

Agency cost and firm performance
—The moderating effect of budget function

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Abstract

We contrast the relationship between budget function and firm performance across subsamples with different level of agency cost. Four functions of budget are considered: planning, communication, control and performance evaluation. We find that control function has an adverse effect on firm performance in the high agency cost subsample. Emphasis on control function intensifies the adverse effect of agency cost on firm performance. The performance evaluation function of budget is positively associated with firm performance. Emphasis on evaluation function moderates the adverse effect of agency cost on firm performance.

Keywords: Agency cost, Uncertainty, Budget function, Planning, Control, Communication, Performance evaluation, Taiwan

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1. Introduction

The versatile uses of budgets in organizations are well-documented in textbooks of management accounting and control (e.g., Hansen & Mowen, 2000, Merchant & Van der Stede, 2003), practice surveys (e.g., Ekholm & Wallin, 2000) and academic research (e.g., Barrett & Fraser, 1977; Hansen & Van der Stede, 2004). Budgets are recognized as time-honored tools for planning and setting organization's goals, for communicating among corporate constituencies, and for providing basis for operating result review as well as performance evaluation. While it is difficult for firms to have perfect budgets that make use of all functions equally well (Barrett & Fraser, 1977), differential emphasis on the respective uses of budgets reflects the environment variation and contracting needs.

Prior research concludes that budgets can alleviate agency problems. Argyris (1990) points out that budgets can change human behavior, can compel managers to look ahead, and can force executives to think, to remove unconscious bias, and to search out weakness. Studies focused on specific function of budgets show that firms with agency problems tend to emphasize the budget function of communication among organization

members and this emphasis leads to better performance of individuals and of the firms (e.g., Shields & Young, 1993; Penno, 1984). Shields & Young (1993) also show that firms that adopt budget-based incentives have better firm-wide performance. Fisher, Maines, Peffer & Sprinkle (2002) study the dual uses of budgets. Their experiments show that firms use budgets for planning and evaluating performance in order to remove budget slack and to increase subordinates' effort and task performance. They conclude that firms should design an internal information system to curb information asymmetry among subordinates. Accordingly, firms are able to motivate subordinates to provide more accurate budgets.

We test whether versatile uses of budgets can lessen the adverse effects of agency cost on firm performance based on identified questionnaires and data available from public sources. We contrast the relative associations between budget function and firm performance in high agency cost subsample with those in low agency cost one. Since Hartmann & Moers (2003) point out that superiors adjust their use of budgets to cope with environmental uncertainty, we also control for uncertainty condition.

Following prior research, we consider four functions of budget: planning, communication, control and performance evaluation. We identify the four functions of budget with questionnaire items on respective budget functions. The respondents knew

that they are identified in the questionnaires. Firm performance is measured as return on assets from publicly available audited financial information matched with returned questionnaires instead of as respondents' self-reported performance. High agency cost firms are separated from low agency cost ones by cluster analysis on firm characteristics observable from public sources. To test the moderating effect of budget function on the adverse effect of agency on firm performance, we observe the difference of adverse effects between these two subsamples.

The empirical results show that the budgeting that emphasizes more on control function has a severer adverse effect on firm performance for high agency cost firms, relative to that of low agency cost firms. Putting more weight on the performance evaluation function of budget can alleviate the adverse effect caused by agency cost. Separate analyses on high uncertainty subsample give similar results. Analyses on low uncertainty subsample suggest that budget function is not associated with firm performance in stable environments. In short, budgets that are directed toward evaluation function help to mitigate the adverse effect of agency cost on firm performance, especially in high uncertainty environment. However, budgets that carry more weight on control function compound the adverse effect of agency cost.

This study is distinct from previous studies in three ways. First, unlike prior

research, we use factual characteristics of firms including performance (ROA) instead of self-reported variables. This increases comparability across firms. Second, we consider the multiple functions of budget and control uncertainty condition. Third, we provide evidence on the use of budgets within Chinese-speaking for-profit companies.

The remainder of this paper is organized as follows. In the next section, we review the relevant literature and develop hypotheses. The methodology is spelt out in sections three and four. Our empirical measurement of uncertainty and agency cost is depicted in section three. In the fourth section, the hypothesis testing procedures are given. The fifth section presents the empirical results and the last section concludes with a discussion of the implications.

2. Literature review and hypothesis development

Budgets can help organizations in many aspects. For example, budgets reduce the agent's activity set, therefore help to tackle agency problems (Hofmann, 2003).

Following prior research, we consider four functions of budget: planning, communication, control and performance evaluation.¹

¹ There are some difference in terminology concerning the uses of budgets in management accounting textbooks and academic research. For instance, in discussing planning, authors label it as planning (e.g., Barrett and Fraser, 1977; Helmkamp, 1987; Ekholm & Wallin, 2000), operational planning (e.g., Hansen & Van der Stede, 2004), profit plans (e.g., Simons, 1995), strategic plan (e.g., Horngren et al., 2003; Hansen & Mowen, 2000). In discussing budgetary control, authors term it as control (e.g., Helmkamp, 1987), or control with evaluation, measurement and motivation. Names of other budget uses include

Several studies highlight that the usefulness of budgets is related to uncertainty.

For example, Govindarajan (1986) finds that under uncertainty, budgetary participation increases the managerial performance. In addition, higher budgetary participation reduced managers' incentive to create slack in high-uncertainty conditions but not in low-uncertainty conditions. Hake & Krishnan (2005) examine the firm performance by the interaction of budget type and environment uncertainty. They find that when the environment is highly uncertain, relative to traditional budget, rolling budgeting can help on coping with the uncertainty and can improve firm performance. We test the association between budget functions and firm performance in different uncertainty levels

In terms of planning function, budgets are the operational guides to a company's activities. Budgets force managers to develop an overall direction for the organization, to predict problems, and to evolve policies. Planning through budgeting specifies the desired achievements and managers' behavior. The importance of the planning function of budgets increases with the agency cost.

