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Capital budgeting decisions: evidence from India

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Abstract

Purpose – The purpose of this paper is to understand current practices in capital budgeting (including real options) in Indian companies and provide a normative framework (guidelines) for practitioners (based on our findings and literature reviewed).

Design/methodology/approach – A questionnaire survey was administered to 166 non-financial companies of the BSE 200 index. Secondary data were also collated from 2001-2011.

Findings – Trends towards sophisticated techniques and sound capital budgeting decisions have continued in India. All sample respondent firms used discounted cash flow (DCF) techniques in conjunction with non-DCF techniques. Internal rate of return (IRR), used by more than three quarters of the sample companies, is favored over net present value (NPV), used by half of the sample companies. Real options are used by half of the sample companies. Permanent (long-term) capital has been used to finance fixed assets (net) and working capital (net).

Research limitations/implications – The limitations of the study are that it is country specific and a detailed sectoral analysis of the constituent sectors of the sample companies could have perhaps provided deeper insight into the subject.

Practical implications – The findings of this research, decades of teaching experience of the authors and the literature reviewed have been utilized to evaluate current practices and suggest possible improvements in decision making (through a normative framework).

Originality/value – The findings show that there still remains a theory-practice gap in the usage of IRR over NPV. The usage of permanent (long-term) capital to fund fixed assets (net) and permanent working capital requirements, although sound, could be an indication of surplus funds which could be used to repay long-term debt or finance more asset building.

Keywords Capital budgeting, Discounted cash flow, India, Real options, Financing pattern

Paper type Research paper

Introduction

Fixed assets are the real earning assets of a business enterprise; these assets enable the firm to generate products/services which, in turn, result in sales/revenues, yielding profits. An opportune investment decision can yield spectacular results in terms of profits but an ill-advised and incorrect decision can endanger the very survival of the business.

In the post-liberalization era, no major Indian studies, except that by Anand (2002) and Jain and Yadav (2004) have been conducted on capital budgeting practices in India. The objective of this paper is to understand current practices relating to capital budgeting (for the large companies) in India for the period 2001-2011. Based on our findings and the literature reviewed, an attempt has also been made to suggest a normative framework (see the Appendix). The paper has used both primary and secondary data. It is not very common that one finds the studies using primary data since it is difficult to obtain responses from practitioners in the area of finance. This is perhaps the first attempt at providing a pre- and post-recession analysis as well, on the current capital budgeting practices in India.

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Literature review

The success of capital budgeting decisions depended on numerous factors. It had to be viewed within the broad framework of its structure and setting rather than with a focus on the technical apparatus involved (Kolb, 1968; Klammer, 1973; Pike, 1986; Mukherjee and Henderson, 1987). Lazaridis (2004) brought to surface some problems that small- and medium-sized companies in Cyprus encountered while implementing their investment policy. Block (2005) studied the use of capital budgeting procedures among industries. Burns and Walker (2009) reviewed the capital budgeting survey literature from 1984 through 2008.

Capital budgeting techniques

Researchers have observed an increasing preference for non-discounted capital budgeting techniques (Velez and Nieto, 1986; Gupta *et al.*, 2011). Gitman and Forrester (1977) surveyed the level of sophistication used in capital budgeting by leading firms. Taggart (1977) examined the capital budgeting decisions as a valuation problem. The payback method was most popular amongst the capital budgeting techniques.

Most companies used internal rate of return (IRR) or net present value (NPV) as either the primary or secondary method (Bierman, 1993; Cherukuri, 1996). Graham and Harvey (2001) indicated that large firms relied heavily on present value techniques and the capital asset pricing model; in contrast, small firms relied more on the payback criterion. Sandahl and Sjogren (2003) showed that the public sector companies were most frequent users of discounted cash flow (DCF) methods.

Berkovitch and Israel (2004) examined NPV as an investment criterion. Jain and Yadav (2004) in their study of public enterprises in India observed that the most popular method used was the IRR followed by payback and ARR. Lam *et al.* (2007) revealed that "formal financial evaluation" (usage of both DCF and non-DCF techniques) was the most popular technique for capital budget evaluation. Hermes *et al.* (2007) compared the use of capital budgeting techniques of Dutch and Chinese firms. Chen (2008) observed that firms with high product standardization were found to place more emphasis on DCF analysis. Osborne (2010) evaluated NPV and IRR against each other.

Incorporation of risk in capital budgeting

Salazar and Sen (1968) described a simulation mode of capital budgeting under uncertainty. Fogler (1972) found that mathematical programming models could be extremely efficient for implementation of tactical capital budgeting procedures where the impact of risk diversification was manageable. Schall *et al.* (1978) enquired about the capital budgeting techniques employed, the computation of the discount rate and of cash flows and the method of estimating and adjusting for project risk. Hertz (1979) focused specifically on the risk aspect of capital budgeting.

