Capital Budgeting in Nepal and the US

Jason Lin, Susan Pradhan and Paul Fellows

Abstract

Capital budgeting is one of the most significant topics in corporate finance. Companies use capital budgeting to make investment decisions that add to the firm's value. It is important that they make the right investments to define strategic direction and sustain both product market and capital market flexibility. Hence it is imperative that they use the right capital budgeting technique ("CBT"). CBTs have evolved over time and most companies in the US now use techniques that coincide with the recommendations of the literature, mainly discounted cash flow techniques ("DCF"). Although DCF techniques might be considered the preferred approach in principle, we will see that it is not always so in practice. In this article we study CBTs used in Nepal and find that they differ from the preferred approaches.

I. Introduction

Previous research has indicated that Nepalese companies have been known to use a higher percentage of non-DCF techniques. However, with a growing economy and a booming IT industry, companies in Nepal may have progressed and now use more DCF techniques when making capital budgeting decisions. If they have done so, what percentages of these progressive companies use DCF techniques? The answer to this question is significant because it gives us current information about the way companies make investment decisions. Companies may be more likely to use specific techniques depending on various characteristics. For example bigger companies may be more likely to use DCF or other sophisticated techniques than others because they may have more resources at their disposal. This paper investigates whether companies in Nepal are moving towards using more sophisticated CBTs.

The paper is divided into four main sections: a literature review, a description of the methodology and data, a discussion of the results and a brief conclusion.

II. Literature Review

Recent findings in the fields of finance and accounting have suggested that business entities in the US are moving towards more sophisticated forms of capital budgeting including DCF techniques (Oblak and Helm, 1980). But how do businesses in a developing economy like Nepal's compare to businesses in the US? According to a survey of Nepalese businesses conducted in 2006, just 41 percent of the respondents used capital budgeting techniques for all their projects while the rest implemented CBTs selectively depending on the project (Poudel, 2006).

Capital budgeting has been defined as the identification, evaluation and selection of the long term (fixed) assets that will increase shareholder's value (Du Toit, Newland & Oast, 1997). The methods used by companies are usually divided into two categories (Hakka, Gordon

Jason Lin, Ph.D., is Professor of Finance at The School of Business, Truman State University, Kirksville, MO 63501, and can be contacted at jlin@truman.edu. Susan Pradhan, is a staff accountant at Pinnacle Technical Resources, 1230 River Bend Dr., Dallas TX 75247. Paul Fellows, Ph.D., is Associate Professor of Business at Truman State and can be contacted at pfellows@truman.edu.

and Pinches, 1985).The categories are non-DCF techniques, which the authors designate as "naïve" techniques, and DCF techniques which use risk factors and cash flows, as "sophisticated" techniques (Hakka, et al, 1985). Divided between these two categories are the individual methods that companies utilize. For example, in the article "Capital Budgeting Practices in Corporate Canada", the most common of these methods cited by the authors (Jog and Srivastava, 1995) were:

- Payback Period ("PBK")
- Internal Rate of Return ("IRR")
- Average Accounting Return ("AAR")
- Net Present Value ("NPV")

It should not be assumed that the above mentioned methods are the only CBTs. In the book *Fundamentals of Corporate Finance* other methods such as discounted payback period, the profitability index and the modified IRR are also included under CBTs (Ross, Westerfield and Jordan, 2008). Among the DCF techniques used by companies, there seems to be a hierarchy of preferred methods. Studies show that managers seemed to prefer IRR to NPV because of the simplicity of having to look at a percentage and make comparisons (Evan and Forbes, 1993).

There is really no definite answer as to which technique is the best technique. Literature suggests "sophisticated" methods as being better because they take into account risk and cash flows as opposed to non-DCF methods (Ross, et al., 2008). However, many companies still incorporate non-DCF techniques.

In the article, "Capital Budgeting Methods Used by Multinational Companies", a higher percentage of multinational corporations ("MNCs") were found to be using DCF. However, this was not always the case. Other research has indicated that corporations have preferred non-discounted techniques in the past, implying a recent shift made towards DCF techniques (Ryan & Ryan, 2002). In a survey conducted by the National Association of Accountants in 1988, only 65 percent of the Fortune 500 used DCF analysis (as quoted in Dulman, 1989). In fact, the trend to use DCF techniques was first pioneered by a railroad engineer to evaluate the profitability of various projects in the late nineteenth century (Dulman, 1989). Furthermore, Dulman states that the prominence of discounted cash flow analysis started vigorously around the 1980s (Dulman, 1989). This illustrates an inclination towards the preferences of literature discussed earlier.