In addition, Birnberg (1998) indicates that planning is more important in uncertain environments than in stable ones. Planning help managers know the capabilities of their

communication (e.g., Helmkamp, 1987; Horngren et al., 2003), coordination (e.g., Barrett and Fraser, 1977; Helmkamp, 1987; Horngren et al., 2003), motivation (e.g., Barrett and Fraser, 1977; Helmkamp, 1987), evaluation (e.g., Barrett and Fraser, 1977; Horngren et al., 2003). We use planning, control, communication and performance evaluation as the budget function. The definitions of these four functions of budget are given in section 4.

practice and the sources and uses of the business resources. Thus, the planning function of budget can help to alleviate the agency problem, and accordingly to increase the firm performance, especially when the firm is facing high uncertainty. We test the following hypothesis:

H1a: For firms facing higher environment uncertainty, the negative effect of agency cost on firm performance is relatively lower if their budgets carry more weight on the planning function of budget.

The Control function of budget is used in monitoring of actual activity. Kluger & DeNisi (1996) suggest that when difference between the actual and goal performance exists, people may increase effort to accomplish the goal. Managers are concerned if they could achieve their budgets and therefore they may be driven to primarily concern more about short-term results. Van der Stede (2000) shows that rigidity of budget control has an effect on budget slack and helps change managerial short-term orientation. If a company's budget is attainable, it is an appropriate tool to control the manager's action (Churchill, 1984).

However, the information asymmetry inherent in agency problems gives managers opportunities to re-set or manipulate goals during budgeting. Higher environment uncertainty compounds the problem. Budgets are therefore usually attainable. Firms that stress the importance of control function of budget may underperform. We test the

following hypothesis:

H1b: For firms facing higher environment uncertainty, the negative effect of agency cost on firm performance is relatively higher if their budgets carry more weight on the control function of budget.

Budgets formally communicate plans of an organization to each employee. All employees are aware of their roles in achieving the objectives during budgeting. Shields & Young (1993) contend that one of the primary reasons firms use participative budgeting is to help communication of private information between organization members. Sharing of information between organizational members is one of the most important benefits of the budgeting process (Hopwood, 1976, Parker & Kyj, 2006). Communication function of budget can moderate agency problem.

In more competitive environments, the use of budget for communication appears to be more important as well (Simons, 1987). Hansen & Van der Stede (2004) maintain that the use of budget for communication of goals becoming important when firms face more competitive condition. Merchant (1981) shows that the greater middle- and lower-management participates in budget-related activities and the more formal patterns of communication are, the higher the self-ratings of organizational performance. We test the following hypothesis:

H1c: For firms facing higher environment uncertainty, the negative effect of agency

cost on firm performance is relatively lower if their budgets carry more weight on the communication function of budget.

Budgets are often used to judge actual performance of managers. Prior research shows that firms use budgets to evaluate performance (Hartmann, 2000; Hope & Fraser, 2000, 2003; Jensen, 2001; Marcino, 2000; Schmidt, 1992). Since managers' wealth and career are both affected by the degree they achieve the budgets, therefore the setting of budgets can have a significant effect on behavior. To avoid inadequate performance, superiors may provide relatively easy budget goals (Argyris, 1990). Hansen & Van der Stede (2004) pointed out that the budget used for performance evaluation is less important when firms face more competition circumstances. When facing uncertainty, managers have incentives to influence the budget by setting revenue targets low and cost ones high, in order to make goals much easier to be met. Thus, budget used in performance evaluation may induce positive or negative effect.

Positive behavior occurs when goals of managers are aligned with the goal of the organization and when managers are motivated to achieve their goals (Hansen & Mowen, 2000, p. 293). Some research shows that adoption of budget-based incentives improves firm performance (Shields & Young, 1993; Chow, 1983; Waller & Chow, 1985). The improvement is significant for firms with agency problems (Shields & Young, 1993).

Thus, the performance evaluation function is appropriate for motivating manager's action, and boosts the firm performance. We test the following hypothesis:

H1d: For firms facing higher environment uncertainty, the negative effect of agency cost on firm performance is relatively lower if their budgets carry more weight on the performance evaluation function of budget.

3. Measurement of agency cost and uncertainty

We measure the extent of agency cost from observable variables. We use cluster analysis to identify subsamples of high agency cost respondents and of low agency cost ones based on the variables. Uncertainty subsamples are obtained in a similar way.

Previous studies measure uncertainty and agency cost from questionnaires. Our measures of uncertainty and agency cost are not based on perception.

3.1. Agency cost

We use the following six observable variables from public sources to proxy the scale of agency cost of a specific respondent.

1. Firm size (*LNsales*)

In large companies where it is difficult to identify the interests of so many different stakeholders, managers tend to maximize their self interests. Zhang (1997) shows that the information asymmetry increases with firm size. We predict larger firms bear higher

agency cost. Firm size is measured as the natural logarithm of sales.

2. Volatility in operating environment (*GROWTH*)

Firm growth increases managers' power. Managers may forego positive net present value investments (Myers, 1977). We predict that as growth opportunities of firm increase, the agency cost rises. We use the growth opportunities to proxy the volatility in operating environment. Growth opportunities are measured by book-to-market ratio.

3. Ownership structure (*CONTROL*)

Jensen & Meckling (1976) argue that owner-controlled firms do not have the same incentives to divert resources, because owner-managers would suffer directly from reduced share values. Ownership structure is measured as the percentage of shares owned by individual shareholders. It is calculated as one minus the value of shares held by executives, directors, and institutional investors divided by the total market capitalization of the firm.

4. Leverage (*LEV*)

Leverage reduces the agency costs of free cash flow by reducing cash at the discretion of managers. However, leverage also increases the usual agency costs of debt, including bankruptcy costs (Jensen, 1986). We expect positive association with

leverage and agency cost. Leverage is measured as the ratio of total debt to total assets.

