and to determine how far these practices reflect the latest financial theories. We submit that this study goes beyond other Indian surveys on capital budgeting because of its breadth, in the sense that it is a comprehensive survey that examines in detail various aspects of corporate investment practices. The research considers a number of strategic investment issues that have received little attention in previous Indian investigations of capital budgeting practices.

The study investigates the extent to which the relatively superior nascent techniques of net present value (NPV) adjusted with real options analysis, modified internal rate of return (MIRR), earnings multiple approach (EMA), economic value added (EVA) and sophisticated risk techniques like Monte Carlo simulation analysis, discounted cash flow (DCF) break even analysis, decision tree analysis, and probability theory are being applied by Indian companies in practice.

It explores the impact of different organisational variables on the usage of capital budgeting techniques. It focuses on issues of net present value (NPV)-internal rate of return (IRR) contradiction, discount rate used for domestic and overseas market, and current cost of capital practices of Indian Companies. It also investigates risk measurement, different risk factors considered and formal risk analysis techniques being used by companies. It analyses not only the traditional financial approach but also the non-financial /qualitative factors that can affect the evaluation and the success of a project. A survey of existing literature reveals that in India, in recent times, no major study has been conducted which focuses in detail on this, with the exception of a study by Singh, Jain, and Yadav (2012) which is based on a sample of 31 companies. The present study is based on a comprehensive primary survey of chief financial officers (CFOs) of 77 companies, randomly selected from the companies listed on the Bombay Stock Exchange. A structured questionnaire was used to obtain the relevant information regarding capital budgeting practices from these CFOs. This study addresses the following research questions specifically:

RQ1. What is the extent to which newer theoretical developments in capital budgeting (as advocated by academic theory) have been adopted by Indian corporate practice?
RQ2. What are the main risk factors considered by Indian companies and incorporated in capital budgeting decisions?
RQ3.What is the degree of association of organisational variables (firm size, CEO education and age of the company) with the level of capital budgeting sophistication?
RQ4. What are the non-financial considerations most relevant in the firm's capital budgeting decision?

The study has sound implications for academicians as it helps them better understand the capital budgeting practices being followed by Indian companies in actuality and redefine the theory accordingly. Besides, it may be useful to practitioners to reassess their own capital budgeting practices in light of the latest advanced investment methodologies being followed by the more efficient and innovative companies.

The paper is organised as follows: the next section exhibits a review of past literature on the topic addressed above, followed by an explanation of research methodology, after which discussions of the survey and the empirical results are presented and evaluated. Lastly, conclusions are drawn, recommendations are made, and ideas for further research are presented.

Literature review

Over the past half a century, a paradigm shift in the investment practices of companies is evidenced by numerous global researches. A review of the past studies, of the 1960s and early 70s, asserts the dominance of non discounted technique of payback period, followed by accounting rate of return (ARR). Most studies during this time reported DCF models to be the least popular method of capital budgeting (Baker & Beardsley, 1972; Istvan, 1961; Mao, 1970).

Nonetheless, a transformation was witnessed by the end of the 1980s wherein surveys reported a changing trend towards adoption of DCF methods of IRR and NPV and decline in the usage of payback period as a primary method, while it remained highly popular as secondary criteria (Blazouske, Carlin, & Kim, 1988; Brigham, 1975; Gitman & Forrester, 1977; Kim & Farragher, 1981; Klammer & Walker, 1984; Klammer, 1972; Oblak & Helm, 1980; Petry, 1975; Petty, Scott, & Bird, 1975; Stanley & Block, 1984). Conversely, a review of Indian researches conducted by Chandra (1975), Porwal (1976), Pandey (1989) and Sahu (1989) in similar time periods indicated the supremacy of payback as a primary criteria though a gradual trend towards usage of DCF methodologies of NPV and IRR was witnessed.

An examination of research of the 1990s provides evidence of continuous increase in usage of DCF techniques, primarily NPV and IRR (Bierman, 1993; Chadwell-Hatfield, Goitein, Horvath, & Webster, 2011; Drury, Braund, Osborne, & Tayles, 1993; Gilbert & Reichert, 1995; Jog & Srivastava, 1995; Kester & Chang, 1999; Parashar, 1999; Petry & Sprow, 1994; Sangster, 1993). Indian studies by Ken and Cherukuri (1991); Babu and Sharma (1996); and Cherukuri (1996) also recognised a rising preference for NPV and IRR as project evaluation techniques, moving in concurrence with the global investment methodologies.

Beginning from the late 1990s to the 2000s, researchers in the field explored the differences in investment practices across firms of varying sizes and characteristics. It was observed that large firms relied heavily on DCF techniques while small firms still favoured the payback criterion (Arnold & Hatzopoulos, 2000; Brealey & Myres, 2000). Graham and Harvey (2001) and Ryan and Ryan (2002) observed that the large firms with high debt ratios, and MBA CEOs are significantly more likely to use NPV and IRR than their counterparts. In conformity, the surveys of Indian companies also established the supremacy of IRR and NPV as the most popular investment methods with larger firms exhibiting a higher degree of sophistication than their smaller counterparts (Anand, 2002; Verma, Gupta, & Batra, 2009). Nevertheless, an increasing preference for non-discounted cash flow (NDCF) techniques as a supplement to the DCF ones was prevalent in India (Gupta, Jain, & Yadav, 2011). Singh et al. (2012) confirmed that despite the theoretical superiority of NPV, Indian firms preferred IRR over NPV.

Cost of capital practices also demonstrated a growing trend of sophistication over the years. While the earlier researches by Christy (1966), Williams (1970), and Petty et al. (1975) reported usage of weighted average cost of capital (WACC) by less than 30% of the firms as discount rate, the subsequent surveys by Schall, Sundem, and Geijsbeek (1978), Oblak and Helm (1980) and Gitman and Mercurio (1982) established a significant increase in the use of WACC by more than 80% of the companies. Successively, studies conducted by Ryan and Ryan (2002), and Graham and Harvey (2001) revealed the supremacy of WACC. Capital asset pricing mode (CAPM) was found to be the most popular to calculate cost of equity capital (Gitman & Vandenberg, 2000; Graham & Harvey, 2001; Ryan & Ryan, 2002). Research studies by Babu and Sharma (1996), Cherukuri (1996), and Jain and Kumar (1998) also validated the growing usage of WACC in India. In agreement with the worldwide researches, PricewaterhouseCoopers (2000), Anand (2002), Irala and Reddy (2006) Verma et al. (2009) confirmed WACC as the most widely accepted discount rate in Indian corporates, and extensive usage of CAPM for estimating cost of equity capital.

Despite a growing implementation of DCF techniques, the review of academic literature reveals a less widespread usage of formal risk analysis techniques. Among the firms that explicitly consider risk in investment evaluation, risk-adjusted discount rate and shorter payback period were found to be most popular (Gitman & Forrester, 1977; Klammer & Walker, 1984; Petty et al., 1975). The sophisticated risk technique of sensitivity analysis gained popularity over the years (Babu & Sharma, 1996; Cherukuri, 1996; Gitman & Mercurio, 1982; Jain & Kumar, 1998; Kim & Farragher, 1981; Klammer & Walker, 1984; Petry, 1975). Later, sensitivity analysis and scenario analysis emerged to be most popular risk adjustment techniques (Anand, 2002; Graham & Harvey, 2001; Ryan & Ryan, 2002; Singh et al., 2012).

