The Performance Consequences of the "Fit" between Management Accounting and Control Systems and Environmental Uncertainty

Neale G. O'Connor
School of Business
The University of Hong Kong
Hong Kong
oconnor@business.hku.hk

Sandra C. Vera-Muñoz*
248 Mendoza College of Business
University of Notre Dame
Notre Dame, IN 46556-5646
sveramun@nd.edu

Francis Chan
Dept of Accounting
Hong Kong Shue Yan University
swchan@hksyc.edu

September 23rd, 2008

*Corresponding author

The authors gratefully acknowledge the helpful comments and suggestions of Shannon Anderson, Gary Biddle, Robert Chenhall, Kyonghee Kim, Frank Selto, Mike Shields, and workshop participants at the 2008 AAA Management Accounting Research Conference, the 2008 Global Management Accounting Research Symposium, the 2008 European Accounting Association Conference, Macquarie University, The University of Hong Kong, and City University of Hong Kong. We are indebted to Chee W. Chow for his guidance in the early stages of this study, and to Gongmeng Chen for his invaluable help with the logistics of the data collection.

The Performance Consequences of the "Fit" between Management Accounting and Control Systems and Environmental Uncertainty

ABSTRACT: Environmental uncertainty (EU) is a frequently cited contingency factor in the extant accounting research on the adoption and use by firms of management accounting and control systems (MCS); however, most of these previous studies have examined a single EU dimension. The broader contingency literature agrees that there are three distinct types of EU, complexity (i.e., heterogeneity of suppliers, customers, and competitors), dynamism (i.e., unpredictable changes in the environment), and munificence (i.e., abundance or scarcity of critical resources), and that all three of these dimensions should be considered in order to understand the role played by MCS in meeting information demands and facilitating resource control. This paper provides new evidence on the performance consequences of the "fit" between the three EU dimensions and the use of MCS by firms. We combine archival and survey-based data collected from publicly listed firms that operate in a transitional economy. We predict and find that either over- or under-emphasis on formal and behavioral MCS in relation to EU adversely affects firm performance. Surprisingly, we find that high- (low-) performing firms make less (greater) use of formal and behavioral MCS when they operate in more dynamic environments and when critical resources are abundant, while this firm performance-MCS use relationship reverses when firms operate in more complex environments. We discuss the practical implications and contributions of our findings and suggest directions for future research.

Keywords: *management accounting and control systems; environmental complexity, dynamism, and munificence; accounting-based performance; economic-based performance.*

Data Availability: The data are available from the first author upon request.

I. INTRODUCTION

This study investigates the implications of the "fit" (or lack thereof) between management accounting and control systems (hereafter MCS) and environmental uncertainty (hereafter EU) on current and future firm performance. EU and MCS vary across firms; in turn, the adoption of appropriate MCS determines the performance consequences of such controls. The importance of this inquiry is twofold. First, EU is a frequently cited contingency factor in the extant accounting research on the adoption and use by firms of MCS; however, with a few notable exceptions (Gul and Chia 1994; Chenhall and Morris 1986; Gordon and Narayanan 1984), most of these previous studies have examined a single EU dimension. The broader contingency literature agrees that there are three distinct types of EU: complexity (i.e., the heterogeneity of suppliers, customers, and competitors); dynamism (i.e., unexpected or unpredictable changes in the environment); and munificence (i.e., the abundance or scarcity of critical resources) (Lawless and Finch 1989; Keats and Hitt 1988; Dess and Beard 1984). We collectively refer to these types as exogenous dimensions. However, little systematic evidence of the effects of the "fit" between MCS and the various EU dimensions studied in combination with accounting- and economic-based firm performance has been presented.

Second, most of the prior studies assume that the performance effects of MCS are the same for all firms. Few studies to date have addressed the fundamental question about the fit of MCS—or parts thereof—with the firm environment or the effect of this fit (or lack thereof) on firm performance (e.g., see Banker and Mashruwala 2007; Said et al. 2003; Ittner et al. 2002). Contingency research (e.g., Widener 2007; Chenhall and Chapman 2006; Anderson and Dekker 2005; Donaldson 2001; Hartmann and Moers 1999) posits that MCS adoption is an endogenous choice, with net benefits and costs that vary depending upon a firm's environmental

characteristics. Consistent with this view, we examine the following research question: Is firm performance enhanced when MCS are more closely aligned with environmental complexity, dynamism, and munificence?

We use publicly listed firms that operate in China's transitional economy to address this research question. The population from which we draw our sample of firms is ideal for our study for two reasons. First, publicly traded firms in China have undergone a gradual and selective economic reform process (Wolfensohn 2002) to compete in a market-based economy, which, in turn, has led to a gradual transition from an informal, government-directed management style to modern management practices that include the use of "Western" MCS.[1] This enables us to draw a sample of firms that are more likely to be moving toward the optimal use of MCS relative to their developed-nation counterparts. Second, the firms in our sample are relatively young in age, with an average age of 9.5 years,[2] which allows us to capture the first MCS that these firms chose to adopt to compete in domestic and foreign markets. This is one of the most important decisions that a newly listed firm makes (Davila and Foster 2005).

We use the firm as the unit of analysis and focus on two groups of MCS practices—formal controls (formal planning and budgeting) and behavioral controls (participative budgeting/performance evaluation and socialization practices)—as assessed by senior- and middle-level managers (i.e., profit-center managers in various divisions, branches, or units and cost-center managers) (Merchant and Otley 2006).[3] We use two types of firm performance measures, one constructed from senior managers' assessments of their firms' performance (i.e., subjective-based), and the other comprising a set of empirical constructs based on accounting- and market-based data.

Following Donaldson (2001), we examine systematically the performance effects of the "fit" between firms' use of, and emphasis on, MCS and their EU in two ways. First, we develop a prediction residuals model (e.g., Ittner et al. 2003, 2002; Said et al. 2003) to examine whether firm performance is enhanced by MCS practices that are more closely aligned with a combination of the three environmental dimensions. We find that too little (but not too much) use of formal MCS relative to a benchmark (i.e., predicted by the line of best fit) adversely affects subjective- and accounting-based performance. Further, either too much or too little use of behavioral MCS relative to that benchmark also adversely affects subjective- and market-based performance. Our results are corroborated using sub-group analyses that indicate significant differences in the adjusted-R^2 between the sub-groups of firms split according to the industry-adjusted median of return on assets (ROA) and sales growth.

Second, we conduct sub-group analyses whereby we split our sample of firms into high- and low-performers based on subjective-, accounting-, and economic-based performance measures, and we then test for differences in both the explanatory power and the regression parameters of regression models run separately for each sub-group (Anderson and Dekker 2005, 1747; Donaldson 2001, 204). These tests allow us to examine more closely the performance effects of the MCS-environment "fit" by examining each EU dimension separately. We predict that high- (low-) performing firms that operate in more complex environments will make greater (less) use of formal and behavioral MCS, and we find support for this prediction when we use accounting measures of performance (i.e., ROA and sales growth). We also predict that high- (low-) performing firms that operate in more dynamic and munificent environments will make less (greater) use of formal controls and greater (less) use of behavioral controls. We find support for our prediction of an inverse (direct) relationship between use of formal controls by high-

(low-) performing firms and environmental dynamism, but we only find partial support for our prediction regarding environmental munificence (i.e., only for market-based performance). Contrary to our predictions, we find that high- (low-) performing firms make less (greater) use of behavioral MCS when they operate in more dynamic environments and when critical resources are abundant.

Taken together, our results suggest that high-performing firms respond to the heterogeneity of products, customers, and competitors (i.e., factors that increase environmental complexity) by increasing their emphasis on formal planning and budgeting, and on organic controls that focus on employee participation and learning, while low-performing firms do the opposite. In contrast, high-performing firms under-emphasize formal and behavioral controls in the face of more environmental unpredictability and more abundance of critical resources, while low-performing firms do the opposite. Our findings are consistent with the argument that high-performing, relatively young publicly-listed firms facing extreme environmental complexity that threatens their short-term survival initially tighten their controls via planning and budgeting to sustain their performance. The greater emphasis on formal MCS by these firms is accompanied by a higher emphasis on behavioral MCS that would otherwise afford these firms a more informal and flexible socialization system. Our findings extend recent research that addresses the performance effects of MCS adoption decisions by early-stage/startup companies versus mature firms (Sandino 2007; Davila and Foster 2005, 2007).

Our study contributes to the management accounting and control literature in three other ways. First, it contributes to the contingency literature that examines the association between either or both of two common EU dimensions (complexity and dynamism) and MCS (e.g., Ghosh and Willinger 2006; Gosselin 2005). However, to date, the effect of a third dimension—

environmental munificence (e.g., the abundance or scarcity of vital resources)—has largely been ignored, even though it has been found to affect firm performance (Tan et al. 2005; Kreiser and Marino 2002, 899; Lawless and Finch 1989, 354; Dess and Beard 1984, 55). Second, a criticism related to contingency-based research is that many studies have focused on specific dimensions of MCS, with a limited number of studies examining broader elements of control, including informal controls. Our study fills this gap by examining both formal and informal (behavioral) MCS. Finally, our study also makes a methodological contribution. Recent researchers have criticized the use of inappropriate proxies to measure theoretical constructs (Luft and Shields 2003; Ittner and Larcker 2001).[4] Consistent with recent contingency research that considers multiple data sources and performance effects (e.g., Widener 2007; Anderson and Dekker 2005; Ittner et al. 2003, 2002; Said et al. 2003), we use an expanded set of independent and performance variables obtained from annual reports and market databases, and a comprehensive—if not exhaustive—set of management accounting and controls. We use multiple data collection methods and performance measures (archival- and survey-based) to minimize the limitations of common response bias and other such biases that are normally associated with the survey method (e.g., see Atkinson et al. 1997).

The remainder of this paper is organized as follows. Section II presents a literature review and develops our research hypotheses and Section III describes our research method. Section IV reports our results, and Section V discusses the implications of our findings and the study's limitations and provides directions for future research.

II. RELATED LITERATURE, RESEARCH QUESTION, AND HYPOTHESES

Formal and Behavioral Management Accounting and Control Systems

An organization's structure includes MCS, which comprise the mechanisms that high-level managers use to encourage their subordinates to make decisions that are consistent with the organization's strategic goals (Anthony and Govindarajan 2001b, 6). The central objectives of MCS are to provide and communicate information that is useful in decision-making, planning, and evaluation (Merchant and Otley 2006) and to design appropriate performance evaluations and rewards to attract, retain, and motivate qualified employees (Anthony and Govindarajan 2001a, 59; Merchant 1985).

Panel A of Figure 1 provides the theoretical framework for our study and is used to guide our discussion hereafter. Consistent with the contingency literature (Chenhall 2007), we group MCS into two areas: (1) formal controls, including planning and budgeting (Chow et al. 1996), and (2) behavioral/cultural controls, including participative budgeting/performance evaluation (Chow et al. 1999) and socialization practices (Pascale 1985). Together, these MCS help to enhance firm performance in several ways. First, formal controls enhance goal congruence and help management to assign responsibility and motivate personnel (Dyson and Foster 1982). Second, behavioral controls facilitate delegation and learning through information exchange, which, in turn, can boost organizational adaptation, market responsiveness (Bushman et al. 2000), and managerial motivation (Malina and Selto 2001; Kren 1992; Chenhall and Brownell 1988; Merchant 1981). Further, socialization practices, such as training, enhance managers' ability to process information properly (Bazerman 2005) and facilitate the open sharing of knowledge among the members of management teams (Vera-Muñoz et al. 2006; Widener 2007).[5, 6]

Insert Figure 1 about here

Performance Consequences of the "Fit" between MCS and Environment

In general, if firms make optimal MCS choices, then we would expect that only the best-performing firms would survive. Thus, there should be no association between performance and MCS use once the environmental (exogenous) dimensions are statistically controlled for (Drazin and Van de Ven 1985). Importantly, however, contingency and economic theories (e.g., Widener 2007; Chenhall and Chapman 2006; Anderson and Dekker 2005; Donaldson 2001; Hartmann and Moers 1999) posit that MCS adoption is an endogenous choice, with net benefits and costs that vary depending upon a firm's environmental characteristics.[7] The broader contingency literature agrees that there are three distinct types of EU: complexity (i.e., the heterogeneity of suppliers, customers, and competitors); dynamism (i.e., unexpected or unpredictable changes in the environment); and munificence (i.e., the abundance or scarcity of critical resources) (Lawless and Finch 1989; Keats and Hitt 1988; Dess and Beard 1984). We refer to these types collectively as exogenous dimensions (they are discussed in more detail in the next section).

Contingency theory suggests that both high- and low-performing firms exist as a result of more or less successful combinations of MCS with the environment (Chenhall and Chapman 2006, 39; Gerdin and Greve 2004, 307; Donaldson 2001; Haveman 1992). That is, MCS are developed in conjunction with, and evolve to fit the needs of, management (Chow et al. 1994; Fisher 1995; Otley and Wilkinson 1988; Drazin and Van de Ven 1985). Based on the above discussion, we propose the following research question (RQ1).

Research Question 1: Is there an association between firm performance and the extent to which management accounting and control systems are aligned with a firm's environmental complexity, dynamism, and munificence?

Next, we examine more closely the "fit" hypotheses for the use of formal and behavioral MCS by high- and low-performing firms, given the three EU dimensions. Panel B of Figure 1 provides a summary of our hypotheses and is used to guide our discussion hereafter.

Environmental Complexity and MCS

Complexity refers to the heterogeneity and range of an organization's activities (Dess and Beard 1984, 56), and it increases naturally as the number of suppliers, customers, and competitors increases (Lawless and Finch 1989, 354; Williamson 1975). In general, firms that operate in a more heterogeneous environment have greater information-processing requirements than do firms that operate in a more homogeneous environment (Kreiser and Marino 2002, 899; Hambrick 1983; Tung 1979; Pennings 1975).