5. Financing activity (FreeCF)

Free cash flow may induce over-investment on unprofitable projects and cause inefficiency of organization (Jensen, 1986). Because conflict between the firm and its managers is rooted from free cash flow, we assume more free cash flow associates with higher agency cost. Financing activity variable is measured as the free cash flow of the firm scaled by current assets. Free cash flows are defined as 1 minus the ratio of dividend over earnings

6. Managerial ownership (MSH%)

When ownership and control are separated, the conflict of interest between managers and shareholders constitute a source of agency costs (Jensen & Meckling, 1976). Managerial ownership is measured as the percentage of top management shareholding in the company.

3.2. Uncertainty

Many researchers use perceived environmental uncertainty as an important variable in their studies (e.g., Govindarajan, 1984; Harrison, 2003). An environment is defined as a complex system of interrelated economic, market, technological and, to a lesser extent, social and political variables in the management accounting literature. These

studies depend on questionnaires to obtain respondents' perceived predictability of firm's external environment with the following items: manufacturing technology, competitors' action, market demand, product attributes/design, raw material availability, raw material price, government regulation and labor union actions.

We measure environmental uncertainty as operating volatility. The nature of uncertainty defined as how accurate one can predict the future (Tosi, Aldag & Storey, 1973, pp. 30-31). Ahmed, Billings, Morton & Stanford-Harris, (2002) argue that firms facing a relatively high degree of operating uncertainty, such as market demand, input price or competitors' action uncertainty, are more likely to experience large positive or negative shocks to their earnings and asset values. They use the standard deviation of firm's ROA to proxy the operating uncertainty. Titman & Wessels (1988, p. 6) use the standard deviation of the percentage change in operating income to measure volatility.

We also define volatility as changes or variability in the organization's external environment (Tung, 1979; Kren, 1992, p. 516). Tosi et al. (1973) operationalize volatility by using the following three variables: (1) market volatility, the coefficient of variation of net sales; (2) technological volatility, the coefficient of variation of the sum of research and development and capital expenditures divided by total assets; and (3) income volatility, the coefficient of variation of profits before taxes (used as a composite

measure to capture other sources of volatility). The volatility variables used are measured as follows.

1. Sales volatility

Sales volatility is measured as the coefficient of variation of sales over the past six years.

2. Earnings volatility

Earnings volatility is measured as the coefficient of variation of earnings before interest and taxes over the past six years, weighted by sales.

3. Technological volatility

Technological volatility is measured as the coefficient of variance of the average ratio of the sum of research and development expenditures and capital expenditures to total assets over the past six years.

3.3. Cluster analysis

Later analyses are conducted on subsamples of firms classifying into high and low agency cost groups and high and low environment (or operating) uncertainty groups using cluster analysis. There are several methods of forming clusters. We use K-means clustering method to compute initial cluster. To minimize the effect of different scale intervals on the clustering results, all input variables are ranked from one

to ten beforehand.

We form clusters of firms based on variables that proxy for agency cost and uncertainty and agency costs, respectively, with the assumption that the level of agency cost and uncertainty and agency costs are constant across firms in a cluster. Within any cluster, the covariance between the budget variables uncertainty is zero.

Table 1 shows the results from the K-means clustering. We use cluster analysis to find the two agency cost subsamples ($H_{agency\ cost}$ and $L_{agency\ cost}$) and two uncertainty subsamples ($H_{uncertainty}$ and $L_{uncertainty}$). Table 1, Panel A presents the cluster mean/median value of the variables that are used to segregate firms into two clusters—high ($H_{uncertainty}$) and low uncertainty ($L_{uncertainty}$). Compared to firms in $L_{uncertainty}$, firms in $H_{uncertainty}$ have significantly larger volatility. Mean (median) earnings volatility is 0.45 (0.58) for $H_{uncertainty}$, whereas -16.42(0.30) for $L_{uncertainty}$; technological volatility is 0.79 (0.76) for $H_{uncertainty}$, whereas 0.58 (0.56) for $L_{uncertainty}$; sales volatility is 0.48 (0.40) for $H_{uncertainty}$, whereas 0.23 (0.22) for $L_{uncertainty}$. ROA in $H_{uncertainty}$ (mean=0.05, median=0.05) are significantly larger than $L_{uncertainty}$ (mean=0.04, median=0.04).

Table 1, Panel B presents the cluster mean/median value of the variables that are used to distinguish firms with high agency cost ($H_{agency\ cost}$) from those with low agency

cost ($L_{agency\ cost}$). Firms in $H_{agency\ cost}$ have lower management shareholding (MSH% mean (median) value is 1.12(0.29) for $H_{agency\ cost}$, whereas 1.16(0.44) for $L_{agency\ cost}$).

Firms in $H_{agency\ cost}$ have larger size than $L_{agency\ cost}$ (mean (median) LNsales is 15.06 (15.11) for $H_{agency\ cost}$, followed by 14.83 (14.72) for $L_{agency\ cost}$). Firms in $H_{agency\ cost}$ have lower growth than firms in the $L_{agency\ cost}$ (mean (median) GROWTH is 2.32 (0.57) for $H_{agency\ cost}$, whereas 6.45 (1.32) for $L_{agency\ cost}$). Firms in $H_{agency\ cost}$ have higher percentage of individual shareholders than firms in the $L_{agency\ cost}$ (mean (median) CONTROL is 0.45 (0.48) for $H_{agency\ cost}$, whereas 0.37 (0.47) for $L_{agency\ cost}$). Firms in $H_{agency\ cost}$ also have higher leverage and free cash flow than firms in the $L_{agency\ cost}$ ROA in $H_{agency\ cost}$ (mean=0.01; median=0.02) is significantly lower than that in $L_{agency\ cost}$ (mean=0.07; median=0.06).

<<Insert table 1 about here>>

4. Research method

4.1. Research sample and data collection

The target population consisted of all 1,147 Taiwan publicly traded companies listed in Market Observation Post System's (MOPS) database at the year-end of 2003. The questionnaire (in Chinese) was sent with a cover letter addressed to the controller or financial vice-president or controller electronically with the aids of securities authorities.