However, the advances made in the Western world should not be generalized to include other parts of the world. This important fact is highlighted in Poudel's research which concluded that outdated techniques in the US were still being employed by Nepalese companies (Poudel, 2006). In fact, according to Poudel's research, only 43 percent of major commercial banks, 36.4 percent of finance and insurance companies, 40 percent of major manufacturing companies and 18 percent of other companies used CBT for certain investments showing that CBTs were used selectively and not often (Poudel, 2006). Overall, only 41 percent of the respondents in the author's survey used capital budgeting for all investment decisions and the

remaining 59 percent used it for only certain types of investments (Ramji, 2006). This is contrary to the trend in the United States. For example, 99.5 percent of Fortune 1000 companies surveyed used CBT (Ryan and Ryan, 2002).

Along with surveying what CBT were being used by American companies, surveys also investigated how the discount rate was set. In a survey carried out in the "Survey and Analysis of Capital Budgeting Methods", 46 percent of the respondents used WACC and the rest used a variety of methods which included cost of debt and past experience (Schall, Sundem, and Geijsbeek, 1978). Similarly, among Nepalese companies, 76 percent of the companies surveyed used WACC to set the discount rate (Poudel, 2006).

However, the question is "what drives companies to choose the method that they use?" What factors could be involved in choosing the technique? The simple fact that more resources could mean more complicated techniques makes us wonder if size of the company could play a huge part in using a certain technique. Accordingly, Schall, et. al. confirms that size could in fact be a factor that affects the decisions of the firm. Along the same lines, size of the capital budget was also considered to be a significant determinant in choosing a CBT (Ryan and Ryan, 2002).

III. Methodology and Data

We form our model based on the assumption that companies in Nepal are moving towards DCF and that the chances of the company using DCF techniques could be dependant on the size of the capital expenditures, which is measured by the total assets of the company and the age of the company. Our model is

$$\mathbf{Y = \beta_O + \beta_1 X_1 + \beta_2 X_2 + e}$$

Where Y = 1, if DCF is used and Y= 0 if a non-DCF technique is used

X_1 = Size of the company

X_2 = Age of the company

e is an error term in our regression, and

β_o, β_1 and β_2 are regression coefficients.

Based on this model, we form our hypotheses:

H0: $\beta_1, \beta_2 = 0$

H1: $\beta_1, \beta_2 \neq 0$ $\alpha = 0.5$

A sample of 52 Nepalese firms was selected. CFOs of these companies were asked to fill out a questionnaire on the capital budgeting techniques that their companies implement, the required investment level in order to employ capital budgeting, their financial background, risk, and financial objectives of using capital budgeting methods. Questionnaires included open ended and close ended questions, with the majority being multiple choice questions where more than one answer could be selected. The survey is based on the previous research done by Poudel (2006) on Nepalese companies. All of these companies have been in existence for more than a year. The stability and profitability could be a bias towards the results and may not reflect the trend of other companies.

Some of the biases that we can expect in surveys are those Sundem and Schall (1978)

label response bias in their sample. The bias refers to the expectation that companies using sophisticated CBTs would be more willing to fill out the survey than firms that do not use them (Sundem and Schall, 1978). The companies selected for the survey were spread among the banking and finance industry (forty-four companies), manufacturing industry (seven companies) and service sector (one hotel company). Although industry bias could exist, the ultimate goal of this project is to investigate the trend of use of CBT among all companies in Nepal.

Fifty-two surveys were distributed out of which forty-eight responded resulting in a response rate of 92.3 percent. Because the response rate is high in this survey, we can expect there to be less response bias than Sundem et.al (1978) discussed. Since these surveys were completed by an individual from each company, a respondent's view may not be reflect the views of other members of the company creating another possible bias (Ryan and Ryan, 2002).

One other problem or limitation of this study involves the concealment or unavailability of data. These cases usually involved numerical data. For these case secondary sources had to be utilized.