The decision-facilitating role of MCS becomes critical for firms in highly complex environments for several reasons. First, market competition generates a number of pressures on firms, such as the increasing need to control costs, supply higher-quality goods and services, and meet uncertain levels of demand (Li 1997, 1101; Khandwalla 1972). Further, supplier, customer, and product complexities increase knowledge transfer costs, which, in turn, are likely to increase the value of formal information systems (Nagar 2002; Jensen and Meckling 1992; Melumad and Reichelstein 1987).[8] Such competitive pressures also highlight the importance of gathering more timely cost, quality, and other non-financial information (Davila and Foster 2005; Krishnan 2005; Gordon and Narayanan 1984), which, in turn, increases the need for formal planning. Also, the need to manage capacity, the timing of orders, and the scheduling of deliveries to key

customers (Li 1997; Abernethy and Lillis 1995) increases the demand for formal performance evaluation and such decentralization mechanisms as participative budgeting (e.g., see Bushman et al. 1995; Lambert and Larcker 1987; Simons 1987).

Second, global expansion adds to the scale and complexity of operations in new ways, such as the need to train management to deal with different legal environments and business practices (Davila and Foster 2005; Chalos and O'Connor 2004). These activities, in turn, are likely to increase the monitoring value of budget controls, which help management to motivate goal-congruent behavior and to retain and attract high-quality employees (O'Connor et al. 2006; Zhongguo 1997, 1). Because of the need for the more efficient gathering and sharing of knowledge (Ring and Van De Ven 1994), organizational learning (Levinthal and March 1993), and the reduction of information ambiguity (Worm and Frankenstein 2000), complex environments also highlight the monitoring value of socialization practices. Based on this discussion, we propose the following hypotheses for the performance consequences of the "fit" between complexity and the use of formal and behavioral MCS:

H1a: High- (low-) performing firms that operate in more complex environments will make greater (less) use of formal (planning and budgeting) MCS than will their counterparts in less complex environments.

H1b: High- (low-) performing firms that operate in more complex environments will make greater (less) use of behavioral (participative budgeting/performance evaluation and socialization practices) MCS than will their counterparts in less complex environments.

Environmental Dynamism and MCS

Dynamism refers to the rate of change and innovation in an industry (Kreiser and Marino 2002; Lawless and Finch 1989, 355; Dess and Beard 1984), as well as to the uncertainty or unpredictability of the actions taken by competitors and customers (Miller and Friesen 1983, 222).[9] Firms that operate in a dynamic environment need to monitor quickly changing conditions, assess their impact on the firm, and rapidly prepare and execute strategic responses (e.g., Milliken 1987). Highly volatile environments tend to limit the effectiveness of formal controls (planning and budgeting) owing to the unpredictability of future events. In particular, volatile environments limit a firm's ability to plan activities ahead of their execution (Galbraith 1973). Volatility also forces managers to respond quickly to unpredictable change, which may render certain budgeting practices, such as static budgets, ineffective, because the initial standards that guided these budgets rapidly become outdated (Chenhall and Morris 1986, 18).

At the same time, firms in highly volatile environments (e.g., fast-growing industries) are more likely to rely on behavioral controls due to their effectiveness in helping to manage the separation of ownership and control between senior- and middle-level managers. To take advantage of the knowledge and experience of division managers, especially those with good access to customers and suppliers (Jensen 1998), firms tend to increase their delegation of authority and decision rights via behavioral controls, such as participative budgeting (Ezzamel 1990; Brownell 1982). Based on this discussion, we propose the following hypotheses for the performance consequences of the "fit" between dynamism and the use of formal and behavioral MCS.

H2a: High- (low-) performing firms that operate in more dynamic environments will make less (greater) use of formal controls (planning and budgeting) than will their counterparts in less dynamic environments.

H2b: High- (low-) performing firms that operate in more dynamic environments will make greater (less) use of behavioral controls (participative budgeting/performance evaluation and socialization practices) than will their counterparts in less dynamic environments.

Environmental Munificence and MCS

Munificence refers to the abundance or scarcity of critical resources—customers, raw materials, or capital—and the resulting capacity to support growth (Tan et al. 2005; Kreiser and Marino 2002, 899; Castrogiovanni 1991, 543; Lawless and Finch 1989, 354; Keats and Hitt 1988, 572; Dess and Beard 1984, 55; Aldrich 1979, 63). When resources become scarce, growth opportunities diminish and the competition for those resources intensifies. This, in turn, adversely affects firm profitability and organizational slack. At the same time, a scarcity of resources in existing markets increases the risk of remaining in those markets and increases the need to expand operations into new markets (Hannan and Freeman 1977). In turn, the need to balance overall risk enhances the need for formal controls (planning and budgeting). For instance, declines in munificence are associated with increased emphasis on budgets, planning and control systems, and equipment and facilities in primary and secondary schools (Koberg 1987).

In contrast, growth is easier to achieve in resource-rich environments, as they provide opportunities to expand in existing markets and develop new markets (Tushman 1977). In turn, to achieve and sustain this growth, these firms will be required to delegate authority and decision rights to lower levels of management via behavioral controls. This is because such controls are more likely to help these firms to manage their strategic resources and information (Dess and Beard 1984). Based on this discussion, we propose the following hypotheses for the performance consequences of the "fit" between munificence and the use of formal and behavioral MCS.

H3a: High- (low-) performing firms that operate in more munificent environments will make less (greater) use of formal (planning and budgeting) MCS than will their counterparts in less munificent environments.

H3b: High- (low-) performing firms that operate in more munificent environments will make greater (less) use of behavioral (participative budgeting/performance evaluation and socialization practices) MCS than will their counterparts in less munificent environments.

III. METHOD

We collected data from both archival and survey-based sources. We took the former from the annual reports of the listed firms in our sample and from the financial and market data compiled by the CSMAR database. To collect the latter, we carried out a comprehensive survey of the senior- and middle-level managers of Chinese listed firms (explained in more detail below).

Design of Survey Instruments

Our survey instruments are reproduced in Appendices A (senior-level managers) and B (middle-level managers). We considered several issues in their design. First, we relied on both the management (e.g., Labroukos et al. 1995; Govindarajan 1988; Pascale 1985) and management accounting literature (e.g., Moores and Yuen 2001; Chow et al. 1999; Chow et al. 1996; Brownell and Hirst 1986; Merchant 1989, 1985, 1984) to construct our measures. Second, consistent with Dillman's (1978, 1999) total design method, we composed preliminary drafts of the instruments in English and then revised them several times. We then hired a professional translator to translate the instruments from English into Chinese. Next, one of the co-authors and

another Chinese accounting professor, both of whom are bilingual, performed back-translation from Chinese to English to ensure that the original meaning had been preserved.

We then pilot-tested the Chinese-version instruments with several objectives in mind: (1) to ensure that they were clear and could be easily understood by the respondents; (2) to identify and rectify any problems with the questions; and (3) to ensure that they conveyed the same meaning as did the English version. We adopted a two-step process for these pilot tests. First, we contacted two companies and interviewees through the China Accounting and Finance Research (CAFR) Center, which is headquartered in mainland China. We conducted personal interviews with four respondents from each company, two senior-level and two middle-level managers. As a result of these interviews, we fine-tuned the instruments. For the second step, we sent the revised instruments to two doctoral students, who at the time worked at the CAFR Center, for their comments and suggestions, and we then fine-tuned the instruments once again.

Survey administration

We use a randomly selected sample of firms that are listed on the Shanghai and Shenzhen Stock Exchanges. Consistent with Dillman (1978, 1999), we first contacted the chief executive officers (CEOs) of these companies by phone and invited them to participate in the study. We informed them that to increase the internal validity of our findings the study required four respondents from each company—two senior-level managers and two middle-level managers—because a single individual often cannot reasonably reflect the beliefs of an entire organization (Young 1996).[10] We mailed a set of four survey booklets to each of the 680 companies in our sample, and three weeks later we mailed a second wave of surveys to non-respondents and made follow-up phone calls to all second-wave recipients.

Respondents

We received surveys from 183 companies, for a response rate of 26.9 percent.[11] We discarded 14 firms that either returned incomplete survey sets or failed to follow our instructions. To reduce potential noise in our data, we excluded a further 13 firms that were either government-protected or operated in closely controlled industries.[12] Thus, our final sample consisted of 156 firms, with surveys returned by 312 senior-level managers and 312 middle-level managers. Panel A of Table 1 summarizes our sample, and Panel B shows its distribution by SIC two-digit code and industry name.

We tested for potential non-response bias in two ways. First, as shown in panel B of Table 1, our sample of respondent firms is not significantly different, in terms of industry, from our target population of firms listed on the Shanghai and Shenzhen Stock Exchanges (Chi-square = 26.19; $p = 0.26$). Second, we conducted tests of differences in means (medians) for the variables related to sales, net income, number of employees, and age, and find no evidence of differences between respondents and non-respondents (see Table 1, Panel C). Finally, we find no evidence of differences in sales, net income, age and size between early and late respondents.

Insert Table 1 about here

The respondents represent a wide range of managerial functions, with more than half of them reporting involvement in accounting/finance and administration. The senior-level managers had an average age of 45 years and an average length of employment with the company of 11.61 years (*s.d.* = 8.11). The middle-level managers had an average age of 35 years and an average length of employment with the company of 10.17 years (*s.d.* = 6.67). The average length of

employment with the company is significantly different between the senior- and middle-level managers (t = 3.821; p = 0.000). Also, the senior-level managers reported a mean tenure in their current position (7.19 years; ***s.d.*** = 5.63) that is significantly higher than that reported by the middle-level managers (6.26 years; ***s.d.*** = 4.68) (t = 2.286; p = 0.023). These descriptive statistics suggest that our respondents' rank (senior-level vs. middle-level) is clearly distinguishable based on their tenure with their companies. More importantly, taken together, these means also suggest that our respondents had adequate knowledge about their companies with which to answer the survey questions. The majority of respondents reported having a college degree or some college education, and of these, 35 percent of senior managers and 17 percent of middle managers reported having a post-graduate degree.[13]

Measures

Management Control Systems

We constructed our MCS measures based on the responses to the survey instruments. These measures reflect the MCS in use at the sample firms as of the start of 2004. Figure 1 summarizes our operational MCS constructs, which are measured as follows.

Formal planning and budget controls *(MCS_FORMAL).* We constructed the formal planning measure shown in Appendix A from the senior managers' responses to five questions on strategic and operational planning in terms of extensiveness and detail (Govindarajan 1988) and the budget controls measure from their responses to 11 questions on budget targets and approval procedures (Chow et al. 1996; Merchant 1985). The Cronbach's alpha (Cronbach 1951) for the formal planning and budget control questions is 0.89.

Behavioral controls *(MCS_BEH).* We constructed the participative budgeting and performance evaluation measures shown in Appendix B from the responses to seven questions (four items

related to the use of participative budgeting and three to performance evaluation) put to middle-level managers. These questions were taken from Chow et al. (1999). We constructed the socialization practice measure from the middle-level managers' responses to 15 questions designed to assess the extent to which various recruiting, training, and rewards procedures are used in the firms and the extent to which a firm's values are shared by its employees (Pascale 1985). The Cronbach's alpha for the behavioral control questions is 0.84.

Environmental (Exogenous) Variables

As mentioned earlier, we argue that a firm's choice of MCS is a function of three environmental (exogenous) dimensions (see Figure 1), as follows.

Complexity. We used four proxies to measure environmental complexity. First, following Dess and Beard (1984), we constructed a proxy for industry concentration (denoted by *IND_CONCENT*). We used a Herfindahl-type index of total sales in a two-digit industry measured by the sum of squares of the market share (in terms of sales) of the ten largest firms in each industry sector. Therefore, higher levels of this index indicate higher levels of industry concentration. We then used the average level of concentration over the 2002 to 2003 period. Second, to measure complexity in terms of the firm's customers, we constructed a proxy for customer concentration (denoted by *CUST_CONCENT*) from the annual report disclosures that are required by generally accepted accounting principles in China. These standards mandate the disclosure of the percentage of a firm's sales, out of its total sales, that are made to its five largest customers.[14] Thus, we calculated customer concentration as the percentage out of total firm sales that a firm made to its five largest customers in 2003: higher levels of this index indicate higher levels of customer concentration. Third, we measured the level of product complexity (denoted by *PRODUCT*) based on a count of the number and types of products each firm reported for

2004. We combined these two measures into a single measure using factor analysis. Finally, to proxy for the complexity associated with competition by foreign firms in the domestic (Chinese) market (denoted by *FGN_COMP*), we used the percentage of foreign firm sales in each industry in 2003.[15]

Dynamism. Following Kren (1992), we constructed our proxy for environmental dynamism (by *DYNAMISM*) by measuring the volatility of sales revenue from the main operations of each firm during the 1999 to 2003 period using the following formula.

$$Volatility(X_i) = \frac{\sum_{j=1}^{n} CV(X_i)_j}{n},$$

where

$$CV(X_i) = \frac{\sqrt{\sum_{k=1}^{5} \frac{(Z_k - \overline{Z})^2}{5}}}{\overline{Z}}.$$

Volatility (X_i) is the market volatility measured by the average coefficient of variation, where X_i = the market (firm revenue) variable and n = the number of companies in the industry. $CV(X_i)$ is the coefficient of variation measured by using the first differences, where $Z_k = (X_{i,k} - X_{i,\,k-1})$, and $X_{i,k}$ = the market variable in year k.

Munificence. Following Dess and Beard (1984), we constructed our proxy for environmental munificence (denoted by *MUNIFICENCE*) using factor analysis of the four dimensions of industry growth between 1999 and 2003: (i) industry employment; (ii) industry value added; (iii) number of firms; and (iv) industry sales.[16]

Validity Tests

In addition to conducting factor analyses (reported in Appendices A and B), we conducted the following validity tests (Podsakoff et al. 1990):

Multiple raters. In addition to having pairs of senior- and middle-level managers complete their respective instruments, we also tested the validity of the participative budgeting and performance evaluation measure (Appendix B) by eliciting the responses of the senior managers to the questions that comprise this measure. The correlation in the responses between the two managerial ranks is positive and highly significant (0.350; $p < 0.01$).

