Adoption of the Balanced Scorecard: A Contingency Variables Analysis

Kevin Hendricks
Richard Ivey School of Business
University of Western Ontario

Larry Menor
Richard Ivey School of Business
University of Western Ontario

and

Christine Wiedman*
Richard Ivey School of Business
University of Western Ontario

September 2004

We thank Harpreet Hora for her research assistance. We also acknowledge the Social Sciences and Humanities Research Council for providing funding for this project.

*Corresponding author. Richard Ivey Business School, University of Western Ontario, London, Ontario, N6A 3K7. Phone: (519) 661-8164. Fax: (519) 661-3959. E-mail: cwiedman@ivey.uwo.ca
Adoption of the Balanced Scorecard: A Contingency Variables Analysis

ABSTRACT

We examine the association between contingency variables and the adoption of a Balanced Scorecard (BSC). The contingency variables we examine include business-level strategy, firm size, environmental uncertainty, and investment in intangible assets. Utilizing both survey and archival data, collected as part of a mixed-methodology design, we find that BSC adoption is significantly related to business strategy, firm size, and environmental uncertainty. Specifically, BSC adopters are (1) more likely to follow a Prospector or Analyzer business strategy, (2) are significantly larger, and (3) exhibit significantly higher environmental uncertainty than non-adopters. We also examined the financial performance of BSC adopters prior to the decision to adopt and following the implementation of the BSC. While we found no post-implementation performance effects, we did find tentative evidence that the financial performance of BSC adopters leading up to the adoption decision was weaker than comparison firms. Our empirical findings provide theoretical and managerial insights into the BSC adoption decision, and substantiate the need for additional BSC adoption and implementation research.
Adoption of the Balanced Scorecard: A Contingency Variables Analysis

INTRODUCTION

The Balanced Scorecard (BSC), a comprehensive framework that identifies a range of distinct performance dimensions and measurement indicators useful for managing diverse firm objectives and activities across all organizational levels, has become a widely advocated management “best practice.” Originally conceived of as a performance measurement system, the BSC approach has evolved into a strategic management tool critical to the firm’s planning process. The BSC approach, as currently advocated and practiced, suggests that senior management translate the firm’s vision and strategy into four performance perspectives: Financial, Customer, Internal Business, and Learning and Growth. Providing a more balanced view of the firm through the use of leading and lagging indicators, both financial and non-financial in nature, performance goals can then be established for a selected four or five relevant measures under each perspective that are aligned with the organization’s business strategy, decisions and activities (see Figure 1).

Insert Figure 1 about here

The International Federation of Accountants (1998) has noted the evolution of managerial accounting emphasis from cost determination and financial control, to examining contingent factors influencing the choice of control mechanisms, to emphasizing reduction of waste in business processes, to more strategic approaches for identifying, measuring, and managing the drivers of firm values. Included among these approaches are economic value measures which approximate shareholder returns (e.g., Stewart 1991), strategic management accounting systems that inform managers about strategic uncertainties (e.g., Simons 1991), and the BSC. In a recent survey, Rigby (2003) reports that the BSC is one of the key
“compass setting” tools used by managers. Several of the anticipated benefits accruing to the organization that adopts and successfully implements an integrated BSC include, among others, better management understanding between specific organizational decisions and actions and the chosen strategic goals, a redefinition of relationships with customers, re-engineering of fundamental business processes, and the emergence of a new corporate culture emphasizing team effort among organizational functions to implement the firm’s strategy (Kaplan and Norton 1996).

Although the benefits of the BSC are widely touted, little rigorous empirical research to date has been conducted to support those beliefs (Ittner and Larcker 2001). Ittner and Larcker (1998) examine one dimension of the BSC — namely the role of customer satisfaction — in predicting future improved performance. Chenhall and Langfield-Smith (1998) examine the perceived benefits from employing balanced performance measures. Lipe and Salterio (2000) focus on the behavioral aspects of using the BSC to manage people, including examining the judgmental effects of common versus unique performance measures, and Lipe and Salterio (2002) consider the impact of the organization of information on the scorecard. Ittner et al. (2003) examine the subjectivity in the weighting of BSC measures. Banker et al. (2004) use an experiment to assess how individuals’ evaluations of the performance of business unit managers depends on strategically linked performance measures of a BSC.