The firms in highly uncertain environments were more prone to using sophisticated capital budgeting methods (Schall and Sundem, 1980; Kira and Kusy, 1990; Verbeeten, 2006). Brick and Weaver (1984) compared the relative accuracy of capital budgeting techniques in identifying profitable investments. Antle and Eppen (1985) showed that capital budgeting practices were linked to the presence of asymmetric information among the stakeholders of the firm. Kulatilaka (1985) suggested financial-economic decision process for investments in flexible manufacturing systems. Kwan and Yuan (1988) provided considerable computational and analytical simplification over the

commonly used decision-tree approach. Kim (1992) examined participative budgeting in the context of the psychology of risk.

A total of 90 per cent of respondent firms used shortening of the payback period method and 59 per cent used sensitivity analysis for incorporating risk (Cherukuri, 1996). Cornell (1999) recognized that relation between risk and duration depends on the genesis of the systematic risk. Collier and Berry (2002) suggested that organizational participants used four domains of risk, namely, financial, operational, political and personal in assessing their capital budgeting decisions. Bennouna *et al.* (2010) evaluated current techniques (including real options) in capital budgeting decision making in Canada.

The most widely accepted discount rate was "weighted average cost of capital" (WACC) and the most popular technique for measuring risk was "sensitivity analysis" (Bierman, 1993). Lee Sang and Lerro (1974) formalized goal programming solutions to the problem of capital budgeting and investment planning under capital rationing.

Methodology, data sources and scope of the study

The BSE 200 index of the Bombay Stock Exchange (BSE)[1] comprises the top 200 companies listed with the BSE, based on their market capitalization and other considerations. Out of these 200 companies, 34 companies were engaged in the financial sector (as on 1 April 2010, the date of sample selection), therefore, the scope of this study is limited to the 166 non-financial BSE 200 companies engaged in manufacturing and service rendering businesses. The sample is representative in nature as the BSE 200 companies represent all industry groups. This apart, the selected sample comprised 84.32 per cent of the total market capitalization on the BSE, as on 1 April 2010. The BSE constitutes the hub of stock market activity in India.

The relevant data (secondary) on the first aspect were collected from the Capitaline database, for 11 years (2001-2011). The other secondary data sources used to substantiate any missing data were the BSE's web site and the company's annual reports.

The 11 years period of the study is divided into two sub-periods/phases to ascertain whether there has been any significant change in investment and financing pattern of the companies over the years. For the purpose of the analysis, the first six years, w.e.f. 1 April 2000 to March 31, 2006 (for brevity referred to as 2001-2006) are designated as Phase 1 and the next five years, w.e.f. 1 April 2006 to 31 March 2011 (for brevity referred to as 2007-2011) as Phase 2. The rationale behind Phase 2 beginning from 2007 is the Securities and Exchange Board of India (SEBI)[2] regulation mandating the adherence of clause 49 (on corporate governance) by all listed companies, from 1 April 2006.

The period of the study is of particular importance because of the recession (originating due to the US financial crisis) that impacted the world economy towards the second-half of 2008. According to the United Nations Council on Trade and Development (UNCTAD)[3] investment brief (1 November 2009), the year 2008 marked the end of a growth cycle in global foreign direct investment with worldwide flows down by more than 20 per cent. In India, total net capital flows fell from US$17.3 billion in April-June 2007 to US$13.2 billion in April-June 2008 (source: UNCTAD Investment Briefs, Investment Issues Analysis Branch of UNCTAD, 2009). Consequently, the last six years of the study (2006-2011) have been divided into two sub-phases to ascertain the impact of recession. The years 2006-2008 denote the pre-recession phase (Phase 3) and 2009-2011 denotes the post-recession phase (Phase 4) for the purpose of this study. The *t*-test has been administered to assess whether financial decisions relating to capital budgeting differed/changed during the phases studied.

The research instrument for primary data consisted of a questionnaire. Questions designed were simple and specific relating to objectives, policies and techniques relating to capital budgeting. The questionnaire (along with covering letter) was sent by courier and e-mailed to the chief financial officer (CFO)/finance manager/director finance of each of the 166 companies.

The initial response was very poor; only a few companies (eight) responded. Subsequently two reminders (both through post and e-mail) were sent to the remaining (non-responding) companies. Personal contacts were also established with the companies located in and around Delhi. This part of the analysis is based on 31 responses received out of 166 after two reminders (a response rate of 18.67 per cent).

Prima facie, the response rate may be seen as low; however, the number of respondents and the response rate are similar to previous studies using a similar method (Jain and Kumar, 1997; Jain and Yadav, 1999, 2004). Also, considering that the survey was addressed to time-constrained CFOs, as well as the commercial sensitivity of some of the requested information, perhaps, in that respect, this may be considered a good and adequate response.

Level of investment activity

Size of investment made each year is measured in terms of change (in percentage) in gross fixed assets (defined to include land and building, plant and machinery, capital work-in-progress and other fixed assets) at the end of the year, *vis-à-vis*, the gross fixed assets at the beginning of the year.