Some previous research studies elucidate the emergence of relatively new techniques of real options (Busby & Pitts, 1997; Luehrman, 1998; McDonald, 2000; Walters & Giles, 2000). Real options are inherently present in any investment project where management has the flexibility to alter its course, i.e. expansion, contraction, delay, or abandonment (Bodie & Merton, 2000; Brealey, Myers, & Marcus, 2001). A noteworthy finding of the recent research studies is the gradual progression of real options, though the usage is still not extensive (Bennouna, Meredith, & Marchant, 2010; Bjarnadóttir, 2013; Block, 2007; Cotter, Marcum, & Martin, 2003; Graham & Harvey, 2001; Grayburn, 2012; Hartmann & Hassan, 2006; McDonald, 2006; Ryan & Ryan, 2002). Researches by Truong, Peat, and Partington (2008) in Australia, and Singh et al. (2012) in India observed a relatively greater acceptance of this technique. However, considering the recent and extensive coverage of real options in the literature, its use is not widespread. A recent survey of 1500 CFOs of the largest companies from Norway, Denmark and Sweden reported that only 7% of the companies use real options, whereas NPV was used by 74% of them. Lack of familiarity with real option concepts and the complexity of real options is the main hindrance for implementation (Horn, Kjærland, Molnár, & Steen, 2015).

Review of literature reveals a continuous progress by the global business as well as the Indian corporate sector in the area of capital budgeting. However, for a long time, theory has emphasised financial issues in investment project evaluation, not taking into account other aspects. Some previous studies have also focussed on the importance of non-financial factors in investment decision making. Studies by Fremgen (1973), Porwal (1976), Petty et al. (1975), Bansal (1985) and Skitmore, Stradling, and Tuohy (1989) reported safety, social concern for employees and community, necessity of maintaining existing programmes, environmental responsibility (such as pollution control), competitive position, corporate image, and legal requirements as important qualitative considerations in evaluating investment proposals. Skitmore et al. (1989) presented a list of 44 non-financial relevant factors that influence the success of building projects. Many researchers have asserted that non-financial criteria play a role as important as sophisticated financial evaluation criteria and are expected to be able to recognise competitive advantages in a project that financial techniques fail to capture (Chen, 1995; Proctor & Canada, 1992). Chen (1995) identifies the following non-financial aspects in the evaluation of projects: strategy, quality, flexibility, potential future growth, market tendency, ethical and social considerations, prestige, and legal issues. Jiang, Klein, and Balloun (1996) also presented 13 financial and non-financial success factors of a project. Later studies have also emphasised that the investment analysis and decision-making process must cover a wide range of aspects, financial and non-financial, including strategic, technical, political, social, environmental, organisational, and legal aspects (Adler, 2006; Akalu, 2003; Datta & Mukherjee, 2001; Hall, 2000; Lopes & Flavell, 1998; Love, Holt, Shen, Li, & Irani, 2002; Meredith & Mantel, 2000; Mohamed & McCowan, 2001; Mohanty, Agarwal, Choudhury, & Tiwari, 2005; Moutinho & Lopes, 2010; Nowak, 2005).

Methodology, data sources and scope of the study

All companies in India listed on Bombay Stock Exchange (BSE) applying capital budgeting techniques comprise the universe of the study. The scope of the study is limited to a sample of 500 companies selected randomly from different groups of BSE, namely A (170), B (170), T (160), of companies dealing in equity, to get an unbiased representative

Table 1 Sample size of various studies on capital budgeting in India.

Author(s)	Sample size
Prassana Chandra (1975)	20
L.S Porwal (1976)	52
I.M.Pandey (1989)	14
Dr Raj.S.Dhankar (1995)	75
Prabhakara Babu and Aradhana Sharma (1996)	73
U.Rao.Cherukeri (1996)	74
Ashish .K. Bhattacharya (1997)	11
Jain and Kumar (1998)	20
Anjana Bedi (2005)	72
Manoj Anand (2002)	81
Irala and Reddy (2006)	60
Verma et al. (2009)	30
Shveta Singh, P.K. Jain, Surendra S. Yadav (2012)	31
Present study	77

sample of companies with different market capitalisation representing various sizes, industry groups, ages and geographical areas. Since 31 firms could not be reached, the effective population taken for the study was 469. Reluctance of CFOs to disclose their investment practices resulted in a final response of 77. The research instrument used to collect primary data about capital budgeting practices of Indian companies was a survey questionnaire. To begin with, a draft questionnaire was developed based on a comprehensive review of the existing literature (Graham & Harvey, 2001).

It was pretested by circulating it to a group of prominent academicians and CFOs of some companies for their feedback. Finally a structured questionnaire was designed in light of their suggestions containing simple and specific questions relating to the area of capital budgeting. The questionnaire was put on a website to be filled online by the CFOs/Finance managers. Also, an attachment file of the questionnaire was sent to CFOs of these companies along with a covering letter assuring them of the confidentiality of their company information. Initially, the response rate was low, but with subsequent reminders (through e-mail) to the non-responding companies and by establishing personal contacts with the companies located in and around Ludhiana, Chandigarh and Delhi, the response rate increased. A final response from 77 companies (16.4% response rate) was attained which was quite favourable as compared to other similar academic surveys on capital budgeting conducted in India (Table 1). Further, in view of the commercial sensitivity of this information and busy time schedules of CFOs, this response rate may be deemed as a good and adequate one. Table 2 displays the characteristics of the sampled firms.

Table 2 Firm characteristics of respondent companies (N = 77).

Size of capital budget	N	%age
Below Rs. 50 crore	25	32.5
Rs. 50 to <100 crore	20	26.0
Rs. 100 to <500 crore	18	23.4
Rs. 500 crore and above	14	18.2
Industry	**N**	**%age**
Transport equipment/automobiles/two wheeler/motor vehicles/tyres/auto components/automotive	11	14.3
Chemicals/fertilizers/petrochemicals, paints/dyes, pharmaceutical/biotechnology/healthcare	9	11.7
Cement/iron & steel/paper/wood/glass/plastic/rubber/marbles	7	9.1
Consumer durable/electronics/electrical equipments, liquor/tobacco, FMCG	8	10.4
Power/oil/gas	2	2.6
Communication/telecom, IT/software development	8	10.4
Food processing/sugar	10	13.0
Textiles/garments/cosmetics & jewellery/leather	13	16.9
Services: banking/financing/insurance, property & construction/advertising/consultancy/hotel/travel/education/retailing, entertainment/media	9	11.7
Sales revenue	**N**	**% age**
< Rs. 100 crore	5	6.5
Rs. 100–Rs 500 crore	28	36.4
Rs. 500–Rs.1000 crore	16	20.8
Rs. 1000 and above	28	36.4
CEO education	**N**	**% age**
Under graduate/graduate	16	20.8
MBA	19	24.7
BE/B.TECH/M.TECH/Non MBA master	16	20.8
Other professional degree like CA,CS and CFS	13	16.9
>Master degree	13	16.9
Company age	**N**	**% age**
<10 years	4	5.2
10 to <20 years	17	22.1
20 to <40 years	31	40.3
40 years and above	25	32.5

Results and discussion

Formal capital budgeting analysis practised by Indian companies

The hierarchical level of personnel involved in taking capital budgeting decisions, in a vast majority of the companies (85.7%), is exclusively the senior or top level management. Only a small percentage (9.1%) of companies involves the middle level in taking such decisions. This demonstrates control of higher levels of management in taking these de-

cisions in the Indian corporate sector. Formal capital budgeting analysis is conducted by companies for even projects with smaller capital outlay, with 38% percent performing it for capital outlays of INR 1 crore—INR 10 crore and over 30% percent for an investment of even less than INR 1 crore.

Almost four-fifths of the sampled companies invest in projects pertaining to expansion of their existing business. Projects of entry into new business lines or replacement of old equipment/modernisation are preferred by almost an equal proportion of companies (53.2% and 59.7%) respectively. While 86% of the larger companies (with a capital budget of INR 500 crore and above) invest in projects of entry into new business, only 16% of the smaller companies (with capital budget below INR 50 crore) prefer to do so. It is noticeable that as the scale of capital budget increased, there was a sharp increase in companies opting for investments in new business lines. On the contrary, companies of all capital budget sizes preferred projects of expansion of existing business.