While valuable to the ongoing study of the BSC, the studies cited above have mostly focused on measurement related issues, and have yet to (1) examine the factors associated with the adoption of the BSC and (2) demonstrate that the adoption and implementation of the BSC itself is associated with improved performance. Given the recent emphasis placed

---

1 Atkinson et al. (1997: 94) note that, “… the balanced scorecard is among the most significant developments in management accounting and thus, deserves intense research attention.”
on the use of the BSC and its implications for better strategic management of the firm (see Kaplan and Norton (2001ab)) more research on BSC adoption and implementation issues is warranted.

In this study, we examine contingency factors affecting the adoption of the BSC using a combination of survey and archival data. The contingency factors we examine include business-level strategy, firm size, environmental uncertainty, and investment in intangible assets. Our study sample includes 179 Canadian firms from a diverse range of industries. We find that 23.5 per cent of our sample firms reported that they had decided to adopt and implement a BSC.\(^2\)

Consistent with our predictions, we find that BSC adoption is significantly related to firm strategy, firm size, and environmental uncertainty. Specifically, we find that BSC adopters are more likely to characterize their firm following Prospector or Analyzer business strategies than Defender or Reactor business strategies, according to the Miles and Snow (1978) typology. Also, BSC adopters are significantly larger and exhibit significantly higher environmental uncertainty relative to the non-adopters. These results are consistent after controlling for industry membership and concurrent firm performance. However, we do not find the decision to adopt the BSC to be related to the firm’s investment in intangible assets.

We also provide preliminary evidence on the financial performance of BSC adopters prior to the decision to adopt the BSC, and following the implementation of the BSC. While our empirical tests are constrained by the number of BSC adopters in our data sample, we do report some tentative evidence that the financial performance of BSC adopters leading up to the adoption decision is weaker than comparison firms. This finding suggests that lower-

\(^2\) This adoption rate is notably smaller than the BSC utilization rates reported in Bain & Company’s annual international survey of senior executives on management tools. Summarizing the 2002 survey results, Rigby (2003) reported a 62% BSC utilization rate among survey respondents.
than-desired firm performance may also be a factor in the decision for firms to adopt the BSC. Unfortunately, the recency of BSC adoptions and small sample size make it difficult to measure post-implementation performance effects. We leave this important question for future research.

To our knowledge, this study is the first to provide evidence on the contingency factors affecting the adoption of the BSC for firms in a wide variety of industries, and to document a specific association between BSC adoption and business strategy using the Miles and Snow (1978) typology. Our findings complement those of Hoque and James (2000) who survey 66 Australian manufacturing firms to identify factors associated with the usage of BSC-type measures and find a positive relation between these measures and organizational size. By surveying top executives of the firm, we are able to examine BSC adoption from the perspective of knowledgeable key informants. Kaplan and Norton (2001b) argue that executive support is needed for the introduction and development of the BSC, and that the BSC should be an initiative that is supported by top management and then cascaded down to functional and team levels. Examination of this management control system at the business level also allows us to combine cross-disciplinary research tools from both survey and capital markets research, as we utilize both key-informant survey data and firm-level archival data.

The remainder of the paper is organized as follows. First, we introduce the contingency variables salient to BSC adoption and offer our research hypotheses. Second, we describe our empirical mixed methodology approach. Third, we present our results that test our predictions. Fourth, we describe additional analyses addressing the association

---

3 Hoque and James (2000) define “BSC usage” as the “firms’ tendency to use quantitative measures (frequency and extent of reporting) of several kinds in assessing performance. This construct shares with the BSC the idea that financial measures alone are insufficient.” (p. 8) Their instrument incorporates the four dimensions defined by Kaplan and Norton (1996).
between BSC adoption and performance. Finally, we offer a discussion of the research results before concluding.

**RESEARCH HYPOTHESES**

While research on the BSC is growing, little research has examined the contingency variables that affect BSC use and effectiveness. For example, in their review of the performance measurement literature, Ittner and Larker (1998: 223-224) argue,

... the use and performance consequences of these [BSC] measures appear to be affected by organizational strategies and the structural and environmental factors confronting the organization. Future research can make a significant contribution by providing evidence on the contingency variables affecting the predictive ability, adoption and performance consequences of various non-financial measures and balanced scorecards.