The sample companies have undertaken impressive investments in gross fixed assets during the period under study. The gross fixed assets increased nearly fourfold during 2001-2010, the respective figures being Indian rupees (INR) 2,112.60 billion in 2001 and INR 7,954.98 billion in 2010. The rate of growth in gross fixed assets has been equally impressive (22 per cent) when measured on year-to-year basis. However, the standard deviations figures indicate fluctuations in the level of investment activities.

The mean values of growth in gross fixed assets for Phase 1 vs Phase 2 have been depicted through Figure 1. Likewise, Figure 2 depicts the mean values of growth in gross fixed assets for Phase 3 vs Phase 4. There has been no statistically significant change in the growth in fixed assets during the pre- and post-recession phase. This could perhaps be due to the inherent fundamental strength of the sample companies and the reasons for the Indian economy's resilience and risk management measures undertaken by the Reserve Bank of India[4] (e.g. prudential norms governing the financial sector, domestic financing of investments, etc.). The standard deviation

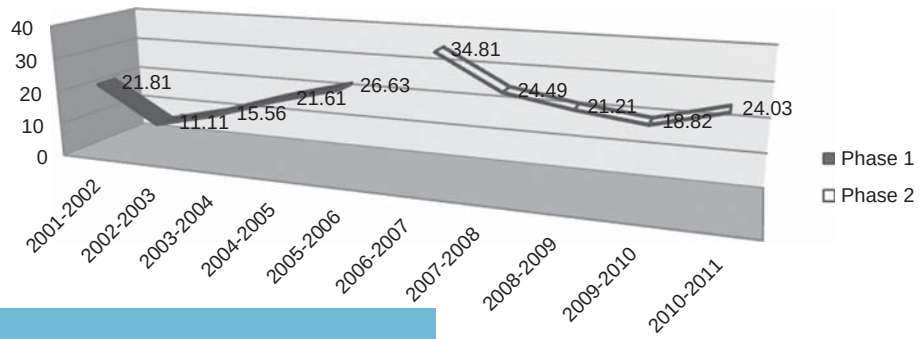

Figure 1.
Mean values of percentage growth in gross fixed assets of sample companies, Phase 1 vs Phase 2

remained almost same for Phases 1 and 2, indicating a marked difference in Phases 3 and 4. The mean figures also support the negative skew and kurtosis in Phase 1 *vis-à-vis* Phase 2 (Table I).

The above findings of the high rate of capital investment and a marked increase in the investment rate over the years by the sample companies may be attributed to the economic liberalization of the Indian economy and the period of consolidation that followed. The Indian gross domestic product, at market prices, has increased more

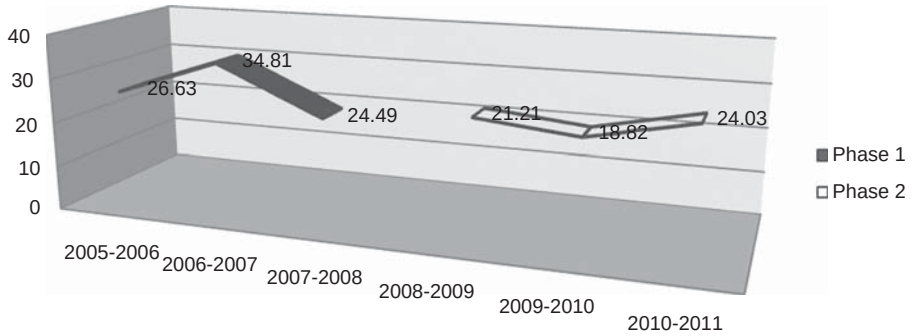

Figure 2.
Mean values of percentage growth in gross fixed assets of sample companies, Phase 3 vs Phase 4

Year	Number	Mean	SD	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001-2002	140	21.81				7.65	2.63	17.97
2002-2003	147	11.11				6.20	1.35	19.00
2003-2004	151	15.56				7.75	1.17	23.25
2004-2005	149	21.61				9.45	3.21	24.43
2005-2006	154	26.63				11.99	4.37	28.40
2006-2007	158	34.81				15.21	5.44	36.71
2007-2008	159	24.49				13.45	5.21	30.47
2008-2009	162	21.21				14.88	6.39	28.73
2009-2010	162	18.82				11.25	5.80	23.75
2010-2011	92	24.03				9.05	4.24	18.85
Mean 2001-2002 to 2010-2011	128	22.00	6.38	0.33	1.35	10.70	3.99	25.16
Mean 2001-2002 to 2005-2006 (pre-clause 49 Phase 1)	148	19.34	6.05	−0.37	−0.83	8.61	2.54	22.61
Mean 2006-2007 to 2010-2011 (post-clause 49 Phase 2)	147	24.67	6.11	1.46	2.64	12.77	5.42	27.70
Mean 2005-2006 to 2007-2008 (pre-recession Phase 3)	128	46.11	5.45	1.44	–	17.38	8.76	36.65
Mean 2008-2009 to 2010-2011 (post-recession Phase 4)	120 (paired sample *t*-test)	12.57	2.61	0.25	–	14.10	8.25	25.55