Multiple measures. We conducted several correlation tests. First, the correlation between the five questions used to measure formal planning (see Appendix A) and the four questions used by Labroukos et al. (1995) to construct their formalization measure is positive and significant (0.620; $p < 0.01$). Second, our socialization measure (Appendix B) is significantly and positively correlated with both parts of the question used by O'Connor et al. (2004, 364): "How extensively does your company make available to employees the following types of training and development programs: (i) offered by overseas entities (0.194, $p < 0.05$); and (ii) offered by local schools and institutions?" (0.483; $p < 0.01$). Third, the product complexity component of our archival-based proxy for environmental complexity (i.e., *PRODUCT*) is positively and significantly correlated with Khandwalla's (1972) 14-item measure of competition intensity (0.199; $p < 0.05$).

Taken together, the results of these tests support the validity of our formal planning, participation, and socialization MCS components, along with product complexity. Finally, and interestingly, our archival-based proxy for environmental dynamism measured over a five-year period is not significantly correlated with Govindarajan's (1984) survey-based measure of environmental predictability ($p > 0.10$). It is possible that senior managers' responses to the environmental predictability questionnaire used in previous studies may have been subject to

primacy or recency effects, and/or the survey questions may have captured their perceptions only at a single point in time.

Firm Performance Measures

We constructed two types of measures to examine the fit-performance effects of MCS use (see Figure 1). The first measure, which was constructed from a survey completed by senior-level managers, is subjective, whereas the other is economics-based and constructed from publicly available data on each firm's accounting and stock market performance. Following Ittner et al. (2003), we included the subjective measure to allow comparisons of our results with other MCS studies that have used subjective measures as their dependent variable (e.g., Bouwens and Abernethy 2000; Gordon and Narayanan 1984). The accounting and market measures, however, allow more direct tests of the effects of MCS on economic performance, which is the main objective for publicly listed firms when they adopt MCS in the first place (Ittner et al. 2003).

Subjective performance measure *(SUBJ_PERF)*. This measure is based on the senior-level managers' responses to questions regarding their firms' performance levels relative to their respective industries on 14 different performance dimensions (Gordon and Narayanan 1984) (see Appendix C). We elicited their responses to the following question: "Over the past three years, how did your company's performance in the following dimensions compare to that of your industry overall?" The performance dimensions range from the long-run level of profitability, financial strength, and liquidity to new product research and development and corporate image and reputation. The managers responded using a seven-point Likert scale anchored at the lower end (= 1) by "Much lower" and at the higher end (= 7) by "Much higher," with the midpoint (= 4) indicating "About average."

Economic performance measures. These include two publicly available accounting measures, return on assets (*ROA*) (Nissim and Penman 2001) and one-year sales growth (one-year return for 2004, denoted by *SALES_GWTH*), and two stock return measures, a short-term measure (one-year return for 2004, denoted by *MRKT_RETURN_04*) and a longer term measure (two-year return for 2004-2005, denoted by *MRKT_RETURN_0405*). Because the performance effects of MCS adoption are not likely to occur immediately, the accounting performance measures obtained from the CSMAR database are based on 2004 calendar-year data, that is, on data from approximately one year after the date of the survey. We expect that this one-year lag in the measure of a firm's economic performance will increase the likelihood of observing the performance effects of MCS adoption. This is consistent with suggestions in the prior research that performance should be measured as a lagged variable to minimize associations between the independent and dependent variables that have a reverse causality component (Short and Keasey 1999).

Firm- and Industry-Specific Characteristics (Control Variables)

We measured the following variables to control for their potential effects on firm performance.

State shareholding (*STATEHOLD*). We controlled for the dominant shareholder in a firm being a state shareholder because such firms are likely to carry similar political costs as pre-1996 listed firms (de Jonge 2005). A dummy variable indicates the presence (=1) or absence (= 0) of the state as the dominant shareholder.[17]

Financial leverage (*DEBT*). We controlled for financial leverage by including a firm's debt to equity ratio as of the end of 2003. Qi et al. (2000) find that financial leverage is negatively associated with firm performance among China's listed firms.

Size (*SIZE*). Larger firms are more likely to benefit from the more extensive use of MCS than are smaller firms (Christie et al. 2003). However, at the same time, larger firms carry greater political costs through employment responsibility, which may limit any said benefits (e.g., cost reduction through downsizing) (Lin et al. 1998). Thus, we control for firm size, proxied by the natural logarithm of total assets at the end of 2002 and 2003. We use the average firm sales for 2002 and 2003 in our analysis.

Sector performance *(ΔIND_MED).* Finally, to compare firm performance across different industries using the performance prediction models in Model 1 (except for subjective performance), we controlled for median firm performance in each industry for 2004 (Ittner et al. 2002).

IV. RESULTS

Descriptive Statistics

Table 2 reports the descriptive statistics for all of the variables examined in our study. Regarding the environmental data, this table shows that, on average, the ratio of each firm's sales to its five largest customers relative to total sales (*CUSTOMER*) was 30 percent in 2003, and foreign firm sales (*FGN_COMP*) in the same year made up 18.5 percent of total sales across the industries in our sample. On average, industry sales (one component of environmental munificence) grew by an average of 1.57 percent between 2002 and 2003. For our control variables, we note that, on average, state shareholders (*STATEHOLD*) held 37.84 percent (not tabulated) of the shares in our sample firms. Table 3 presents pair-wise Pearson correlations for our MCS, environmental (exogenous), and control variables. *MCS_FORMAL* is significantly and positively correlated with *SIZE* ($p < 0.05$), and *MCS_BEH* is significantly and positively correlated with *STATEHOLD* ($p < 0.10$).

Insert Table 2 and Table 3 about here

RQ1: Performance Consequences of the "Fit" between Environment and MCS

Recall that RQ1 addresses the question, "Is there an association between firm performance and the extent to which management accounting and control systems are aligned with a firm's environmental complexity, dynamism, and munificence?" We used two tests to examine RQ1, namely, a prediction residuals model approach and a sub-group analysis approach (discussed in the next section). Together, these tests capture the performance effects of the "fit" between MCS and the three EU dimensions (denoted by *COMPLEXITY*, *DYNAMISM*, and *MUNIFICENCE*).

The prediction residuals model method (also known as the deviation-score approach) (Ittner et al. 2002, 2003; Donaldson 2001; Drazin and Van de Ven 1985) comprises two stages: residuals prediction and performance association. This approach assumes that the firms in our cross-sectional sample are dynamically learning and moving toward their optimal MCS; therefore, they are distributed above and below the line of best fit (Hartmann and Moers 1999). Intuitively, the line of best fit is where the MCS are aligned with a firm's level of EU. In stage 1, we constructed two separate regression models, one for each of the two MCS components (*MCS_FORMAL* and *MCS_BEH*). Ordinary least squares (OLS) prediction model 1 regresses each MCS on the environmental variables:

$$MCS = \beta_0 + \beta_1 IND\_CONCENT_{it} + \beta_2 CUST\_CONCENT_{it} + \beta_3 PRODUCT_{it} + \beta_4 FGN\_COMP_{it} + \beta_5 DYNAMISM_{it} + \beta_6 MUNIFICENCE_{it} + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + e_{it}. \quad (1)$$

Table 4 shows our OLS prediction results.[18] The two regression models are statistically significant ($p < 0.01$), with an adjusted-R^2 of 0.08 and 0.06 for *MCS_FORMAL* and *MCS_BEH*, respectively.[19] Consistent with the prior literature, *PRODUCT*, a proxy for *COMPLEXITY*, is significantly and positively associated with *MCS_FORMAL* ($p < 0.05$, two-tailed), and *CUSTOMER*, a proxy for *COMPLEXITY*, is significantly and negatively associated with *MCS_BEH* ($p < 0.10$, two-tailed). *MUNIFICENCE* is significantly and negatively associated with *MCS_FORMAL* ($p < 0.01$, two-tailed) and significantly and positively associated with *MCS_BEH* ($p < 0.05$, two tailed). Surprisingly, we find no significant associations between *DYNAMISM* and our MCS variables.

Insert Table 4 about here

In stage two, we used the standardized residuals from our two prediction residuals models to capture the extent to which firms have deviated from the line of best fit. As deviations above and below the line of best fit are unlikely to affect firm performance equally, we constructed a model with the residuals split into positive and negative deviations for our formal and behavioral MCS (Ittner et al. 2002). Positive (negative) deviations from the line of best fit suggest too much (too little) use of the particular MCS practice relative to the line of best fit (benchmark). We construct OLS regression model 2 to test the overall fit hypothesis:

$$\begin{aligned} PERF = {} & \beta_0 + \beta_1 POS\_MCS\_FORMAL\_RESID_{it} + \beta_2 NEG\_MCS\_FORMAL\_RESID_{it} \\ & + \beta_3 POS\_MCS\_BEH\_RESID_{it} + \beta_4 NEG\_MCS\_BEH\_RESID_{it} \\ & + \beta_5 MCS\_FORMAL\_PRED_{it} + \beta_6 MCS\_BEH\_PRED_{it} \\ & + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + \beta_{10} IND\_MED_{it} + e_{it} \end{aligned} \quad (2)$$

POS_MCS_(FORMAL, BEH)_RESID equals the residual from our prediction residuals models if the residual is *positive* (i.e., the firm uses more MCS than the benchmark estimated by

our prediction residuals model), and zero otherwise. *NEG_MCS_(FORMAL, BEH)_RESID* equals the residual from the model if the residual is *negative* (i.e., the firm uses less MCS than the benchmark estimated from our prediction residuals model), and zero otherwise. The expected coefficient sign is negative for *POS_MCS_RESID*, thus indicating that too great a use of the given MCS practice relative to the benchmark is expected to be associated with lower performance. The expected coefficient sign is positive for *NEG_MCS_RESID*, thus indicating that too little use of the given MCS practice relative to the benchmark is expected to be associated with lower performance. *MCS_PRED* equals the expected values from the prediction residuals model.

Table 5 presents the results of our tests to examine the performance effects of the "fit" between MCS and our environmental variables. We ran five regression models, one for each of the five performance measures. All but one (*MRKT_RETURN_0405*) of these five models are significant overall ($p < 0.05$ or better), with adjusted-R^2 values ranging from 0.07 to 0.31.[20] As expected, the coefficients for *NEG_MCS_FORMAL_RESID* are positively and significantly associated with *SUBJPERF* ($p < 0.01$, two-tailed) and *ROA* ($p < 0.01$, two-tailed). For *MCS_BEH*, we find a negative and significant association between *POS_MCS_BEH_RESID* and *MRKT_RETURN_04* ($p < 0.01$, two-tailed), and a positive and significant association between *NEG_MCS_BEH_RESID* and *SUBJ_PERF* ($p < 0.10$). Taken together, our results regarding RQ1 using the prediction residuals model approach provide support for the argument that too little (but not too much) use of formal MCS relative to the benchmark adversely affects subjective- and accounting-based performance, whereas either too much or too little (to a lesser extent) use of behavioral MCS relative to the benchmark adversely affects subjective- and market-based performance.

Insert Table 5 about here

Performance Consequences of the "Fit" between Environmental Dimensions and MCS Using the Sub-Group Analysis Approach (RQ1 and H1-H3)

In this section, we examine the results reported above in more detail. In particular, we conduct sub-group analysis (Anderson and Dekker 2005; Donaldson 2001), which allows us to address RQ1 (using the Chow *F*-tests) by examining the combined level of "fit" and H1-H3 by considering its directional associations.

RQ1. We divide our sample of firms into top and bottom halves, split at the industry-adjusted median of each of our five performance measures, and estimate OLS regression model 1 for each subgroup. We examine the performance effect of the "fit" by using the Chow *F*-tests of the difference in the explanatory power (measured by the adjusted-R^2) of the model between the high- and low-performing sub-groups.

Insert Tables 6 and 7 about here

Our results for *MCS_FORMAL* (Panel A, Table 6) show that the overall differences in the adjusted-R^2 between the sub-groups of firms are significant when we use the industry-adjusted median split based on *ROA* (Chow *F*-statistic = 3.14; $p < 0.01$) and *SALES_GWTH* (Chow *F*-statistic = 4.44; $p < 0.01$). Similarly, the results for *MCS_BEH* (Panel A, Table 7) show that the overall difference in the adjusted-R^2 between these sub-groups is significant when we use the industry-adjusted median split based on *ROA* (Chow *F*-statistic = 2.43; $p < 0.05$), and it is marginally significant when we use the industry-adjusted median split based on

SALES_GWTH (Chow *F*-statistic = 1.85; $p < 0.10$). Taken together, our results with regard to RQ1 lend further support to the previously reported results and are consistent with the argument for a significant association between accounting-based performance and the extent to which MCS are aligned with a firm's combined environmental complexity, dynamism, and munificence.

Environmental Complexity (H1a and H1b). Panel C of Figure 1 provides a summary of our results and is used to guide our discussion hereafter. H1a predicts that high- (low-) performing firms that operate in more complex environments will make greater (less) use of formal MCS than will their counterparts in less complex environments. Our results for *MCS_FORMAL* (Panel B, Table 6) show that the differences in the *IND_CONCENT* coefficients between the high- and low-performing firms are highly significant and in the expected direction (i.e., negative) when performance is measured using *ROA* ($p < 0.01$) and *SALES_GWTH* ($p < 0.01$).[21] The results with respect to *PRODUCT* are significant and in the expected direction (i.e., positive) for *ROA* ($p < 0.05$) and *SALES_GWTH* ($p < 0.01$), whereas none of the *CUST_CONCENT* coefficients are significant at conventional levels. The difference in the *FGN_COMP* coefficients between these sub-groups is also highly significant and in the expected direction (i.e., positive) when performance is measured using *ROA* ($p < 0.05$) and *SALES_GWTH* ($p < 0.01$). Taken together, these results support H1a with respect to accounting performance.