IV. Empirical Results

A. Descriptive Statistics

Table I below shows the percentage of Nepalese companies that use some form of capital budgeting for various investment levels. From the 48 companies, only one company reported using CBTs for all their projects and one company reported never using CBTs. Additionaly, 46.8 percent answered that they used formal capital budgeting for projects starting at NRs 1 million to NRs 10 million, 29.8 percent used CBTs for projects from NRs 10 million onwards, 10.64% started their analysis from 50 million and only 8.33% used CBT only for projects greater than a 100 million. (Note: Nepalese Rupees (NRs. / Rs.) is the currency of Nepal.) These percentages show that not all companies use formal CBT for all projects that they undertake.

Table I: Percentage of Companies Start Using CBT at Various Investment Levels

Investment (NRs.)	% Usage
All	2.13%
1 mil. To 10 mil.	46.81%
10 mil. To 50 mil.	29.79%
50 mil. To 100 mil.	10.64%
Greater than a 100 mil.	8.51%
Never	2.13%

These results are similar to the results of Sundem, et.al. In their research, 41 percent of the American companies surveyed used CBT for all their investments, 39 percent for certain types and 20 percent were using them for investments over a $100,000. *(*Sundem, et.al., 1978*)* A more recent study conducted by Ryan and Ryan (2002) found 48.5 percent of the companies that they surveyed required a formal analysis for investments below $100,000 and 50 percent using

them for above $100,000 which indicates slightly higher percentages than Sundem's results.

Depending on where they needed a formal analysis, the respondents were asked to mark the most preferred CBT. Surprisingly, the results were evenly distributed and not skewed considering the fact that NPV and IRR are the most preferred methods in literature. From Table II below we can see that out of 48 responses, 16.67% chose AAR. 20.83% chose IRR, 16.67% chose Payback period, 25% chose NPV, 14.58% chose a combination of CBTs and 6.25% did not respond to the question.

Table II: Percentage of Companies Using Various CBT

CBT	Percent
ARR	16.67%
IRR	20.83%
Payback	16.67%
NPV	25.00%
Combination	14.58%
N/A	6.25%

It is surprising to see that approximately 17% chose ARR which does not use the discounted cash flow approach and is usually less preferred by literature. Jog and Srivastava (1995) conducted research on "Capital Budgeting Practices in Corporate Canada" and noted that ARR was also one of the most highly used non-DCF CBT. However, in Poudel's results for Nepalese companies, NPV was most preferred, followed by the payback period and internal rate of return in the third position. ARR and profitability index techniques were ranked lower.

Overall, we can see in Table II that only one-fourth of the companies used NPV. This may be the largest category in our sample, but when compared to Ryan and Ryan (2002) where 85.1% of the respondents frequently used NPV, the percentage of Nepalese companies that use NPV is still very low. Also, when asked about how the cash flows were estimated for the DCF methods, 27.08% replied "Subjective", 20.83% used an expert opinion and 22.92% used quantitative methods to come up with the cash flows. Similarly, 29.17% chose WACC to estimate their discount rate, while 17% used the cost of funds, 15% used management defined rates and historical rates of the company, and the rest chose industry specific rates.

In order to understand the motives for the specific capital budgeting methods used, respondents were asked to state their reason for the techniques selected. Companies that selected payback and ARR stated simplicity as being the major reason; whereas companies that selected NPV stated that NPV was scientifically sound and accurate. IRR, on the other hand, was used because of the simplicity of "looking" at just a percentage. Importantly, the results in Table II are along the same lines as Poudel's research wherein he stated that a significant number of companies in Nepal were using non-DCF techniques. We can see that not a lot has changed since 2006 (Ramji, 2006).

Table III: Correlation of CBT Used Between Companies Younger and Older than 15 Years

CBT	Age>15	Age=<15
AAR	23.08%	8.33%
IRR	19.23%	20.83%
PBK	11.54%	20.83%
NPV	26.92%	20.83%
ARR & IRR	3.85%	-
IRR & PBK	3.85%	-
IRR & PBK & NPV	3.85%	8.33%
IRR & NPV	3.85%	4.17%
N/A	3.85%	16.67%
Correlation	-0.07408	

In order to obtain a better idea of the variation in CBT used by companies in Nepal, a simple correlation is determined between different groups of companies. Table III shows the CBT used by companies that are below 15 years of age and above 15 years and indicates that the age of a company and the CBT they use are minimally related. Thus, we conclude that older companies and newer companies are almost equally likely to use NPV and AAR.