Phase	*T*	df	Significance (two-tailed)
Phase 1-Phase 2	1.653	155	0.100
Phase 3-Phase 4	0.910	162	0.360

Note: Figures are in percentages

Table I.
Mean, SD, skewness, kurtosis, median, quartile and paired *t*-test values of percentage growth in gross fixed assets of sample companies, 2001-2011

than 12 times from INR 6,547.29 billion in 1991-1992 to INR 78,756.27 billion in 2010-2011 (source: table 1 from Reserve Bank of India's Database on Indian Economy, 2011). Another aspect of increased level of investment in fixed assets by these companies is perhaps the encouraging environment for raising corporate finance because of the increasing robustness of the capital markets in the country over the same period. The market capitalization at the BSE recorded a growth of a rather remarkable 21 times from INR 3,233.63 billion in 1991-1992 to INR 68,368.78 billion in 2010-2011 (source: table 99 from Reserve Bank of India's Database on Indian Economy, 2011). Also, the assets under management of mutual funds grew nearly seven times from INR 858.22 billion in 1997 to INR 5,922.50 billion in 2011 (source: table 85 from Reserve Bank of India's Database on Indian Economy, 2011).

Financing pattern

As per the sound principles of financial management, long-term investment/capital expenditure/capital budget needs of the business enterprises should be financed from permanent/long-term sources of finance. It is gratifying to note that long-term investment needs of sample companies have been financed by long-term sources/ permanent capital. The standard deviations figures are small and hence do not merit consideration (Table II).

Through Table II and Figures 3 and 4, it is evident that the financing pattern remains unchanged even during post-recession phase (2009-2011). This sound

Year	Number	Mean	SD	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2000-2001	141	48.00				46.00	28.00	64.00
2001-2002	149	52.00				50.00	30.00	69.00
2002-2003	152	52.00				48.00	28.00	69.00
2003-2004	154	51.00				48.00	26.00	71.00
2004-2005	159	49.00				41.00	25.00	65.00
2005-2006	160	43.00				39.00	20.00	60.00
2006-2007	162	42.00				38.00	19.00	58.00
2007-2008	166	40.00				34.00	17.00	54.00
2008-2009	166	40.00				35.00	17.00	56.00
2009-2010	166	40.00				34.00	14.00	53.00
2010-2011	93	38.00				32.00	17.00	52.00
Mean 2000-2001 to 2010-2011	154	45.45	5.44	0.182	−1.905	40.45	21.91	61.00
Mean 2000-2001 to 2005-2006 (pre-clause 49 Phase 1)	153	49.17	3.43	−1.37	1.78	45.33	26.17	66.33
Mean 2006-2007 to 2010-2011 (post-clause 49 Phase 2)	151	40.00	1.41	0.00	2.00	34.60	17.33	54.60
Mean 2005-2006 to 2007-2008 (pre-recession Phase 3)	163	41.41	1.53	−0.94	–	37.15	16.80	55.37
Mean 2008-2009 to 2010-2011 (post-recession Phase 4)	142	40.13	1.15	−1.73	–	34.27	18.21	53.53

Phase	*T*(paired sample *t*-test)	df	Significance (two-tailed)
Phase 1-Phase 2	−0.558	161	0.577
Phase 3-Phase 4	1.134	165	0.258

Note: Figures are in percentages

Table II.
Mean, SD, skewness, kurtosis, median, quartile and paired *t*-test values related to share of fixed assets (net) as percentage of permanent (long-term) capital employed (FAPC) of sample companies, 2001-2011

financing pattern of having long-term funds, as a primary source of financing fixed assets, seems to have facilitated (to a marked extent) to withstand better the adversities of post-recession period (2009-2011). Similar soundness in financing patterns was observed in the study of private enterprises of India.

It is important to emphasize that the long-term capital is also preferred/desired to meet core/permanent working capital needs of an enterprise. The FAPC ratio of the sample companies indicates that nearly half of the long-term funds are available to finance working capital needs of these enterprises, *prima facie*, an indicator of sample firms banking, to a marked extent, on long-term sources to finance their working capital needs (Table II). This aspect has been examined (further) by determining percentage share of total long-term needs (fixed assets, net plus net working capital, i.e. current assets minus current operating liabilities) to long-term capital employed. The relevant data contained in Table III, Figures 5 and 6 indicate that the sample companies are using long-term sources of finance to cater their aggregate long-term needs (consisting of financing long-term assets and net working capital). In fact, the ratio of long-term requirements to long-term sources of finance is much lower than 100 per cent through the period of the study, indicative of surplus funds available. The standard deviations figures are small and hence do not merit consideration.