Capital budgeting techniques practised by Indian companies

In the Indian corporate sector, the use of capital budgeting techniques has shifted dramatically towards increasing adoption of sophisticated DCF techniques like NPV, IRR and advanced techniques like NPV with Real Options, MIRR and Simulation Analysis (Anand, 2002; Singh et al., 2012; Verma et al., 2009). This does not disregard the usage of old NDCF techniques especially payback period method, which is still used widely as a secondary criterion (Gupta et al., 2011).

An encouraging aspect of the study is that an overwhelming majority (91%) of companies use the theoretically sound DCF techniques in some form or the other. The results are in conformance with sound corporate finance practices. The NDCF techniques are still rigorously used, though, mainly as a secondary criterion. About 65 companies (84.5%) used a combination of both NDCF and DCF techniques. These results are very close to those of Singh et al. (2012), who found that all the respondent companies used both discounted and Non-DCF techniques to evaluate capital expenditure. Our survey shows that almost an equal proportion (69%) of the sampled companies ("often" or "always") prefer to use IRR, payback period and NPV (Table 3). However, if only "always" is considered then IRR (43%), trails NPV (35%) in preference. This confirms that the usage of IRR overrides the theoretically sound method of NPV as reported in many previous researches (Anand, 2002; Bhattacharya, 1997; Cherukuri, 1996; Graham & Harvey, 2002; Jog & Srivastava, 1995; Singh et al., 2012). On the contrary, the non-discounted ARR method and the other discounting tools such as profitability index (PI), discounted payback period, hurdle rate, adjusted present value (APV) are employed less frequently with a majority (exceeding 50%) of the companies rarely using these methods. The results are consistent with the findings of Graham and Harvey (2002); Singh et al. (2012); and Anand (2002) who found comparatively lower usage of these techniques.

The relatively sophisticated latest techniques of earnings multiple approach, EVA, MIRR and real options are favoured by a small percentage of companies. Considered superior to IRR as per academic theory, MIRR is used most of the times ("often" or "always") by 13% of the companies only. Further, 43% of the companies made use of it "sometimes", "often" or "always". In a recent development, companies are gradually incorporating managerial strategic options in capital budgeting decisions. A notable finding of the survey is that real options technique though used frequently ("often" or "always") only by 5.2% percent of the companies, is used by nearly 21% of the companies ("sometimes", "often" or "always"). Identical results were reported by Singh et al. (2012) and Graham and Harvey (2002) who found a gradual adoption of real options valuation technique across companies. However, the results are in disagreement with Bennouna et al. (2010), Block (2007) and Ryan and Ryan (2002) who observed that real options technique was rarely used.

Kruskal–Wallis (H test) was applied to determine the association between different company variables and usage of capital budgeting techniques. Results confirmed significant differences in the usage of NPV across different capital budget sizes at 5% significance level. Similarly the difference is significant for IRR, MIRR and NPV with real options at 10% level of significance. The usage of NPV and IRR increased from 48% and 52% respectively in smaller companies (capital budget less than INR 50 crore) to 85% each in larger companies (capital budget greater than INR 500 crore). Results showed conformance with those of Andor, Mohanty, and Toth (2011), Anand (2002), Brounen, De Jong, and Koedijk (2004), Graham and Harvey (2002) and Ryan and Ryan (2002) who also observed that larger firms with larger capital budgets tend to prefer NPV and IRR. The survey results reveal that the degree of sophistication in terms of usage of DCF techniques of NPV and IRR and advanced techniques such as real options, MIRR is likely to increase with the increase in size of capital budget, while payback is unanimously preferred across all capital budget sizes (Table 3).

An overwhelming majority of companies (67–87%) with larger sales (exceeding INR 100 crore), use ("always" or "often"), the traditional payback period method (Table 3). The mean usage of this method is observed to be very high in these companies. On the contrary, nearly 40% of the companies with sales of <INR 100 crore, rarely prefer to use this method. Kruskal–Wallis test results also indicate a significant difference in the usage of this method across different companies with varying sales. The DCF method of NPV and sophisticated techniques of real options, MIRR and APV technique also have a significant relation with sales revenue at 10% significance level. The usage of NPV and IRR, and advanced methods of APV, MIRR and NPV adjusted with real options enhances with increase in sales. In the companies with sales exceeding INR 1000 crore, the usage of NPV and IRR methods is as high as 89.3% and 92.8% respectively. Additionally, 32% and 60.7% of these companies with sales exceeding INR 1000 crore use ("always", "often" or "sometimes") NPV with real options and MIRR respectively. On the contrary, all the sampled companies (100%) with sales less than INR 100 crore and nearly 90% with sales in range of INR 100 - 500 crore, never or rarely use NPV with real options method. This also lends support to the results of Graham and Harvey (2002), Anand (2002), Ryan and Ryan (2002) who reported that larger companies used more NPV and IRR techniques than the smaller ones. Our survey results indicate that larger the size of company (on basis of sales revenue), the more sophisticated are the techniques being used by them.

Table 3 Capital budgeting techniques preferred by companies distributed according to capital budget size and sales turnover.

