

CAPITAL BUDGETING PROCESS OF HEALTHCARE FIRMS: A SURVEY OF SURVEYS

Abstract

How healthcare firms make capital budgeting decisions is an intriguing question principally because about 85% of these firms are not-for-profit operations. Several surveys have been performed over the last forty plus years to learn about capital budgeting practices of these firms. In this paper, we analyze and synthesize these surveys in a four-stage framework of the capital budgeting process—identification, development, selections, and post-audit. The major findings include: medical personnel play a dominant role in the process-----from initiation to acceptance of most projects; the selection is usually considered to be the most difficult stage; the payback period is the leading technique for ranking investment alternatives; and qualitative factors play an important role in capital budgeting decisions. Due to the business environment they operate in, for-profit firms behave more like not-for-profit firms in the healthcare industry than for-profit firms in non-healthcare industries.

CAPITAL BUDGETING PROCESS OF HEALTHCARE FIRMS: A SURVEY OF SURVEYS

I. INTRODUCTION

Unlike firms in most industries in which ownership almost always belongs to shareholders, only a small minority of healthcare firms in the United States are owned by for-profit investors (IO), with the overwhelming majority being owned by two types of non-profit entities--- private including churches (NFP) and government (GO). Figure 1 presents the hospital trends by ownership for U.S. Community Hospitals for Selected Years (1976-2012). It shows the hospital market is served by investor-owned, NFPs, and state and local government hospitals. NFPs dominate with 59% in term of number of hospitals, distantly followed by GOs with about 25% and the remaining hospitals are run on a for-profit basis (16%).

(Insert Figure 1 about here)

For-profit businesses have a clear objective which is to increase the monetary value of the organization for the owners. The interest of a NFP, however, is not linked to increasing its monetary value but to fulfilling its overall service mission. Consequently, a NFP might approve an action in which outflows are greater than predicted inflows from an investment as long as the action contributes to the mission of the organization. The expectation here is that losses from one project would be offset by another profitable project. Thus, the objective function of a NFP is far complex than for-profit hospitals (Cleverley and Felkner, 1982).

There are other differences that add to the complexity faced by NFPs when making financial decisions. NFPs cannot raise equity through issuing stocks or other forms of equity to the public and thus are limited to retained earnings from operations, income from investments, philanthropic contributions, government grants, and debt financing, while IOs can finance their investment opportunities with retained earnings, selling new stock to the public, and debt financing (Reiter, Wheeler and Smith (2008)).¹ Second, to protect their return on investments (in the form of dividends and/or capital gains), the shareholders of an IO demand a sound financial statement, in contrast to the owners of a NFP who do not receive dividends and look to the organization to manage surpluses to remain liquid and solvent. Third, unlike profit hospitals, not-for-profits are exempted from most revenue and property taxes since 1913.

Even when a hospital is investor-owned, it does not operate in the same environment as does a publicly-held corporation in a non-hospital industry. The latter gets to set its own competitive price and receives payments directly from the consumer who receives the service. In the case of the former, however, “the majority of payments for services made to healthcare providers are not made by patient---but rather by some third-party payer.Indeed, even the purchase of health insurance is dominated by employers rather than by the individuals who will receive the services” (Gapenski, 2006, page 4). Additionally, unlike their counterparts in other industries, an investor-owned hospital not only has to compete with other IOs but with NFPs and GOs as well. The environmental differences are expected to reflect in the way an IO in the hospital

¹ Reiter, Wheeler and Smith (2008) define donations or government grants as the secondary sources of equity.

industry makes financial decisions vis-à-vis a publicly-held firm in a non-hospital industry.

Several papers over the years have examined the capital budgeting practices of firms in the hospital industry. However, papers comparing practices between IOs, NFPs and GOs as well as between investors-owned firms in the hospital industry vis-à-vis those in non-hospital industries are few and far between. The purpose of our paper is to first present an overview of their findings and then isolate differences, if any, in the practices between IOs and NFPs on one hand and between an IO and a non-hospital corporation on the other. Based on the relevant literature, we also provide rationale for why some practices prevail and why they are more popular with one group than another.

The paper proceeds along the following lines. Section II presents an outline of four stages that generally constitute the capital budgeting process and delineates issues/questions that are relevant to each stage of the process. Section III examines survey results of the capital budgeting practices in each stage of the process. Section IV presents further analyses on the major differences in practices between for-profit hospitals versus not-for-profit hospitals and between healthcare firms and industrial firms. The concluding remarks are offered in section V.

II. CAPITAL BUDGETING PROCESS

The capital budgeting process usually involves four stages; 1) Identification, 2) development, 3) selection and implementation, and 4) post completion auditing. In the first stage of capital budgeting process, ideas for possible investment of company

assets are identified. In the second stage, the economically feasible ideas are developed into full-blown proposals. Best projects are selected and put into operation in the third stage, while implemented projects are reviewed for feedback in the fourth stage. To fully understand how a firm makes its investment decisions, one has to ask many questions pertaining to each stage. Below we provide an incomplete list of such questions.

II.1. STAGE ONE: IDENTIFICATION

Suggested questions for this stage include:

- 1) How are the project proposals initiated? Is the company always soliciting ideas or is it an “only-when-needed” process?
- 2) At what level are projects usually generated?
- 3) Is there a formal process for submitting ideas? If so, how does that process work?
- 4) Is there an incentive system for coming up with good project ideas?

II.2. STAGE TWO: DEVELOPMENT

It is appropriate to divide the questions relevant to this stage in to two subgroups---screening ideas and developing cost-benefit data.

II.2.1. Screening

- 1) Do all ideas develop into specific projects proposals, or alternatively, are the ideas screened before further development?
- 2) At what level are these ideas reviewed (or screened)?
- 3) What criteria are used in screening ideas? Are ideas screened based on their excellence, or only the projects preferred by divisional managers put

forward? Is it possible that only the ideas likely to be favored by the top managers are further developed by divisional managers? Is it also possible that the top management does not get to look at some good options because they are removed from the available set of alternative proposals? What role does the project size or organizational structure play in this regard?

II.2.2. Cost-benefit Data:

Questions relating to the estimation of project data include:

- 1) What types of data (for example accounting data versus cash flows) are used to perform cost-benefit analyses?
- 2) How are the data estimated? Are there common guidelines as to what should and what should not be included in the data?
- 3) Who is responsible for the data estimation?
- 4) Are there common sources of information which are used to estimate the project's cost-benefit data?

II.3. STAGE THREE: SELECTION

The selection stage involves deciding which projects are profitable, which of mutually exclusive is superior, and which combination of investment is best in the face of capital rationing. Questions relating to this stage include the following:

- 1) Who (or which department) analyzes capital expenditures?
- 2) What technique(s) is (are) used to evaluate competing projects? If multiple methods are used, which method is emphasized in case of conflict?
- 3) How is the discount rate determined? Is the discount rate company wide, division wide, or project specific? Several questions on these issues are relevant:
 - a) To what extent do firms use hurdle rate to make project selections?
 - b) Is the same hurdle rate used to evaluate all projects?

- c) How is the hurdle rate defined and why?
 - d) How does a firm arrive at a particular number to be used as a project's hurdle rate?
- 4) How is the risk defined in the context of capital budgeting? How is risk taken into consideration in decision making?
- a) To what extent do firms use risk assessment and risk adjustment?
 - b) Why the use of the available sophisticated risk assessment and adjustment models has been limited in capital budgeting decisions?
 - c) How would we improve the existing risk models or build new ones?
- 5) How prevalent is capital rationing? How are projects actually selected in the presence of capital rationing?
- 6) Who makes the final decision on an investment?