Though this finding is in tune with sound tenets of financial management in that fixed assets requirements as well as permanent working capital (being long term in nature) have been financed from long-term sources, at the same time, the matter of concern is that the sample companies seem to be carrying surplus funds which could be used for long-term investments or refund of long-term borrowings. This aspect merits consideration at the top management level of the sample companies.

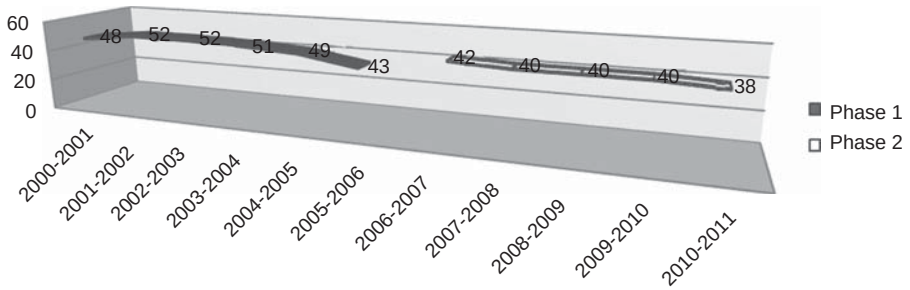

Figure 3.
Mean values related to share of fixed assets (net) as percentage of permanent (long-term) capital employed (FAPC) of sample companies, Phase 1 vs Phase 2

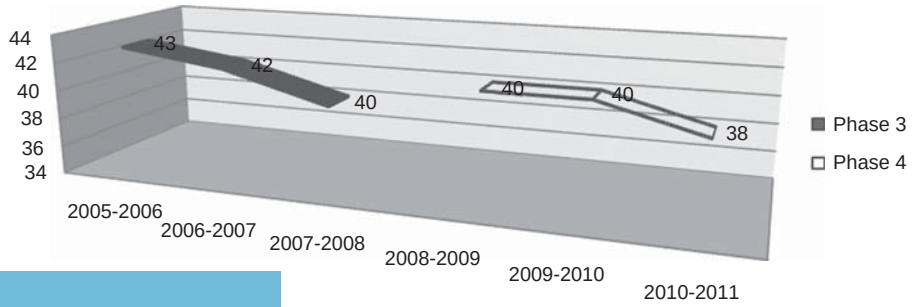

Figure 4.
Mean values related to share of fixed assets (net) as percentage of permanent (long-term) capital employed (FAPC) of sample companies, Phase 3 vs Phase 4

Year	Number	Mean	SD	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2000-2001	123	76.23				81.49	54.52	98.77
2001-2002	139	52.00				52.07	51.61	84.16
2002-2003	130	77.39				82.56	61.14	99.45
2003-2004	129	76.39				80.22	55.74	97.67
2004-2005	133	73.44				77.70	50.17	95.55
2005-2006	131	67.00				70.76	43.60	89.06
2006-2007	136	68.24				70.70	44.83	92.38
2007-2008	146	70.12				71.49	46.40	93.19
2008-2009	146	69.49				72.34	46.17	91.21
2009-2010	141	63.38				61.43	38.60	86.25
2010-2011	93	68.54				69.12	50.36	88.89
Mean 2000-2001 to 2010-2011	132	69.29	7.23	−1.32	2.55	71.81	49.37	92.41
Mean 2000-2001 to 2005-2006 (pre-clause 49 Phase 1)	131	70.41	9.78	−1.76	2.92	74.13	52.80	94.11
Mean 2006-2007 to 2010-2011 (post-clause 49 Phase 2)	132	67.95	2.66	−1.80	3.54	69.02	45.27	91.38
Mean 2005-2006 to 2007-2008 (pre-recession Phase 3)	138	68.45	1.57	0.60	–	70.98	45.94	91.54
Mean 2008-2009 to 2010-2011 (post-recession Phase 4)	127	67.14	3.29	−1.57	–	67.63	45.04	88.78

Phase	*T* (paired sample *t*-test)	df	Significance (two-tailed)
Phase 1-Phase 2	−0.664	153	0.508
Phase 3-Phase 4	−0.641	159	0.523

Note: Figures are in percentages

Table III.
Mean, SD, skewness, kurtosis, median, quartile and paired *t*-test values related to share of fixed assets (net) plus net working capital as percentage of permanent (long-term) capital employed of sample companies, 2001-2011

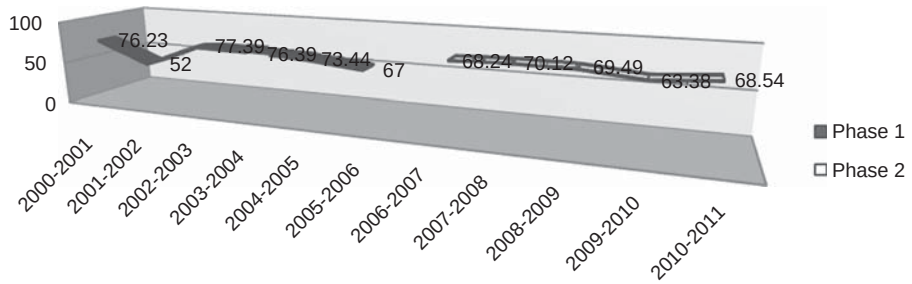

Figure 5.
Mean values related to share of fixed assets (net) plus net working capital as percentage of permanent (long-term) capital employed of sample companies, Phase 1 vs Phase 2

