

# Capital Budgeting Practices of Chinese Firms

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## ABSTRACT

*The capital budgeting practices of U.S. firms have been studied extensively. Surveys show that U.S. executives have shifted away from non-discounted cash flow techniques to the use of the theoretically more correct discounted cash flow techniques. A small number of studies have investigated capital budgeting practices in the Asia-Pacific region. In contrast to the findings for U.S. companies, it appears that firms in these countries consider discounted and non-discounted cash flow techniques to be equally important in evaluating and ranking projects. This paper extends these studies by surveying executives of Chinese firms regarding their firms' capital budgeting practices.*

## INTRODUCTION

Effective investment decisions are crucial to firm survival and success. In general, these decisions involve effective acquisition, maintenance, and divestment of real assets. In recent years, many sophisticated capital budgeting techniques have been proposed to help managers in this task. Many times, however, there is reluctance on the part of management to employ the latest tools. This may be because the techniques at first appear too esoteric, impractical or cost prohibitive. It is probably also due to the fact that it seems to be human nature to continue to use the proven and time tested techniques and to avoid change.

Studies have surveyed firms in a number of countries concerning their use of capital budgeting techniques. In the U.S., survey results indicate that the sophistication of analytical techniques used by U.S. executives have increased over time. Specifically, they have shifted from non-discounted cash flow techniques (e.g. accounting rate of return (ARR) and payback) to the use of the theoretically more correct discounted cash flow techniques, net present value (NPV) and the internal rate of return (IRR). However, theoretically incorrect models such as payback continue to be widely used as back-up tools to time adjusted methods. Of the time-adjusted methods, the internal rate of Return technique seems to be the preferred method, while the profitability index (PI) is the least popular. (See for example Mao (1970), Klammer (1972), Fremgen (1973), Petty Scott and Bird (1975), Gitman and Forrester (1977), Schall, Sundem, and Geijsbeek (1978), Kim and Farragher(1981), Gitman and Maxwell (1987), Trahan and Gitman (1995), Bierman (1992), and Graham and Harvey (2001). Researchers have also found an increasing use of formal techniques to adjust for risk.

There have been some studies of capital budgeting practices in the Asia-Pacific region, covering firms in Hong Kong, Malaysia, Singapore, Philippines and Australia. In contrast to the findings for U.S. companies, firms in these countries seem to ascribe equal importance to discounted and non-discounted cash flow techniques in evaluating projects. Lee and Ip (1984) found that payback and NPV were the most frequently used methods in Hong Kong. Wong, Farragher and Leung (1987) found that payback was the most popular primary technique in Malaysia, whereas in Hong Kong payback and accounting (earnings) rate of return were equally most popular. Payback, IRR, and accounting rate of return were tied as the most popular methods in Singapore. Wong et al. (1987) also found that firms in these countries do not undertake much risk analysis. For those that did, the most popular risk assessment techniques were sensitivity analysis and scenario analysis. In an earlier survey of Malaysian firms, Han (1986) had found that the most popular methods for adjusting for risk were shortening the payback period and requiring higher rates of return for riskier projects. More recently, Kester and Chong (1998) and Kester et al. (1999) found that executives of Singaporean firms considered IRR and payback to be equally important for evaluating and ranking capital investment projects. Kester et al. also reported the same finding for firms in Australia, Hong Kong, Indonesia, Malaysia and the Philippines. To assess risk, scenario analysis and sensitivity analysis were considered to be the two most important techniques.

Taken as a whole, it seems that companies in the U.S. as well as the Asia-Pacific region most often evaluate projects using IRR, NPV and payback. This paper extends these previous studies by surveying executives of Chinese firms regarding their capital budgeting practices. Chinese firms are becoming dominant players in the global markets, and insights into their business practices can assist investors and others who deal with them (e.g., customers, suppliers and competitors) in assessing their relationships with Chinese firms.

The remainder of this paper is organized as follows. The next section explains the research method, including the instrument, sample, and data collection procedures. Then the results are presented in section III. The final section provides a summary of findings and conclusions.

## METHOD

### A. Instrument

The instrument used was an updated version of the one used in the Gitman and Forrester (1977) study, and also contained some questions from the instrument used by Graham and Harvey (2001). The survey instrument was then translated from the English to Chinese by a Chinese faculty member and back translated into English by one of the coauthors. Only minor changes were suggested by comparing the original and back-translated versions.