More generally, Fisher (1995), like Covaleski et al. (1996), argues for a contingency theory approach to research on the management control systems. He suggests contingent control variables that relate to: external environment, competitive strategy and mission, technology, unit, firm and industry variables, and knowledge and observability factors. More recently, Chenhall (2003) summarizes contextual research in this area, and notes that little work has been published on newer management control system practices\(^4\), including the BSC, target costing and life cycle costing. Drawing from Chenhall’s (2003) summary and previous research in the area, we examine the importance of contingency variables in explaining the decision for an organization to adopt the BSC. Specifically, we examine: business strategy, firm size, demand volatility (i.e., environmental uncertainty) and investment in intangible assets.

---

\(^4\) Chenhall (2003) notes that the terms management accounting, management accounting systems, management control systems and organizational systems have sometimes been used interchangeably. We follow the more recent definition of management control systems to represent systems of accounting and other controls that provide a broad scope of information to assist managerial decision making.
Business Strategy

It has long been argued in the accounting literature that accounting control systems should be designed according to the business strategy of the firm (Langfield-Smith 1997; Dent 1990; Simons 1987; Otley 1980). While the importance of business strategy as a contingency variable has been explored for other management control systems (Govindarajan and Fisher, 1990; Simons, 1987; Gosselin, 1987) it has yet to be examined with the BSC.

In examining the business strategy contingency variable, we utilize Miles and Snow’s (1978) four types of firms. Miles and Snow proposed a comprehensive, business-level strategic typology interrelating organizational strategy, structure and process. Their typology provides a useful framework for distinguishing distinct firm strategies vis-à-vis the competitive environments in which firms operate. The four strategic archetypes they identified, each providing a distinct competitive response to the question “how should we compete in a given line of business?,” were: Defenders, Prospectors, Analyzers and Reactors (see Zahra and Pearce (1990) for a review on research on the Miles and Snow typology).

Miles and Snow (1978) argue that Defenders and Prospectors view organizational performance very differently, and at extremes on an adaptability continuum. Defenders are “organizations which have narrow product-market domains. Top managers in this type of organization are highly expert in their organization’s limited area of operation but do not tend to search outside of their domains for new opportunities.” (Miles and Snow, 1978: 29)

---

5 An advantage of the Miles and Snow typology is the strong and consistent support for its validity in the literature (e.g. James and Hatten 1995; and Simons 1987; Hambrick 1983; Snow and Hrebiniak 1980), and its conceptual and theoretical contributions to the strategic management literature (Ghoshal 2003; Hambrick 2003; and Chakravarthy and White 2002).
Defenders view their performance primarily in terms of efficiency, or “doing things right.” As a result, Defenders organizations have control structures that emphasize efficiency and stability, with financial and production experts being more influential organization members.

In contrast, Prospectors are “organizations which almost continually search for market opportunities, and they regularly experiment with potential responses to emerging environmental trends.” (Miles and Snow, 1978: 29) Prospectors evaluate performance in terms of effectiveness and “doing the right things,” with marketing and research and development experts possessing more influence in the organization.

Miles and Snow hypothesized that organizations are responsive to their environments and become dominated by the adaptive decision patterns they employ. As a result, managers need to identify their firm’s strategy type in order to understand how their organization competes as that dictates (1) how to improve their firm’s position in the industry, (2) what functional strategies to pursue, (3) what type of structure and process to adopt, and (4) how to make meaning, ongoing strategic and tactical decisions. Miles and Snow observed that the Defender, Prospector and Analyzer strategies should lead to effective performance if properly implemented, and should all outperform the Reactors.⁶

As noted earlier, previous management accounting research suggests that business strategy is an important determinant in the design of systems (e.g., management control system adoption decision). Govindarajan and Gupta (1985) and Gupta and Govindarajan (1984) find that firms following a Prospector strategy perform better when using long-term performance evaluation that focuses on the future development of the company. Similarly,

---

⁶ According to Miles and Snow (1978: 29), Analyzers are “organizations which operate in two types of product-market domains, one relatively stable, the other changing. In their stable areas, these organizations operate routinely and efficiently through use of formalized structures and processes. In their more turbulent areas, top managers watch their competitors closely for new ideas, and then they rapidly adopt those which appear to be the most promising.” Reactors are “organizations in which top managers frequently perceive change and uncertainty occurring in their organizational environments but are unable to respond effectively.”
Simons (1987) finds that Prospector firms seem to place more emphasis on forecast data in control systems. This research suggests that Prospectors benefit from broader planning mechanisms that allow them to exploit new opportunities. Defenders, it can be posited, are better off focusing on financial measures, including cost efficiency in their control systems.