Origination and planning of capital budgeting proposals

From Table IV, it can be observed that the majority of the sample companies (72.41 per cent) have the origination of new investment proposals at central/head office level indicating control by the top management on such decisions. In nearly half (48.27 per cent) of the sample companies, new investment proposals originate at the highest level exclusively. More than one-fourth (27.58 per cent) of the sample companies indicate that the new investment proposals originate at divisional/regional office level as well. A revealing finding of our survey is an indication of participative style of management; evidenced by nearly one-third of the sample companies reporting that new investment

proposals originate at plant level (with nearly one-tenth companies stating this exclusively).

More than half of the responding companies (68.96 per cent) have been planning their capital budgets for the next five years; in contrast, less than one-fifth (17.24 per cent) of the sample companies are planning one year in advance. Further, it is satisfying to note that only a few companies use ad hoc approach (as and when opportunity takes place) to plan their long-term investments. Likewise, planning for capital projects in advance (ten years) is a rare phenomenon; the probable reason is that it is difficult to forecast revenues and costs for such a distant future in this highly turbulent business world.

Capital budgeting techniques

Previous researches show that though conceptually sound techniques (as per scholarly literature) may be accepted, they are not universally observed in management practice (Bennouna *et al.*, 2010).

It is gratifying to note (Table V) that all the respondent companies used both discounted and non-DCF techniques to evaluate capital expenditure. This is in sharp contrast to findings of the Bennouna *et al.* (2010) study of large Canadian firms, where, even in large firms, 17 per cent did not use DCF.

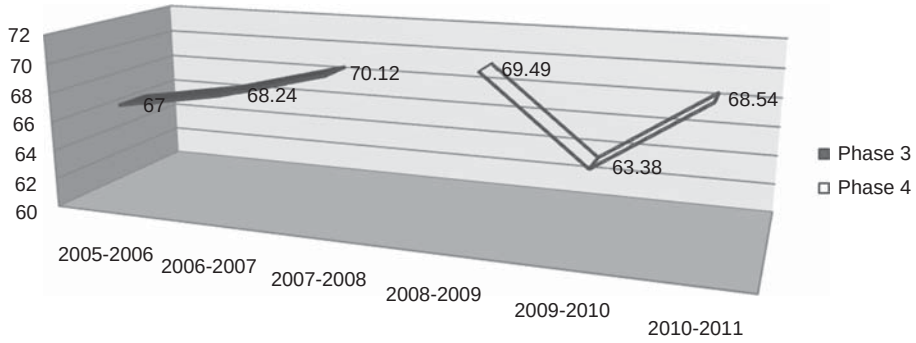

Figure 6.
Mean values related to share of fixed assets (net) plus net working capital as percentage of permanent (long-term) capital employed of sample companies, Phase 3 vs Phase 4

	(%)
Origination of new investment proposals	
At central/head office level	72.41 (48.27)
At plant level	31.03 (10.34)
At divisional/regional office level	27.58 (6.89)
At any other level	3.44 (3.44)
Planning horizon for capital expenditure	
For next five years	68.96 (62.06)
For next one year only	17.24 (6.89)
For next ten years	6.89 (6.89)
As and when the opportunity takes place	6.89 (3.44)
Any other	17.24 (6.89)

Table IV.
Origination and planning of new investment proposals for sample companies

Notes: Figures in brackets indicate that the new investment proposals have originated exclusively at the level stated. The same applies to other tables

The traditional non-discounted techniques, though used rigorously initially, are today mostly applied as a supplementary method in combination with the DCF techniques. Similar findings are observable in our survey. A sizable number of responding companies although continue to follow traditional methods, namely, payback period (64.28 per cent) and accounting rate of return (39.28 per cent), it is pertinent to note that the sample companies are using these methods in conjunction with the DCF techniques.

Another notable finding of the survey is that the conceptually sound method of NPV is followed only by one-half of the companies; IRR has been observed to be practiced most (more than three-fourths) by the respondent companies. Firms in Canada also prefer to use IRR (Bennouna *et al.*, 2010).

The payback period continues to be a popular method amongst the non-DCF techniques used in evaluating capital budgeting proposals due to its simple calculation and ease of understanding (Table VI).

Risk considerations

Almost all respondent companies use sensitivity analysis as an approach to incorporate project risk in investment decisions (96.15 per cent). In fact, 69.23 per cent companies use this method exclusively (Table VII).