We asked the addressees to have the questionnaire completed by the person most knowledgeable about the company's annual budgeting activities. The questionnaire was pre-tested on a small group of academicians and managers prior to administration. This resulted in minor changes to some of the wording and the presentation of the questionnaire items. The questionnaire was administrated on August 1 2004 and a total of 240 responses (21%) were received by September 1 2004. Table 2 gives the industry composition of respondents. One hundred and six respondents out of 240 received are from electronics industry. The sample composition is similar to the industry composition of all listed companies.

<<Insert table 2 about here>>

There is weak evidence showing that the respondents are larger companies. Table 3, Panel A shows the firm size proxies of respondents² and non-respondents. There is no significant difference between respondents and non-respondents in terms of total assets and market value. Nevertheless, the total assets of all respondents is about 26% of total assets of all public traded companies and total market value of all respondents is about 27% of total market value of all public traded companies. Compared to 21% response rate of survey, at least some respondents are large companies. The significant

² Twenty-five respondents were excluded due to missing data on financial variables.

difference in the number of employees also suggests that respondents are larger companies. We control size in our subsequent tests.

Panel B shows summary statistics of ROA for the respondents and non-respondents. The respondents have lower ROA with a mean (median) of 0.04 (0.05) compared to 0.05 (0.05) for the non-respondents, but the difference is not significant. Panel C reports summary statistics of uncertainty variables. We use earnings volatility, technological volatility and sales volatility to proxy uncertainty. The respondents have significantly lower volatility measures. Panel D shows summary statistics of agency cost variables—MSH%, LNsales, GROWTH, CONTROL, LEV and FreeCF. The respondents have significantly higher LNsales and LEV, other variables are not significantly different. Panel E shows summary statistics of control variables. The respondents have significantly higher total assets and longer firm age compared with non-respondents. Overall, except volatility, this table highlights that the respondents' characteristics do not significantly differ with those of non-respondents.

<<Insert table 3 about here>>

4.2. Variable measurement

4.2.1. Definition of budget function

Textbooks (e.g., Horngren et al., 2003; Hansen & Mowen, 2000) and academic

research (e.g., Barrett & Fraser, 1977; Ekholm & Wallin, 2000; Hansen & Van der Stede, 2004) suggest that budgets signify multiple functions. Our questionnaire focuses primarily on the four functions of budget —planning, communication, control and performance evaluation.

Our definition of the budget function is consistent with those used in textbooks and academic research. Planning function of budget deems that budgeting is the operational guide to company activities. It identifies problems and forces managers to consider the different circumstances and further deal with the change of environment (Horngren, Datar, & Foster, 2003; Hansen & Mowen, 2000; Hansen & Van der Stede, 2004).

Control function of budget emphasizes to provide managers with realistic performance targets against which actual results can be compared. For example, management by exception is performed by identifying significant variances (differences between actual and budgeted amounts) that require corrective action if the firm is to achieve its goals (Helmkamp, 1987, p. 268).

When managers share information concerning goals, ideas, and achievements during budgeting, budgets provide communication function. Communication function also means that managers interact and develop an awareness of how each of their activities contributes to the firm's overall operation (Helmkamp, 1987, p. 268).

Evaluation function of budget is defined by Barrett & Fraser (1977) as budgets that provide meaningful evaluation of a company's or a manager's performance. Management can use operational budgets to motivate persons to help achieve the organization's overall objectives by committing themselves to a predetermined plan of action. Managers' level of compensation and upward mobility depend to a large degree on their performance. Emphasis on evaluation function helps to have managers committed to budgeted objectives.

4.2.2. Measurement of budget function

The measure of planning function of budget consisted of six items taken from management account literature (Cress & Pettijohn, 1985; Horngren et al., 2003). Items included whether the company established a budget committee, whether the chairman or the CEO is responsible for the preparation of budgets, whether managers are responsible for excessive cost estimates, and whether line managers collaborate on reducing excessive budget estimates. Respondent were asked to answer "YES" or "NO" to the items. An "YES" is coded '1' and "NO" is coded '0'. The other items include numbers of committee members and numbers of components of budgets. We ask respondents to indicate whether their committee members include division managers, department managers, lower level line supervisors, controller or financial vice-president,

and managers of related departments. We sum respondents' indications of participation of the above-mentioned positions as the measure of numbers of committee member. We ask respondents to indicate whether components of budgets include revenue budget, production budget, ending inventory budget, direct materials costs budget, direct manufacturing labor costs budget, manufacturing overhead costs budget, cost of goods sold budget, research and development expenditures budget, marketing expenditures budget. We sum respondents' indications of the above-mentioned components of a master budget as the measure of components of budgets. The variable Planning is the summation of all questionnaire items. The original score can range from zero to 22. We use quintile rankings to control for outliers in the variable and differential variation across budget function measurement. Higher ranking on Planning suggests relative emphasis of planning function of the respondent.

The measure of communication function was adapted from measures developed by Rasmussen & Elchorn (2000) and Merchant (1981). We ask respondents to indicate the application of balanced scorecard, benchmarking, activity-based budgeting to budget preparation. An "Yes" is coded '1' and "No", '0'. We also asked respondents to indicate horizons of their budget. The variable Communication is the summation of all answers to these questionnaire items. The original score can range from zero to six.

We use quintile rankings to control for outliers in the variable and differential variation across budget function measurement. Higher ranking on Communication suggests relative emphasis of communication function of the respondent.

Following Rasmussen & Elchorn (2000), Cress & Pettijohn (1985), Chow, Shields & Wong-Boren (1988), Laudeman & Schaeberle (1983) and Merchant (1981), we measure the control function from questionnaire items on variance investigation, variance investigation method, persons who are responsible for investigating the cause of a particular variance. We asked respondents to indicate whether CFO's or controllers are held responsible for the preparation of budgets. Respondents also indicate their budgeting approach, such as adoption of zero-based budgeting or any other method, used in preparing their current annual budgets. We also asked respondents to indicate whether they use statistical methods to determine if a particular cost variance should be investigated and what method they use to select variances for investigation.