The appropriate management control system for Analyzer firms is less clear (Olson and Slater 2002). Analyzers have characteristics of both the Defender and Prospector strategies as they operate in two types of product-market domains, one relatively stable, the other changing. Analyzers are concerned both with developing new products and venturing into new markets while protecting a stable core of products and markets. Because of this, singular focus on cost control is not likely to be optimal. Miles and Snow (1978) argue that the Analyzer organizational structure must accommodate both stable and dynamic areas of operation, making them extremely complex to manage. Gosselin (1997) finds that both Prospectors and Analyzers are more likely than Defenders to adopt innovative management accounting systems (specifically, activity management approaches.) Olson and Slater (2002) examined the relationship between strategic type and BSC performance dimension emphasis. They found, for example, that Prospectors firms on the whole emphasized innovation and growth perspectives more than the other strategy types, while defenders were more inclined to emphasize the financial perspective. While this study did not distinguish the respondents in terms of BSC adopters and non-adopters, these findings further motivate the examination of the firm strategy and BSC adoption relationship.

Given the broader scope and the inclusion of non-financial, forward-looking measures in the BSC, these studies suggest that the use of the BSC is more likely to benefit firms following a Prospector or Analyzer strategy, and less likely to benefit firms following a Defender strategy. Also, given Miles and Snow’s (1978) prediction that firms following a
Reactor strategy are the least likely to be successful, innovation in management control systems for these firms is not likely to be beneficial. Therefore, Reactor firms are also less likely to adopt the BSC. Hence, we predict that:

Hypothesis 1: The propensity to adopt the BSC is positively related to firms following a Prospector or Analyzer strategy.

Firm Size

Firm size, like business strategy, is an important contingency factor requiring explicit consideration in the BSC adoption decision. The relationship between firm size and organization structure (see Kimberly 1976) and organizational performance (see Gooding and Wagner 1985) has been a primary consideration in the organizational design and theory literature. This consideration stems from the general view that larger firms are generally more complex (Blau 1970), and require more formalized, decentralized, specialized, and integrated systems (Mintzberg 1979; Lawrence and Lorsch 1967). These systems provide the organization with a greater degree of functional and organizational structure coordination that aids in effective managerial decision making.

Previous accounting research suggests that firm size can affect the design and use of management control systems. Merchant (1984) argues that organizational growth poses increased communication and control problems. Also larger firms may have greater access to the resources needed to implement more complex systems (Shields, 1995). Libby and Waterhouse (1996) find that the number of changes made to a management control system is positively related to firm size. In their review, Moores and Chenhall (1994) find there is considerable evidence that size is an important factor related to the adoption of more complex administration systems. Hoque and James (2000) predict that large organizations
depend on sophisticated information and control systems using diverse measures, and find the use of BSC-type measures (measured as a 20-item scale) to be increasing with organization size. By design, the BSC represents an integrative management tool useful for coordinating cross-function and cross-level decisions and activities. Hence, we predict that:

Hypothesis 2: The propensity to adopt the BSC is positively related to firm size.

Environmental Uncertainty

Given the previous discussions of the business strategy and firm size contingency variables, examining the impact of environmental uncertainty on BSC adoption is to be expected. Indeed, Zahra and Pearce (1990) note the confounding association between these three contextual factors as they apply to the general business strategy and performance relationship. Environmental uncertainty has long been viewed as a central problem for organizations, notably dating back to March and Simon (1958), which creates difficulties for effective strategic management (Grant 2003; Jauch and Kraft 1986). Further, the classic/normative approaches in the business strategy literature advocating strategic fit (e.g., Frederickson 1984; Burgelman 1983; and Miles and Snow 1978) address the problem a firm’s environment creates for strategic and tactical decision making (Nutt 2002). Frederickson (1984: 445), for example, describes the need for firm comprehensiveness, which is “the extent to which organizations attempt to be exhaustive or inclusive in making and integrating strategic decisions.” A management control system like the BSC is likely useful in achieving such comprehensiveness.