H1b predicts that high- (low-) performing firms that operate in more complex environments will make greater (less) use of behavioral MCS than will their counterparts in less complex environments. Our results for *MCS_BEH* (Panel B, Table 7) show that the differences in the *CUST_CONCENT* coefficients between the high- and low-performing firms are highly significant and in the expected direction (i.e., negative) when performance is measured using *ROA* ($p < 0.05$), and they are also in the expected direction when performance is measured using

MRKT_RETURN_04 ($p < 0.05$) and *MRKT_RETURN_0405* ($p < 0.05$). The difference in the *PRODUCT* coefficients between these two sub-groups of firms is significant and in the expected direction (i.e., positive) when performance is measured using *SALES_GWTH* ($p < 0.05$), whereas the difference in the *FGN_COMP* coefficient between these sub-groups is positive and significant when performance is measured using *ROA* ($p < 0.05$). Taken together, these results generally support H1b with respect to *CUST_CONCENT* for market performance and *PRODUCT* and *FGN_COMP* with respect to accounting performance.

Environmental Dynamism (H2a and H2b). H2a predicts that high- (low-) performing firms that operate in more dynamic environments will make less (greater) use of formal controls than will their counterparts in less dynamic environments. Our results for *MCS_FORMAL* (Panel B, Table 6) show that the difference in the *DYNAMISM* coefficient for these two sub-groups of firms is significant and in the expected direction (i.e., negative) when performance is measured using *ROA* ($p < 0.05$), *SALES_GWTH* ($p < 0.05$), and *MRKT_RETURN_0405* ($p < 0.01$). Taken together, our results provide support for H2a.

H2b predicts that high- (low-) performing firms that operate in more dynamic environments will make greater (less) use of behavioral controls than will their counterparts in less dynamic environments. Our results for *MCS_BEH* (Panel B, Table 7) show that the differences in the *DYNAMISM* coefficients between these two sub-groups of firms are significant, but in the opposite direction to our prediction (i.e., negative) when performance is measured using *SALES_GWTH* ($p < 0.05$) and *MRKT_RETURN_0405* ($p < 0.01$). Thus, contrary to our predictions, these results suggest that high- (low-) performing firms that operate in more dynamic environments are less (more) likely to use behavioral controls than are their counterparts in less dynamic environments.

Environmental Munificence (H3a and H3b). H3a predicts that high- (low-) performing firms that operate in more munificent environments will make less (greater) use of formal MCS than will their counterparts in less munificent environments. Our results for *MCS_FORMAL* (Panel B, Table 6) show that the difference in the *MUNIFICENCE* coefficient between the sub-groups of firms is significant and in the expected direction (i.e., negative), but only when performance is measured using *MRKT_RETURN_04* ($p < 0.05$). Surprisingly, we find an opposite-signed difference in the coefficient when performance is measured using *SUBJ_PERF* ($p < 0.01$), thus suggesting that our results are sensitive to the performance measure used. Thus, H3a is partially supported. H3b predicts that high- (low-) performing firms that operate in more munificent environments will make greater (less) use of behavioral MCS than will their counterparts in less munificent environments. Surprisingly, our results for *MCS_BEH* (Panel B, Table 7) show that the difference in the *MUNIFICENCE* coefficient between these two sub-groups of firms is significant, but in a direction opposite to that of our prediction (i.e., negative) when performance is measured using *SUBJ_PERF* ($p < 0.01$), *SALES_GWTH* ($p < 0.05$), and *MRKT_RETURN_04* ($p < 0.05$). The results, therefore, do not support H3b.

Sensitivity tests

We tested the sensitivity of the results in several ways. First, the results of the prediction residuals analysis are qualitatively robust to the concurrent (2003) measures of accounting and market performance (except for one-year sales growth in 2003). Second, the sub-group analysis results are qualitatively similar when we conduct the same test with the highest- and lowest-performing *third* of the firms, except that we obtain stronger Chow *F*-statistics. Third, our results are qualitatively similar when we split the *MCS_FORMAL* and *MCS_BEH* variables into their constituent components. Finally, the results are qualitatively similar when we control for whether

the respondent is an accountant or a non-accountant (to rule out the possibility that accountants may be more familiar with MCS than non-accountants).

V. CONCLUSIONS

We examine the performance consequences of the "fit" between environmental complexity, dynamism, and munificence and the firms' use of, and emphasis on, formal MCS (formal planning and budget controls) and behavioral MCS (participative budgeting/performance evaluation and socialization). We argue that the high vs. low performance of firms result from more or less successful combinations of MCS with the environment, respectively. That is, MCS are developed in conjunction with, and evolve to fit the needs of management. Using a sample of relatively young, publicly listed Chinese firms, we find that too little—but not too much—use of formal MCS relative to the benchmark (i.e., as predicted by the line of best fit) adversely affects subjective- and accounting-based performance. Further, either too much or too little use of behavioral MCS relative to the benchmark adversely affects subjective- and market-based performance. These results are corroborated by sub-group analyses that indicate significant differences in the adjusted-R^2 between sub-groups of firms split at the industry-adjusted median of *ROA* and sales growth.

Our results also indicate that high- (low-) performing firms that operate in more dynamic environments make less (greater) use of formal controls. Contrary to our predictions, both high- and low-performing firms that operate in more munificent environments use less formal controls. This result is stronger for high-performing firms when we use a market-based performance measure. Surprisingly, our results regarding the use of behavioral controls in both the dynamic and munificent environments are in the opposite direction to our predictions. Specifically, we find that high- (low-) performing firms make less (greater) use of formal and behavioral MCS when they operate in more dynamic environments and when critical resources are abundant.

Our findings of a positive association between the extent of environmental complexity and the use of formal and behavioral controls is consistent with previous findings in the accounting literature on environmental complexity (Krishnan 2005; Khandwalla 1972) and environmental dynamism (Gosselin 2005; Hartmann 2005). We extend these findings by examining the implications of the "fit" (or lack thereof) between MCS and EU on current and future firm performance.

Our findings extend recent research that addresses the performance effects of MCS adoption decisions by early-stage/startup companies versus mature firms (Sandino 2007; Davila and Foster 2005, 2007). As indicated earlier, the firms in our sample are relatively young in age (i.e., a listing date of 2002). As such, our study captures mostly the first MCS that our newly listed firms chose to adopt to compete in domestic and foreign markets. Our findings contribute to the emerging body of literature (Sandino 2007; Davila and Foster 2005) that proposes the argument that certain categories of MCS are introduced at particular stages of firm growth. For instance, the initial MCS that focus on planning, budgeting, and managerial incentives are primarily intended to mitigate the risk of failure typically faced by newly created organizations.

The limitations of this study point to several directions for future research. First, our findings with respect to the focal variable (MCS) are based on managers' perceptions and on what they chose to reveal through their responses. Although the consistency among the independent respondents within each firm, in conjunction with the divergence across firms, provides a reasonable level of assurance with regard to data reliability, other data sources, such as annual reports, are likely to provide additional ways of validating survey-based data, and future studies should endeavor to so include them. Second, this study focuses only on publicly-listed Chinese firms, which presumably have advanced further along the reform process than

their non-listed counterparts. However, there is still significant variance in the responses across the sample, which may allow for other plausible explanations of our results. Finally, it remains an empirical question why companies with seemingly similar corporate governance policies could have very different financial performance outcomes. Thus, future research could examine how various corporate governance initiatives (e.g., compliance with Sarbanes-Oxley) might act as a catalyst or agent of change for the adoption of more sophisticated MCS.

Notwithstanding these limitations, by using accounting- and market-based performance measures, our study helps to provide robust and generalizable evidence for the "fit" hypothesis and extends the recent contingency-based literature that considers multiple data sources and performance outcomes (e.g., Anderson and Dekker 2005; Davila and Foster 2005; Ittner et al. 2003, 2002; Said et al. 2003; Sandino 2007; Widener 2007). We also extend the findings of prior research that relies on subjective measures of firm performance (e.g., Henri 2006; Gul and Chia 1994; Gordon and Narayanan 1984).

REFERENCES

Abernethy, M.A., and A.M. Lillis. 1995. The impact of manufacturing flexibility on management control system design. *Accounting, Organizations and Society* 20(4): 241-258.

Aldrich, H.E. 1979. *Organizations and Environments*. Englewood Cliffs, NJ: Prentice-Hall.

Anderson, S.W. and H.C. Dekker. 2005. Management control for market transactions: The relation between transaction costs, incomplete contract design and subsequent performance. *Management Science* 51(12): 1734-1752.

Anderson, S.W., and W. Lanen. 1999. Economic transition, strategy and the evolution of management accounting practices: The case of India. *Accounting, Organizations and Society* 24(5/6): 379-412.

Angresano, J. 2005. China's development strategy: A game of chess that countered orthodox development advice. *Journal of Socio-Economics* 34(4): 471-498.

Anthony, R., and V. Govindarajan. 2001a. Behavior in organizations (Chapter 2). In Anthony and Govindarajan (Eds.), *Management Control Systems* (10th Edition). New York: McGraw-Hill/Irwin: 55-75.

_____. 2001b. The nature and management of control systems (Chapter 1). In Anthony and Govindarajan (Eds.), *Management Control Systems* (10th Edition). New York, NY: McGraw-Hill/Irwin: 1-19.

Atkinson, A., R. Balakrishnan, P. Booth, J. Cote, T. Groot, T. Malmi, H. Roberts, E. Uliana, and A. Wu.1997. New directions in management accounting research. *Journal of Management Accounting Research* 9: 79-108.

Balakrishnan, R., T. Linsmeier, and M. Venkatachalam. 1996. Financial benefits from JIT adoption: Effects of customer concentration and cost structure. *The Accounting Review* 71: 183-206.

Bank, J. 1992. *The Essence of Total Quality Management.* New Jersey: Prentice Hall.

Banker, R.D., and R. Mashruwala. 2007. The moderating role of competition in the relationship between nonfinancial measures and future financial performance. *Contemporary Accounting Research* 24(3): 763-793.

Bazerman, M.H. 2005. *Judgment in Managerial Decision Making* (6th Edition). New York: John Wiley & Sons.

Belsley, D. A. 1991. *Conditioning diagnostics: collinearity and weak data in regression.* New York: John Wiley & Sons.

Bouwens, J. and M. A. Abernethy. 2000. The consequences of customization on management accounting system design. *Accounting, Organizations and Society* 25(3): 221-241.

Boyd, B.K. 1995. CEO duality and firm performance: A contingency model. *Strategic Management Journal* 16(4): 301-312.

Brickley, J.A., C.W. Smith, J.L. Zimmerman, and J. Willett. 2003. Knowledge and incentives in organizations (Chapter 3). In Brickley et al. (editors), *Designing Organizations to Create Value—From Structure to Strategy*. New York: McGraw-Hill: 43-64.

Brownell, P. 1982. Participation in the budgeting process: when it works and when it doesn't. *Journal of Accounting Literature* 1: 124-150.

Brownell, P., and M. Hirst. 1986. Reliance on accounting information, budgetary participation, and task uncertainty: tests of a three-way interaction. *Journal of Accounting Research* 24(2): 241-249.

Bushman, R.M., R. Indjejikian, and M. Penno. 2000. Private predecision information, performance measure congruity, and the value of delegation. *Contemporary Accounting Research* 17(4): 561–587.

Bushman, R.M., R. Indjejikian, and A. Smith. 1995. Aggregate performance measures in business unit manager compensation: The role of intrafirm interdependencies. *Journal of Accounting Research* 33 (Supplement): 101-128.

Castrogiovanni, G.J. 1991. Environmental munificence: A theoretical assessment. *The Academy of Management Review* 16(3): 542-565.

Chalos, P., and N.G. O'Connor. 2004. Determinants of the use of various control mechanisms in US-Chinese joint ventures. *Accounting, Organizations and Society* 29(7): 591-608.

Chenhall, R.H. 2003. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Accounting, Organizations and Society* 28(2–3): 127–168.

Chenhall, R.H.. 2007. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. In Chapman, C., A. Hopwood, and M. Shields (editors), *Handbook of Management Accounting Research* 1. Oxford: Elsevier.

Chenhall, R.H., and P. Brownell. 1988. The effect of participative budgeting on job satisfaction and performance: Role ambiguity as an intervening variable. *Accounting, Organizations and Society* 13(3): 225-233.

Chenhall, R.H., and C.S. Chapman. 2006. Theorising and testing fit in contingency research on management control systems. In Z. Hoque (Ed.), *Methodological Issues in Accounting Research—Theories, Methods, and Issues*. London, UK: Spiramus: 35-54.

Chenhall, R.H., and K.J. Euske. 2007. The role of management control systems in planned organizational change: An analysis of two organizations. *Accounting, Organizations and Society* 32: 601-637.

Chenhall, R.H., and F. Moers. 2007. The issue of endogeneity within theory-based, quantitative management accounting research. *European Accounting Review* 16(1): 173-195.

Chenhall, R.H., and D. Morris. 1986. The impact of structure, environment and interdependencies on the perceived usefulness of management accounting systems. *The Accounting Review* 61 (January): 16-35.

Chow, C. W., Y. Kato, and K. Merchant. 1996. The use of organizational controls and their effects on data manipulation and management myopia: a Japan vs. U.S. comparison. *Accounting, Organizations and Society* 21(2/3): 175–192.

Chow, C. W., Y. Kato, and M. Shields. 1994. National culture and the preference for management controls: an exploratory study of the firm-labor market interface. *Accounting, Organizations and Society* 19(4/5): 381–401.

Chow, C.W., M. Shields, and A. Wu. 1999. The importance of national culture in the design of and preference for management controls for multi-national operations. *Accounting, Organizations and Society* 24(5/6): 441-462.

Christie, A., M. Joyce, and R.L. Watts. 2003. Decentralization of the firm: theory and evidence. *Journal of Corporate Finance* 9(1): 3–36.

Cronbach, L.J. 1951. Coefficient alpha and internal structure of tests. *Psychometrika* 16: 297–334.

Davila, A. and G. Foster. 2005. Management accounting systems adoption decisions: Evidence and performance implications from early-stage/startup companies. *The Accounting Review* 80(4): 1039-1068.

Davila, A. and G. Foster. 2007, Startup Firms Growth, Management Control Systems Adoption, and Performance. *The Accounting Review.* 82(4): 907-937.

de Jonge, A. 2005. Solving agency problems in a cross-border environment—Ten years of Chinese company listings in Hong Kong. In R. Smyth, O.K. Tam, M. Warner, and C.J. Zhu (Eds.), *China's Business Reforms—Institutional Challenges in a Globalized Economy*. London, UK. RoutledgeCurzon: 46-61.