Respondents indicate to whom the accountability for certain specified costs is charged.

Possible candidates include department managers and lower level line supervisors.

Respondents also give the frequency of reviewing operating results and analysis and variance investigation. We sum the measure scores for above items as measure of

control function. An "Yes" is coded '1' and "No", '0'. We also asked respondents to

indicate the frequency of budget revisions. The variable Control is the summation of all answers to these questionnaire items. The original score can range from zero to 28. We use quintile rankings to control for outliers in the variable and differential variation across budget function measurement. Higher ranking on Control suggests relative emphasis of control function of the respondent.

The measurement of performance evaluation is based on items taken from Rasmussen & Elchorn (2000), Cress & Pettijohn (1985), Chow, Shields & Wong-Boren (1988), and Shim & Siegel (1994). The respondents are asked to indicate whether their performance reports include production information (cost, quantity and quality), performance measures (sales, profit, return on investment, turnover of assets, income per sales dollar, market share, and growth rate), and variances (controllable and noncontrollable costs or current budgeted and past period actual amount). As to the distribution and use of performance reports, respondents indicate whether line managers are notified of significant variances from budgeted and the association of budgets with reward system. An “Yes” is coded ‘1’ and “No”, ‘0’. The variable Evaluation is the summation of all answers to these questionnaire items. The original score can range from three to 17. We use quintile rankings to control for outlier in the variable and differential variation across budget function measurement. Higher ranking on

Evaluation suggests relative emphasis of performance evaluation function of the respondent.

4.3. Performance measurement

We use the return on assets to proxy the firm performance. We are able to calculate return on assets both from parent company financial statements and from consolidated financial statements. Because the questionnaire is sent to the publicly traded companies, we expect the feedback from questionnaires reflects mostly the budgeting practice of the company. We opt for parent company's ROA in the following analysis. Nevertheless, the use of ROA calculated from consolidated financial statements gives similar empirical results. The return on assets (ROA) is obtained from the Taiwan Economic Journal (TEJ) database. ROA's are ranked from 1 (lower ROA) to 10 (higher ROA).

4.4. Control variables

The control variables for the dependent variable include firm size (nature log of total assets; LNta), recent growth in sales (change in sales/sales; Salesgro) and firm age (number of years with the firm; Age). Large corporations are more likely to use budget to control performance (Churchill, 1984). The control variables data are drawn from the Taiwan Economic Journal (TEJ) database.

4.5. Model

We use the following stacked regression to test hypotheses.

$$ROA = H_{Agency\ cost} * \begin{bmatrix} \beta_0 + \beta_1 Plan + \beta_2 Communication + \beta_3 Control \\ + \beta_4 Evaluation + \beta_5 \ln TA + \beta_6 Salesgro + \beta_7 Age \end{bmatrix} + L_{Agency\ cost} * \begin{bmatrix} \alpha_0 + \alpha_1 Plan + \alpha_2 Communication + \alpha_3 Control \\ + \alpha_4 Evaluation + \alpha_5 \ln TA + \alpha_6 Salesgro + \alpha_7 Age \end{bmatrix} + \varepsilon \quad (1)$$

Our empirical model is similar to Riedl (2004). Equation (1) represents the stacking of two regressions: the first where the observations are from the high agency cost ($H_{agency\ cost}$), and the second where the observations are from the low agency cost ($L_{agency\ cost}$). Thus, $H_{agency\ cost}$ is an indicator variable equal to 1 for observations occurring high agency cost (0 otherwise), and the β coefficients measure associations between firm performance and the budget function variables for the $H_{agency\ cost}$ observations. Similarly, $L_{agency\ cost}$ is an indicator variable equal to 1 for observations occurring in the $L_{agency\ cost}$ (0 otherwise), and the α coefficients measure the same associations for the $L_{agency\ cost}$ observations. The stacking of the equations allows statistical tests of differences in coefficient estimates across the $H_{agency\ cost}$ and $L_{agency\ cost}$.

5. Empirical results

5.1. Univariate results

Table 4 presents descriptive statistics for return on asset (ROA). Firms facing higher agency cost ($H_{agency\ cost}$) results in lower ROA. The difference between high and low agency cost in terms of ROA is significant. Firms facing higher uncertainty

($H_{uncertainty}$) do not show significant difference in terms of ROA. The results are consistent with adverse effects of agency cost on firm performance.

<<Insert table 4 about here>>

Table 5 contrasts the univariate relation between each budget function and ROA between high and low agency cost groups. For high agency cost ($H_{agency\ cost}$) firms, respondents giving more attention to the planning function have significantly higher ROA (mean=0.02; median=0.02) than those giving less attention to (mean=0.00; median=0.01). For low agency cost ($L_{agency\ cost}$) firms, ROA for respondents giving more attention to the planning function (mean=0.07; median=0.06) is not significantly higher than those giving less attention to (mean=0.06; median=0.06). Communication and performance evaluation functions give similar results.

In case that firm responds higher agency cost with more emphasis on planning, communication, and performance evaluation functions in their budgeting, they might result in higher firm performance. This suggest that budgets help tackle with agency costs.

Firm performance does not differ between firms with more weight on control function of budget and firms with less weight.

<<Insert table 5 about here>>

Table 6 presents the Person correlations among variables in regression model.

Budget functions are positively correlated. Other correlation coefficients are less than 0.20.

<<Insert table 6 about here>>

5.2. Regression results

The results of equation (1) are summarized in Table 7. Panel A presents the result for the full sample. Difference of association between $H_{agency\ cost}$ and $L_{agency\ cost}$ subsamples between control function of budget is significantly negative. For firms with higher agency cost, emphasis of control function of budgets does not help on firm performance. Kluger & DeNisi (1996) find that managers can change the goal if they have the ability to do so. Managers' commitment to the goal is accordingly reduced. While some of our respondents intend to use their budgets to monitor activities, it seems that agency cost prevents the success of monitoring for these firms.