Chenhall (2003) emphasizes the importance of considering the environment in future contingency-based research. Previous research has found that environmental uncertainty, which Milliken (1987: 136) operationally defines as the “[organization’s]
perceived inability to predict accurately” due to a “lack... of information” or “an inability to
discriminate between relevant and irrelevant data,” is related to greater usefulness of broad
scope information. Gordon and Narayanan (1984) argue that the operating environment
should be the major consideration in designing management accounting systems. They
survey senior managers from 34 firms, and find that the environmental uncertainty is related
to the extent to which their information systems emphasize external, non-financial and
future-oriented information. Chenhall and Morris (1986) find a positive association between
perceived environmental uncertainty and the demand for broad-based information systems
incorporating non-financial indicators. Gosselin (1997) finds that environmental uncertainty
influences the decision to implement activity-based costing. Given that an integrative BSC
incorporates both non-financial and future-oriented information, we posit that the
usefulness of such a system would be particularly critical for firms where environmental
uncertainty is high. Hence, we predict that:

Hypothesis 3: The propensity to adopt the BSC is positively related to the firm’s environmental
uncertainty.

Investments in Intangible Assets

Examining investments in intangible assets as a contingency variable is particularly
apt when studying BSC adoption. Kaplan and Norton (1996), in their discussion of the
learning and growth perspective of the BSC, identified three essential categories of intangible
assets: employee capabilities; information systems capabilities; and motivation,
empowerment, and alignment. Kaplan and Norton (2004: 2) recently revised their
description of these intangible asset categories whereby:
• Human Capital represents “skills, talent and knowledge that a company’s employees possess”; 
• Information Capital represents “the company’s databases, information systems, networks, and technology infrastructure”; and 
• Organizational Capital represents “the company’s culture, its leadership, how aligned its people are with its strategic goals, and employees’ ability to share knowledge.”

Lev (2000) acknowledges the difficulty in establishing a comprehensive definition of intangible assets. He classifies intangibles into four categories: product innovation, such as a company’s R&D efforts; company brand, “which let a company sell its products or services at a higher price than its competitors”; structural assets, representing “better smarter, different ways of doing business that can set a company apart from its competitors”; and monopolies, or “companies that enjoy a franchise, or have substantial sunk costs that a competitor would have to match, or a barrier to entry that it can use to its advantage.” (p. 214)

While the need for the effective management of such intangible assets — difficult to achieve through traditional management control systems — has been recognized across a variety of business disciplines, their depiction has differed in the literature. Stewart (1997) and Gray (2001), for example, employ similar categorizations of an organization’s intangibles in their discussion of “intellectual capital.” Teece (2000), on the other hand, describes these intangibles as “knowledge assets,” while Garud (1997) describes such intangibles as “know-how, know-why, and know-what.” Common to each of these characterizations of intangible

7 The descriptor “intangible,” as it applies to this discussion, is slightly misleading. Many of the forms of intangible assets identified in the extant literature (e.g., people, systems, databases, etc.) can be counted or touched.
assets is the recognition of the general difficulty in managing organizational knowledge for sustained competitive advantage (Argote et al. 2003; Eisenhardt and Santos 2002).

The increased importance of intangible assets for many organizations is reflected, in part, on the firm’s balance sheet by their increased percentage of total assets. Yet many argue that most current management control systems and financial reporting models have not changed sufficiently to manage and measure these assets (Lev 2002). Guthrie et al. (2001: 366) argue that “there is a growing awareness that intellectual capital adds significantly to the value of a business and, in some cases, represents almost the entire value base. Stemming from this is the drive to establish new measures and ways of reporting that can be used to record and report the value attributable to intellectual capital within a company.” Similarly, Blair and Wallman (2003) conclude, “Although good management has always involved elements of intuition and gut instinct, managers themselves concede that their poor understanding of the role of intangibles makes its harder for them to judge the performance of individual employees or teams within the firm, as well as the true costs and benefits of a large share of their business activity. One indication that some firms consider the costs of not knowing substantial is the energy they are devoting to the development of internal nonstandard and nonfinancial measures of performance.” (p. 462)

The BSC represents a notable management tool presumed to result in better managing of intangible assets through the use of non-financial measures directly reflecting an organization’s learning and growth decisions, activities, and outcomes. Hence, we predict that:

Hypothesis 4: The propensity to adopt the BSC is positively related to the firm’s investment in intangible assets.
METHODS

This study attempts to address Ittner and Larcker’s (2001) concerns about the reliance on — and limitations associated with — the use of a single data source (e.g., publicly available information, surveys conducted by a third party or the researchers, etc.), and Birnberg’s et al. (1990) recommendation for the use of multiple methods in empirical management accounting research. Specifically, we uniquely combine the strengths of survey-based research (Young 1996) with rigorous empirical capital markets research (e.g. event studies (McWilliams et al. 1999) to examine issues associated with the adoption of a BSC.