A similar analysis for banks and non-banks is shown in Table IV. Based on this grouping the correlation is again close to zero. This indicates that the choice of techniques used is not correlated with the industry grouping involved.

Table IV: Correlation of CBT Used Between Banks and Non-Banks

CBT	Banks	Non-Banks
ARR	20.83%	12.50%
IRR	12.50%	29.17%
PBK	29.17%	4.17%
NPV	20.83%	29.17%
ARR & IRR	4.17%	4.17%
IRR & PBK	-	4.17%
IRR & PBK & NPV	8.33%	8.33%
N/A	4.17%	8.33%
Correlation	-0.150931079	

When companies make capital budgeting decisions, there are quantitative as well as qualitative factors that need to be considered. Quantitative factors would include the IRR and NPV of a particular investment. However, there are other qualitative factors that Nepalese companies may take into account. The survey asked respondents to state the qualitative factors that were significant to them. Table V shows the results:

Table V: Qualitative Factors that affect CBT Used

Factor	Percentage
Image	11.11%
Management Goal	42.22%
Employee Morale	4.44%
Employee Safety	4.44%
Legal Issues	4.44%
Environmental Safety	4.44%
Others	2.22%
Combination	27.00%

We can see that management's goals are one of the leading qualitative factors considered to be significant in capital budgeting and that image is also an important factor.

B. Regression Analysis

In order to do a regression analysis, we use the age of the company as one of the independent variables and the size of the firm as another independent variable. The natural log of total assets was used to measure the size of the company. Our dependant variable is qualitative and has been assigned a 1 if a company uses any kind of DCF and a 0 if it uses a non-DCF method. A company that uses any form of DCF method along with a non-DCF method was assigned a 1 since it does use a DCF method. As our dependant variable is qualitative, a PROBIT regression was conducted to get the probability for a company to use DCF and non-DCF techniques under various values of total assets and age of the companies. Although, the response rate was almost 100 percent, 36 percent of the companies were hesitant to indicate quantitative data about their respective companies. The results of the PROBIT regression are shown below:

Variable Name	Estimated Coefficient	Standard Error	T-Ratio
X_1	0.18507	0.21122	0.87622
X_2	-0.20360E-01	0.29062E-01	-0.70057
Constant	-2.1744	3.7821	-0.57491

X_1 refers to the natural log of total assets and X_2 refers to the age of the company. The natural log was used in order to avoid having a skewed data set and to enable easier comparison. Because the PROBIT model is based on the probability density function, we can compute the probability a company will use DCF under various values of the independent variables. We assume that:

$\hat{y} = 1, p>0.5$

$\hat{y} = 0, p=<0.5$

A hypotheses test was carried out on the entire model and also to test the significance of the coefficients.

Based on the probability computed and the significance test, we can conclude that a unit change in the company's assets will be negligible to a company's decision to use a different

method from the current one. One explanation for this result is that the size of a company has little effect on the CBT that a company uses. This is realistic because most companies use DCF techniques regardless of the size of the company. The most important factor to be considered when choosing a method should be the accuracy of the method and its ability to bring about a profitable investment decision.

Assuming the total assets of the company remained constant, if the age of the company increased by 1 year, the results of the PROBIT regression imply the probability that the company would use DCF methods would be .3685, and there would not be a significant change in a company's decision to use a different method.

Our coefficients are insignificant at $\alpha = .05$ level; therefore we conclude that age and size of a company are not variables that determine a company's decision to use DCF.

V. Conclusion

Capital budgeting in Nepal is in fact different from the United States. US companies prefer DCF techniques to other techniques as shown by the recent research done by Ryan and Ryan (2002) and bigger companies in the US have moved on to more complicated techniques including computer simulations. Among the CBT, the most preferred among companies in Nepal were NPV, IRR followed by AAR and payback. The percentage of companies using AAR was high which does not correspond to recommendations in the literature.