II.4. STAGE FOUR: POST-AUDIT

The final step of capital budgeting process is post audit. It is important that a system be in place for comparison of actual with projected performance, both to adjust the individual project and to appraise management of any discrepancy in information or to revise models that are being used to make other decisions. Suggested questions for this stage are as follows:

- 1) Is project performance evaluated and how often? Who makes such evaluation? How is the evaluation done?
- 2) What measure does the company take when it finds that actual performance is below the projected performance?
- 3) Is there an expenditure control procedure?
- 4) Is the management penalized or rewarded depending on the relationship between the estimated and actual outcomes? How?

III. PRACTICES OF FIRMS IN THE HOSPITAL INDUSTRY

Several surveys have been performed over the years on the capital budgeting practices of firms in the hospital industry. Table 1 presents details of 11 surveys that were conducted during the 1972-2007 period.

(Insert Table 1 about here)

Table 1 lends itself to several observations, including the following. First, questionnaire method of survey dominates----eight of eleven employ this method, while one uses case method, one the interview method and one combines questionnaire method with interviews. Second, Survey samples consist predominantly of NFPs. The representation of NFPs range from 60.1% (Williams and Rakich, 1973) to 90% (Kamath and Elmer,1989). The percentage of IOs in the sample on the other hand ranges between 0% to 3.2%, with one exception being Williams and Rakich (1973) whose sample contain 13.4% from the IO group. High representation of NFPs in the sample is consistent with the population distribution of healthcare firms (See Figure 1). The response rate for the questionnaire method ranges from 18.5% to a little over 40%. This rate compares favorably with similar surveys pertaining to firms in non-hospital industries.²

Table 2 describes the extent to which each of the 11 surveys address the questions raised in Section II above. It is rather obvious from this table that almost all of the surveys on U.S. hospitals have focused predominantly, if not only, on the selection

² Response rates to most capital budgeting surveys have ranged from 12% to around 50% (see Mukherjee and Al Rahahleh (2011).

stage of the capital budgeting process, with the primary emphasis being on the tools employed to evaluate projects.³ In spite of the deficiency, these surveys allow us to glean out information, however limited, pertaining to the remaining three stages of the process. Below we present our findings on each stage based on our analyses of these surveys.

(Insert Table 2 about here)

III.1. IDENTIFICATION

The identification stage for healthcare firms is more likely to be identified with a bottom up process. Most surveys indicate that the medical staff plays a central role in capital budgeting, including this idea-generation stage (Kamath and Elmer, 1989; Kamath and Oberst, 1992; Campbell, 1994; Reiter and Song, 2013).⁴

III.2. DEVELOPMENT

As we have done in Section II above, we break down the findings with respect to the development stage in two sub-components ---screening and cost-benefit analyses.

III.2.1. Screening

As regards the extent to which the proposals go through formal evaluation, Kamath and Elmer (1989) indicate that 26.8% of the respondents formally evaluate all

³ This phenomenon is shared in capital budgeting surveys of firms in non-hospital industries (see Mukherjee and Al Rahahleh, 2011).

⁴ Smith, Wheeler, and Wynne (200) report that the NFPs and health care systems use a blend of board of trustee and department-initiated (bottom-up and top-down) input into budget development with the interaction between the two.

of their capital investment proposals, while 42% of the respondents formally evaluate 50% or less. Kamath and Oberst (1992) indicate that 30% of the respondents formally evaluate all of their capital expenditure proposals, while about 35% formally evaluate about 50% or less than 50% of their capital expenditure proposals.

Smith, Wheeler, and Wynne (2006) interview CFOs of non-for-profit hospitals and health care systems in Michigan to determine how budget is apportioned between routine items (e.g., equipment replacement, plant maintenance) and strategic investments (e.g., entering new products or geographic markets). They find that hospital and health system leaders desire to allocate two-thirds to strategic investments vs. one-thirds to routine items. While actual allocations end up being one-half to two-thirds to routine operational projects and one-third for proposals involving strategic investments. They further report that: 1) more than 50% of the respondents establish evaluation criteria before receipt of requests and that these criteria are well-known to the managers submitting proposals and are stable over time; 2) 71% of respondents classify proposals by clinical service line or elements of the strategic plan; and 3) 86% of respondents ensure that proposal have guidelines and standardized formats. In other words, when the decisions are made, they are based on information presented in proposals.

Cleverly and Felkner (1982) report that 87% (up from 63% in 1975) of the hospitals specifically search for alternatives to major investments. They also report that 79% of hospitals (up from 32% in 1975) develop a long-range capital budget (i.e., the first step in capital budgeting process). The authors point out that this increase is due to

the regulations that require hospital participating in the Medicare program to have a three-year capital plan.

III.2.2. Cost-benefit Analysis

Surveys seem to suggest that healthcare firms employ cash flows as cost-benefit data. Nearly all surveys point to the difficulties for firms in the healthcare industry in estimating cost-benefit data to evaluate the strength of a proposal.⁵ An overriding factor that makes estimating cash flow of a healthcare firm complex is the presence of third-party payers. Cleverley and Felkner (1982) argue that it is critical to incorporate the effects of cost reimbursement from major third-party payers in the estimation of cash flows since failure to adjust cash flows for cost reimbursement may lead to a wrong decision regarding an investment's acceptability. In their study, they find that 64% of hospitals making adjustments for cost reimbursement in estimation of cash flows in 1980, which was up from 31% in 1975. Similarly, Reiter, Smith, Wheeler, and Rivenson (2000) indicate that the health care systems that receive capitation payments face added challenges in predicting project-specific cash flows. They state that "Capitation severs the link between capital investments and subsequent revenues, introducing greater uncertainty into the estimation process" (page 32).

⁵ The importance of cash flows in deciding the worthiness of a project and the difficulties faced by firms in estimating the cash flows have been recognized in capital budgeting surveys involving firms in non-hospital industries as well (Mukherjee and Al Rahahleh, 2011). The predominant reason for the difficulty associated with cash-flow estimation is the complexity linked to determining opportunity costs of the project under consideration.

III.3. SELECTION

III.3.1. Personnel

One of the most common findings in all surveys is that the medical staff plays the most dominant role in all stages of the capital budgeting process. For example, Kamath and Oberst (1992) find that the medical staffs, particularly the physicians, participate in major capital investment decisions at their hospitals by providing subjective inputs into the capital budgeting process, providing objective patient data, and participating in the formal analysis stage. Similarly, Campbell (1994) reports that hospitals are highly influenced by physicians' requests in equipment replacement decisions from CFOs. Specifically, she investigates the factors that affect decisions to replace hospital plant and equipment and finds that factors affecting replacement decisions are largely dictated by physicians, accreditors, and regulators. Smith, Wheeler, and Wynne (2006) conclude that the health care system faces the pressure to approve capital investment projects preferred by the physicians even when these are not necessarily favored by the system. Reiter and Song (2013, page 16) conclude based on previous studies in this area ".....that pressure from physicians can often drive capital investment decisions, sometimes trumping what is deemed to be best for the hospital."

III.3.2. Selection Techniques

As we have pointed before in reference to Table 2, the primary focus of almost all of the surveys has been on the selection stage, with their primary emphasis being on the tools employed to evaluate projects and its relationship with the key characteristics of U.S. hospitals (e.g., ownership classification). Table 3 summarizes survey findings regarding the extent of popularity of a selection technique.

(Insert Table 3- about here)

It is clearly evident from Table 3-Panel A that the payback period continues to be most favorite primary tool for evaluating capital investment alternatives. A consistent finding of surveys starting as early as in 1973 (Williams and Rakich, 1973) and ending as recently as in 2007 (Kocher, 2007) has been that healthcare firms prefer the payback period method to other methods, including discounted cash flow (DCF) models.