Dess, G.G., and D.W. Beard. 1984. Dimensions of organizational task environments. *Administrative Science Quarterly* 29 (March): 52-73.

Dillman, D. 1978. *Mail and telephone surveys: The total design method*. New York: Wiley.

Dillman, D. 1999. *Mail and internet surveys: The tailored design method*. New York: Wiley.

Donaldson, L. 2001. *The Contingency Theory of Organizations*. Thousand Oaks, CA: Sage Publications.

Drazin, R., and A.H. Van de Ven. 1985. Alternative forms of fit in contingency theory. *Administrative Science Quarterly* 30: 514-539.

Dyson, R. G. and M. J. Foster. 1982. The relationship of participation and effectiveness in strategic planning. *Strategic Management Journal* 3(1): 77-88.

Ezzamel, M. 1990. The impact of environmental uncertainty, managerial autonomy and size on budget characteristics. *Management Accounting Research* 1: 181-197.

Fan, G. and X.L. Wang. 2004. *NERI Index of Marketization of China's Provinces.* China Economic Reform Research Fund. National Economic Research Institute. Economic Sciences Press.

Fisher, J. 1995. Contingency-based research on management control systems: Categorization by level of complexity. *Journal of Accounting Literature* 14: 24-53.

Galbraith, J. 1973. *Designing Complex Organizations.* Addison-Wesley.

Gerdin, J., and J. Greve. 2004. Forms of contingency fit in management accounting research—a critical review. *Accounting, Organizations and Society* 29: 303-326.

Ghosh, D. and G.L. Willinger. 2006. Environmental Uncertainty, Organizational Slack, Control Systems, and Firm Performance. Working paper, University of Oklahoma.

Gordon, L. and V. Narayanan. 1984. Management accounting systems, perceived environmental uncertainty and organization structure: an empirical investigation. *Accounting, Organizations and Society* 9(1): 33-47.

Gosselin, M. 2005. An empirical study of performance measurement in manufacturing firms. *International Journal of Productivity and Performance Management* 54(5/6): 419-437.

Govindarajan, V. 1984. Appropriateness of accounting data in performance evaluation: an empirical examination of Environmental Uncertainty as an intervening variable. *Accounting, Organizations and Society* 9(2): 125–135.

Govindarajan, V. A. 1988. Contingency approach to strategy implementation at the business-unit level: Integrating administrative mechanisms with strategy. *Academy of Management Journal* 31(4): 828-853.

Granlund, M., and K. Lukka. 1998. It's a small world of management accounting practices. *Journal of Management Accounting Research* 10: 153-179.

Gul, F.A., and Y.M. Chia. 1994. The effects of management accounting systems, perceived environmental uncertainty, and decentralization on managerial performance: a test of three-way interaction. *Accounting, Organizations and Society* 19: 413-26.

Hambrick, D.C. 1983. Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types. *Academy of Management Journal* 26: 5-26.

Hannan, M.T., and J. Freeman. 1977. The population ecology of organizations. *American Journal of Sociology* 82: 929-963.

Hartmann, F. 2005. The effects of tolerance for ambiguity and uncertainty on the appropriateness of accounting performance measures. *Abacus* 41(3): 241-264.

Hartmann, F., and F. Moers. 1999. Testing contingency hypotheses in budgetary research: an evaluation of the use of moderated regression analysis. *Accounting, Organizations and Society* 24: 291-315.

Haveman, H. 1992. Between a rock and a hard place: organizational change and performance under conditions of fundamental environmental transformation. *Administrative Science Quarterly* 37(1): 48-75.

Henri, J. F. 2006. Management control systems and strategy: A resource-based perspective. *Accounting, Organizations and Society* 31: 529-558.

Ittner, C.D., W.N. Lanen, and D.F. Larcker. 2002. The association between activity-based costing and manufacturing performance. *Journal of Accounting Research* 40(3): 711-726.

Ittner, C. D., and D. Larcker. 2001. Assessing empirical research in managerial accounting: A value-based management perspective. *Journal of Accounting and Economics* 32(1-3): 349–410.

Ittner, C.D., D.F. Larcker, and T. Randall. 2003. Performance implications of strategic performance measurement in financial services firms. *Accounting, Organizations and Society* 28: 715-741.

Jensen, M. C. 1998. *Foundations of Organizational Strategy*. Cambridge, MA: Harvard University Press.

Jensen, M. C., and W.H. Meckling. 1992. Specific and general knowledge, and organization structure. In L. Werin and H. Wijkander (Eds.), *Contract Economics.* Oxford: Basil Blackwell.

Keats, B.W., and M.A. Hitt. 1988. A causal model of linkages among environmental dimensions, macro organizational characteristics, and performance. *The Academy of Management Journal* 31(3): 570-598.

Khandwalla, P. 1972. The effect of different types of competition on the use of management control. *Journal of Accounting Research* 10 (2): 272–285.

Koberg, C.S. 1987. Resource scarcity, environmental uncertainty, and adaptive organizational behavior. *Academy of Management Journal* 30(4): 798-807.

Kreiser, P., and L. Marino. 2002. *Management Decision* 40(9): 895-905.

Kren, L. 1992. Budgetary participation and managerial performance: The impact of information and environmental volatility. *The Accounting Review* (July): 511-526.

Krishnan, R. 2005. The effect of changes in regulation and competition on firms' demand for accounting information. *The Accounting Review* 80(1): 269-287.

Labroukos, N.S., S. Lioukas, and D. Chambers. 1995. Planning and performance in State-Owned Enterprises: A multidimensional assessment. *European Journal of Operational Research* 87(3): 624-640.

Lambert, R. A., and D.F. Larcker. 1987. An analysis of the use of accounting and market measures of performance in executive compensation contracts. *Journal of Accounting Research* 25 (Supplement): 179–203.

Lanen, W., and R. Thompson. 1988. Stock price reactions as surrogates for the net cash flow effects of corporate policy decisions. *Journal of Accounting and Economics* 10**:** 311–334.

Lawless, M.W., and L.K. Finch. 1989. Choice and determinism: A test of Hrebiniak and Joyce's framework on strategy-environment fit. *Strategic Management Journal* 10: 351-365.

Levinthal, D. A., and J. G. March. 1993. The myopia of learning. *Strategic Management Journal* 14(8): 95-112.

Li, W. 1997. The impact of economic reform on the performance of Chinese state enterprises, 1980-1989. *Journal of Political Economy* 105(5): 1080-1106.

Lin, J.Y., F. Cai, and Z. Liz. 1998. Competition, policy burdens, and state-owned enterprise reform. *American Economic Review* 88(2): 422-427.

Luft, J., and M. Shields. 2003. Mapping management accounting: Graphics and guidelines for theory-consistent empirical research. *Accounting, Organizations and Society* 28: 169-250.

Malina, M.A., and F.H. Selto. 2001. Communicating and controlling strategy: An empirical study of the effectiveness of the balanced scorecard. *Journal of Management Accounting Research* 13: 47-90.

Melumad, N. D. and S. Reichelstein. 1987. Centralization versus delegation and the value of communication. *Journal of Accounting Research* (Supplement) 25(3): 1-18.

Merchant, K.A. 1981. The design of the corporate budgeting system: Influences on managerial behavior and performance. *The Accounting Review* (October): 813-829.

Merchant, K.A. 1984. Influences on departmental budgeting: An empirical examination of a contingency model. *Accounting Organizations and Society* 9(3/4): 291-310.

Merchant, K. A. 1985. *Control in Business Organizations.* Cambridge, MA: Ballinger.

Merchant, K.A. 1989. *Rewarding Results: Motivating Profit Center Managers.* Boston: Harvard Business School Press.

Merchant, K.A., and D.T. Otley. 2006. A review of the literature on control and accountability. In C. Chapman, A. Hopwood, and M. Shields (Eds.), *The Handbook of Management Accounting Research*. Elsevier Press.

Milgrom, P., and J. Roberts. 1992. *Economics, Organizations and Management*. Englewood Cliffs, NJ: Prentice-Hall.

Milgrom, P., and J. Roberts. 1995. Complementarities and fit: strategy, structure, and organizational change in manufacturing. *Journal of Accounting and Economics* 19(2-3): 179-209.

Miller, D., and P.H. Friesen. 1983. Strategy-making and environment: the third link. *Strategic Management Journal* 4: 221-235.

Milliken, F.J. 1987. Three types of perceived uncertainty about the environment. *Academy of Management Review* 12: 133-143.

Moores, K., and S. Yuen. 2001. Management accounting systems and organizational configuration: A life-cycle perspective. *Accounting, Organizations and Society* 26(4/5): 351-389.

Nagar, V. 2002. Delegation and incentive compensation. *The Accounting Review* 77(2): 379-395.

Nissim, D. and S. Penman, 2001. Ratio Analysis and Equity Valuation: From Research to Practice. *Review of Accounting Studies* 6:109-154.

O'Connor, N. G., C. Chow, and A. Wu. 2004. The adoption of ''Western'' management accounting/controls in China's state-owned enterprises during economic transition. *Accounting, Organizations and Society* 29(3–4): 349–375.

O'Connor, N.G., J. Deng, and Y. Luo. 2006. Political constraints, organization design and performance measurement in China's State-owned enterprises. *Accounting, Organizations and Society* 31(2): 157-177.

Olsen, M.D., B. Murthy, and R. Teare. 1994. CEO perspectives on scanning the global hotel business environment. *International Journal of Contemporary Hospitality Management* 6(4): 3-9.

Otley, D., and C. Wilkinson. 1988. Organizational behavior: Strategy, structure, environment, and technology. In K. Ferris (Ed.), *Behavioral accounting research: A critical analysis* Columbus, OH: Century VII Publishing: 147-170.

Pascale, R. 1985. The paradox of ''corporate culture:'' reconciling ourselves to socialization. *California Management Review* 27(2): 26–41.

Pennings, J.M. 1975. The relevance of the structural-contingency model of organizational effectiveness. *Administrative Science Quarterly* 20: 393-410.

Podsakoff, P.M., S.B. McKenzie, R.H. Moorman, and R. Fetter. 1990. Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly* 1: 107-142.

Qi D, W.Wu, and H. Zhang. 2000. Shareholding structure and corporate performance of partially privatized firms: Evidence from listed Chinese companies. *Pacific-Basin Financial Journal* 8(2): 587-610.

Ring, P.S., and A.H. Van de Ven. 1994. Developmental processes of cooperative interorganizational relationships. *Academy of Management Review* 19(1): 90-118.

Rogers, W. 1993. Regression standard errors in clustered samples. *Stata Technical Bulletin Reprints* 13. College Station, TX: Stata Press.

Said, A., H.R. HassabElnaby, and B. Wier. 2003. An Empirical Investigation of the Performance Consequences of Nonfinancial Measures, *Journal of Management Accounting Research* 15: 193–224.

Sandino, T. 2007. Introducing the first management control systems: Evidence from the retail sector. *The Accounting Review* 82(1): 265-293.

Selto, F.H., C. Renner, and S.M. Young. 1995. Assessing the organizational fit of a just-in-time manufacturing system: Testing selection, interaction and systems models of contingency theory. *Accounting, Organizations and Society* 20(7/8): 665-684.

Short, H. and K. Keasey. 1999. Managerial ownership and the performance of firms: evidence from the UK. *Journal of Corporate Finance* 5: 79-101.

Simons, R. 1987. Accounting control systems and business strategy: An empirical analysis. *Accounting, Organizations and Society* 12: 357–74.

Simons, R. 1994. *Levers of Control: How managers use innovative control systems to drive strategic renewal*. Boston, Massachusetts: Harvard University Press.

StataCorp. 1999. *Stata Statistical Software: Release 6.0 User's Guide.* College Station, TX: Stata Press: 256-260.

Tan, J., Y. Luo, and O. Shenkar. 2005. Entrepreneurial strategies in a transitional economy: Chinese state and non-state enterprises compared and contrasted. *International Journal of Entrepreneurship and Innovation Management* 5(5/6): 518-539.

Tung, R. 1979. Dimensions of organizational environments: An exploratory study of their impact on organization structure. *Academy of Management Journal* 22: 672-693.

Tushman, M.L. 1977. Special boundary roles in the innovation process. *Administrative Science Quarterly* 22: 587-605.

Van de Ven, A. H. and R. Drazin. 1985. The concept of fit in contingency theory. *Research in Organizational Behavior* 7: 333-366.

Van Lent, L. 2007. Endogeneity in management accounting research: A comment. *European Accounting Review* 16(1): 197-205.

Venkatraman, N. 1989. Strategic orientation of business enterprises: the construct, dimensionality, and measurement. *Management Science* 35: 942-962.

Vera-Muñoz, S.C., J.L. Ho, and C.W. Chow. 2006. Enhancing knowledge sharing in public accounting firms. *Accounting Horizons* 20(2): 133-155.

Widener, S. K. 2007. An empirical analysis of the levers of control framework. *Accounting, Organization and Society* 32*:* 757-788.

Williamson, O.E. 1975. *Markets and Hierarchies.* Free Press, New York.

Wolfensohn, J.D. 2002. Implementing global partnership for poverty reduction. Keynote address delivered at Peking University, May 29.

Worm, V. and J. Frankenstein. 2000. The dilemma of managerial cooperation in Sino-western business operations. *Thunderbird International Business Review* 42(3): 261-283.

Young, S.M. 1996. Survey research in management accounting: A critical assessment. In A. Richardson (Ed.), *Research Methods in Accounting: Issues and Debates.* Vancouver, B. C.: CGA-Canada Research Foundation: 55-68.

Zhongguo, G. B. 1997. China-culture: Performance reviews discussed. *Beijing Review*: 1.