Association between performance evaluation function of budget and firm performance significantly differs between $H_{agency\ cost}$ and $L_{agency\ cost}$ subsamples. For firms with higher agency cost, use of budget-based incentives can motivate managers and enhance firm performance.

Several studies highlight that the usefulness of budgets depends on uncertainty. We

test the association between budget functions and firm performance in different uncertainty levels ($H_{uncertainty}$ and $L_{uncertainty}$). Results in Panel B for $H_{uncertainty}$ subsample are similar to those for full sample. Budgeting is more difficult in case of higher uncertainty. For respondents with higher agency cost, emphasis on control function may create budget slack and discourage truth-telling. Meeting budgeted goals may actually mean lower achievements. Unlike results in full sample, putting more weight on performance evaluation function also improves firm performance. The difference of association between evaluation function and performance is insignificant across $H_{agency\ cost}$ and $L_{agency\ cost}$ subsamples.

Panel C reports the result for low uncertainty subsample. It seems that budgets do not play a significant role in a stable environment. The association of budget function and performance depends more on the level of uncertainty.

In summary, evaluation function of budget can moderate the agency problem, and increase firm performance, especially under higher uncertainty condition. Putting more weight on control function compounds agency problem, and decreases firm performance. The adverse effect of control function on firm performance is more obvious in $H_{agency\ cost}$ subsample.

5.3. Additional tests

We use different performance measures and get similar results. We use industry adjusted ROA as firm performance measures. The results remained unchanged. As discussed in Section 4, variables taken from public sources are either decile ranked or quintile ranked. In addition, we use un-ranked numerals and get very similar results.

Excluding negative earnings participants does not change our conclusion on adverse effect of control function. The moderating effect of planning is observed in this sample. Planning function increases firm performance in $H_{agency\ cost}$ subsample in full sample.

Results remain unchanged when we exclude finance companies or using ROA calculated from consolidated financial statements. Use Tobin's Q instead of ROA ends up with similar results.

6. Conclusion

Prior research suggests that budgets can alleviate agency problems. Studies also show that budget function lead to better performance. We contrast the relationship between budget function and firm performance across subsamples with different level of agency cost. We find that control function has an adverse effect on firm performance in high agency cost subsample. Emphasis on control function intensifies the adverse effect of agency cost on firm performance. The performance evaluation function of budget is positively associated with firm performance. Emphasis on evaluation function

moderates the adverse effect of agency cost on firm performance.

Previous studies show that the use of budget depends on environmental uncertainty.

We examine the relationship between budget function and firm performance across subsamples with different level of uncertainty. The four budget function are not significantly associated with firm performance in low uncertainty subsample. Budgets do not have a significant role in a stable environment. Results in high uncertainty subsample is similar to full sample except that the evaluation function is also significantly positively associated with firm performance.

The association between budget function and firm performance is somewhat different with prior studies. The discrepancy may come from the use of different performance measure and/or participants from a different country.

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Table 1
K-means clustering results

	Cluster 1		Cluster 2		Difference	
	Mean	Median	Mean	Median	<i>t</i> test	Z test
	H _{uncertainty} (N=100)		L _{uncertainty} (N=115)			
Panel A: Uncertainty						
Earnings volatility	0.45	0.58	-16.42	0.30	16.87	0.28
Technological volatility	0.79	0.76	0.58	0.56	0.21**	0.20***
Sale volatility	0.48	0.40	0.23	0.22	0.25**	0.18***
ROA	0.05	0.05	0.04	0.04	0.01	0.01***
Panel B: Agency cost						
	H _{agency cost} (N=106)		L _{agency cost} (N=109)			
MSH%	1.12	0.29	1.16	0.44	-0.04	-0.15
LNsales	15.06	15.11	14.83	14.72	0.23	0.39*
GROWTH	2.32	0.57	6.45	1.32	-4.13	-0.75***
CONTROL	0.45	0.48	0.37	0.47	0.08***	0.01
LEV	0.55	0.51	0.34	0.34	0.21***	0.17***
FreeFC	0.72	1.00	0.23	0.22	0.49***	0.78***
ROA	0.01	0.02	0.07	0.06	-0.06***	-0.04***

1. This table presents the cluster-wise mean /median value of the variables that are used to segregate firms into two clusters. Panel A presents subsamples of high and low uncertainty, panel B of high and low agency cost.

2. Variables definitions:

ROA= return on assets; *Earnings Volatility*= The coefficient of variation of earnings before interest and taxes over the past six years, weighted by corporate sales; *Technological Volatility*= the coefficient of variance of the average ratio of the sum of research and development expenditures and capital expenditures to total assets over the past six years; *Sale Volatility*= the coefficient of variation of sales over the past six years; *MSH%*= the percentage of top management shareholding in the company; *LNsales*=ln(sales); *GROWTH*=book value of equity/ market value of equity; *CONTROL*= the percentage of capital owned by individual shareholders; *LEV*= the ratio of total debt to total assets *FreeCF* = 1- dividend/earnings;

3. *significant at p<0.01; ** significant at p<0.05;*** significant at p<0.1.

Table 2

Industry classification of respondents

Industry	Questionnaires mailed ¹	Responses	Response rate (%)
Cement	8	4	50%
Food	28	3	11%
Plastics	28	6	21%
Textiles	63	16	25%
Electric, Machinery	52	13	25%
Appliance, Cable	16	2	13%
Chemical	66	18	27%
Glass, Ceramics	8	0	0%
Paper, Pulp	13	2	15%
Steel, Iron	33	11	33%
Rubber	10	5	50%
Automobile	4	1	25%
Electronics	592	106	18%
Construction	55	11	20%
Transportation	23	7	30%
Tourism	10	1	10%
Banking, Insurance	57	23	40%
Other	81	11	14%
Total	1147	240	21%

1. This table presents the industry composition for the population and sample observations.

2. The target population consisted of 1,147 Taiwan all publicly traded companies listed in Market Observation Post System's (MOPS) 2003/12/31 database.