The popularity of the payback period method is not limited to NFPs, but extends to other types of ownership as well, including IOs. For example, Williams and Rakich (1973) report that about 50% (16 out of 34) of the IOs in their sample employ the payback as the primary selection technique. Although payback is popular to all types of ownership, except State- and Federally-owned hospitals,⁶ the degree of popularity varies. Kamath and Oberst (1992) find that the community-owned hospitals rely more on Payback Period method (33.3%) relative to church affiliated (25%) and governmental affiliated hospitals (21.8%).

Does size affect the extent to which a hospital uses sophisticated selection tools? According to surveys (Williams, 1974, Cleverley and Felkner, 1982, Kamath and Elmer, 1989, and Kamath and Oberst, 1992), the size does not lead to a greater usage of sophisticated than unsophisticated techniques. Kocher (2007) too fails to find a significant positive association between the hospital size and the level of sophistications in capital budgeting decisions. However, she finds a significant positive relation between hospitals that belong to a multi-hospital systems and the use of DCF methods.

⁶ An important exception is that State- and Federally-owned hospitals seldom use payback but rely more on subjective criteria (see for example, Williams and Rakich, 1973).

Put differently, members of multi-hospital system use NPV and IRR more frequently than standalone hospitals. She argues that the significance relation due to 1) the economies of scale that the members of multi-hospital system can achieve in hiring highly trained financial managers and developing a system wide process for evaluating investment alternatives; 2) the cost pressure and the fierce competition that they face; 3) the complexity of the system hospitals and the need for the sophisticated approaches to help managers to deals with such complexity.

While payback rules the day, the popularity of DCF methods is on the rise as well. Kamath and Elmer (1989) show that hospital appears to be changing toward more sophisticated tools. They find that up to 34.2% of firms in their healthcare sample use a DCF method compared to Williams and Rakich (1973)'s 11.5% and Cleverley and Felkner (1982)'s 21%. Kocher (2007) finds that private hospitals (church owned and non-church owned hospitals) rely more on sophisticated capital budgeting approaches relative to government hospitals (state or local government) as they more likely to have higher risk of financial distress and insolvency. However, this relationship is not statistically significant

A somewhat unique feature pertaining to healthcare firms is that a substantial portion of them rely on subjective criteria to select viable projects. For example, Williams and Rakich (1973) find that 33.9% of the respondents rely on factors such as the need, the availability of funds, and the relevancy to patient care when evaluating their capital investment decisions. Williams (1973) also find that 37.3% of respondents use other methods such as the availability of funds and necessity. Kamath and Elmer (1989) find that 24.1% of the respondents report that qualitative factors determine the

accept/reject decision more than 75% of the time and 29.3% of the respondents report that qualitative factors determine the final decision 51% to 75% of the time. Kamath and Oberst (1992) find that 25.56% of the responding hospitals report that qualitative factors determine the final decision over 75% of the time and 28.89% of the respondents report that qualitative factors determine the acceptance decisions 51% to 75% percent of the time. Kamath and Elmer (1989) and Kamath and Oberst (1992) find that the facility need, the physician demand, the community needs, and enhanced marketability are the four most important qualitative factors. Kocher (2007) finds three of these four factors to be common among her survey responders, with the exception being that she finds employee safety (instead of enhanced marketability) as the fourth factor in lieu of employee safety.⁷

III.3.3 Hurdle Rate

Earlier surveys (e.g., Kamath and Oberst, 1992) report that 68% of the responding healthcare firms in their sample employ cost of capital. They also point out that actual cost of capital used by these firms varies depending on the ownership of these firms: They find that the reported cost of capital 8.19% for affiliated hospitals, 10.36% for church affiliated, 9.75% for community non-profit, and 12.5% for IOs.

A few years later, Reiter, Smith, Wheeler, and Rivenson (2000) too find that the health care systems use the weighted average cost of capital (WACC) in their capital budgeting process. However, they note less agreement on the method for calculating the cost of capital among the CFOs of the leading nonprofit health care systems. For

⁷ The evidence seems to suggest that the percentage of healthcare firms that rely only on subjective criteria is on the decline. Cleverley and Felkner (1982) find that 17% of hospitals do not employ any method for evaluating capital investment alternatives in 1980, down from 45% in 1975.

example, one interviewed organization report calculating a WACC based on a cost of equity and a cost of debt. Another interviewed organization required a return on Investment (ROI) in excess of the prevailing rate of inflation. Two other interviewed systems have established base discount rates of 12% and 19%. Ho, Chan, and Tompkins (2003) find that the most frequently cited discount rate used in DCF by their respondents is 8%, with a range of 7% to 12%. They indicate that 70% of their respondents do not adjust the discount rate for inflation. They indicate that 50% of their respondents do not adjust cash flows for inflation.

Block (2005)⁸ finds that 75.4% of the Healthcare respondents (i.e., hospitals, pharmaceuticals, and medical products) use the WACC as the primary cut-off criterion for projects, whereas 12.8%, 8.1%, 3.7% use return on stockholders' equity, required growth in EPS, and other metrics, respectively. He also indicates while the divisional cost of capital was used by 56.2% of healthcare respondents, 43.8% used corporate-wide measure. Block (2005) finds that 50.2% of healthcare respondents explicitly include the portfolio effect (i.e., how investments interact with each other) as a key parameter in analyzing an individual decision.

III.3.4. Handling Risk

Do healthcare firms consider risk in making their capital budgeting decisions? If the answer is yes, how do they incorporate in the decision-making process? Does the risk-adjustment process vary depending on the ownership of these hospitals?

⁸ Block (2005) investigates whether there is differences in capital budgeting practices between industries by studying eight major industries (Energy, Technology, Manufacturing, Retail, Finance, Healthcare, Utilities, Transportation) covering 302 Fortune 1000 companies.

Cleverley and Felkner (1982) indicate that 64% of hospitals account for risk in their analysis of capital investment proposals in 1980, which was up from 38% in 1975. Kamath and Elmer (1989) indicate that 30% of respondents “explicitly” account for risk in their analysis of capital investment proposals. Kamath and Oberst (1992) indicate that 36.17% of respondents explicitly account for the relative risk of the project evaluated. It appears then at least one-thirds of surveyed firms take into account the risk of the project.

Surveys indicate that two principal methods of adjusting for risk are risk-adjusted-discount rate and shortening the payback period. The popularity of shortening the payback period to adjust for risk is consistent with its popularity as a selection tool, Kamath and Elmer (1989) report that 37.8%, 35.1%, 27% use the risk adjusted discount rate⁹, shortening the payback period, probability distribution of NPV, IRR, or Profitability Index¹⁰ respectively in accounting for risk when evaluating capital investment proposals, Kamath and Oberst (1992) find that 41.03%, 38.46%, 20.51% use the risk adjusted discount rate, the expected variations in return, and shortening the payback period in accounting for risk when evaluating capital investment proposals, respectively. Kocher (2007) also finds that shortening of payback period is the most frequent (with a mean

⁹ Reiter, Smith, Wheeler, and Rivenson (2000) find that while there is a general agreement among their respondents as to the importance of adjusting the discount rate for risk in their analysis of capital investment proposals, there is less agreement on the method of adjusting for risk. They indicate that most organizations consider the following factors in the risk adjustment of cost of capital: Individual hospital market characteristics, equity rate of return of other not-for-profit hospitals (pure-plays), reliability of cash flows, answers to strategic questions, and three types of risk: risk related to cost, patient volume, and revenue per case. This could explain the difficulties in estimating the cost of equity for not for profit hospitals that have no access to capital component (issuing new stocks) that is available to profit organizations.