Figure 1—Theoretical Framework, Operational Constructs, Hypotheses, and Results

Panel A: Theoretical Framework and Operational Constructs

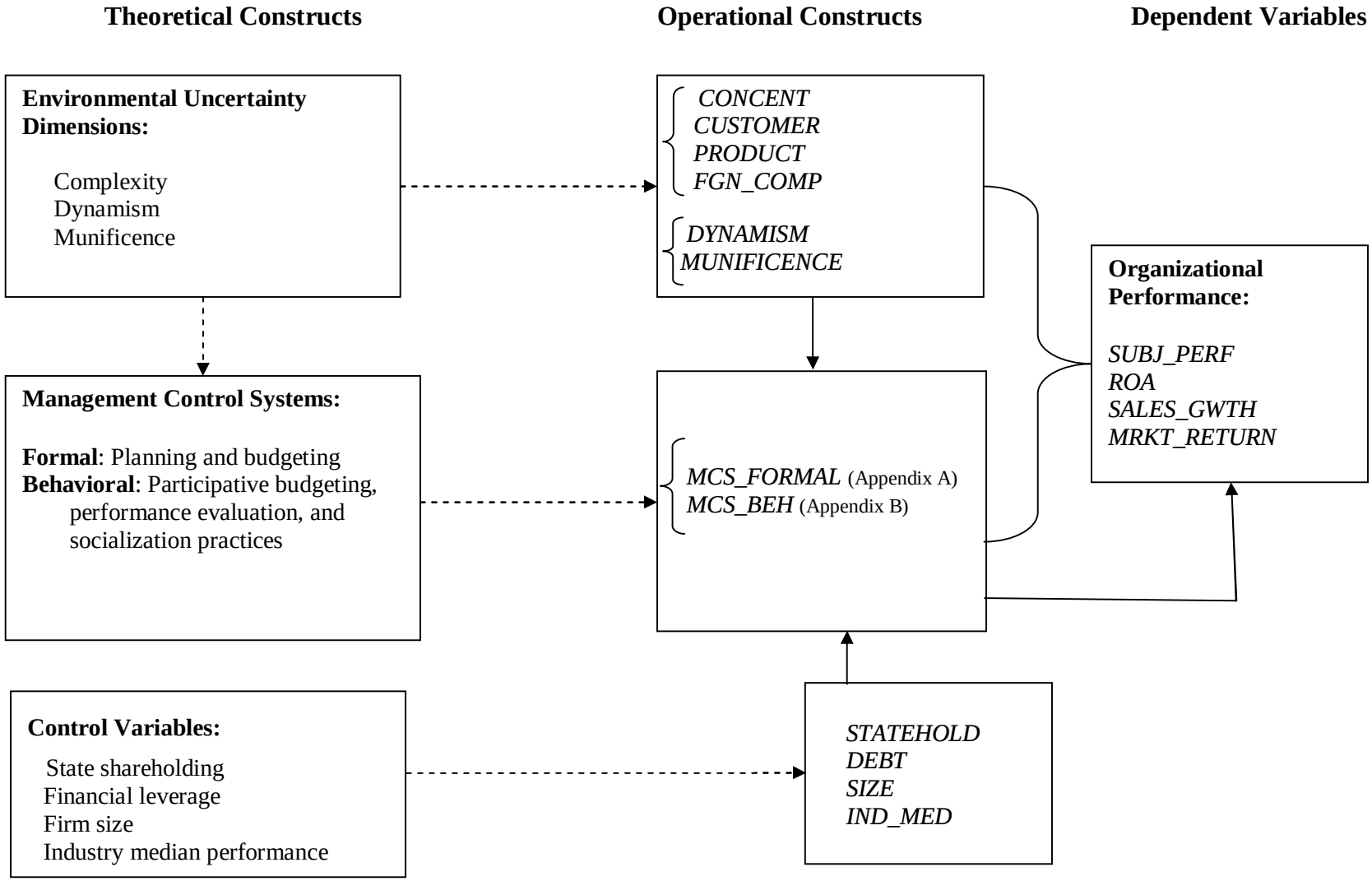

Figure 1—Theoretical Framework, Operational Constructs, Hypotheses, and Results (continued)

Panel B: Hypotheses

Environmental Uncertainty Dimension[1]	Expected Use of MCS by High (Low) Performing Firms: Formal	Behavioral
More complexity	**H1a**: Greater (Less)	**H1b**: Greater (Less)
More dynamism	**H2a**: Less (Greater)	**H2b**: Greater (Less)
More munificence	**H3a**: Less (Greater)	**H3b**: Greater (Less)

Panel C: Results of Hypotheses Tests

Environmental Uncertainty Dimension	Use of MCS by High (Low) Performing Firms: Formal	Behavioral
More complexity	**H1a**: Supported	**H1b**: Supported
More dynamism	**H2a**: Supported	**H2b**: Less (Greater)
More munificence	**H3**a: Partially supported[2]	**H3b**: Less (Greater)

[1] *Complexity* refers to the heterogeneity and range of an organization's activities, and it increases as the number of suppliers, customers, and competitors increases.
Dynamism refers to the rate of change and innovation in an industry, as well as to the uncertainty or unpredictability of the actions taken by competitors and customers.
Munificence refers to the abundance or scarcity of critical resources—customers, raw materials, or capital, and the resulting capacity to support growth.

[2] Both high- and low-performing firms that operate in more munificent environments use less formal controls. The difference in the *MUNIFICENCE* coefficients between these two sub-groups of firms is in the expected direction and significant when firm performance is measured using *MRKT_RETURN_04* (see Table 2 for definition), but the difference in the *MUNIFICENCE* coefficient is in the opposite direction to our predictions when firm performance is measured using *SUBJ_PERF* (see Table 2 for definition).

TABLE 1
Sample Selection, Distribution by Industry, and Tests of Respondent vs. Non-Respondent Firms

Panel A: Sample selection

Firms publicly listed on the Shanghai Stock Exchange by end of 2003	759
Firms publicly listed on the Shenzhen Stock Exchange by end of 2003	500
Total number of publicly listed firms	1,259
Less:	
Firms listed in 2003	(134)
Firms listed in 2002	(69)
Non-manufacturing firms	(376)
Firms surveyed	680
Less: Non-response firms	(497)
Response firms	183
Less:	
Firms that returned incomplete questionnaires	(14)
Government protected firms, conglomerates	(13)
Final sample size	156

TABLE 1 (continued)
Sample Selection, Distribution by Industry, and Tests of Respondent vs. Non-Respondent Firms

Panel B: Manufacturing Industry Composition

	Target Firms		Sample Firms	
Manufacturing Industry	**# of Firms**	**%**	**# of Firms**	**%**
Coal Mining (6)	9	1.32	0	0
Petroleum and Natural Gas Extraction (7)	4	0.60	0	0.00
Ferrous Metals Mining (8)	1	0.10	0	0.00
Nonferrous Metals Mining (9)	1	0.10	0	0.00
Nonmetal mineral mining (10)	1	0.10	0	0.00
Food Processing (13)	19	2.80	6	3.85
Food Manufacturing (14)	10	1.47	5	3.21
Beverage (15)	27	3.97	4	2.56
Tobacco Processing (16)	29	4.26	7	4.49
Textile (17)	27	3.97	7	4.49
Furniture Manufacturing (21)	2	0.29	0	0.00
Papermaking & Printing (22)	23	3.38	6	3.85
Raw Chemical (incl Petroleum Processing) (26)	98	14.41	29	18.59
Medical and Pharmaceutical Products (27)	63	9.26	9	5.77
Chemical Fiber (28)	20	2.94	5	3.21
Rubber Products (29)	5	0.74	0	0.00
Plastic (30)	11	1.62	7	4.49
Nonmetal Products (31)	42	6.18	7	4.49
Metal Products (34)	60	7.21	16	7.69
Ordinary Machinery (35)	32	6.32	4	5.13
Special Equipment (36)	49	7.21	13	8.33
Transport Equipment (37)	55	8.09	13	8.33
Electrical Machines, Electronic and Telecom Equipment (41)	79	11.62	14	8.97
Instruments, Cultural and clerical machines (42)	13	1.91	4	2.56
Total	680	100%	156	100%

Chi-Square Test*	Chi-Square	=	26.19
	df	=	23
	Pr > Chi-Square	=	0.26

TABLE 1 (continued)
Sample Selection, Distribution by Industry, and Tests of Respondent vs. Non-Respondent Firms

Panel C: Differences between Respondent and Non-Respondent Firms

	Means				
Variable	**Respondent Firms**	**Non-respondent firms**	**Difference in Means**	**t-test (Pr > t)**	**Wilcoxon Test (Pr > z)**
SALES (million)	180.76	176.61	0.42	0.34	0.64
Net income (million)	176.74	181.35	(0.46)	0.33	0.44
SIZE (# of Employees)	4122	4765	(643)	0.63	0.70
AGE (in # years)	9.57	9.69	0.12	0.40	0.05

*The Chi-square statistics is calculated as $Q = \sum_i \frac{(f_i - e_i)^2}{e^i}$, where f_i is the observed frequencies of each industry in the sample of respondents (f_i = Respondents' sample size * %Responding firms in industry i) and e_i is the expected frequencies based on the industry composition of the target firms (e_i = Respondent's sample size * %Target firms in industry i).

TABLE 2
Descriptive Statistics

	Summary statistics					Percentiles		
	Mean	Std. Dev.	Theoretical Range	Min.	Max.	25%	50%	75%
Firm Performance:								
SUBJ_PERF	68.46	12.63	15-105	28.50	98.00	60.50	67.00	77.50
ROA	3.49	9.90		-57.00	25.00	2.00	5.00	8.00
SALES_GWTH	11.04	65.89		-708.46	96.76	5.67	19.62	28.77
MRKT_RETURN_04	-17.82	26.89		-104.09	84.65	-32.50	-16.89	-1.17
MRKT_RETURN_0405	-39.11	37.06		-132.74	104.13	-61.51	-39.21	-16.99
Management Control Systems:								
MCS_FORMAL	83.86	10.82	16-112	39.00	107.50	77.00	83.91	91.50
MCS_BEH	98.79	13.46	22-154	54.50	134.50	91.75	99.50	106.25
Environmental Variables:								
IND_CONCENT	0.01	0.01	0-1	0.00	0.03	0.00	0.01	0.01
CUST_CONCENT	0.29	0.19		0.04	0.94	0.15	0.24	0.39
PRODUCT	-7.44	0.66	0-100	-0.68	3.76	-0.39	-0.17	0.14
FGN_COMP	18.71	18.27	0-100	0.00	67.28	5.98	10.80	28.22
DYNAMISM	-5.29	11.71		-50.20	2.55	-10.42	-0.98	1.62
MUNIFICENCE	.001	1.00		-0.92	3.05	-0.43	-0.27	-0.25
Control Variables:								
STATEHOLD	.72	.45	0-1	0.00	1.00	0	1	1
DEBT	109.74	88.88		7.18	602.62	55.20	89.95	133.44
SIZE	21.18	0.79		19.68	24.81	20.63	21.07	21.49
IND_MED	2.97	1.15		1.19	7.05	2.23	2.79	3.02

TABLE 2 (continued)
Descriptive Statistics

Variable definitions:

Firm Performance:

SUBJ_PERF = Subjective performance for 2003 elicited from senior managers (see Appendix C)
ROA = Return on assets for 2004
SALES_GWTH = Sales growth for 2004
MRKT_RETURN_04 = Market return for 2004
MRKT_RETURN_0405 = Market return for 2004 and 2005

Management Control Systems:

MCS_FORMAL = A combination of formal planning and budget control. Formal planning is an aggregate measure that combines the responses from the senior-level managers to five questions related to formal planning procedures (see Appendix A). Budget control is an aggregate measure that combines the responses from the senior-level managers to 11 questions related to budget setting and targets (see Appendix A).

MCS_ BEH = A combination of participation in budget setting and performance evaluation and socialization practices. Participation in budget setting is an aggregate measure that combines the responses to seven questions elicited from the middle-level managers (see Appendix B). Socialization practices is an aggregate measure that combines the responses from the middle-level managers to 11 questions related to socialization practices (see Appendix B).

Environmental Variables:

IND_CONCENT = Industry concentration, based on the Herfindahl index of total sales in a two-digit industry code, measured by the sum of squares of the market share (in terms of sales) of the ten largest firms in each industry sector (2002-2003). Higher levels of this index indicate higher levels of industry concentration.

CUST_CONCENT = Customer concentration, calculated as the percentage of sales, out of total firm sales, made to the five largest customers of each firm (2003). Higher levels of this index indicate higher levels of customer concentration.

FGN_COMP = Percentage of foreign firm sales revenue in each of China's domestic industries based on the two-digit code (2003)

PRODUCT = Based on the count of product numbers and product types published by each firm in 2004. The two measures are combined into a single measure using factor analysis.

DYNAMISM = Volatility of sales revenue from the main operations of each firm during the 1999 to 2003 period.

MUNIFICENCE = factor analysis of four dimensions of industry growth between 1999 and 2003: (i) industry employment; (ii) industry value added; (iii) number of firms; and (iv) sales

Control Variables:

STATEHOLD = Average percentage of state shareholders at the end of 2003
DEBT = Book value of long-term debt/book value of shareholders' equity at end of 2003
SIZE = Average log of total assets at the end of 2002 and 2003
Δ*FIRM_SALES* = Percentage change in firm sales between 2002 and 2003
ZONE = Dummy variable equal to 1 if the firm's place of registration is located in a special economic zone, and 0 otherwise.
IND_MED = Median performance on each performance dimension for each of the industries listed in Panel B of Table 1. Descriptive statistics for *ROA* shown.