Sample and Survey Procedure

We constructed a focused survey to be administered to management key informants (Seidler 1974) who could provide valid proxy/judgmental and retrospective data that identifies BSC adopters and categorizes firm business strategies.8 Specifically, we asked senior executives from Canadian organizations to identify whether their firms had adopted the BSC, when they decided to adopt the BSC, when they began using the BSC and whether or not they have since discontinued its use. Because response rates for senior executives are typically lower than for other organizational respondents9 (Zajac, 1990), we confined our survey to fit on one page and to be completed within a short period of time in order to increase our potential response rate (Burchell and Marsh 1992). Prior to constructing this survey, the researchers interviewed several executives who were intimately involved with the adoption and implementation of a BSC at their respective organizations. These interviews

---

8 A copy of the survey may be obtained from the corresponding author.
9 Recommendations for appropriate survey response rates are many and vary dramatically (Dillman 2000). Baruch (1999) notes that respondent survey fatigue is becoming a critical concern for survey researchers and response rates are likely to be smaller if the targeted respondents hold more senior-level positions within an organization. Baruch recommends the following response rate norms: 36 +/- 13 for top management, 60 +/- 20 for other populations.
provided additional face validity to our choices of contextual variables used in this BSC adoption study. We also employed a missed-mode data collection strategy as outlined below.

We obtained our survey population of Canadian firms from PC Compustat (1,448 firms) and eliminated all firms with non-Canadian mailing addresses or missing contact information. This resulted in 1,363 firms. We further eliminated firms with missing industry, identifier, or sales information (237 firms), and firms no longer in business in 2001 (256). We also eliminated firms with sales of less than $10 million (49 firms) and trust funds in the 6700-6799 SIC code range (36), as these firms are not likely to require sophisticated management control systems like a BSC (Chenhall 2003). Finally, we removed 206 firms with invalid contact information. Our final sampling frame consisted of 579 Canadian firms.

We systematically identified the top executives at each firm, and selected multiple target key informants based upon the following order of preference: Chief Executive Officer, President, Chief Financial Officer or Vice President of Finance, Chairman of the Board, Controller, Chief Operating Officer, and Vice President. Using this ordering we were able to identify 1,929 key informant contacts for the 579 firms.

Our initial survey administration was conducted by mail in the summer of 2003. Five weeks after our initial mailing, we sent a second request to all companies who had not responded. We received 92 usable key informant responses, and repeated responses (i.e. responses from two executives from the same company) for only three companies. Therefore at the firm level our initial response rate is 15 per cent.

We conducted a follow-up data collection effort, utilizing the same survey as before, with those companies who had not responded to our initial mailing. This time the survey was administered by phone in winter 2004. For this data collection effort, we identified and targeted a single key informant from each firm, preferably the Chief Financial Officer or
Vice President of Finance. We systematically phoned each of the targeted key informants to solicit a response to our short survey; a new informant was identified if the original informant was no longer with the organization or not able to respond. Informants willing to respond were able to provide their responses by phone, mail or fax. This process yielded usable responses from an additional 93 firms. The response rate for this phase of the survey is 19 per cent, similar to what was achieved in other studies (see, for example, Wasserman, 2003 and Cormier et al. 2004).

In total, this mixed-mode survey effort yielded responses from 185 key informants from 182 unique firms. For the companies where we received two responses, we only included the first response received in our statistical tests. Further, we eliminated two firms where responses differed across the two respondents. One final firm was lost due because it was missing key data. This resulted in a final sample of 179 firms. Of the responding 179 firms, 42 (23.5 per cent) reported that they had adopted the BSC approach. The timing of the decision to adopt the BSC is reported in Figure 2. Except for one firm, the year of adoptions began in 1996 and ran through 2003, with the highest number of adoptions (ten) in 2002.