Regarding the methods that the companies choose, age and size (total assets of the company) were assumed to affect a company's choice of CBT. However, our regression results indicate that the age of the company had little or no influence on a company's decision to choose a certain technique as our coefficient was close to zero. Similarly, size was also assumed to have an effect on a company's decision because bigger companies tend to use more sophisticated methods and are more likely to exhibit that in the questionnaire. However, size was not a strong variable affecting a company's decision. As mentioned previously, the results are consistent with the literature which advocates DCF as a more accurate and detailed method of making an investment decision and also indicates many companies are willing to utilize DCF in order to make an accurate decision.

Besides age and size, there could be other qualitative and quantitative variables affecting a company's decision. However, measuring qualitative variables like managers' attitudes could be a challenge. In countries like Nepal there may be other factors, such as the availability of resources and other restrictions, affecting a company's ability to make decisions; these factors may act as constraints on a company's interest in investing. These restrictions and qualitative factors can be an excellent topic for future research that would supplement this project to help us better understand CBTs used in Nepal.

References:

Du Toit, G. S., E. W. Mewland & E. J. Oast (1997), Capital Investment decisions, Pretoria: Unisa Press.
Dulman, Scott. The Development of Discounted Cash Flow Techniques in U.S Industry. *The Business History Review* 63 (No.3, Fall 1989), 555–587. Retrieved from JSTORE database (31116040).
Evans, Dorla A. and Shawn M. Forbes.(1993) "Decision Making and Display Methods:The Case of Prescription and Practice in Capital Budgeting," *The Engineering Economist* 39 (No. 1, Fall), 87-92.
Haka, Susan F., Gordon, Lawrence A., and Pinches, Gordon A.(2000). Sophisticated Capital Budgeting Techniques and Firm Performances. *The Accounting Review*, *60(4), 651-669*. Retrieved from JSTORE database (247460).
Hill, R. Carter, Griffiths, William E. and Judge, George G. (Eds.). 2000. *Undergraduate Econometrics*. John Wiley and Sons, Inc.
Jog, Vijay M.; and Srivastava, Ashwani K. (1999).Capital Budgeting Practices in Corporate Canada. Financial Practice and Education, 5(2), 37 – 47.
Klammer, Thomas P.(1972).Empirical Evidence on the Application of Sophisticated Capital Budgeting Techniques. *Journal of Business, (1972) 45(2), 387-397*. Retrieved from JSTORE database (2351494).
Oblak, David J. and Helm Jr., Roy J. (1980). Survey and Analysis of Capital Budgeting Methods Used by Multinationals. *Financial Management, 9(4), 37-41*. Retrieved from JSTORE database (3664917).
Pike, Richard H. (1986). The Design of Capital Budgeting Processes and the Corporate Context. Managerial and Decision Economics, 7(3), (187-195). Retrieved from JSTORE database (2487567).
Poudel, Ramji. (2006) Capital Budgeting Practices in Nepal,(*M.Phil Program, Tribhuvan University, 2006)*.
Pradhan, R. S. and R. Adhikari. (1996) Capital Budgeting Practices in Nepal: A Survey. (24-35).
Pradhan, R. S. and Ranjana Adhikari. (1998) A Survey of Capital Budgeting Practices in Nepal. Management Dynamics, 8(1) (*Kathmandu: Shanker Dev Campus, Tribhuvan University*).(24-35).
Ross, Stephen A., Westerfield, Randolph W. and Jordan, Bradford D. (Eds.). 2006. *Fundamentals of Corporate Finance*. McGraw-Hill Irwin.
Ryan, Patricia A. and Ryan, Glenn P. (2002). Capital Budgeting Practices of the Fortune 1000: How Have Things Changed? *Journal of Business and Management, 8(4)*. Retrieved from JSTORE.
Schall, Lawrence D. and Sundem, Gary L.(1980). Capital Budgeting Methods and Risk: A Further Analysis. *Financial Management, 9(1), 7-11*. Retrieved from JSTORE database (3665304).
Schall, Lawrence D. and Sundem, Gary L., Geijsbeek Jr., William R.(1978). Capital Budgeting Methods and Risk. *The Journal of Finance 33(1), 281-287*. Retrieved from JSTORE database (2326365).