TABLE 3
Pearson Correlation Statistics of the MCS and Environmental Dimensions

			Environmental Dimensions					Control Variables		
Correlations	***MCS_ FORMAL***	***MCS_ BEH***	***IND_ CONCENT***	***CUST_ CONCENT***	***PRODUCT***	***FGN_ COMP***	***DYNA MISM***	***MUNIFI CENCE***	***STATE HOLD***	***DEBT***
MCS_BEH	0.3327‡									
IND_CONCENT	0.0105	-0.0889								
CUST_CONCENT	-0.0369	-0.0665	0.0638							
PRODUCT	0.1075	0.0797	-0.0474	-0.0300						
FGN_COMP	0.1251	0.0922	-0.0674	0.0350	-0.0455					
DYNAMISM	0.0203	-0.0203	0.0020	0.1709†	0.0511	0.1195				
MUNIFICENCE	-0.0919	0.1180	-0.2414‡	0.0918	0.1358*	0.0266	0.2818‡			
STATEHOLD	0.0475	0.1561*	-0.0950	0.1199	0.1024	0.0400	-0.0194	0.1125		
DEBT	-0.0169	-0.0146	-0.0657	0.0103	-0.0544	-0.0606	0.0000	-0.0432	-0.1002	
SIZE	0.1916†	0.0015	0.1469*	0.0368	-0.0735	0.0579	-0.0309	-0.1079	-0.1420*	-0.0693

[1] Significance levels: ‡ $p < 0.01$, † $p < 0.05$, * $p < 0.10$ (two-tailed).

[2] See Table 2 for variable definitions.

TABLE 4
Ordinary Least Squares (OLS) Regressions for Predictions of the Firms' Use of Management Control Systems[1]

$$MCS = \beta_0 + \beta_1 IND\_CONCENT_{it} + \beta_2 CUST\_CONCENT_{it} + \beta_3 PRODUCT_{it} + \beta_4 FGN\_COMP_{it} + \beta_5 DYNAMISM_{it} + \beta_6 MUNIFICENCE_{it} + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + e_{it} \quad (1)$$

		MCS_FORMAL	***MCS_BEH***
INTERCEPT		24.1218	81.0351‡
		(0.92)	(3.76)
Environmental variables:[2]			
COMPLEXITY	*IND_CONCENT*	-29.3859	-68.6966
		(-0.26)	(-0.35)
	CUST_CONCENT	-2.7901	-6.0205*
		(-0.86)	(-1.97)
	PRODUCT	2.1360†	1.1332
		(1.99)	(0.60)
	FGN_COMP	0.0679	0.0664
		(0.88)	(0.57)
	DYNAMISM	0.0444	-0.0519
		(0.99)	(-0.83)
	MUNIFICENCE	-1.2206‡	1.4440†
		(-3.62)	(2.10)
Control Variables:			
STATEHOLD		1.8591	4.4388
		(0.83)	(1.56)
DEBT		0.0016	0.0022
		(0.22)	(0.19)
SIZE		2.7491†	0.7102
		(2.29)	(0.75)
Adjusted R^2		0.0833‡	0.0586‡

[1] Significance levels: ‡ $p < 0.01$, † $p < 0.05$, * $p < 0.10$ (two-tailed). The t-statistics are shown in parentheses.

[2] See Table 2 for variable definitions.

TABLE 5
Ordinary Least Squares (OLS) Regressions of the Association between the Management Control Systems (Aggregate) Prediction Residuals Model and Firm Performance[1]

$$PERF = \beta_0 + \beta_1 POS\_MCS\_FORMAL\_RESID_{it} + \beta_2 NEG\_MCS\_FORMAL\_RESID_{it} + \beta_3 POS\_MCS\_BEH\_RESID_{it} + \beta_4 NEG\_MCS\_BEH\_RESID_{it} + \beta_5 MCS\_FORMAL\_PRED_{it} + \beta_6 MCS\_BEH\_PRED_{it} + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + \beta_{10} IND\_MED_{it} + e_{it} \quad (3)$$

	RQ1 (exp. sign)	SUBJ_PERF	ROA	SALES_GWTH	MRKT_RETURN04	MRKT RETURN_0405
INTERCEPT		103.89‡	-11.36	152.98	24.05	-93.81
		(3.55)	(-0.44)	(1.10)	(0.43)	(-1.03)
MCS_FORMAL_PRED		-0.19	-2.21	12.16	4.10	-3.85
		(-0.14)	(-1.53)	(1.01)	(1.58)	(-1.45)
MCS_BEH_PRED		3.09†	4.70†	-17.33	2.82	6.68†
		(2.85)	(2.90)	(-1.01)	(1.46)	(2.24)
POS_MCS_FORMAL _RESID[2]	(-)	3.59	0.04	-17.27	3.39	4.60
		(1.70)	(0.04)	(-0.87)	(0.73)	(0.77)
NEG_MCS_FORMAL_RESID	(+)	7.04‡	4.23‡	8.87	1.36	2.13
		(6.81)	(2.99)	(1.30)	(0.32)	(0.38)
POS_MCS_BEH _RESID[2]	(-)	-0.20	-0.47	-15.20	-10.48‡	-5.34
		(-0.10)	(-0.56)	(-1.38)	(-3.17)	(-1.10)
NEG_MCS_BEH_RESID	(+)	3.48*	0.81	4.52	5.17	-0.83
		(1.84)	(0.40)	(1.04)	(1.36)	(-0.18)
Control Variables:						
STATEHOLD		-5.22*	-0.90	47.40	-7.29	-7.71
		(-1.94)	(-0.47)	(1.42)	(-1.07)	(-0.76)
DEBT		-0.01	-0.02†	0.02	-0.03	-0.00
		(-1.42)	(-2.60)	(0.25)	(-1.08)	(-0.10)
SIZE		-1.31	1.08	-8.91	-0.45	4.77
		(-0.95)	(0.85)	(-1.12)	(-0.20)	(1.11)
IND_MED			-1.02	1.32	1.21‡	1.97†
			(-1.10)	(1.36)	(5.54)	(2.69)
Adjusted R^2		0.31‡	0.24‡	0.10†	0.19‡	0.07†
Maximum VIF		2.28	3.21	5.36	2.31	2.89
Condition Index		21.17	13.84	13.87	10.43	18.51

[1] Significance levels: ‡ $p < 0.01$, † $p < 0.05$, * $p < 0.10$ (two-tailed). The t-statistics are shown in parentheses.

[2] See Table 2 for variable definitions; additional definitions below.

MCS_PRED = Expected values derived from the prediction residuals model in Table 4.

POS_MCS_RESID = Summed total of the average standardized residuals of the five MCS practices from the prediction residuals model in Table 4, coded 1 if the residual for each MCS practice is positive, and 0 otherwise.

NEG_MCS_RESID = Summed total of the average standardized residuals of the five MCS practices from the prediction residuals model in Table 4, coded 1 if the residual for each MCS practice is negative, and 0 otherwise.

TABLE 6
Ordinary Least Squares (OLS) Regressions for Predictions of the Use of Formal Management Controls (*MCS_FORMAL*) among Sub-groups of the Lowest and Highest Performing Halves of Firms[1]

Panel A: Regression model for the lowest and highest performing halves of the sample firms (estimates for the intercept and control variables not shown)

$$MCS\_FORMAL = \beta_0 + \beta_1 IND\_CONCENT_{it} + \beta_2 CUST\_CONCENT_{it} + \beta_3 PRODUCT_{it} + \beta_4 FGN\_COMP_{it} + \beta_5 DYNAMISM_{it} + \beta_6 MUNIFICENCE_{it} + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + e_{it} \quad (3)$$

Sub-groups of high- (H) and low- (L) performing firms, split at the median value of these industry-adjusted performance measures:

	SUBJ_PERF		***ROA***		***SALES_GWTH***		***MRKT_RETURN04***		***MRKT_RETURN_0405***	
	H	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**
Environmental Complexity:[2]										
IND_CONCENT	24.76	75.15	-445.42‡	337.48†	-350.17†	495.21†	78.20	-136.42	-106.49	-1.11
	(0.17)	(0.44)	(-2.84)	(1.96)	(-2.33)	(2.83)	(0.40)	(-0.87)	(-0.57)	(-0.01)
CUST_CONCENT	1.19	-0.55	-1.25	-5.17	0.52	3.55	1.54	-3.11	-4.01	-4.18
	(0.18)	(-0.09)	(-0.19)	(-0.82)	(0.09)	(0.53)	(0.21)	(-0.51)	(-0.58)	(-0.69)
PRODUCT	1.23	2.72*	7.45‡	1.50	4.44†	0.99	3.22*	0.92	3.96†	0.51
	(0.83)	(1.33)	(3.07)	(0.91)	(2.25)	(0.60)	(1.49)	(0.51)	(1.86)	(0.28)
FGN_COMP	0.10†	0.02	0.12†	-0.08	0.18‡	-0.09	0.01	0.10*	0.03	0.12†
	(1.90)	(0.26)	(2.22)	(-0.93)	(2.89)	(-1.26)	(0.20)	(1.48)	(0.38)	(1.82)
DYNAMISM	0.08	0.05	0.03	0.18*	0.01	0.06	0.08	0.03	-0.02	0.19*
	(0.92)	(0.45)	(0.29)	(1.48)	(0.06)	(0.63)	(0.69)	(0.27)	(-0.17)	(1.64)
MUNIFICENCE	-0.95	-3.32†	-0.96	-1.87	-1.56	0.29	-2.34*	-0.75	-1.92*	-0.77
	(-0.96)	(-1.92)	(-0.93)	(-1.18)	(-0.63)	(0.27)	(-1.57)	(-0.60)	(-1.38)	(-0.57)
Adjusted-R^2	0.10	0.21†	0.29‡	0.16	0.25†	0.22†	0.12	0.15	0.09	0.20*
Maximum VIF (Condition Index)	1..36 (35.32)	1.49 (25.02)	1.24 (34.65)	1.41 (25.81)	1.41 (31.12)	1.33 (28.62)	1.29 (26.55)	1.28 (29.41)	1.26 (26.32)	1.33 (29.68)
Chow *F*-statistic **RQ1**	0.64		3.14‡		4.44‡		0.69		0.69	

Panel B: *T*-test of differences in regression coefficients between high- and low-performing halves of firms (one-tailed *t*-statistics in parentheses)

IND_CONCENT	**H1a**	39.31	(0.27)	-758.11‡	(-4.72)	-761.15‡	(-4.72)	258.99	(1.30)	-52.78	(-0.26)
CUST_CONCENT	**H1a**	-7.41	(-0.95)	0.10	(0.02)	4.88	(0.75)	4.11	(0.46)	-1.92	(-0.27)
PRODUCT	**H1a**	-1.27	(-0.39)	5.10†	(2.21)	3.98‡	(2.58)	1.77	(0.95)	3.29	(1.33)
FGN_COMP	**H1a**	0.04	(0.45)	0.21†	(1.87)	0.30‡	(2.94)	-0.08	(-0.57)	-0.09	(-0.72)
DYNAMISM	**H2a**	0.02	(0.27)	-0.14†	(-2.43)	-0.16†	(-1.84)	0.06	(0.61)	-0.20‡	(-3.45)
MUNIFICENCE	**H3a**	2.99‡	(2.69)	0.59	(0.55)	-1.67	(-0.81)	-1.75†	(-2.36)	-1.02	(-1.19)

[1]Significance levels: ‡$p < 0.01$; †$p < 0.05$; and *$p < 0.10$ (two-tailed for Chow *F*-statistic; one-tailed otherwise). See Table 2 for variable definitions. We use industry-adjusted median performance measures.

[2]Chow *F*-statistic comparing the high- and low-performing halves of firms using industry-adjusted median performance measures.

TABLE 7
Ordinary Least Squares (OLS) Regressions for Predictions of the use of Behavioral Management Controls (*MCS_BEH*) among the Sub-groups of the Lowest and Highest Performing Halves of Firms[1]

Panel A: Regression model for the lowest and highest performing halves of the sample firms (estimates for the intercept and control variables not shown)

$$MCS\_BEH = \beta_0 + \beta_1 IND\_CONCENT_{it} + \beta_2 CUST\_CONCENT_{it} + \beta_3 PRODUCT_{it} + \beta_4 FGN\_COMP_{it} + \beta_5 DYNAMISM_{it} + \beta_6 MUNIFICENCE_{it} + \beta_7 STATEHOLD_{it} + \beta_8 DEBT_{it} + \beta_9 SIZE_{it} + e_{it} \quad (3)$$

Sub-groups of high- (H) and low- (L) performing firms, split at the median value of these industry-adjusted performance measures:

	SUBJ_PERF		***ROA***		***SALES_GWTH***		***MRKT_RETURN_04***		***MRKT_RETURN_0405***	
	H	**L**	**H**	**L**	**H**	**L**	**H**	**L**	**H**	**L**
Environmental Complexity:[2]										
IND_CONCENT	78.81	42.95	-18.11	67.43	-57.90	127.40	-113.80	-155.93	-274.87	-53.66
	(0.37)	(0.20)	(-0.08)	(0.34)	(-0.31)	(0.53)	(-0.55)	(-0.72)	(-1.23)	(-0.26)
CUST_CONCENT	-10.95	-1.56	-15.24*	-1.71	-8.01	-0.05	-11.68*	4.52	-17.37†	3.95
	(-1.14)	(-0.21)	(-1.56)	(-0.24)	(-1.10)	(-0.01)	(-1.51)	(0.54)	(-2.10)	(0.52)
PRODUCT	-0.67	3.90*	2.87	0.92	4.18†	-1.03	1.31	2.65	3.01	0.76
	(-0.31)	(1.55)	(0.79)	(0.48)	(1.70)	(-0.45)	(0.57)	(1.06)	(1.18)	(0.33)
FGN_COMP	0.16†	-0.07	0.22‡	-0.21†	0.18†	-0.07	-0.04	0.19†	0.04	0.18†
	(2.15)	(-0.73)	(2.84)	(-2.15)	(2.36)	(-0.73)	(-0.50)	(2.09)	(0.43)	(2.13)
DYNAMISM	0.03	-0.08	-0.12	0.08	-0.24*	0.02	-0.06	-0.01	-0.16	0.14
	(0.28)	(-0.58)	(-0.87)	(0.54)	(-1.48)	(0.15)	(-0.46)	(-0.10)	(-1.20)	(0.97)
MUNIFICENCE	0.34	4.15†	1.67	2.11	-1.77	2.67†	-0.11	2.23*	1.23	0.79
	(0.24)	(1.96)	(1.08)	(1.16)	(-0.57)	(1.80)	(-0.07)	(1.30)	(0.74)	(0.47)
Adjusted R^2	0.13	0.13	0.20*	0.10	0.25†	0.07	0.07	0.25†	0.15	0.20*
Maximum VIF (Condition Index)	1.47 (29.17)	1.25 (24.47)	1.31 (25.96)	1.21 (26.42)	1.33 (28.04)	1.48 (24.44)	1.30 (28.26)	1.33 (24.73)	1.31 (25.84)	1.26 (26.22)
Chow *F*-statistic **RQ1**	1.53		2.43†		1.85*		1.73		1.42	

Panel B: *T*-test of differences in regression coefficients between high- and low-performing halves of firms (one-tailed *t*-statistics shown in parentheses)

IND_CONCENT	**H1b**	134.09	(0.60)	-230.46	(-0.61)	-210.14	(-1.15)	224.30	(1.41)	-13.38	(-0.06)
CUST_CONCENT	**H1b**	-12.55	(-1.15)	-19.50†	(-2.53)	-4.81	(-0.40)	-15.29†	(-2.00)	-20.13†	(-1.79)
PRODUCT	**H1b**	-4.20	(-1.29)	2.27	(0.44)	6.20†	(2.56)	-2.15	(-1.03)	1.55	(0.47)
FGN_COMP	**H1b**	0.22	(1.46)	0.39†	(2.10)	0.26	(1.23)	-0.20	(-1.59)	-0.10	(-0.65)
DYNAMISM	**H2b**	0.09	(1.04)	-0.14	(-0.85)	-0.36†	(-1.83)	-0.06	(-0.57)	-0.32‡	(-2.51)
MUNIFICENCE	**H3b**	-3.36‡	(-2.95)	-0.45	(-0.60)	-3.50†	(-1.86)	-2.26†	(-1.84)	0.37	(0.32)

[1] Significance levels: ‡$p < 0.01$; †$p < 0.05$; and *$p < 0.10$ (two-tailed for Chow *F*-statistic; one-tailed otherwise). See Table 2 for variable definitions. We use industry-adjusted median performance measures.