Capital budgeting tool	Size of capital budget	Always or often (%)	Rarely or never (%)	Always, often or sometimes (%)	Mean usage	Sales/turnover	Always or often (%)	Rarely or never (%)	Always, often or sometimes (%)	Mean usage
Payback period	Below Rs. 50 Crore	64.0	16.0	84.0	3.60	<Rs. 100 Crore	20.0	40.0	60.0	2.40
	Rs. 50–100 Crore	80.0	15.0	85.0	4.05	Rs. 100–Rs. 500 Crore	67.9	10.8	89.3	3.79
	Rs. 100–500 Crore	55.5	16.7	83.3	3.50	Rs. 500–Rs. 1000 Crore	87.5	6.3	93.8	4.31
	Rs. 500 Crore and above	78.6	7.1	92.9	4.00	Rs. 1000 Crore & above	67.9	17.8	82.2	3.68**
	Total	68.9	14.3	85.8	3.77	Total	68.9	14.3	85.8	3.77
Accounting rate of return (ARR)	Below Rs. 50 Crore	12.0	56.0	44.0	2.16	<Rs. 100 Crore	20.0	60.0	40.0	2.00
	Rs. 50–100 Crore	25.0	65.0	35.0	2.30	Rs. 100–Rs. 500 Crore	21.6	60.8	39.5	2.29
	Rs. 100–500 Crore	22.2	66.7	33.3	2.17	Rs. 500–Rs. 1000 Crore	25.0	37.5	62.5	2.63
	Rs. 500 Crore and bove	14.3	71.5	28.6	2.00	Rs. 1000 Crore & above	10.7	82.1	17.8	1.82
	Total	18.2	63.7	36.4	2.17	Total	18.2	63.7	36.4	2.17
Net present value (NPV)	Below Rs. 50 Crore	48.0	32.0	68.0	3.08	<Rs. 100 Crore	60.0	20.0	80.0	3.80
	Rs. 50 -100 Crore	75.0	15.0	85.0	4.00	Rs. 100–Rs. 500 Crore	64.3	17.9	82.2	3.61
	Rs. 100 -500 Crore	72.2	11.1	88.9	4.00	Rs. 500–Rs. 1000 Crore	68.8	25.1	75.1	3.69
	Rs. 500 Crore and above	85.8	0.0	100.1	4.29**	Rs. 1000 Crore & above	71.4	10.7	89.3	3.93*
	Total	67.6	16.9	83.2	3.75	Total	67.6	16.9	83.2	3.75
Internal rate of return (IRR)	Below Rs. 50 Crore	52.0	28.0	72.0	3.32	<Rs. 100 Crore	60.0	20.0	80.0	3.40
	Rs. 50–100 Crore	65.0	30.0	70.0	3.50	Rs. 100–Rs. 500 Crore	60.7	28.5	71.4	3.50
	Rs. 100–500 Crore	83.3	16.7	83.3	3.94	Rs. 500–Rs. 1000 Crore	62.6	31.3	68.9	3.50
	Rs. 500 Crore and above	85.7	0.0	100.0	4.57*	Rs. 1000 Crore & above	82.1	7.1	92.8	4.18
	Total	68.9	20.8	79.3	3.74	Total	68.9	20.8	79.3	3.74
Modified internal rate of return (MIRR)	Below Rs. 50 Crore	8.0	72.0	28.0	1.96	<Rs. 100 Crore	20.0	80.0	20.0	1.80
	Rs. 50–100 Crore	10.0	65.0	35.0	1.90	Rs. 100–Rs. 500 Crore	7.1	71.4	28.5	1.93
	Rs. 100–500 Crore	27.8	50.0	50.0	2.61	Rs. 500–Rs. 1000 Crore	25.0	56.3	43.8	2.31
	Rs. 500 Crore and above	7.1	28.6	71.4	2.71*	Rs. 1000 Crore & above	10.7	39.3	60.7	2.57*
	Total	13.0	57.2	42.9	2.23	Total	13.0	57.2	42.9	2.23
Hurdle rate	Below Rs. 50 Crore	4.0	84.0	16.0	1.56	<Rs. 100 Crore	0.0	100.0	0.0	1.20
	Rs. 50–100 Crore	10.0	85.0	15.0	1.65	Rs. 100–Rs. 500 Crore	10.7	85.7	14.3	1.61
	Rs. 100–500 Crore	11.2	66.7	33.4	1.89	Rs. 500–Rs. 1000 Crore	18.8	62.6	37.6	2.06
	Rs. 500 Crore and above	35.7	42.8	57.1	2.64	Rs. 1000 Crore & above	14.3	60.7	39.3	2.11
	Total	13.0	72.7	27.3	1.86	Total	13.0	72.7	27.3	1.86
Earnings multiple approach	Below Rs. 50 Crore	0.0	92.0	8.0	1.40	<Rs. 100 Crore	0.0	100.0	0.0	1.40
	Rs. 50–100 Crore	10.0	85.0	15.0	1.60	Rs. 100–Rs. 500 Crore	0.0	92.8	7.1	1.36
	Rs. 100–500 Crore	5.6	83.4	16.7	1.50	Rs. 500–Rs. 1000 Crore	18.8	56.3	43.8	2.25
	Rs. 500 Crore and above	0.0	78.5	21.4	1.64	Rs. 1000 Crore & above	0.0	92.9	7.1	1.29
	Total	3.9	85.7	14.3	1.52	Total	3.9	85.7	14.3	1.52
Adjusted present value (APV)	Below Rs. 50 Crore	4.0	84.0	16.0	1.64	<Rs. 100 Crore	0.0	80.0	20.0	1.80
	Rs. 50–100 Crore	20.0	60.0	40.0	2.00	Rs. 100–Rs. 500 Crore	3.6	85.8	14.3	1.50
	Rs. 100–500 Crore	11.1	72.3	27.8	1.83	Rs. 500–Rs. 1000 Crore	31.3	43.8	56.3	2.63
	Rs. 500 Crore and above	7.1	78.6	21.4	1.86	Rs. 1000 Crore & above	7.2	78.6	21.5	1.68*
	Total	13.0	72.7	27.3	1.82	Total	10.4	74.0	26.0	1.82
Discounted payback-period	Below Rs. 50 Crore	24.0	56.0	44.0	2.44	<Rs. 100 Crore	40.0	20.0	80.0	3.20
	Rs. 50–100 Crore	25.0	50.0	50.0	2.60	Rs. 100–Rs. 500 Crore	17.8	64.3	35.7	2.21
	Rs. 100–500 Crore	16.7	66.6	33.4	2.28	Rs. 500–Rs. 1000 Crore	31.3	43.8	56.3	2.81
	Rs. 500 Crore and above	7.1	31.7	57.1	2.64	Rs. 1000 Crore & above	10.7	57.2	42.8	2.32
	Total	19.5	54.6	45.5	2.32	Total	19.5	54.6	45.5	2.44
Profitability index (PI)	Below Rs. 50 Crore	16.0	64.0	36.0	2.12	<Rs. 100 Crore	20.0	60.0	40.0	2.20
	Rs. 50–100 Crore	25.0	65.0	35.0	2.40	Rs. 100–Rs. 500 Crore	10.7	64.3	35.7	2.04
	Rs. 100–500 Crore	5.6	50.0	50.0	2.28	Rs. 500–Rs. 1000 Crore	31.3	56.3	43.8	2.56
	Rs. 500 Crore and above	21.4	50.0	50.0	2.64	Rs. 1000 Crore & above	14.2	53.6	46.3	2.50
	Total	16.9	58.5	41.6	2.32	Total	16.9	58.5	41.6	2.32
NPV adjusted with real options analysis	Below Rs. 50 Crore	0.0	92.0	8.0	1.44	<Rs. 100 Crore	0.0	100.0	0.0	1.60
	Rs. 50–100 Crore	10.0	70.0	30.0	1.80	Rs. 100–Rs. 500 Crore	0.0	89.3	10.7	1.39
	Rs. 100–500 Crore	5.6	88.9	11.2	1.61	Rs. 500–Rs. 1000 Crore	12.5	75.0	25.0	1.75
	Rs. 500 Crore and above	7.1	57.1	42.8	2.21*	Rs. 1000 Crore & above	7.1	67.9	32.1	2.04*
	Total	5.2	79.2	20.8	1.71	Total	5.2	79.2	20.8	1.71
Economic value added (EVA)	Below Rs. 50 Crore	0.0	100.0	0.0	1.16	<Rs. 100 Crore	0.0	100.0	0.0	1.20
	Rs. 50–100 Crore	15.0	65.0	35.0	2.05	Rs. 100–Rs. 500 Crore	3.6	92.9	7.2	1.39
	Rs. 100–500 Crore	11.0	88.9	66.6	1.67	Rs. 500–Rs. 1000 Crore	18.8	68.8	31.3	2.06
	Rs. 500 Crore and above	7.1	71.4	28.5	2.00	Rs. 1000 Crore & above	7.1	78.6	21.4	1.79
	Total	7.8	83.1	16.9	1.66	Total	7.8	83.1	16.9	1.66

Note: **Denote significant difference at 5% level of significance.
*Denote significant difference at 10% level of significance.

The traditional payback is still highly preferred except in companies with sales below INR 100 crore.

The study also affirmed that a majority (84%) of the old, experienced and well established companies with age (greater than 40 years) prefer ('often' or 'always') the payback period method whereas a marginally lower (43%) of young companies with age (less than 20 years), use this technique. There is significant difference in usage of payback period method across different age groups at 10% significance level as revealed by Kruskal–Wallis test results. The mean usage of this method increased with the age of the company with older companies (greater than 40 years) having a mean usage as high as 4.08. In contrast to this, 4% of these older companies use ARR while nearly 34% of the young companies use it. This indicates that older experienced companies still find payback period method quite useful and relevant in project evaluation as compared to the ARR technique. The DCF technique NPV is widely preferred by companies of all age groups, with younger companies (74%) preferring it to an even greater extent than the older ones (68%). Similarly both the young and old companies use IRR with nearly 72% reported usage. Furthermore, 56% of the older companies prefer using IRR "always" with a high mean usage of 4.08. Significant differences are also found in the usage of APV method at 5% significance level. While the younger companies (less than 40 years) prefer it to lesser extent (32–38%) a majority (92%) of the older ones (greater than 40 years) use it almost negligibly. The proportion of younger companies that use sophisticated techniques of MIRR and NPV adjusted with real options, EVA, and earnings multiple approach is observed to be marginally higher than their older counterparts. The survey affirms a greater inclination by the younger companies to make an effort to apply the novel, advanced methods. On the other hand their older counterparts though making good usage of the DCF techniques of NPV and IRR and even greater use of payback appear relatively less interested to shift over to the advanced techniques of MIRR, real options and the like.