Real options and abandonment options

In the context of capital budgeting decisions, opportunities to respond to changing circumstances and as a result influence the outcome of a project are called managerial strategic options; in practice, they are more popularly known as real options as they are associated with real assets. In operational terms, a project having negative NPV may

Capital expenditure evaluation technique	(%)
Companies using DCF as well as non-DCF techniques	*100.00*
Internal rate of return	78.57
Payback period	64.28
Net present value	50.00
Accounting rate of return on investment	39.28
Profitability index/present value index	21.42
Any other technique[a]	7.14

Note: [a]Specific responses stated "economic profit"

Table V.
Capital budgeting decision technique(s) used by sample companies in India

Reasons for using the payback period method	(%)
Easy to explain to top management	31.25 (12.50)
Simplicity leading to less time and cost involved	31.25 (18.75)
Shortage of liquid funds	12.50 (12.50)
Obsolescence due to technological developments	12.50 (12.50)
Any other[a]	50.00 (43.75)

Notes: [a]Includes "helps in optimal resource allocation", "suitable for small projects", "determines timely return on assets", "relates to period of investments getting returned", "useful as a tool for cash management" and "gives quick view of cash flows"

Table VI.
Reasons behind the usage of payback period method for the sample companies

turn out eventually worth accepting, keeping in mind the options such a project creates in terms of opportunities to expand in future.

Under real options, abandonment options assume equal significance in capital projects. In other words, the projects having abandonment value, in many cases, can lower the project's risk by limiting downside losses and enhancing its expected profitability (NPV).

It is heartening to note that half of the sample companies are using recent techniques of real options in making capital budgeting decisions (Table VIII). It is also revealing to note that all companies using the abandonment option are necessarily using the real option too in combination, while making their capital budgeting decisions. This is in sharp contrast to findings of the Bennouna *et al.* (2010) study of large Canadian firms, where, even in large firms, only 8 per cent use real options.

Investment pattern

An overwhelming majority of companies (86.24 per cent) focus on capacity build-up by investing in the existing line of business (Table IX). This is perhaps an indication of the growing markets for such companies encouraging them to increase production. Another encouraging aspect is the outlays on modernization/technology upgradation

Table VII.
Approaches to incorporate project risk in investment decision process of sample companies

Approaches to incorporate project risk	(%)
Sensitivity analysis	96.15 (69.23)
Shorter payback period for risky projects	11.53 (3.84)
Higher cut-off rate for risky projects	11.53 (–)
Any other[a]	7.69 (–)

Notes: (–), not even one company uses the technique exclusively; [a]"higher hurdle rate" and "scenario analysis"

Table VIII.
Utilization of techniques of real options and abandonment options by the sample companies

Utilization of techniques	(%)
Real options	50.00 (35.00)
Abandonment options	17.64

Note: All companies that use the abandonment option use the real option too

Table IX.
Constituents of capital expenditure outlays for sample companies

Constituents of capital expenditure outlays	(%)
New investment in existing line of business (capacity build-up)	86.24 (31.03)
Technology upgradation (modernization)	44.82 (–)
New investment in other areas (diversification)	27.58 (6.89)
Replacement of machinery	20.68 (–)
Any other[a]	10.34 (–)

Note: [a]Includes "mergers and acquisitions" and "joint ventures in allied areas (backward, forward and integral)"

as the second most important constituent for capital expenditure outlay (44.82 per cent). "New investment in other areas (diversification)" is the third important constituent for capital expenditure outlays, hinting towards aggressive expansion into other areas by more than one-fourth (27.58 per cent) of the sample companies.

Capital rationing

It is encouraging to note that capital rationing does not seem to be a relevant factor for the sample companies as vast majorities of them (78.57 per cent) deny that they forego profitable investment opportunities due to paucity of funds (Table X). The finding is also in tune with the comfortable financial position of long-term funds in an earlier section.

Reasons for failure in capital budgeting decisions

The peculiarities of the market in terms of competition and sales and high fixed costs appear to be the important factors leading to failures of capital budgeting decisions amongst the sample companies. It is revealing to note that higher cost of capital and inefficiency in technology usage are not important factors (Table XI).

Managerial implications of research

The findings of this research, decades of teaching experience of the authors and the literature reviewed have been utilized to evaluate current practices and suggest possible improvements in decision making (through a normative framework as the Appendix). Also, the findings indicate a high degree of sophistication in the capital budgeting practices of the sample Indian companies. This implies that the Indian

Table X.
Sample companies foregoing expected profitable investment opportunity due to paucity of financial resources

Foregoing investment opportunities	(%)
No	78.57
Yes	21.42

Table XI.
Reasons for failure of capital budgeting decisions (if any), with rankings in order of impact (1 for highest, 7 for lowest) for sample companies