### B. Sample and Procedure

Given the difficult nature of collecting data in China, we enlisted the help of one of our former students who was able to get 54 firms, clients of a Chinese consulting firm, to agree to participate. The surveys were sent to these firms, and were all guaranteed anonymity. All 54 completed the survey and provided usable data on the questionnaire. These sample firms varied in total assets size from RMB100 million to over RMB1 billion, with numbers of full-time equivalent employees between 100 and 1000. Only a few had more than 1000 employees. The firms covered a variety of industries, with a larger percentage of firms in the electronics/communications, manufacturing, real estate and consumer products industries.

The respondents were most often high level managers in the financial area or controllers of the firm. These managers had been employed on average about seven years with the current company and had been in their current position an average of about four and one half years. These characteristics suggest that they would be sufficiently knowledgeable about their firms to provide informed answers.

## SURVEY RESULTS

### A. Capital Budgeting Statistics

We first asked the respondents to specify the size of their annual capital budgets, the minimum project size for requiring formal analysis, the percentages of formally analyzed projects that are accepted, and the cost of capital or hurdle rate used in their analysis. Over half of the firms had annual capital budgets of less than RMB10 million, and 26% ranged between RMB 50 million and RMB100 million. The rest had an annual budget of over RMB 100 million. The respondents also reported that a minimum cost of RMB100, 000 was required to justify formal analysis, and the majority (61%) indicated that less than fifty percent of the projects they analyzed were accepted. The question related to the hurdle rate elicited a wide range of responses with almost eighty percent used a cost of capital or cutoff rate of return between nine and seventeen percent.

### B. Capital Budgeting Process

The next set of questions focused on the nature of the capital budgeting process. In a review of selected studies of Fortune 500 firms, Scott and Petty (1984) found that project origination is a "bottom-up" process. Stanley and Block's (1984) survey of multinational firms arrived at the same conclusion. However, 70% of the respondents reported that the capital budgeting evaluation process was centralized. Furthermore, project definition and cash flow estimation was considered the "most difficult" aspect of the capital budgeting process. This was followed by project implementation and review.

To shed light on these aspects of Chinese firms' practices, we asked the respondents to specify (yes- no answer) if they use a central/formal review committee. As shown in Table 1 (Panel A), the responses suggest that project origination typically follows a "bottom-up" process and that typically a project is accepted only after an appropriate manager and/or a formal committee had approved it. The results also suggest that if the outlay is below a certain amount, only the manager's approval is needed. Above that threshold, the project goes to the committee for a formal review before it is accepted.

**Table 1: Capital Budgeting Process**

<b>Panel A: Requirements for Project Acceptance</b>	
Approval of a formal committee	66.7%
Approval by the appropriate responsible manager	63.0%
Depends on the magnitude of the outlay involved	59.3%
<b>Panel B: Division or Department Responsible for the Analysis</b>	
Finance	77.8%
Operations	13.0%
Planning	7.4%
Production	1.9%
Total	100.0%
<b>Panel C: Most Difficult Stage of the Capital Budgeting Process</b>	
Project definition and estimation of cash flows	51.9%
Financial analysis and project selection	29.6%
Project implementation	13.0%
Project review	5.6%
Total	100.0%
<b>Panel D: Most Critical Stage of the Capital Budgeting Process</b>	
Projected definition and estimation of cash flows	50.0%
Financial analysis and project selection	42.6%
Project implementation	7.4%
Project review	0
Total	100.0%

We also asked the respondents to specify which division or department is responsible for conducting capital budget analysis. The responses to this question (Table 1, Panel B) indicate that the finance department was usually charged with this responsibility. Finally, the last two questions in this section dealt with identifying which of the stages listed in Table 1, Panels C and D, are most difficult or critical. Over fifty percent of the firms felt that project definition and cash flow estimation was the most difficult and critical part of the capital budgeting process. These results are consistent with results reported for U.S. firms. (See for example, Stanley and Block (1984), Gitman and Maxwell (1987)).