¹⁰ This is how the authors explain the probability approach: Assume that project A has 0.2 probability of a \$1000 NPV and 0.8 probability of \$1500 NPV, while project B has equal probabilities of resulting in NPVs of \$0 and \$2800. While both projects have expected NPVs of \$1400, Project A is clearly superior because of its tighter probability distribution of NPVs.

rating of 3.13) used method of accounting for risk followed by the risk adjusted discount rate and project correlation methods¹¹, with mean ratings of 2.42, 2.30, respectively.¹²

Whether IOs are more concerned about risk than other types of hospitals cannot be ascertained from these surveys because of under-representation of IOs in relevant surveys. For example, there is no single IO in the sample used by Kamath and Elmer (1989). However, there is indirect evidence that State- and Federally-owned firms do not explicitly consider risk.

III.4. POST AUDIT

Our knowledge about the post audit stage of healthcare firms is rather limited. The surveys we consider in this paper have paid relatively little attention to this stage. It appears that relatively a large number of healthcare of firms participate in the post-auditing stage. Kamath and Oberst (1992) report that 43% of their respondents perform post audits of their major projects while Ho, Chan, and Tompkins (2003) find that 85% of their respondents conduct post-expenditure audits on approved long-term investment projects. Kamath and Oberst (1992) ask those who conduct post audits to list the major factors evaluated through post audits. The most frequently evaluated area they find is the deviation between the actual and the expected outcomes of capital projects and the "quality" resulting from the capital investments. About 98% of their sample comes from

¹¹ As par the portfolio theory, all else the same, the lower the correlation between the two assets, the lower is the risk of the combined portfolio.

¹² However, to the contrary, Stanley (2005) finds that 82.1%, 3.7%, 14.2% use risk-adjusted discount rate, certainty equivalent approach, and subjective decision-making for adjusting for risk when evaluating capital investment proposals, respectively.

not-for-profit (including government) hospitals; thus, it is difficult to decipher from the responses if post audit is more popular with for-profit hospitals. ,

IV. FURTHER ANALYSES----TWO SPECIFIC ISSUES

IV.1. FOR-PROFIT HOSPITALS VERSUS NOT-FOR-PROFIT HOSPITALS

As said above, only a small percentage of healthcare firms are owned by investors and their representation in survey samples has been few and far between. As a result, not much is revealed in these surveys that are specific to for-profit healthcare firms. However, it is safe to speculate that there are little differences in capital budgeting practices between for-profit and not-for-profit groups. A major reason for the lack of disparity is the type of environment within which both for-profit and not-for-profits operate---where cash flows are not derived directly from consumers but negotiated with or dictated by third-party payers. Additionally, physicians play a dominant role in making investment decisions in both of the groups

The similarity in behavior between the for-profit group and not-for-profit group has been ascertained by researchers (for example, Sloan and Vraciu, 1983; Duggan, 2000; Malani and Philipson, 2000; Sloan, Picone, Taylor, and Chou, 2000; Malani, Philipson and David, 2003), and David, 2009). These researchers compare the two groups in terms of their behavior, efficiency, and the quality of care they provide.

Sloan and Vraciu (1983) find that private not-for-profit and profit hospitals in the state of Florida are close to identical in: profit margins, dollar value of charity care, percentage of Medicare and Medicaid patient days, and net operating funds per admission and patient days. Duggan (2000) finds not-for-profits hospitals that operate

in markets with a large share of profit hospitals respond to the changes in the financial incentives to treat low-income patients¹³ in a similar way to that of their profit maximizing counterparts.¹⁴ Sloan, Picone, Taylor, and Chou (2000) find that there is no difference in the cost and the quality of care between not-for-profit and profit hospitals. Sloan (2000) finds that when controlling for scale, input prices, taxes, case-mix severity and teaching status, previous empirical literatures fail to systematically observe the difference in efficiency between for-profit and not for profit hospitals. David (2009) argues that the differences in behavior between the not-for-profit and profit hospitals vary overtime. He further explains the differences in behavior between the for-profit and nonprofit hospitals by the differences in the regulatory environment under which they must operate and not by the objectives of the two ownership types.

IV. 2. HEALTHCARE FIRMS VS. INDUSTRIAL FIRMS

Mukherjee and Al Rahahleh (2011) review several surveys conducted over the last five decades that report results pertaining to capital budgeting practices of US firms in non-hospital industries. The surveys considered in the review are presented in the Appendix 1 for ready reference.

¹³ In 1990, California state government created an incentive program for hospitals to treat the low-income individuals. The incentive program was designed to improve the quality of medical care for indigent patient. For example, If 25 percent of hospitals' patients are from low-income patient, the hospital will receive a substantial funds from the state.

¹⁴ Duggan (2000) finds also that governmental hospitals are less responsive than the not-for-profit and profit hospitals to the changes in the government policy or incentives.

IV.2.1. Similarities in Findings

Comparing the results of the current paper with those of the Mukherjee and Al Rahahleh (2011) paper reveals some similarities as well as some differences in capital budgeting practices between the two groups of firms. The similarities include the following. First, the predominant focus of an overwhelming majority of surveys in both groups has been on the selection stage. Consequently, our knowledge of other three stages is relatively limited concerning both groups. Second, surveys on both groups indicate that ideas originate bottom up rather than top down. Third, in the development stage, most firms consider cash flows as the appropriate cost-benefit stream and estimate cash flows in determining a project's worth. Fourth, according to surveys, the post-auditing stage appears to be growing in importance as evidenced by the increasing percentages of firms performing the performance review.

IV.2.2. Differences in Findings

A comparison of the survey results between the healthcare group and the non-healthcare group reveals three major differences in their capital budgeting practices. First, Industrial firms in general consider the development stage to be most crucial yet most difficult stage, while most healthcare firms appear to consider selection stage to be more crucial than other stages. Second, industrial firms employ discounted cash flow based techniques as the primary selection tool, while healthcare firms continue to emphasize the payback period method. Third, when incorporating risk, the healthcare firms rely on shortening the payback period, while industrial firms rely much more heavily on risk-adjusted discount rate.

IV. 2.2.1. Which stage is most difficult and most crucial?

Non-healthcare industrial firms overwhelmingly consider the development stage to be the most crucial yet most difficult stage of the capital budgeting process (Mukherjee and Al Rahahleh, 2011). This stage is most crucial because the data needed to analyze the worthiness of a project are developed in this stage and the selection tools, no matter the level of sophistication, are rendered ineffective if the data are inaccurate. Perhaps the most important reason that makes the development stage most difficult is also tied to complications involved in estimating data, especially in taking into account opportunity costs associated with computation of cash flows. Healthcare firms, however, as surveys indicate, do not consider development stage to be most crucial of all stages. For example, Cleverley and Felkner (1982) find that hospital managers believe that the financial analysis and selection phase is the most difficult phase, followed by project definition and cash flow estimation in the second place, and project implementation and review occupying the third place. Kamath and Oberst (1992) indicate that hospital managers believe that the assessment of risk phase is the most difficult task in capital budgeting process followed by the task of analyzing, ranking, and selecting of capital investment proposals, while the project definition and cash flow estimation phase occupies the third place.¹⁵

We can only speculate as to why industrial firms and healthcare firms differ in their responses to this question. We believe that industrial firms face a greater level of difficulties than healthcare firms in estimating cash flows because of their greater exposure to macroeconomic variables (domestic and international) as well as potential

¹⁵ Reiter, Smith, Wheeler and Rivenson (2000), one of the CFOs of nonprofit health care systems surveyed indicated that the cash flow estimation was more difficult than estimating the cost of capital.

opportunity costs. Additionally, cash inflows of healthcare firms are more predictable because they are pre-determined by payers and, therefore, less subject to vagaries of competitive pressures. On the other hand, healthcare firms may find the selection stage more difficult (than industrial firms) because, among other things, determining the cost of capital is more complicated for healthcare firms as more than 80% of these firms are not publicly traded.