Table 3

Descriptive statistics for variables: Respondents versus non-respondents

	Respondents (N=215)		Non-respondent (N=828)		Difference	
	Mean	Median	Mean	Median	t-test	Z-test
Panel A: Firm size						
Total asset (billion)	14.30	3.40	10.20	2.70	4.10	0.70
as of all listed firms(%)	26.00		74.00			
Market value (billion)	16.90	3.0	11.4	2.2	5.50	0.80
as of all listed firms(%)	27.00		73.00			
Number of employees	1053	358	634	265	419**	93
Panel B: Performance						
ROA	0.04	0.04	0.05	0.05	-0.00	-0.01
Panel C: Uncertainty variables						
Earnings Volatility	-9.18	0.43	0.59	0.40	-9.77**	0.03
Technological Volatility	0.67	0.63	0.71	0.64	-0.04**	-0.01
Sales Volatility	0.74	0.66	0.80	0.70	-0.06**	-0.03
Panel D: Agency Cost variables						
MSH%	1.15	0.37	1.24	0.38	-0.09	-0.01
LNsales	14.94	14.89	14.64	14.50	0.31***	0.40***
GROWTH	4.42	0.91	3.19	0.78	1.23	0.13
CONTROL	0.41	0.48	0.41	0.47	-0.00	0.01
LEV	0.45	0.43	0.42	0.41	0.03*	0.02
FreeCF	0.48	0.37	0.43	0.31	0.05	0.06
Panel E: Control variables						
Salesgro	26.93	10.57	23.59	12.21	3.35	-1.65
LNTA	15.58	15.35	15.10	14.88	0.48***	0.48***
Age	25.49	25.00	22.12	20.00	3.37**	5.00***

1. This table shows the mean (median) of the variables use in regression analyses and size measures.
2. Variables definitions:
ROA= return on assets; *Earning Volatility*= The coefficient of variation of earnings before interest and taxes over the past six years was used, again weighted by corporate sales; *Technological Volatility*= the coefficient of variance of the average ratio of the sum of research and development expenditures and capital expenditures to total assets over the past six years; *Sale Volatility*= the coefficient of variation of sales over the past six years; *MSH%*= the percentage of top management shareholding in the company; *LNsales*=ln(sales); *GROWTH*=book value of equity/ market value of equity; *CONTROL*= the percentage of capital owned by individual shareholders; *LEV*= the ratio of total debt to total assets; *FreeCF* = 1- dividend/earnings; *SALES**GRO*= change in sales/sales; *LNTA*= nature log of total assets; *AGE*=number of years with the firm.
3. *significant at p<0.01; ** significant at p<0.05;*** significant at p<0.1(two-tailed test)

Table 4

Adverse effects of agency cost on firm performance (ROA)

	$H_{uncertainty}^2$		$L_{uncertainty}$		difference	
	mean	median	mean	median	t-test	Z-test
$H_{agency\ cost}^2$	0.02	0.02	0.01	0.01	0.01	0.01
	(N=51)		(N=55)			
$L_{agency\ cost}$	0.07	0.06	0.07	0.06	0.00	0.00
	(N=49)		(N=60)			
difference	-0.05***	-0.05***	-0.06***	-0.05***		

1. This table presents descriptive statistics for return on assets (ROA) under each cell.
2. We use cluster analysis to separate $H_{uncertainty} / L_{uncertainty}$ and $H_{agency\ cost} / L_{agency\ cost}$. The uncertainty variables include *Earning Volatility*= The coefficient of variation of earnings before interest and taxes over the past six years was used, again weighted by corporate sales; *Technological Volatility*= the coefficient of variance of the average ratio of the sum of research and development expenditures and capital expenditures to total assets over the past six years; *Sale Volatility*= the coefficient of variation of sales over the past six years; The agency cost variables include *MSH%*= the percentage of top management shareholding in the company; *LNsales*=ln(sales); *GROWTH*=book value of equity/ market value of equity; *CONTROL*= the percentage of capital owned by individual shareholders; *LEV*= the ratio of total debt to total assets *FreeCF* = 1- dividend/earnings.
3. *significant at $p < 0.01$; ** significant at $p < 0.05$; *** significant at $p < 0.1$

Table 5

Budget function and performance (ROA) across high and low agency cost groups²

		$H_{agency\ cost}$		$L_{agency\ cost}$		Difference	
		Mean	Median	Mean	Median	t-test	Z-test
Planning ³	More weight (N=56)	0.02	0.02	0.07 (N=56)	0.06	-0.05	-0.04
	Less weight (N=50)	0.00	0.01	0.06 (N=53)	0.06	-0.06	-0.05
	Difference	0.02*	0.01	0.010	0.004		
Control	More weight (N=51)	0.01	0.01	0.08 (N=63)	0.06	-0.07	-0.05
	Less weight (N=55)	0.01	0.02	0.06 (N=46)	0.06	-0.05	-0.04
	Difference	0.00	0.00	0.02	0.00		
Communication	More weight (N=58)	0.02	0.01	0.07 (N=57)	0.06	-0.05	-0.05
	Less weight (N=48)	0.00	0.02	0.07 (N=52)	0.06	-0.07	-0.04
	Difference	0.02	-0.01	0.00	0.00		
Evaluation	More weight (N=50)	0.03	0.02	0.07 (N=63)	0.06	-0.04	-0.04
	Less weight (N=56)	-0.01	0.01	0.07 (N=46)	0.06	-0.08	-0.06
	Difference	0.04***	0.01**	0.00	0.00		

1. This table reports the mean (median) of the ROA under each cell.
2. Observations are grouped into high and low agency cost groups as described in table 4.
3. Emphasis on the four budget functions are measured with returned questionnaires. Firms with score above median are said to have more weight on that budget function in their budgeting..
4. *significant at $p < 0.01$; ** significant at $p < 0.05$; *** significant at $p < 0.1$