[2] Chow *F*-statistic comparing high- and low-performing halves of firms using industry-adjusted median performance measures.

APPENDIX A

Survey Instrument for Senior Managers and Confirmatory Factor Analysis Used to Construct *MCS_FORMAL (Alpha = 0.89)*

Factor		**Factor score**
1. Formal Planning[a]		
Plan1[b]	How extensive are your company's strategic plans relating to acquisitions, diversification, major new product introductions, long-term goals, etc.?	0.831
Plan2[b]	How extensive are your company's plans relating to day-to-day business operations, including equipment replacement, production planning, adjusting prices of goods, inventory purchases, hiring of lower level personnel, etc.?	0.869
Plan3[b]	How detailed are your company's strategic plans relating to acquisitions, diversification, major new product introductions, long-term goals, etc.?	0.515
Plan4[b]	How detailed are your company's plans relating to day-to-day business operations, including equipment replacement, production planning, adjusting prices of goods, inventory purchases, hiring of lower level personnel, etc.?	0.661
Futplans	How far in advance does your company prepare strategic plans relating to acquisitions, diversification, major new product introductions, long-term goals, etc.?	0.686
2. Budget Controls		
2a. Budget Targets[b]		
Please rate the extent to which your company uses each of these control devices:		
	Net income targets:	
	Annual	0.683
	Quarterly	0.799
	Monthly	0.742
	Discretionary program targets:	
	Total program expenditures	0.742
	Individual program expenditures	0.766
	Approvals are required for.	
	Formal reviews of responsibility center performance	0.588
2b. Tightness of Controls[b]		
Please rate the extent to which your company uses each of these control devices:		
	Strict headcount targets	0.614
A number of control devices are listed below. Please rate the extent to which approvals are required for each of the following:		
	Hiring new employees	0.675
	Spending discretionary program money already in the budget	0.571
	Spending discretionary program money in excess of budgeted levels	0.772
	Making capital expenditures	0.737

[a] 1 = Not at all extensive/detailed; 7 = Extremely extensive/detailed
[b] 1 = Not used at all; 4 = Used moderately; 7 = Used very extensively

APPENDIX B
Survey Instrument for Middle Managers and Confirmatory Factor Analysis Used to Construct *MCS_BEH (Alpha = 0.84)*

Factor	**Factor score**
1. Participative Budgeting (PB) and Performance Evaluation(PPE)[c]	
How much importance do superiors typically place on subordinates' explanations of their actual performance relative to the budget? (PPE)	0.768
How much overall influence do subordinates typically have in the determination of their budgets? (PB)	0.747
To what extent do superiors typically seek subordinates' input in the budget preparation process? (PB)	0.746
How much importance do superiors typically place on not finalizing subordinates' budgets until the latter fully agree with them? (PB)	0.821
How much importance do superiors typically place on subordinates' level of agreement with the evaluation of their actual performance relative to the budget before concluding the evaluation process? (PPE)	0.703
How much importance do superiors typically place on subordinates' suggestions concerning how to revise the latter's budget? (PB)	0.620
To what extent do superiors typically seek subordinates' opinions when evaluating the latter's actual performance relative to the budget? (PPE)	0.599
3. Socialization Practices[e]	
3a. Recruiting Procedures[e]	
Recruitment forms identify several key traits deemed crucial to a firm's success; traits are defined in concrete terms, and interviewer records specific evidence of each trait.	0.496
Recruits are subjected to at least four in-depth interviews.	0.702
Company actively facilitates de-selection during the recruiting process by revealing weaknesses as well as strengths.	0.412
3b. Training and Rewards[e]	
New hires work long hours, are exposed to intensive training of considerable difficulty, and/or perform relatively menial tasks in the first months.	0.651
The intensity of entry-level experience builds cohesiveness among peers in each entering class.	0.542
All professional employees in a particular discipline begin in entry-level positions regardless of prior experience or advanced degrees.	0.673
Reward systems and promotion criteria require mastery of a core discipline as a precondition of advancement.	0.399
The career path for professional employees is relatively consistent over their first six to ten years with the company.	0.689
Reward systems, performance incentives, promotion criteria, and other primary measures of success reflect a high degree of congruence.	0.429

APPENDIX B (continued)

3c. Shared Values[e]	
Virtually all professional employees can identify and articulate the company's shared values (i.e., the purpose or mission that ties the company to society, the customer, or its employees).	0.546
There are very few instances when the actions of management appear to violate the company's espoused values.	0.771
Employees frequently make personal sacrifices for the company because of their commitment to the company's shared values.	0.715
When confronted with trade-offs between systems measuring short-term results and doing what's best for the company in the long-term, the company usually decides in favor of the long-term.	0.724
This organization fosters mentor-protégé relationships.	0.680
There is considerable similarity among high-potential candidates in each particular discipline.	0.580

[a]1 = Not used at all; 4 = Used moderately; 7 = Used very extensively
[b]1 = Not at all extensive/detailed; 7 = Extremely extensive/detailed
[c]1 = Extremely low; 4 = Moderate; 7 = Extremely high
[d]1 = Not at all; 7 = Very much
[e]1 = Not true of this company; 7 = Very true of this company

APPENDIX C

Instrument of Subjective Measures of Firm Performance Completed by Senior-Level Managers

Over the past three years, how did your company's performance in the following dimensions compare to that of your industry as a whole?

	Much lower			About average			Much higher
1. Long-run level of firm profitability	1	2	3	4	5	6	7
2. Financial strength and liquidity	1	2	3	4	5	6	7
3. Growth rate of sales or revenues	1	2	3	4	5	6	7
4. Return on Assets	1	2	3	4	5	6	7
5. Growth in ROA	1	2	3	4	5	6	7
6. Market share	1	2	3	4	5	6	7
7. Market position	1	2	3	4	5	6	7
8. Operating efficiency and cost efficiency	1	2	3	4	5	6	7
9. New product research and development	1	2	3	4	5	6	7
10. Employee turnover rate and morale	1	2	3	4	5	6	7
11. Corporate image and reputation	1	2	3	4	5	6	7
12. Profit rate	1	2	3	4	5	6	7
13. Growth in profit rate	1	2	3	4	5	6	7
14. Customer satisfaction and loyalty	1	2	3	4	5	6	7
15. Overall performance	1	2	3	4	5	6	7

[1] The varying pace of modernization among firms was influenced by: (a) the timing of the listing; i.e., pre-1996 listings on the stock market were dictated by the government rather than motivated by the goal of competing successfully in global markets; (b) government-directed merger and acquisition activity; and (c) the varying pace of China's responsibilities with the World Trade Organization (WTO) across industries (Angresano 2005).

[2] The relatively young age of the firms in our sample is comparable to the average age of firms in recent studies that focus on the early life-cycle stage of firms (e.g., 5.47 years reported by Davila and Foster 2005; 13.27 years reported by Sandino 2007).

[3] The literature offers a taxonomy that classifies MCS as ranging from mechanistic to organic (e.g., see Chenhall 2003, 131). Mechanistic controls rely on formal rules, standardized operating procedures and routines. As such, formal controls are at the mechanistic end of the MCS continuum because they are "written and standardized information-based procedures and statements, used by managers to monitor and influence the behavior and activities in a firm" (Simons 1994, 5; see also Anthony and Govindarajan 2001a, 63). Behavioral controls are at the organic end of the MCS continuum because they are "more flexible, responsive, involve fewer rules and standardized procedures and tend to be richer in data" (Chenhall 2003, 131). Our list of MCS is by no means exhaustive in that it does not include strategic cost management practices and tools (e.g., Anderson and Lanen 1999) or manufacturing practices (Selto et al. 1995; Bank 1992). For a review, see Granlund and Lukka (1998).

[4] For example, much of the prior contingency-based performance measurement research that has examined the "fit" hypothesis has relied quite heavily on respondents' perceptions of EU (Gul and Chia 1994; Gordon and Narayanan 1984; Govindarajan 1984) and self-reported

performance (e.g., Henri 2006; Gul and Chia 1994). These measures are typically constructed using responses from surveys and, thus, do not necessarily reflect the true state of firms' EU. Moreover, there are inconsistencies in the types of survey questions used to measure perceived EU, which makes it difficult to interpret and compare findings across studies (Chenhall 2003).

[5] The above discussion suggests that the benefits of formal and behavioral MCS should be higher when they are combined as a package (Chow et al. 1994; Milgrom and Roberts 1992, 1995). Predictions about whether MCS are complements or substitutes for one another (e.g., see Widener 2007; Anderson and Dekker 2005) are beyond the scope of this study.

[6] The focus on these sets of controls is also consistent with the types of controls that firms first introduce (e.g., Sandino 2007; Davila and Foster 2005).

[7] For a theoretical discussion of the issue of endogeneity in management accounting research, see Chenhall and Moers (2007) and Van Lent (2007); in financial accounting research, see Lanen and Thompson (1988).

[8] The cost of transferring knowledge depends on such factors as the nature of the knowledge being transferred (e.g., general versus specialized, explicit versus tacit), the organizational structure, and the use of information technology (Vera-Muñoz et al. 2006, 136; Christie et al. 2003; Brickley et al. 2003; Jensen 1998, 107).

[9] Other terms with the same general meaning include instability, turbulence, and volatility (e.g., Kreiser and Marino 2002, 899; Boyd 1995; Olsen et al. 1994; Venkatraman 1989; Dess and Beard 1984).

[10] The CEO, who was also a participant, selected three other managers for the study. Arguably, this practice may introduce sampling bias due to the possibility that the contact person may

channel the surveys only to employees with favorable views. However, our empirical tests show no evidence of systematic biases associated with the variables in our models.

[11] By the end of 2003, there were 759 public companies listed on the Shanghai Stock Exchange and 500 public companies listed on the Shenzhen Stock Exchange, for a total of 1,259 firms. We excluded 376 non-manufacturing companies and 203 companies that were listed after 2001, leaving us with a sample of 680 firms.

[12] These included firms in the steel making, telecommunications, and mining industries. Twenty-four different industry codes are represented in our sample.

[13] Two senior- and two middle-level managers from each of our sample firms completed the survey instruments. Within each managerial level, we compared the participants' responses across all of the items in the survey and across all of the firms in our sample. Neither the mean responses between each pair of middle managers nor those between each pair of senior managers are significantly different ($p > 0.10$). Further, the hypotheses test results are qualitatively similar, regardless of whether we use the average of the two responses for each managerial level or the disaggregated responses. Therefore, our results are based on the average responses of each pair of senior- and middle-level managers.

[14] This is similar to the customer concentration data mandated by SFAS No. 14 and used by Balakrishnan et al. (1996). The only difference is that SFAS No. 14 requires such disclosure of customers only when they account for more than ten percent of a firm's annual sales.

[15] Researchers have used other proxies, such as indicator variables for special economic zones or the market development index (Fan and Wang 2004), but such proxies are one further step removed from the foreign competition construct we employ herein.

[16] We sourced the data from the China Statistical Yearbook, available at www.chinadataonline.com.

[17] With regard to the shareholding structure of the listed firms, other types of shareholders, including legal-person shares, A-shares, and B-shares, have the ability to influence firm structure and operations. Our results are qualitatively similar when we include these shareholder types. Our analyses do not include employee shares, H-shares, N-shares, and L-shares due to their minor quantitative importance.

[18] Given the different industries represented by the sample, we employ Huber-White robust standard errors with the cluster command to control for the sample dependence around the industry in which each firm is located (Rogers 1993). This estimation procedure assumes and estimates a common component of the variance and co-variance matrix for all observations from the same industry (StataCorp 1999, 257).

[19] Multicollinearity is not a problem in any of the regression models presented here, as evidenced by the largest variance inflation factor (VIF) of 1.30 and the largest condition index value (CIV) of 32.33, both of which are within the accepted limits (Belsley1991). The residuals in all of the models are normally distributed.

[20] Multicollinearity is not a problem, as evidenced by the largest VIF of 5.36 and the largest CIV of less than 30 (Belsley 1991). The residuals in all of the models are normally distributed.

[21] Recall that higher levels of the *IND_CONCENT* index indicate higher levels of industry concentration and, thus, lower levels of environmental complexity. This same rationale applies to the *CUST_CONCENT* index.