IV.2.2.2. Payback period versus IRR

Figure 2 presents the trend in the use of the primary selection tool by the healthcare firms vis-à-vis industrial firms. It shows that although DCF-based methods are increasingly being used by healthcare firms, the domination of the payback period as the primary selection tool continues. For industrial firms, however, the use of IRR as the primary tool has been increasing while the use of payback period as the primary selection tool has been declining over the last five decades. This opposite trend is depicted in Figure 2 below.

(Insert Figure 2 about here)

Why do healthcare firms (especially, not-for-profit ones) continue to prefer the payback period method? This question has been broached by several researchers. Most of the researchers point to a combination of factors that provide answer to this question. Included among the factors are the following. First, some researchers (e.g., Cleverley and Felkner, 1982; Smith, Wheeler, and Wynne, 2006) suggest that, on average, healthcare firms are smaller than industrial firms and this might be one reason

for their preference of the payback period method to DCF-based methods. Second, the utility function of a not-for-profit firm is optimized not by maximization of profits but by fulfillment of its mission. In this effort, a DCF-based method might not be as effective as the payback period (see for example, Dittman and Ofer, 1976; Reiter, Smith, Wheeler and Rivenson, 2000, Smith, Wheeler, and Wynne, 2006). Third, an overwhelmingly large portion of investments that healthcare firms invest are in assets that are subject to a high degree of obsolescence, rendering the payback period method more effective than DCF-based methods (e.g., Dittman and Ofer, 1976; Reiter, Smith, Wheeler and Rivenson, 2000). Some researchers also raise the issue of applicability of DCF techniques in evaluating investment proposals facing healthcare firms. Reiter, Smith, Wheeler and Rivenson (2000) point to the following weaknesses of DCF techniques based on their interviews with a small sample of CEOs of healthcare firms:

- First, the firms argue that capital budgeting decisions can get complicated as they are subject to a different tax code and the inability to raise capital through equity markets;
- Second, the NPV approach ignores the qualitative considerations (such as contribution to hospital mission or vision and patient satisfaction) that are difficult to quantify in dollar terms;
- Third, DCF techniques are difficult to use in face of the growth in managed care where revenues are per member per month so all services are cost.

- Fourth, the DCF techniques require identifying the firm's required rate of return for making capital investment decisions which is at best difficult because not-for-profit firms cannot raise money externally.¹⁶
- Finally, the unusual circumstance of non-employee workers¹⁷ (i.e., the medical staffs, particularly the physicians) requesting capital without bearing the direct cost of investment make the application of a DCF technique difficult to say the least.

IV.2.2.3. Managing risk: shortening payback period versus adjusting hurdle rate

According to surveys, it is more common among industrial firms to employ sensitivity analyses in measuring risk and use primarily risk-adjusted discount rate (RADR) to adjust for risk (Mukherjee and Al Rahahleh, 2011). Shortening of the payback period is barely in the industrial firms' arsenal for risk adjustment. On the other hand, shortening the payback period plays a major role in risk adjustment for the healthcare firms. The larger use of sensitivity analyses by industrial firms (than healthcare firms) is reasonable given their investments are exposed to a much wider array of risks---firm specific, macroeconomic, and international--which are likely to affect a project's final outcome. The greater exposure to a wider variety of risk can perhaps be better handled by adjusting to risk-adjusted discount rates. In comparison, the primary investment risk that healthcare firms are exposed to is perhaps the risk of

¹⁶ Another quote from one of the interviewed CFO: "I do not believe in NPV. You can make any project look good or bad by selecting the discount rate. Or, you can spend all your time arguing about the right rate."

¹⁷ Smith, Wheeler, and Wynne (2006) stated in their paper that "except for anesthesiologists, radiologists, pathologists and emergency physicians, most physicians are not hospital employees".

obsolescence for which shortening the payback period is a better fix, especially in situations where estimation of cost of capital is fraught with much difficulties.

V. SUMMARY AND CONCLUSION

In this paper, we analyze survey findings on capital budgeting practices of healthcare firms in a four-stage framework. The results are more directly applicable to not-for-profit hospitals than to for-profit ones since number of respondents to surveys from the second group is very low and often non-existent.

The identification stage is a bottom-up process in which medical personnel plays a dominant role. In the development stage, surveys indicate that the percentage of hospital doing formal evaluation of proposal has increased steadily. Surveys addressed the challenges in estimating the cash flow in hospital industry relative to other industries. Cost reimbursement or the unique payment mechanisms complicates the estimation of cash flows from major investment alternatives and increases the uncertainty in the estimation process. In the project selection stage which is the focus of most surveys, evidence shows that the payback period is the popular primary tool and the dominant techniques for evaluating capital investment alternatives. Surveys in more recent years, however, report that the use of NPV as a method of project analysis technique is on the rise but yet to take the lead. In addition, surveys suggest that qualitative factors also play an important role in capital budgeting decisions. As for WACC, although there seems to be a general agreement among the healthcare firms that it should be used, less agreement exists on how it should be computed: Issues involving the appropriate capital structure, reimbursement policies, tax-status of debt,

and computation of the cost of equity in the absence of a market prices have made the computation challenging at best. Regarding risk adjustment, two primary ways that healthcare firms incorporate risk in capital budgeting decisions are the adjusted discount rate and shortening of the payback period. As regards the fourth stage of capital budgeting, survey information is very limited in spite of the finding that a large portion of healthcare firms do perform post-audit of their implemented projects.

Analyses of survey results on capital budgeting practices of healthcare firms lead us to two broader conclusions: 1) there are little differences in the practices between the two groups---for-profit and not-for-profits; and 2) differences in practices are more pronounced between healthcare firms and other industrial firms. Environmental factors explain the two phenomena. The application of the option valuation continues to grow with respect to capital budgeting decisions of industrial firms (Mukherjee and Al Rahahleh, 2011). We believe that the healthcare industry stands to benefit a great deal from the adoption of the option pricing model in their capital budgeting decisions. Given that the medical staff plays a dominant role in capital budgeting decisions of healthcare firms (from initiation to acceptance of most projects), the decision left for the boards often boils down to implementation of a project. Additionally, the environment within which the healthcare firms operate does not lend itself to an efficient use of the DCF models. Such circumstances create golden opportunities for the application of the option pricing model (i.e., valuation of real options) that recognizes the value stemming from investment timing options, growth option, abandonment option or flexibility option implicit in one equipment over another (see Brigham and Ehrhardt, 2014, Chapter 26).

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Table 1: Capital Budgeting Surveys of U.S. Hospitals

This tables summaries a list of the surveys of capital budgeting practices of U.S. hospitals from the early 1970s to the present.