It is noticeable from the survey results, that payback period method is used widely by CEOs of various companies, irrespective of their educational qualifications because of its emphasis on liquidity and risk consideration. Indeed, nearly 85% of the CEOs with higher qualification (greater than a master's degree) make rigorous use of this method with a high mean usage of 4.08. However, ARR is rarely being used by the CEOs, except the ones with professional degrees (such as Chartered Accountant (CA) and Company Secretary (CS) as 31% of these CEOs use ARR. The results of Kruskal–Wallis test reveal significant differences in the usage of payback and IRR methods across CEOs of different educational qualifications. These CA/CS qualified CEOs also make very high usage of NPV, IRR and payback methods. 56% and 43% of less qualified CEOs (graduate/undergraduate), and in contrast nearly 100% and 85% of highly qualified CEOs (holding greater than a master's degree) use the NPV and IRR methods respectively. The mean usage of NPV and IRR is observed to be highest amongst CEOs holding professional degrees (CAs or CSs), and the ones possessing greater than a master's degree. Our survey also unveils the fact that the MBA CEOs prefer to use IRR as the primary technique and payback as a secondary criterion even more than NPV method. Our results are at variance with Brounen et al. (2004) who found that European companies managed by a CEO with an MBA (except for the UK) used NPV significantly more often. Evidently, with an increase in a CEO's educational qualifications, usage of sophisticated techniques also expanded but the differences are insignificant. Conversely, none of the companies with highly qualified CEOs (greater than a master's degree) and a very small percentage of MBA CEOs make use of the advanced techniques like MIRR and NPV adjusted with real options. Apparently, even the most educated CEOs seem to be hesitant to make use of these sophisticated techniques. On the contrary, only the technically sound CEOs (with B.E/B.TECH/M.TECH degrees) prefer to use not only all DCF techniques but also the advanced techniques of MIRR and real options, though to a relatively smaller extent.

Reasons for usage/non usage of different capital budgeting techniques

The seven sampled companies which do not use DCF techniques disclosed that the most important reason for non usage of these techniques, is that it is not required as per their business conditions. High level of complexity and difficulty of these techniques and unwillingness of top management to implement these are other detrimental factors, especially in the usage of advanced techniques like NPV with real options, MIRR, and simulation analysis. Furthermore, many companies think that they do not require DCF techniques as majority of their projects are "replacement" projects. In contrast to this the prominent reasons for the usage of DCF techniques by a vast majority of sampled companies (70) is their consideration of time value of money as well as cash inflow throughout the life of the project. Other reasons favouring their usage appeared to be less influential. Moreover, DCF techniques are favoured because computational technology have made as made their calculations much easier (Arnold & Hatzopoulos, 2000; Ryan & Ryan, 2002). Our survey also supported this observation wherein companies reported that information technology has simplified use of DCF techniques resulting in its increasing adoption. Nevertheless, an overwhelming number of companies (nearly 85%) continue to prefer NDCF techniques primarily for their emphasis on liquidity. That these NDCF techniques consider risk and uncertainties associated with future and are easy to calculate are other prominent reasons for their being supplemented with DCF techniques. Other reasons for their usage are stated by a very small proportion of companies. The results are consistent with those of Singh et al. (2012) and Graham and Harvey (2002).

Previous research studies have shown that companies prefer multiple criteria for investment appraisal and reliance on a single capital budgeting technique is very limited (Anand, 2002; Gilbert & Reichert, 1995; Ken & Cherukuri, 1991; Singh et al., 2012; Verma et al., 2009). Our survey also reveals that a majority of the Indian companies (nearly 65%) use multiple capital budgeting techniques for project evaluation, especially the ones with higher capital budgets. Of the ones which do not use multiple techniques, a majority (91%) have a smaller capital budget size (below INR 100 crore). Of the sampled companies 84.5% use a combination, wherein NDCF techniques are used to supplement DCF techniques.

NPV and IRR contradiction

Despite IRR's drawbacks such as—the fact that it gives multiple answers, difficulty in calculation and that it makes a reinvestment that is unrealistic, and NPV's conceptual superiority, finance managers seem to prefer IRR over NPV because it is more appealing as a percentage measure (Anand, 2002; Graham & Harvey, 2002; Singh et al., 2012).

In contrast to academic theory, which purports that NPV and IRR give contradictory results, 59% (41) of the 70 companies using DCF techniques, believe that no such contradiction exists. Out of the 29 companies that acknowledged this contradiction, nearly 52% (15) stated that they prefer NPV while 48% (14) preferred IRR in cases of contradiction. Indian companies seem to be equally divided on the issue of NPV-IRR contradiction and both the methods are preferred in almost equal proportion in case of such situations.

Discount rate/cut off rate used in investment evaluation

In support to the academic superiority of WACC, in practice also it is the most preferred discount rate, being used by 59% of the companies. The next in preference is cost of debt being used by 20%, and bank rate by 8.6% of the sampled companies. Cost of retained earnings, cost of new equity, historical rate, and arbitrary cut off point, and term lending rate are preferred almost negligibly as discount rates. The results are in agreement with past literature wherein WACC was evidently the most widely used discount followed by cost of debt (Bedi, 2005; Cherukuri, 1996; Irala & Reddy, 2006; Ryan & Ryan, 2002). Previous Indian studies have confirmed that companies prefer a single discount rate based on WACC, rather than multiple rates (Anand, 2002; Irala & Reddy, 2006; Parashar, 1999). In contrast to this, our survey confirms that nearly 69% companies use multiple discount rates for different projects. In the Indian corporate sector, project specific discount rates, keeping in view individual riskiness of each project, are more popular than a single discount rate. This is true especially for companies with higher capital budgets (greater than INR 500 crore) with nearly 93% using multiple discount rates. This result is consistent to Brounen et al. (2004) and Graham and Harvey (2002) where large firms are more likely to use risk-adjusted discount rate than smaller firms.

In case of overseas projects nearly 23% of the companies use the same discount rate for the company as a whole, while approximately 20% prefer companies with higher capital budgets (greater than INR 500 crore) and 16% use a discount rate specifically for the overseas market. However, in companies with higher capital budgets (greater than INR 500 crore), higher preference (36% companies) is given to risk adjusted discount rates.

Consideration of risk by Indian companies

Our survey results show an increased trend of risk measurement by a majority of Indian companies. An overwhelming majority of 97.5% of the companies measured risk in their projects. Only 2.5% of the companies did not report measuring risk, those being companies with capital budget size below INR 50 crore. Indian companies use a variety of statistical measures to capture different facets of risk. Standard deviation /coefficient of variation emerged as the most preferred measure, with 58.7% sampled companies using it, followed by expected NPV using probability distribution being used by 25.3% of the companies. The results remain more or less the same across all sizes of capital budgets. The use of measures of range and semi variance is scanty.

There are certain specific macroeconomic risk forces faced by a business firm which are beyond the control of the business enterprise such as inflation, interest rate, business cycle, term structure, commodity price, and foreign exchange risk. Survey results reveal that nearly 89% companies rate risk of unexpected inflation as most important, followed by interest rate risk (85%) and foreign exchange risk (81%). Next in order of importance were GDP/business cycle risk and commodity price risk, followed closely by term structure risk and momentum risks. Distress risk, company size, and "market to book ratio" risk were comparatively unimportant. Mean values also reveal that inflation risk, interest rate risk and foreign exchange risk were the most important and highly rated risks with highest mean value, followed closely by GDP/business cycle risk, commodity price and term structure risks. Other risks like distress risk, company size risk or momentum risk had comparatively lesser mean importance. These results are consistent with those of Graham and Harvey's (2001) where the respondents identified, besides market risk, other risk factors such as interest rate, size, inflation, and foreign exchange rate risk.