### C. Capital Budgeting Techniques Used

One of the primary goals of this study is to determine which of the capital budgeting techniques are used by Chinese firms to evaluate capital budgets. These include the net present value, internal rate of return, modified internal rate of return, the profitability index, payback and the accounting rate of return. Previous capital budgeting surveys have generally either asked which techniques are considered primary and secondary techniques or whether or not a firm uses a particular capital budgeting technique (or how frequently it uses a technique). In this survey we asked both: What were considered primary and secondary techniques and how frequently the technique was used. Results concerning the preferred technique among the major competing capital budgeting methods are shown in Table 2.

**Table 2: Capital Budgeting Techniques – Primary and Secondary**

	Primary Percent	Secondary Percent
Net Present Value (NPV)	88.9	11.1
Internal Rate of Return (IRR)	40.7	57.4
Payback period	13.0	83.3

Discounted payback period	18.5	70.4
Profitability index	46.3	46.3
Accounting Rate of Return (or Book Rate of Return on Assets)	66.7	27.8
Modified Internal Rate of Return (IRR)	14.8	64.8

For the question concerning the primary and secondary methods, there were multiple answers (causing the sum not to equal 100%). Almost 89 % of the firms indicated NPV was their primary method. This was followed by approximately 67 % for the accounting rate of return, 46 % for the profitability index, and 41 % for IRR. This contrasts with U.S. firms where IRR seems to be the most popular technique (See for example, Gitman and Forrester (1977) and Gitman and Maxwell (1987)), though Gitman and Maxwell (1987) had found the use of NPV to be increasing at the time of their surveys. It also is worth noting that many Chinese firms had multiple primary methods. These results can be viewed as somewhat akin to the previous results reported by Wong, Farragher & Leung (1987), and Kester and Chong (1998) for Asia-Pacific firms where many methods were considered equally important. We find that approximately 83 % of firms used payback as the secondary technique. This was followed by discounted payback (70%), modified IRR (65 %) and IRR (57%).

The firms were also asked to score how often they used the different capital budgeting techniques on a scale of 0 to 4 with 0 meaning never and 4 meaning always. Results are presented in Table 3. A response of 3 or 4 was classified as always or almost always. As can be seen, NPV is always or almost always used by a vast majority of firms. This percentage is higher than the 75 % reported for U.S. and Canadian firms by Graham and Harvey (2001). Although many of the firms are using the other capital budgeting techniques, the percentages are not as large as found by Graham and Harvey for IRR (57 %) and payback (57 %). However, our percentages are higher than Graham & Harvey's percentages for ARR (20 %) and PI (12 %).

**Table 3: Capital Budgeting Techniques – Frequency of Use**

	% Always or Almost Always	Mean
Net Present Value (NPV)	92.6	3.74
Accounting Rate of Return (ARR) (or Book Rate of Return on Assets)	61.1	2.85
Profitability Index (PI)	48.2	2.39
Internal Rate of Return (IRR)	41.4	2.22
Payback Period	18.5	1.85
Discounted Payback Period	14.9	1.5
Modified Internal Rate of Return (MIRR)	3.8	1.00
Other	1.9	.13

#### **D. Risk and Uncertainty**

In this section of the survey, we asked questions concerning if and how risk was taken into account when evaluating projects. The first question dealt with whether projects in different risk classes are evaluated differently. Over fifty percent of the firms indicated they did specifically differentiate project risk by either grouping projects into risk classes or individually measuring project risk. The second question dealt with the method used in this regard. As can be seen in Table 4, more did so by risk-adjusting the cash flows of the project rather than adjusting the cost of capital. This contrasts with the Gitman and Maxwell (1987) survey where it was found that the highest percentage of U.S. firms adjusted the cost of capital. However in an earlier survey, Gitman and Mercurio (1982) had found that slightly more U.S. firms adjusted the cash flows. In our survey, one third of the firms risk-adjusted both the cash flows and cost of capital.

**Table 4: Method for Adjusting for Risk**

	Percent
Risk-adjust the cash flows of each project	37.0
Risk-adjust the cost of capital applied to each project	29.6
Risk-adjust both the cash flows and the cost of capital	33.3
Total	100.0

We also asked questions concerning how a project's risk was assessed. These results are shown in Table 5. The project's payback period is considered most important, followed closely by its size. In a similar survey of U.S. firms Gitman and Mercurio (1982) found that the size of the project was most important followed closely by the payback period.