Survey Years	Survey Author(s)-Year	Method	Number of Usable Responses and the Response Rate	Break down of usable responses	Sample
1972	Williams & Rakich (1973)	Questionnaire	Usable responses: 253 Response rate: 31.6%	Church (23.3%), Community (36.8), For profit (13.4%), Federal (3.6%), State (2.8%), City (2%), County (13%), Other (5.1%)	Short-stay hospitals nationwide (<i>small and large</i>). The sample includes Church affiliated hospitals, community (non-government), proprietary, federal, state, city, county.
1974*	Williams (1974)	Questionnaire	Usable responses: 102 Response rate: 45%	Church (19.6%), Community (50%), Proprietary (2%), Federal (3.9%), State (13.7%), City (2.9%), County (2.9%), Other (4.9%)	Short-stay hospitals in Ohio. The sample includes Church affiliated hospitals, community (non-government), proprietary, federal, state, city, county.
1980	Cleverley & Felkner (1982)	Questionnaire	Usable responses: 87 Response rate: 23%	Not for profit hospitals	The sample includes the first 377 hospital subscribers of Financial Analysis Service (FAS) in Dec. 1980. The typical hospital in the FAS data base has approximately 300 beds.
1986	Kamath & Elmer (1989)	Questionnaire	Usable responses: 120 Response rate: 41%	Corporation (nonprofit) (50.8%), Church affiliated (15%), Nongovernment community (24.2%), State, County, City government affiliated (9.2%), Proprietary (0%), Other (0.8%)	The Sample includes <i>mid-size and large hospitals</i> in Ohio, Michigan, and Pennsylvania (government affiliated, Church affiliated, and community hospital) with 200 or more beds.
1989	Kamath & Oberst (1992)	Questionnaire	Usable responses: 94 Response rate:22.01%	Community Not-profit (60.6%), Church affiliated (22.3%), State, County, and City government affiliated (13.8%), Proprietary (3.2%).	The sample includes <i>large hospital</i> nationwide. It was made up of every fifth hospital from the 2135 hospitals with 200 or more beds listed in the American Hospital Association (AHA) Guide, 1988). The survey includes state, county, and city, government affiliated, church affiliated, community non-profit, and investor owned hospitals.

Survey Years	Survey Author(s)-Year	Method	Number of Usable Responses and the Response Rate	Break down of usable responses	Sample
1992	Campbell (1994)	Questionnaire	Usable responses:119 Response rate: 24.4%	Response by hospital ownership classification is not provided	The sample includes <i>large</i> acute hospitals. The sample (487 CFOs) was selected at random from the 1992 HFMA membership list.
1999	Ho, Chan & Tompkins (2003)	Questionnaire	24 completed questionnaires were returned (5%)	Response by hospital ownership classification is not provided	Random sample of 500 U.S. hospitals.
1999	Kleinmuntz & Kleinmuntz (1999)	Case study	One nonprofit hospital		One nonprofit hospital
2000*	Reiter, Smith, Wheeler & Rivenson (2000)	Interviews	12 to 13 CFOs responded to each issue.	Not for profit health care systems.	CFOs of leading health care systems. These systems are systems consisting of a number of hospitals and related organizations, including home health agencies, home infusion therapy companies, nursing homes, physician organizations, health maintenance organizations, and others.
2006*	Smith, Wheeler, & Wynne (2006)	Questionnaire and Interviews	9 interviews, 3 face-to-face and 8 written communication.	20 selected not for profit hospitals and health care systems	CFOs of 20 selected not for profit hospitals and health care systems throughout the state of Michigan. All respondents were members of MIDNET.
2007*	Kocher (2007)	Questionnaire	Usable response: 187 Response rate: 18.5%	Local government (27%), Non-government tax-exempt (68%), Investor-owned (2%)	The sample was made up of every fifth medical surgical hospital from the American Hospital Association (AHA) Guide. The data was collected as part of a larger study on hospital management.

*: When the year of the survey is unknown, the year of publication is shown.

Table 2: Capital Budgeting Surveys and Four Phases of Capital Budgeting: US Hospitals

This Table lists the capital budgeting surveys and the extent to which elements of four phases of Capital Budgeting they consider.

Survey Author(s)-Year	Williams & Rakich (1973)	Williams (1974)	Cleverley & Felkner(1982)	Kamath and Elmer (1989)	Kamath & Oberst (1992)	Campbell (1994)	Kleinmuntz & Kleinmuntz (1999)*	Reiter, Smith, Wheeler, & Rivenson (2000)	Ho, Chan, & Tompkins (2003)	Smith, Wheeler, & Wynne (2006)	Kocher (2007)
I. Idea Generation											
A. Source of Origination			√							√	
B. Reasons for idea Origination											
C. Process of Origination & Submission										√	
D. Time Pattern Of Origination											
II. Proposal Development											
A. Level at which screening take place			√	√	√		√	√		√	
B. Screening Process							√			√	
C. Cash flow Estimates			√				√	√	√		
D. Responsibility for Budget Preparation				√	√		√				
III. Selection of Projects											
A. Classification of Projects for Economic Analysis											
B. Personnel (Dept.) Responsible for Analysis						√	√	√		√	
C. Techniques Used	√	√	√	√	√		√	√	√	√	√
D. Rationale for Techniques Used											
E. Risk: Assessment			√	√	√			√			√
Adjustment			√	√	√			√			√
F. Capital Rationing: How Extensive											
Why Capital Rationing			√					√			
Methods Used								√			
G. Cost of Capital			√	√	√			√	√	√	
H. Project Approval				√	√			√			
IV. Control (or Performance Evaluation)											
A. Extent of Use of post Audit			√		√				√		
B. Personnel Involved/Procedure											
C. Performance Measurement					√						
D. Use of Evaluation (Punishment/Reward/etc.)											

*: Kleinmuntz & Kleinmuntz' (1999) survey consists of only one NFP firm.

Table (3)-Panel A: Surveys by the Most three Favorite Capital Budgeting Techniques

This table shows the technique that each survey finds to be favorites o healthcare firms. . √ (1) indicates that the technique ranked first. √ (2) indicates that the technique ranked second. √ (3) indicates that the technique ranked third.

Survey Years	Survey Author(s)-Year	Sample	Most Favorite Capital Budgeting Techniques								
			ARR	Payback	Discounted PB	DCF method	IRR	NPV	PI	Other (subjective criteria)	No Method
1972	Williams & Rakich (1973)	<ul style="list-style-type: none"> • State, local and federal government (20.5%) • Non-government, church, not for Profit Corporation (60.1%) • Profit (13.4%) • Other (5.1%) 	√ (3)	√ (1)						√ (2)	
1974	Williams (1974)	<ul style="list-style-type: none"> • State, local and federal government (21.4%) • Non-government, church, not for Profit Corporation (69.6%) • Profit (2%) • Other (4.9%) 	√ (3)	√ (1)						√ (2)	
1975	Cleverley & Felkner (1982)	<ul style="list-style-type: none"> • Not for profit hospitals 		√ (2)		√ (3)				√ (2)	√(1)
1980	Cleverley & Felkner (1982)	<ul style="list-style-type: none"> • Not for profit hospitals 		√(1)		√ (3)				√ (2)	
1986	Kamath & Elmer (1989)	<ul style="list-style-type: none"> • State, local and federal government (9.2%) • Non-government, church, not for Profit Corporation (90%) • Profit (0%) • Other (0.8%) 		√(1)				√ (2)	√ (3)		
1989	Kamath & Oberst (1992)	<ul style="list-style-type: none"> • State, local and federal government (13.8%) • Non-government, church, not for Profit Corporation (83%) • Profit (3.2%) 		√(1)			√ (3)	√ (2)			
1992	Campbell (1994)	<ul style="list-style-type: none"> • Response by hospital ownership classification is not provided 									