Further, most of the companies adjust either their discount rates or cash flows or both, for interest rate risk (78%) and risk of unexpected inflation (73%, while the foreign exchange risk is adjusted by 60% of the companies. Only 40–45% percent of the companies adjust their discount rates or cash flows or both for term structure, commodity price risk, whereas GDP or business cycle risk is adjusted by nearly 36%. For interest rate risk, term structure risk, company size and momentum risk, majority of the companies adjust their discount rates. However, for risk of unexpected inflation, GDP risk, commodity price risk, foreign exchange risk, market to book value risks, the majority adjusted their cash flows. The results seem consistent with Truong et al. (2008) survey of 87 Australian companies where 58% of the companies adjust their discount rate according to expected changes in the level of project risk, and 25% according to the term structure of interest rate. It also follows from our analysis that usage of risk-adjusted cash flows is comparatively more than risk-adjusted discount rates. The results are in agreement with those of Gitman and Vandenberg (2000); Stanley and Block (1984) and Shao and Shao (1996).

Risk adjusted capital budgeting techniques preferred by Indian companies

In today's risk–prone business environment where companies are exposed to different types of risks, a wide variety of tools are available from simple break even analysis to sophisticated advanced techniques like simulation, for their adjustment. Our survey clearly exhibits that the most popular technique used for incorporation of risk among Indian companies is sensitivity analysis. It is used by nearly 56% of re-

spondent companies "often" or "always" and by 71% of them "sometimes", "often", "always". The risk analysis techniques of shorter payback period, scenario analysis and conservative estimates of cash flows are used "often" or "always" by 46.7%, 44%, and 40% of the companies respectively, and by a vast majority of 68%, 81%, 83% of the companies "sometimes", "often", "always".

Risk adjusted discount rates and analysis of project risk through judgement evaluation are also used by companies, to a relatively lesser extent. Similarly a small percentage of companies use Hiller model, calculated bail out factor, utility theory and even the certainty equivalent approach. The theoretically sound techniques of probability theory, decision tree analysis, and Monte Carlo simulation are used very infrequently. The results are in conformity with those of Singh et al. (2012), Hall and Millard (2010), Verma et al. (2009), Anand (2002), Ryan and Ryan (2002) and Arnold and Hatzopoulos (2000), who all observed that sensitivity analysis, followed by higher cut off rate and shorter payback period are the ones mostly preferred for incorporation of risk in capital budgeting.

Cost of capital and equity capital practices

The survey results reveal that a majority of 61% of the companies used weighted average cost of capital (WACC) to calculate cost of capital, followed by cost of debt, used by 17% companies. The other methods were rarely preferred. These results are in agreement with those of Truong et al. (2008), Irala and Reddy (2006), Anand (2002), Arnold and Hatzopoulos (2000), Ryan and Ryan (2002), Babu and Sharma (1996), Cherukuri (1996) Bruner, Eades, Harris, and Higgins (1998), Jain and Kumar (1998), Kester and Chang (1999) and Parashar (1999) who also observed that WACC is the most widely used discount or cut off rate followed by cost of debt or bank loan. The results remained similar across all sizes of capital budgets except in case of companies with capital budget size below INR 50 crore wherein WACC and cost of debt, both are equally preferred by nearly 32% of the companies. Interestingly, in the companies with capital budget size of INR 50–100 crore, WACC is preferred strongly by a vast majority of 90% of the companies. Indeed, in companies with capital budget exceeding INR 50 Crore, it clearly emerged as the most preferred method.

Moreover, an overwhelming majority of 79% of sampled companies estimate cost of equity capital. Nearly, 32.7% of the companies prefer ("often" or "always") the CAPM model (the beta approach) for calculation of cost of equity capital. Almost an equal proportion of companies ("often" or "always") prefer the dividend yield model. The CAPM model is clearly one of the most popular among models for estimation of cost of equity (Anand, 2002; Andor et al., 2011; Arnold & Hatzopoulos, 2000; Brounen et al., 2004; Bruner et al., 1998; Gitman & Vandenberg, 2000; Graham & Harvey, 2002; Irala & Reddy, 2006; Kester & Chang, 1999; PricewaterhouseCoopers, 2000; Truong et al., 2008). Cost of equity with average historical returns on common stock, by using CAPM, but including some extra risk factors or "by whatever the investors tell they require" are the methods preferred by nearly 28% percent of companies "often" or "always". Earnings yield model and Gordon dividend discount/growth model are preferred by 23% and 18% of the sampled companies respectively. The other methods like bond yield plus risk premium approach, multi factor model, or calculation on basis of regulatory decisions were preferred negligibly. Survey results show that while the mean usage of average historical returns on common stock, dividend yield, dividend growth and earnings yield method for calculating cost of equity is high in low capital budget companies, in case of companies with higher capital budgets, the mean usage of CAPM model (beta approach) and CAPM with some extra risk factors is high. These results are in conformance with those Anand (2002) who found that larger firms give significantly more importance to CAPM than small firms while the dividend discount model is more popular among the smaller firms. Further, Brounen et al. (2004), and Graham and Harvey (2002) also found that large firms are more likely to use CAPM than small firms.

Non-financial considerations in capital budgeting decisions

Basing an investment decision only on financial criteria may result in inadequate decisions. According to Myers (1984) "the non-financial approach taken in many strategic analyses may be an attempt to overcome the short horizons and arbitrariness of financial analysis as it is often misapplied". Non-financial evaluation techniques provide information about less tangible factors and are expected to be able to identify competitive advantages in a project that financial techniques cannot capture (Chen, 1995).

Not much literature is available on the role of non-financial factors in financial appraisal which sometimes carry even more weight than the financial parameters. The project selection involves the evaluation of multiple attributes, both quantitative and qualitative (Mohanty et al., 2005). Mohamed and McCowan (2001) state that non-monetary project aspects need "careful analysis and understanding so that they can be managed and neglecting these aspects can cause the failure of a project despite very favorable financial components".

The survey research results show that business firms may give different weightage to different non-financial parameters which may vary according to their nature of the business, scale of investment, level of competition, global market operations and the like. A majority (78% i.e. 60 out of 77) of the sampled companies consider "project linkage with corporate objectives and strategy" as an important non-financial criterion. This is done to ensure that a project fits well with the corporate objectives and strategy. In fact, many times a good project may be turned down due to lack of strategic fit with corporate objectives, despite positive financial figures and information. Interestingly, an overwhelming 84% of the small companies (with capital budget size below INR 50 crores) consider this highly important. This is in conformance with studies of Moutinho and Lopes (2011), Kenny (2003), Cooke-Davies (2002) and Lopes and Flavell (1998) wherein the contribution of the project to the company's strategic goals is mentioned by almost all firms as the most relevant characteristic in project valuation.

"Customer market" in case of new projects /demand analysis in case of new products emerged as another important non-financial criterion before selecting an investment as mentioned

by 65% of the sampled companies. An overwhelming majority of 93% of the companies (with capital budget exceeding INR 500 crore) conduct the same. Furthermore, 53.2% of the sampled companies consider the technical considerations such as "availability of raw material, power and other basic amenities" necessary for the project, followed closely by "availability of manpower" (50.6%), "suitable project location" (48.1%) and "availability of suitable technology" (45.5%) as relevant non-financial parameters. Kantel (2002) and Kenny (2003) also confirmed that level of technology in a project was very relevant.