**Table 5: Importance of Factors in Assessing Project Risk**

	Very Unimportant				Very Important	Weighted Average Response*
	1	2	3	4	5	
The dollar size of the project	1	0	20.4%	11.1%	68.5%	4.48
The project's payback period	0	0	5.6	22.2	72.2	4.66
The relationship between this project's returns and the returns of the company's other projects	1.9	9.3	29.6	33.3	5.9	2.72
The track record of the division presenting the project	18.5	31.5	29.6	13.0	7.4	2.60
The track record of the individual presenting the project	32.4	28.5	30.6	11.1	7.4	2.63

\* Weighted average response for each factor is calculated as the sum of the product of the response percentage and the importance value across all five importance values (i.e., 1, 2, 3, 4, 5). For example, the weighted average response for "Dollar size of project" is calculated as follows:  $[(0 \times 1) + (0 \times 2) + (.204 \times 3) + (.111 \times 4) + (.685 \times 5)] = 4.481$ .

In a related question concerning the use of sensitivity analysis or simulation, 63 % of the firms indicated that they always or almost always used sensitivity analysis to assess project risk and 50 % used simulation analysis.

#### D. Capital Rationing

Past survey results suggest that most U.S. companies operate under capital rationing at least part of the time. (Gitman and Forrester (1977, Petty, Scott, and Bird (1975)). Capital rationing occurs when a certain number of total dollars are available at each point, regardless of the suitable investments that might be discovered. This dollar amount is sometimes self-imposed by management and may be used for control purposes. They usually set an upper limit on the total amount of capital investment for a period, even if additional funds could be raised and investments with positive NPVs are being rejected. Other times, the dollar amount is imposed by capital markets. Lending institutions may place a limit upon the firms' borrowing capacity. This debt limit may also be set by the firm itself thereby limiting its financial flexibility. The alternative, of course, is to sell stock and usually firms are reluctant to do so because of fear of losing control.

We asked a series of questions to determine whether or not these companies operate under capital rationing conditions. We first asked the respondent to answer "yes" or "no" on whether their firm made a competitive allocation of a fixed budget to competing projects. About 80 % of the firms indicated "yes" suggesting that the majority of these firms engage in capital rationing. We next asked a question to determine how often this occurs. About 54 % of the firms indicated that 50 % or more of the time they had more acceptable projects than funds available to invest. Finally, we asked them what they considered their major cause of capital rationing. The results are presented in Table 6. About 52% of the respondents cited "Debt limit imposed by internal management" as the main cause, followed by "Debt limit imposed by management external to the organization" (20.4%) and "Debt limit imposed by an outside agreement" (14.8%), respectively. Consistent with prior survey results (e.g. Gitman and Forrester (1977)) capital rationing primarily results from some type of internal or external debt limitation.

**Table 6: Reason for Capital Rationing**

Debt limit imposed by <i>an outside agreement</i>	14.8 %
Debt limit imposed by <i>management external</i> to the organization	20.4
Debt limit imposed by <i>internal management</i>	51.9
Restrictive policy imposed on the payment of cash dividends	3.7

The need to maintain a target earnings per share or price-earnings ratio	9.3
Other	14.8
Total	100 %

## SUMMARY AND CONCLUSIONS

One of the issues facing managers is how to effectively acquire, maintain or divest real assets. A number of financial tools have been developed to assist financial managers in this task. Some are sophisticated and are considered theoretically correct, while others are not. Adopting and using the right technique in making investment decisions is essential to firm survival and success, and a number of authors have studied the adoption of these techniques by firms in the U.S. and in the Asia-Pacific region. This study has extended this body of knowledge by surveying Chinese financial managers regarding their firm's capital budgeting practices.

Our results are somewhat similar to what has been reported for U.S. firms and Asian-Pacific firms. Similar to U.S. firms, a large percentage of Chinese firms seem to have adopted DCF techniques for evaluating projects. However, a large number are also using the accounting rate of return method, which is a non-discounting technique. Unlike U.S. firms, IRR does not seem as popular. When asked which technique they considered to be their primary technique, NPV was the most popular, though it seems that many techniques are considered equally important as found in the previous studies for other Asian-Pacific countries. Similar to these studies, scenario or sensitivity analysis was primarily used to assess risk followed by simulation. Unlike the previous studies reporting that simulation was not widely used, a relatively large percentage of the firms in this study were using simulation.

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