Survey Years	Survey Author(s)-Year	Sample	Most Favorite Capital Budgeting Techniques									
			ARR	Payback	Discounted PB	DCF method	IRR	NPV	PI	Other (subjective criteria)	No Method	
1999	Ho, Chan, & Tompkins (2003)	• Response by hospital ownership classification is not provided		√(1)								
1999	Kleinmuntz & Kleinmuntz (1999)*	• One NFP hospital										
2000	Reiter, Smith, Wheeler, & Rivenson (2000)**	• Not for profit health care systems.										
2006	Smith, Wheeler & Wynne (2006)***	• 20 selected not for profit hospitals and health care systems										
2007	Kocher (2007)	• Local government (27%) • Non-government tax-exempt (68%) • Profit (2%)		√(1)			√ (3)	√(2)				

*: Kleinmuntz & Kleinmuntz (1999) proposed a strategic capital budgeting method to evaluate capital investment proposals. This approach incorporates nonfinancial criteria and strategic priorities. This approach consists of eight steps: 1) Establish evaluation criteria. The evaluation criteria selection include: a) financial impact measures(e.g., operating NPV; b) Strategic impact measures(e.g., market share); c) measures of impact on quality of services(e.g., patient outcomes); 2) classify proposals; 3) ensure that proposals are complete and easy to understand; 4) determine costs of proposals; 5) rate proposals with respect to each criterion; 6) set strategic priority weights for each criterion; 7) calculate weighted value scores for each proposal; 8) rank proposals by benefit-cost ratios.

** : Reiter, Smith, Wheeler, & Rivenson (2000) indicated that most CFOs(10 out of 12 CFOs) of the leading not for profit health care systems use NPV of all large proposed projects as the basis for investment evaluation. They further indicate that the CFOs reported multiple complementary decision making rules, with payback period and IRR being the most frequently mentioned after NPV. They also stated that “In our survey of health system CFOs, NPV was mentioned most frequently. However, payback period continued to be important”

***: Smith, Wheeler, & Wynne (2006) were unable to provide a detailed assessment of methods employed for capital budgeting within the limited time available for interviews, however, they indicate that health care systems employ standard approaches of investment evaluation but rarely engaged in sophisticated analytical approaches or few used the most sophisticated capital budgeting techniques. “Only calculate NPV on big/new things”

Table (3)-Panel B: Use of NPV, IRR and Payback Period Methods as a primary method of evaluating projects

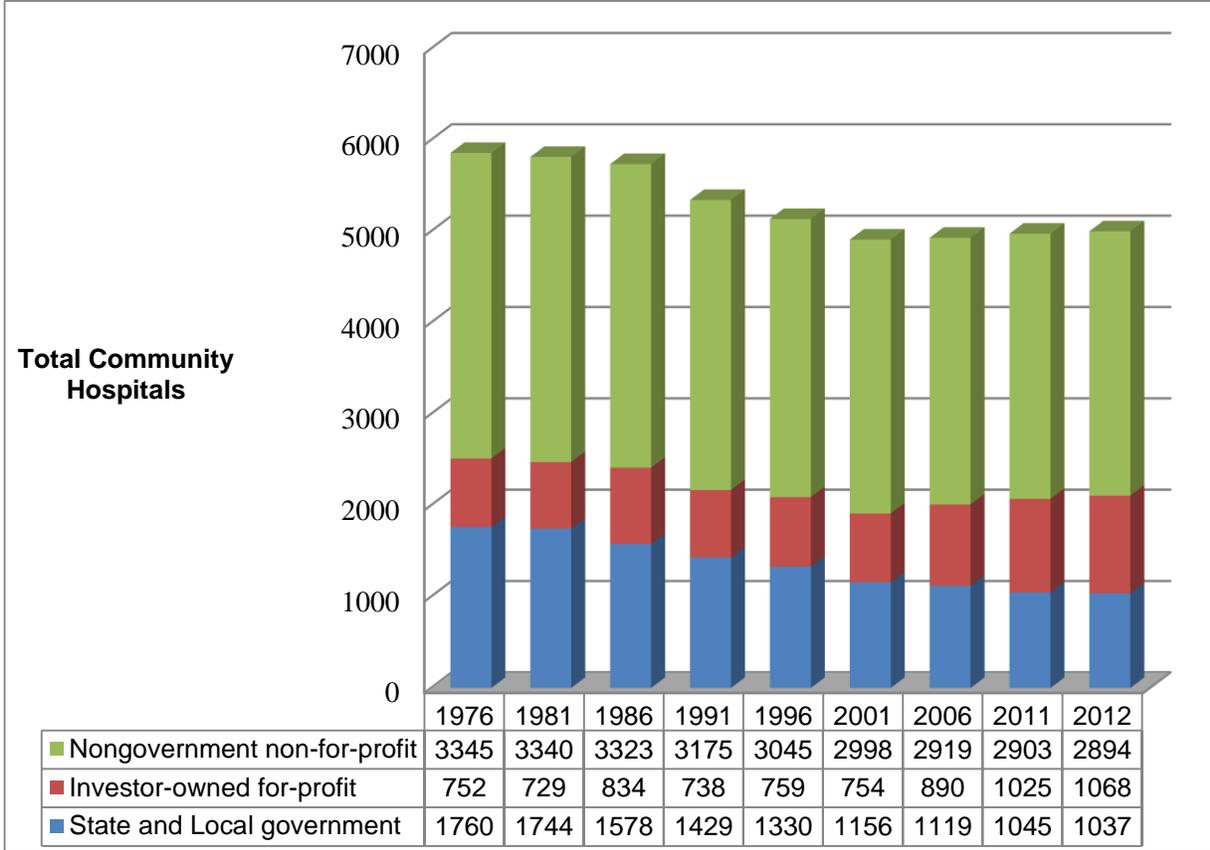
This table shows the popularity ranking of capital budgeting methods among healthcare firms.

Capital Budgeting Techniques	Survey Author(s)-Year									
	Williams & Rakich (1973)	Williams (1974)*	Cleverley & Felkner (1982)		Kamath & Elmer (1989)	Kamath & Oberst (1992)	Reiter, Smith, Wheeler & Rivenson (2000) **	Ho, Chan, Tompkins & (2003)***	Smith, Wheeler, & Wynne (2006) ****	Kocher (2007)*****
	1972	1974	1975	1980	1986	1989	2000	1999	2006	2007
Accounting Rate of Return	15.8	13.7	0	3	4.4	7.45				
Payback Period	48.2	47.1	24	34	26.5	28.72		50		3.72
Discounted Payback Period					2.9	4.79				
NPV	8.30	3.9			19.1	17.87				3.13
IRR	3.2	3.9			16.2	17.23				2.91
PI					17.7	6.92				
Subtotal of NPV, IRR, and PI	11.5	7.8	7	21	53.0	42.02				
Some Other Method Used	33.9	37.3	24	25	13.2	9.57				
No Method Used			45	17		7.45		20		

*: Frequencies do not total 100% since some hospitals used more than one of these techniques.
 **: Reiter, Smith, Wheeler and Rivenson (2000) indicate that NPV was mentioned in their survey of health system CFOs most frequently. However, payback continued to be important.
 ***: Ho, Chan, Tompkins did not provide the percentages for the other techniques.
 ****: Smith, Wheeler, and Wynne (2006) were unable to provide a detailed assessment of methods employed for capital budgeting within the limited time available for interviews, however, they indicate that health care systems employ standard approaches of investment evaluation but rarely engaged in sophisticated analytical approaches or few used the most sophisticated capital budgeting techniques. "Only calculate NPV on big/new things"
 *****: Kocher (2007) use the likert scale (1=seldom and 5= frequently) as a way to show the methods used and their relative importance. The results of this study support the historical general trend that the NPV is more used by hospitals than IRR and that the Payback is the most dominant tool of capital budgeting in hospitals.