Of the sample companies 44.2% also give due weightage to "social considerations of employee and public safety" in project evaluation. Many a time, financially viable projects turned down due to their hazardous impact on the employees or adverse impact on social environment or societal values and beliefs. Results are in agreement with those of Zika-Viktorsson, Hovmark, and Nordqvist (2003), Johns (1995), Belout (1998) and Lopes and Flavell (1998) who considered human factors like team coordination and employee motivation as significant non-financial criteria and Hall (2000) who observed "safety of their employees or the public" as an important non-financial criterion that influences capital investment decisions. The other non-financial criteria that are considered by Indian companies while selecting an investment proposal are "necessity of maintaining existing product lines" (41.6%), and "need to meet competition" (21%). Indian companies undertake investments just to maintain the existing product lines, to aid an increase in manufacturing flexibility, have fewer product failures and better service, promote improved product delivery, and quality and product design. The results are in line with Moutinho and Lopes (2011), and Hall (2000) who observed that development of a company's current business and meeting the market's needs are important non-financial criteria. Previous studies by Porwal (1976), Fremgen (1973), and Bansal (1985) have also reported reasons like safety, social concern for employees and community, necessity of maintaining existing programmes, pollution control and competitive position as important qualitative considerations in evaluating investment proposals.

Furthermore "country interest/government direction in particular area", "government regulation/legal norms, tax benefits or incentives", "environmental constraints", "availability of qualified managerial personnel" and "capacity availability" are mentioned by a few companies as other relevant non-financial criteria affecting project selection. Results support those by Lopes and Flavell (1998), OECD (1997), McPhail and Davy (1998) and Bansal (1985) who found similar environmental and legal factors as important qualitative consideration in capital expenditure decisions.

Only 2.6% of the respondent companies did not give any consideration to the non-financial factors. Consequently, survey results show that qualitative or non-financial considerations play a major and significant role in investment decisions.

Research findings and conclusion

This research investigated the level of sophistication of capital budgeting practices in India, based on a primary survey of Indian companies. It is significant to note that there is growing adoption of sophisticated DCF techniques and risk-adjustment techniques. As advocated by academic literature, DCF techniques of IRR and NPV are the ones most favoured by the Indian corporates in practice, though IRR overrides NPV in preference. Survey results indicate that Indian companies are equally divided on the issue of NPV-IRR contradiction, and both the methods are equally preferred. Consideration of time value of money and all the cash inflows of project emerged as the prime reasons for an extensive usage of DCF techniques. Conversely, the few companies not using these techniques identified non-suitability to their business, difficulty in use and non supportive top management as the reasons for the same. There is a growing inclination by the Indian corporate sector to use multiple capital budgeting techniques in evaluating investments, wherein NDCF techniques are used as a supplement to DCF techniques. The usage of traditional payback period method is very common. The high popularity of this method is attributed to its increased emphasis on liquidity, risk and simplicity. It is striking to note that all the other investment appraisal methods are scantily or less frequently used. There is sluggish adoption of even the newer techniques advocated by academic theory viz a viz NPV with Real Options, MIRR, APV, EVA and the like. Evidently, higher managerial level control prevails in capital budgeting decisions with formal capital budgeting analysis being undertaken for smaller outlays. The study reveals that the Indian corporate sector prefers the theoretically superior WACC as discount rate and multiple, risk adjusted discount rates are in prevalence, especially in larger companies. Consistent with academic theory, WACC emerged as the most popular method to calculate cost of capital. The usage of the CAPM model (the beta approach) and dividend yield model is found to be dominant in the determination of the cost of equity capital.

Survey results suggest some fundamental differences between the practices of large and small companies. The degree of sophistication is apparently high in companies with larger capital budgets having a relatively greater adoption of NPV, IRR and even the sophisticated techniques of NPV with real options and MIRR. The usage of these sophisticated techniques also showed an uptrend in the companies having higher sales. Interestingly, the non-DCF technique of payback is highly preferred irrespective of company size because of its practical utility, besides being simple. The cost of capital practices also vary along with the company size with a higher usage of average historical returns on common stock, dividend yield, dividend growth and earnings yield among low capital budget companies, and higher usage of CAPM model (beta approach) and CAPM with some extra risk factors in higher capital budget companies. Evidently, greater capital budgeting sophistication is also observed among the younger companies with highly qualified CEOs. Younger companies attach slightly more importance to NPV, while the older to IRR. Furthermore the proportion of younger companies willing to experiment with the academically advocated superior techniques of MIRR and real options is somewhat higher than the older ones. In fact the proportion of CEOs preferring DCF techniques of NPV and IRR increases with the rise in CEOs' educational level. The CEOs with technical qualifications are the ones most receptive to the latest advanced techniques such as MIRR and real options than those with other qualifications. Payback period emerged as equally popular across all CEOs, irrespective of their educational qualifications.

An increased trend of risk measurement by Indian corporate sector is observed with standard deviation /coefficient of variation being the most preferred measure. Risks of fluctuations in inflation, interest rates and foreign exchange emerged as the most important risk factors followed closely by GDP/business cycle, commodity price and term structure risks. While for interest rate, term structure, company size and momentum risk, companies prefer to adjust their discount rates, for risk of unexpected inflation, GDP, commodity price, foreign exchange, and market to book value risks preference is to adjust cash flows. To combat the risks, when confronted by turbulent financial markets, the companies explicitly adopt certain risk adjustment techniques as proposed by academic literature. Sensitivity analysis emerged as the most popular risk adjustment technique, followed by shorter payback period, scenario analysis and conservative estimates of cash flows. Risk adjusted discount rates and judgment evaluations are used to a limited extent. All other techniques were rarely used. However there is strong reluctance by Indian firms to adopt relatively new, and theoretically sound techniques of probability theory, decision tree analysis, and Monte Carlo simulation. Our research shows that an overwhelming majority of companies consider project linkage with corporate objectives and strategy, and customer market /demand analysis as the most important non-financial considerations in capital budgeting. Technical considerations of availability of raw material, power, manpower, suitable project location and technology, and social considerations of employee, public safety are also given priority by many. Almost all the companies give due consideration to these qualitative factors to some extent.

The study has the limitation of being a country-specific study limiting itself to a one-time period only. Nevertheless, it makes a valuable contribution to the existing body of knowledge in the area of global capital budgeting in general and the Indian scenario in particular. The research not only evaluates the capital budgeting techniques used by Indian companies but also studies their practices for risk incorporation, cost of capital and qualitative considerations in capital budgeting decisions. The impact of certain firm variables such as size of capital budget, sales revenue, age of company, and CEOs' education level on the capital budgeting practices is determined. Further, investment practices in India are generally consistent with academic theory. Although there is an increasing adoption of DCF capital budgeting methods, there has been a slack adoption of relatively new developments in capital budgeting and use of advanced methods as real option analysis, APV, MIRR and Monte Carlo simulation by the Indian firms. The results observed a higher sophistication among the larger and younger companies with highly qualified CEOs. Table 4 presents the key findings that emerged from the survey results.

Implications of the study

The survey results have sound implications for corporate practitioners, academicians and all other stakeholders. Good corporate governance aims to benefit all stakeholders by increased transparency, reduced agency cost and maximising a firm's value. Superior capital budgeting practices help maximise the value of an organisation which ensures better corporate governance and satisfaction of different stakeholders such as creditors, shareholders, suppliers, and employees. The survey findings suggest certain specific areas of improvement for corporate practitioners for better investment decision-making. Progressive adoption of the advanced techniques of NPV with real options and MIRR is a step in this new direction.

Discontent with existing, well-established investment techniques, such as net present value, due to the lack of flexibility and ability to alter projects when new information becomes available has led to a growing literature on real options. The DCF framework is a standard approach which is being criticised by recent academic literature for failing to value management flexibility, resulting in wrong investment decisions. Complementing the conventional DCF analysis with real options analysis to determine true NPV, has the potential of increased flexibility, which the earlier methods have not been able to capture. Most firms do not make explicit use of real option techniques in evaluating investments. Nevertheless, real option considerations can be a significant component of value, and firms which take them into account should outperform firms which do not (McDonald, 2000). Real options analysis was often recommended as an emerging valuation technique for high-risk investment projects (Hartmann & Hassan, 2006). In cases where project risk and the discount rates are expected to change over time, the risk-neutral ROV approach will be easier to implement than DCF (McDonald, 2006). Real options analysis seeks to value both the flexibility embedded within the investment opportunity (such as expand and contract.), and the flexibility of delaying the investment through time (Grayburn, 2012). The real option valuation is extremely valuable for companies that are operating in highly volatile markets and in high risk projects. Although the valuation of real options has been prevalent since the 1980s, more work and improvements are required in this area before it is considered by critics as a standard method in investment decisions. It is relatively new for many industries and the performance of real options as a decision-making tool in different industries has yet to be closely valued by corporate practitioners (Bjarnadóttir, 2013).