Reasons for failure of capital budgeting decisions	1	2	3	4	5	6	7
Very high fixed cost component	45.45 (9.09)	27.27	9.09	9.09	0.00	9.09	0.00
Increased competition in the chosen area impacting sales	45.45 (9.09)	9.09	0.00	18.18	9.09	18.18	0.00
Decrease in cash inflows due to decrease in expected sales	40.00 (20.00)	20.00	20.00	10.00	10.00	0.00	0.00
Unexpected increase in cost of production	33.33 (–)	11.11	33.33	11.11	11.11	0.00	0.00
Higher cost of capital	25.00 (12.50)	25.00	12.50	12.50	12.50	12.50	0.00
Inefficiencies in terms of technology usage and revamp	12.50 (12.50)	0.00	0.00	12.50	37.50	37.50	0.00
Any other[a]	67.67 (67.67)	0.00	0.00	0.00	0.00	0.00	33.00

Note: [a]Includes "market down cycle" and "changes in business scenario" ranked number 1

corporate appears to be capable of meeting the global challenges with respect to investment levels and financing.

Conclusion

Capital budgeting practices in India appear to have improved over the past decade or so with an increasing number of companies using more sophisticated DCF techniques. To assess risk, sensitivity analysis is perceived to be the most important technique.

It is a matter of gratification to note than all the respondent sample companies used DCF techniques in conjunction with non-DCF techniques. There was a strong preference for DCF with 50 per cent using NPV and 78.57 per cent using IRR. The results also indicated that firms still relied on simple capital budgeting techniques such as the payback period and the ARR. Despite the recommendations of the financial literature on using NPV as the primary technique, this research too found that respondent firms indicated a preference for IRR compared to NPV.

Consistent with financial theory, the survey reveals that the sample companies are risk-averse. Sensitivity analysis (96.15 per cent) is the most widely used tool.

Another notable finding is the emergence and usage of new techniques of real options (50 per cent) and abandonment options (17.64 per cent), an encouraging indication of growing professionalism amongst the sample companies. The results are in sharp contrast with Graham and Harvey (2001) and Block (2005) who found a low usage of real options (11.40 and 14.30 per cent, respectively).

It is evident from statistics related to investments in gross fixed assets of the sample companies that massive capital expenditure has been made by them during the period of the study.

As far as the financing pattern of long-term investment projects is concerned, the sample companies seem to be following sound tenets of financial management in this regard in that their fixed assets requirements and net working capital (current assets minus operating current liabilities) requirements through long-term sources.

Very high fixed-cost components of capital projects and the irregularities in prediction of future cash flows due to decrease in sales and increased competition, seem to be the major factors leading to failure of capital budgeting decisions for the sample companies. This is perhaps a reflection of the growing challenges of a volatile global marketplace.

Above all, the global recession has not impacted the sample companies (representing vital segment of Indian economy) significantly. The survey also reveals that paucity of funds is not a major hurdle for exploring profitable capital investment projects for a large majority of the sample companies.

Notes

1. www.bseindia.com/about/abindices/bse200.asp, accessed 1 April 2010.
2. www.sebi.org/, accessed 17 November 2011.
3. www.unctad.org/en/docs/webdiaeia20095_en.pdf, accessed 17 November 2011.
4. http://rbidocs.rbi.org.in/rdocs/Speeches/PDFs/87784.pdf, accessed 17 November 2011.

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Appendix. Normative framework

Capital budgeting evaluation techniques

NPV is the best method as it is consistent with the objective of maximizing shareholders' wealth and it has a uniform reinvestment rate which can be applied consistently to all capital projects. Literature as well as present survey still indicates wider acceptance of IRR (Brigham and Ehrhardt, 2002; Bennouna *et al.*, 2010).

Misinterpretation and misapplication of cash flow estimations

Aspects commonly misapplied are determination of incremental sales revenue and incremental depreciation in replacement projects, deducting an allocation of existing fixed overhead costs, not deducting income tax, treatment of interest expense as well as other financial costs and ignoring inflation (Bierman, 1993; Brigham and Ehrhardt, 2002).

Discount rate

Firms are expected to use the weighted average cost of funds from various sources, including debt, preferred stock and common equity (Brigham and Ehrhardt, 2002). The weights used in calculating the cost of capital should preferably be based on the firm's capital structure target or market values, rather than book values. Also, using a single WACC for all investment proposals is not advisable (Ross *et al.*, 2005).

Risk analysis methods

Sophisticated methods that should be employed consist of probabilistic risk analysis such as sensitivity analysis, decision-tree analysis and Monte-Carlo simulation.

Emerging approaches like real options

Conventional DCF analysis should be complemented by real options analysis in order to determine the true NPV (Block, 2005; Brounen *et al.*, 2004; Graham and Harvey, 2001; Jog and Srivastava, 1995).

Administrative procedures

Preferably, there should be a capital investment manual (Pike, 1986), full-time capital budgeting staff (Pike, 1986), use of standard model for deriving the NPV or IRR (e.g. a MS Excel model), supportive information systems and post-investment audits (Pike, 1996).

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