Table 6
Pearson Correlations among variables in study

Variables	ROA	Agency	Planning	Communication	Control	Evaluation	LNTA	Sales
Agency	-0.45***	1.00						
Planning	0.06	-0.03	1.00					
Communication	-0.02	0.04	0.47***	1.00				
Control	-0.05	0.11	0.54***	0.43***	1.00			
Evaluation	0.05	0.07	0.51***	0.50***	0.50***	1.00		
LNTA	0.11*	-0.06	-0.03	0.11	-0.01	0.07	1.00	
Sales	-0.14**	0.17**	-0.07	0.22***	0.09	0.18**	0.06	1.00
Age	-0.17***	0.03	-0.18***	0.09	-0.07	-0.07	-0.17***	0.30***

1. *ROA*= return on assets; *Agency*= cluster result(1=high agency; 0=low agency);*Planning*, *Communication*, *Control* and *Evaluation* defined by questionnaire; *Salesgro*= change in sales/sales; *LNTA*= nature log of total assets; *Age*=number of years with the firm.
2. *significant at $p < 0.01$; ** significant at $p < 0.05$;*** significant at $p < 0.1$

Table 7
Regression results

Variables	H _{agency cost} (N=106)		L _{agency cost} (N=109)		Hypothesis	Difference predicted	Difference
	Coefficient	t-statistic	Coefficient	t-statistic			
Panel A: full sample							
Intercept	5.86	2.87***	8.24	3.11***			-2.38
Planning	-0.24	-0.88	-0.07	-0.25	H1a	+	-0.17
Control	-0.41	-2.04**	0.25	1.31*	H1b	-	-0.66***
Communication	0.21	0.86	-0.13	-0.62	H1c	+	0.34
Evaluation	0.77	3.29***	-0.06	-0.24	H1d	+	0.83***
Salesgro	0.02	1.81*	0.00	0.63			0.02*
LNTA	-0.17	-1.33	-0.02	-0.13			-0.15
Age	-0.01	-0.40	-0.05	-2.50***			0.04
Model Adj-R ²	0.43						
Mode F-test	95.38						
Panel B: High uncertainty(H_{uncertainty})							
	(N=51)		(N=49)				
Variable	Coefficient	t-statistic	Coefficient	t-statistic			Difference
Intercept	6.41	2.00	12.86	2.49			-6.45
Planning	-0.40	-1.06	-0.42	-1.07	H1a	+	0.02
Control	-0.69	-1.87*	0.50	1.88*	H1b	-	-1.19***
Communication	0.20	0.61	-0.43	-0.97	H1c	+	0.63
Evaluation	1.34	4.22***	0.62	1.58*	H1d	+	0.73
Salesgro	0.02	1.18	0.00	0.96			0.01
LNTA	-0.24	-1.07	-0.43	-1.26			0.19
Age	0.01	0.25	-0.04	-1.20			0.05
Model Adj-R ²	0.43						
Mode F-test	53.59						
Panel C: Low uncertainty(L_{uncertainty})							
	(N=55)		(N=60)				
Variable	Coefficient	t-statistic	Coefficient	t-statistic			Difference
Intercept	3.07	1.20	8.00	3.31***			-4.93
Planning	0.08	0.19	0.23	0.76	H1a	+	-0.15
Control	-0.20	-0.74	-0.11	-0.44	H1b	-	-0.10
Communication	0.04	0.11	-0.05	-0.21	H1c	+	0.09
Evaluation	0.16	0.52	-0.34	-1.35***	H1d	+	0.51
Salesgro	0.02	2.12**	0.04	3.05***			-0.02

LNTA	0.02	0.11	0.02	0.13	0.00
Age	-0.00	-0.18	-0.05	-1.84**	0.04

Model Adj-R² 0.44

Mode F-test 99.36

- *significant at p<0.01; ** significant at p<0.05;*** significant at p<0.1(one-tailed test)
- We use the cluster analysis to separate $H_{uncertainty} / L_{uncertainty}$ from $H_{agency\ cost} / L_{agency\ cost}$.
The uncertainty variables include *Earning Volatility*= The coefficient of variation of earnings before interest and taxes over the past six years was used, again weighted by corporate sales; *Technological Volatility*= the coefficient of variance of the average ratio of the sum of research and development expenditures and capital expenditures to total assets over the past six years; *Sale Volatility*= the coefficient of variation of sales over the past six years; The agency cost variables include *MSH%*= the percentage of top management shareholding in the company; *LNSales*=ln(sales); *GROWTH*=book value of equity/ market value of equity; *CONTROL*= the percentage of capital owned by individual shareholders; *LEV*= the ratio of total debt to total assets *FreeCF* = 1- dividend/earnings.
- We use the following stacked regression to test hypotheses.

$$ROA = H_{Agency\ cost} * \begin{bmatrix} \beta_0 + \beta_1 Plan + \beta_2 Communication + \beta_3 Control \\ + \beta_4 Evaluation + \beta_5 \ln TA + \beta_6 Salesgro + \beta_7 Age \end{bmatrix} + L_{Agency\ cost} * \begin{bmatrix} \alpha_0 + \alpha_1 Plan + \alpha_2 Communication + \alpha_3 Control \\ + \alpha_4 Evaluation + \alpha_5 \ln TA + \alpha_6 Salesgro + \alpha_7 Age \end{bmatrix} + \varepsilon$$

This equation represents the stacking of two regressions: the first where the observations are from the high agency cost (Hagency cost), and the second where the observations are from the low agency cost (Lagency cost). Thus, Hagency cost (Lagency cost) is an indicator variable equal to 1 for observations occurring high agency cost (low agency cost), and 0 otherwise. The coefficients measure associations between firm performance and the budget function variables for the Hagency cost (Lagency cost) observations. The stacking of the equations allows statistical tests of differences in coefficient estimates across the Hagency cost and Lagency cost.

Planning, Communication, Control and Evaluation collect form questionnaire. Salesgro= change in sales/sales; LNTA= nature log of total assets; Age=number of years with the firm.