Figure 1: Hospital Trends by Ownership for U.S. Community Hospitals for Selected Years: 1976-2012*

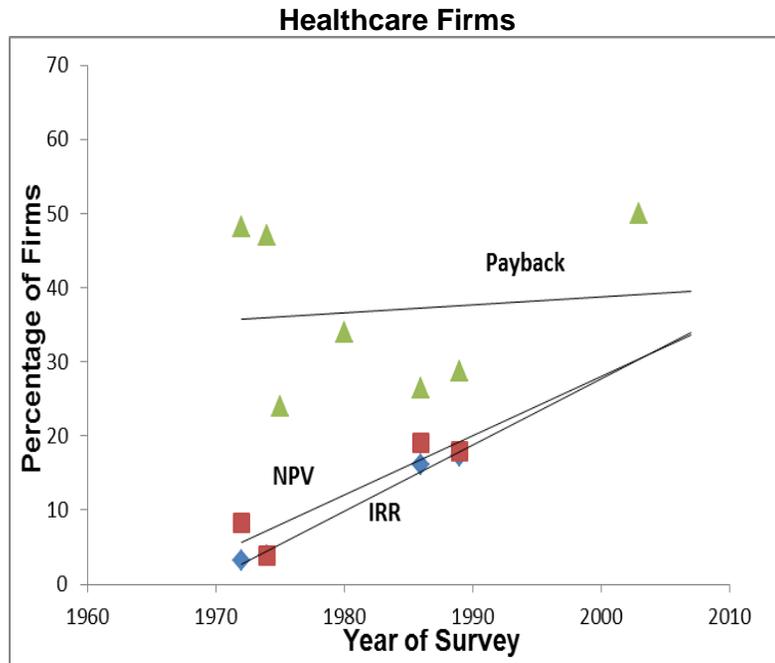
This Figure presents the breakdown of US community hospitals by ownership for selected years (1976-2012)



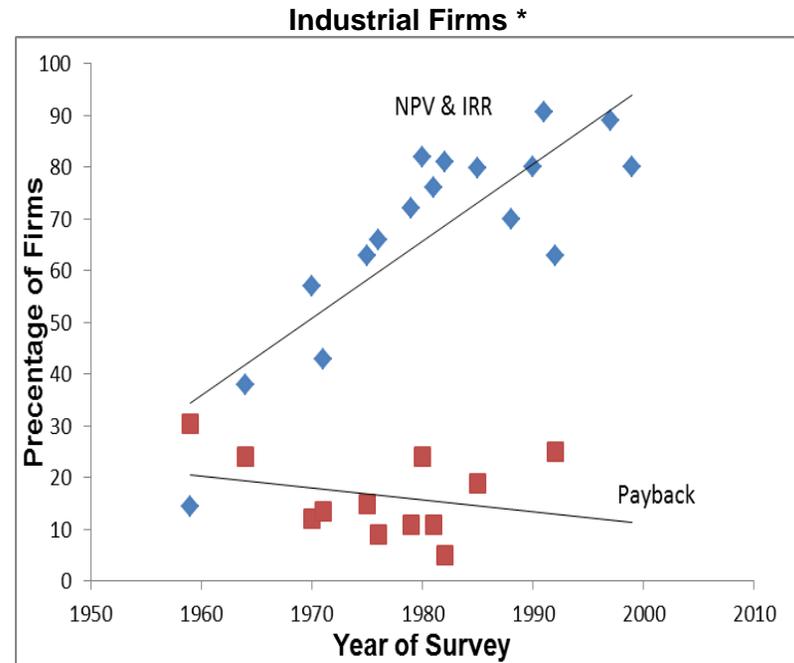
*: Source: American Hospital Association, AHA Hospital Statistics 2013: the comprehensive reference source for analysis and comparison of hospital trends. Chicago (IL): AHA; 2013.

**Figure 2: Usage of NPV, IRR and Payback Period Methods as primary tools
Healthcare firms vs. Industrial Firms**

This Figure shows the trend in the use of the primary selection tool by the healthcare firms vis-à-vis industrial firms.



Sources: Williams and Rakich (1973); Williams (1974); Cleverley and Felkner (1982); Kamath and Elmer (1989); Kamath and Oberst (1992); Ho, Chan, and Tompkins (2003); Kocher (2007).



Source: Mukherjee and Al Rahahleh (2011)

*: Industrial firms include specifically Fortune 500 industrial firms, Fortune 1000 industrial firms, Compustat industrial firms, ect.

Appendix 1: Capital Budgeting Surveys of US Firms

Survey Year(s)	Survey Author(s)-Year	Method	Number of Usable Responses	Sample
1959	Istvan (1961)	Interview	48	67 percent from large industrials
1960	Miller (1960)	Questionnaire	127	Fortune 500
1964	Christy (1966)	Questionnaire	108	S&P Stock Guide
1969	Mao (1970)	Interview	8	Medium and large firms in five industries
1969	Williams (1970)	Questionnaire	100	Fortune 500 and 29 small manufacturing firms
1959, 1964, 1970	Klammer (1972)	Questionnaire	184	Compustat large industrial firms
Early 1970s	Petty, Scott, & Bird (1975)	Questionnaire	109	Fortune 500
1971	Fremgen (1973)	Questionnaire	177	Dun & Bradstreet Reference Book
1972	Brigham and Pettway (1973)	Questionnaire	53	Compustat public utilities
1972	Osteryoung (1973)	Questionnaire	94	Fortune 500
1975	Kim (1978)	Questionnaire	114	Dun & Bradstreet Million Dollar Directory
1976	Gitman & Forrester (1977)	Questionnaire	103	74 percent from large industrial firms
1978	Schall, Sundem, and Geijsbeek(1978)	Questionnaire	189	Compustat large industrial firms
1975 1979	Kim & Farragher (1981)	Questionnaire	200	Fortune 1000
1979	Oblak & Helm (1980)	Questionnaire	58	Fortune 500
1979	Rosenblatt (1979)	Interview	21	67 percent from Fortune 500
1980	Scapens & Sale (1981)	Pre- and Post-questionnaire and Interviews	205	Fortune 500
1980	Moore & Reichert (1983)	Questionnaire	298	Fortune 500
1965, 1970, 1975, 1980	Klammer & Walker (1984)	Questionnaire	188	Compustat large industrials
1982	Stanley & Block (1984)	Questionnaire	121	Fortune 1000 multinationals
1983	Farragher (1986)	Questionnaire	149	Fortune Service 500 Directory
1981 1982	Ross (1986)	Interview	12	Large firms

Survey Year(s)	Survey Author(s)-Year	Method	Number of Usable Responses	Sample
1985	Kim, Crick, & Kim (1986)	Questionnaire	367	Fortune 1000
1985	Mukherjee (1988)	Capital budgeting Manuals	60	Fortune 500
1991	Gilbert & Reichert (1995)	Questionnaire	151	Fortune Magazine Directory CFOs
1992	Bierman (1993)	Questionnaire	74	100 largest of Fortune 500
1992	Trahan & Gitman (1995)	Questionnaire	84	Fortune 500 CFOs plus Forbes 200 CFOs
1992	Burns & Walker (1997)	Questionnaire	180	Fortune 500
1994	Payne, Heath, & Gale (1999)	Questionnaire	155	U.S.- and Canadian-based firms from S&P Compustat database
1999	Graham & Harvey (2001)	Questionnaire	392	CFOs from Financial Executives Institute corporations
2008	Chen (2008)	Questionnaire	115	Publicly traded manufacturing firms identified from the Disclosure Database

Source: Mukherjee and Al Rahahleh (2011),