It is also surprising to discover that MIRR has acquired so little acceptance among companies despite strong academic support and the inclusion of MIRR in popular financial spreadsheet packages. While MIRR is not perfect, it, at the very least, allows users to set more realistic interim- reinvestment rates and hence to calculate a true annual equivalent yield. The CFOs need to value the superiority of MIRR over IRR as it allows the manager to adjust the discount rate of intermediate term cash flows to better match a realistic return for the cash flows. Increasingly the use of a relevant rate of return to avoid the problem of multiple internal rates of return has been suggested by Hartman and Schafrick (2004), Kelleher and MacCormack (2004), and Biondi (2006) in their studies.

With changing global market conditions, companies are constantly confronted with uncertainty in investment decisions. The academically superior probabilistic risk analysis techniques of decision-tree analysis and Monte-Carlo simulation offer a basis to value high risk investment opportunities. Managers need to supplement their standard DCF methods with these risk approaches especially in uncertain

Table 4 Key findings of the survey.

Capital budgeting issues and aspects	Findings and conclusions
Formal capital budgeting decision	• Decision at higher/top level of management • Conducted even for projects of smaller capital outlays.
Capital budgeting techniques most preferred	• DCF methods of NPV and IRR • NDCF technique of payback as a supplement. • Usage of multiple techniques preferred
NPV-IRR contradiction	• Equally divided on the issue. • Both preferred equally in contradiction.
Reasons for preference of DCF techniques	• Consider time value of money • Considers entire stream of cash flows
Reasons for non-preference of DCF	• Non-suitability as per business condition • Complexity in usage • Non-supportive top management
Reasons for preference of NDCF like payback	• Emphasis on liquidity • Risk consideration • Simplicity and ease in calculation
Usage of latest advanced techniques	• Sluggish adoption and less use of EVA,MIRR, APV and NPV with real options
Discount rate Preferred	• Use of WACC most prevalent • Multiple risk adjusted discount rates favoured.
Cost of capital practices	• WACC most preferred for cost capital calculation • CAPM model (the beta approach) and dividend yield model most popular for cost of equity capital
Risk measurement	• Increased trend of risk measurement • Standard deviation/coefficient of variation most preferred measures.
Risk factors	• Inflation, interest rates and foreign exchange risks most important risks • GDP/business cycle, commodity price and term structure risks also high in priority. • Lesser importance to risks of distress, company size or momentum risk.
Risk adjustment	• Usage of risk-adjusted cash flows overrides risk-adjusted discount rates. • For interest rate, term structure, company size and momentum risk, preference to adjust discount rates, • For risk of unexpected inflation, GDP, commodity price, foreign exchange, market to book value risks preference to adjust cash flows.
Capital budgeting techniques incorporating risk	• Sensitivity analysis most popular followed by shorter payback period, scenario analysis and conservative estimates of cash flows. • Limited use of risk adjusted discount rates and judgment evaluations. • Hiller model, calculated bail out factor, utility theory and certainty equivalent approach rarely used.
Latest sophisticated risk incorporation techniques	• Strong reluctance to adopt newer sound techniques of probability theory, decision tree analysis, and Monte Carlo simulation.

(*continued on next page*)

Table 4 (*continued*)

Capital budgeting issues and aspects	Findings and conclusions
Non-financial considerations in investment	• Project linkage with corporate objectives and strategy and customer market /demand analysis most important • Technical considerations of availability of raw material, power, manpower, suitable project location and technology and social considerations of employee, public safety are next in importance. • Necessity to maintain existing product lines, meeting competition, government legislations, environmental constraints, moderate in priority. • Almost all companies give consideration to the non financial factors.
Capital budgeting and company size	• Fundamental differences between the practices of large and small companies. • Higher degree of sophistication in companies with larger capital budgets with a relatively greater adoption of NPV, IRR and the sophisticated techniques of NPV with real options and MIRR. • Uptrend in usage of sophisticated techniques in the higher sales companies. • NDCF technique of payback highly preferred irrespective of company size. • Disparities in the cost of capital practices along the size dimension. • High usage of average historical returns on common stock, dividend yield, dividend growth and earnings yield in low capital budget companies, • High usage of CAPM model (Beta Approach) and CAPM with some extra risk factors in higher capital budget companies.
Capital budgeting and company age	• Greater sophistication in usage of capital budgeting techniques among the younger companies. • Younger companies attach slightly more importance to NPV while the older to IRR. • Younger companies have a greater willingness to experiment with the superior MIRR and real options than the older ones.
Capital budgeting and CEO education	• Usage of superior investment techniques among the highly qualified CEOs. • Higher preference for DCF techniques of NPV and IRR with rise in CEOs educational level. • CEOs with technical qualifications most receptive to adopt the latest advanced techniques like MIRR, real options than those of any other qualifications. • Payback period equally popular across all CEOs, irrespective of their educational qualifications.
Non financial considerations	• Project linkage with corporate objectives and strategy and customer market /demand analysis most important non-financial considerations. • Technical considerations of availability of raw material, power, manpower, suitable project location and technology and social considerations of employee, public safety also high on priority.

Note: a complete set of Exhibits could be made available on request.

investments and markets. Other areas of upgradation include better administrative procedures for capital budgeting, employing WACC, adjusting WACC for different projects or divisions, and applying the market values for weights. Furthermore, if the proposed investments have diverse risk characteristics, employing a multiple-risk-adjusted discount rate system is more appropriate, as the accept-reject investment decisions will, otherwise, be biased in favour of poor high-risk investments and against good low-risk investments. The growing acceptance of CAPM for equity valuation is supported by both academic literature and research studies. However, a recent research by Bell (2015) questions the credibility of CAPM and suggests the use of well established and appropriately suited engineered model based on statistical ordinary least squares (OLS) in its place. Corporate practitioners would need to rethink and revisit their valuation models in light of these recent developments.

Past researches have focused heavily on the financial feasibility of investments; the importance of qualitative non-financial aspects in project appraisal has been disregarded. The escalating risks in financial markets, increasing project failures and overdependence on quantitative parameters, all exhort the company personnel to alter their investment practices to focus more on a combination of financial and non-

financial factors rather than purely basing their investment decisions on financial analysis. It reinforces that the CFOs should deliberate on soft non-financial aspects (strategic, commercial, political, environmental, human resources, and technical) in the early stages of project evaluation, and not when risks become a reality.

Usage of sophisticated investment appraisal practices ensures that companies operate conscientiously, which not only minimises the agency costs and protects the stakeholders' interests, but also ensures compliance with corporate regulators and government bodies. The research inferences provide a useful platform to academicians to rethink capital budgeting theory and align it with prevailing capital budgeting practice. Academic theory advocates the superiority of NPV being consistent with the objective of shareholders' wealth maximisation and affirms IRR as a problematic method generating multiple rates of return. Nevertheless, the present survey evidences the increasing preference of IRR over NPV in Indian corporate sector. Academicians need to identify the reasons for these differences in theory and practice and revisit theory. In addition, theory should comprehend capital budgeting and its pervasive relation with certain variables (particularly size of the company) as suggested by the survey results. Nevertheless, there is ample room for improvement in investment practices of Indian firms especially in volatile markets, and it raises questions as to why the adoption and use of real options, MIRR and other advanced methods has not been widespread.

Appendix:
Supplementary material

Supplementary data to this article can be found online at doi:10.1016/j.iimb.2017.02.001.

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