Insert Figure 2 about here

One advantage of the mixed-mode data collection strategy is that the phone survey component allowed us to systematically follow up with key informants for reasons for non-response. The most significant reasons, in declining order of frequency, are: the informant

---

10 Based upon the responses received from our mail survey and discussions with BSC administrators, it became apparent that not all of the firm's senior managers were adequately informed about, or involved with, their organization's BSC efforts.
was reached but did not respond to follow-up messages (24 per cent); the informant provided no response even after follow-up (23 per cent); the informant was no longer with the company (16 per cent); we were unable to reach the information by phone (12 per cent); the organization had a policy not to respond to surveys (11 per cent); and the informant had not heard of the BSC (1 per cent). These categories are generally consistent with those reported in Kennedy and Affleck-Graved (2001).

Finally, we compared respondents to non-respondents to assess potential response bias. Specifically we compared the two groups along the dimensions of: size (total sales), leverage (total liabilities to total assets), market value to book value, and profitability (net income to total assets). The two groups were not statistically significantly different using either parametric or nonparametric tests.\footnote{For nonparametric tests, we use the Kolmogorov-Smirnov test, because of its advantage of making no assumptions about the distribution of the data.}

One further aspect about our survey collection effort deserves comment. In order to improve response rates we employed a mixed-mode data collection strategy (Dillman 2000). In obtaining responses from some members from our sample using a mail survey while obtaining responses from others using telephone solicitation/collection, there exists the possibility for measurement differences resulting from the use of two distinct data collection modes. Specifically, it is possible that key informants do not respond the same way to different survey modes (Dillman and Tarnai 1988). While generally a valid concern, the objective/retrospective nature, and unobtrusiveness, of the specific questions asked in the survey likely attenuates the likelihood of measurement differences from our mixed-mode surveying effort.
Measurement of the Contingency Variables

We employed the self-typing paragraph approach to measure the Miles and Snow (1978) business strategy types. Each key informant read four short unlabeled paragraphs and identified the paragraph which best characterizes his or her firm’s business strategy. We used the popular self-typing paragraphs tested in James and Hatten (1995) and similar to Shortell and Zajac (1990). James and Hatten (1995) found this to be a useful measurement approach that resulted in reasonable convergent validity. Snow and Hambrick (1980) found this approach to be efficient since it allows rapid collection of substantial databases. Further, this measurement instrument should be valid since it is top managers’ views and decisions which largely define a business’ strategy. We define PROS/ANALYZ as a binary indicator variable equaling one if the firm’s business strategy was characterized as being either that of a Prospector or an Analyzer.

Our remaining contingency variables, in contrast, are taken from COMPUSTAT. Firm size (SIZE) is measured as the log of the mean sales over the adoption decision period, defined for this study as 1996-2003. Environmental uncertainty (EU) is measured as the coefficient of variation in sales (Gosselin and Pare, 1998) over the decision period:

\[
CV = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n - 2}}
\]

where \( y \) represents annual sales for the firm, \( x_i \) is the first difference in annual sales (i.e. sales in year \( i+1 \) less sales in year \( i \)), and \( n \) is the number of years of data available over the adoption decision period. This coefficient of variation measure captures the demand unpredictability dimension of environmental uncertainty. While the environmental uncertainty construct has proven challenging to measure (Buchko 1994), similar measures to
the one utilized here have also been applied at the industry level of analysis (e.g. Bourgeois 1985; Carpenter and Fredrickson 2001). Lastly, investment in intangible assets (INTANG) is measured as the mean ratio of intangible assets to total assets over the adoption decision period.

Descriptive statistics for the sample are reported in Table 1. Panel A provides financial measures, Panel B industry membership, and Panel C strategy type. As indicated in Panel A, the mean (median) level of total sales for sample firms is CDN $1,408.5 (126.4) million. Given that the average COMPUSTAT US firm has a mean total sales of USD $2.3 million during 2000-2002, our sample is considerably larger than the typical COMPUSTAT firm, reflecting, as least in part, our decision to exclude firms with sales of less than $10 million.

Industry membership data in Panel B indicate that the largest number of firms are in manufacturing. Thirty firms (16.8 per cent of the sample) are in the 2000-2999 SIC code range, representing process manufacturing, and 44 firms (24.6 per cent of the sample) are in the 3000-3999 range, representing industrial, commercial and high-tech manufacturing.

Panel C reports the business strategy type as characterized by key informant survey responses on the Miles and Snow (1978) typology. Fifty one firms (28.5 per cent of the sample) are described as Defenders, 63 firms (35.2 per cent) as Prospectors, 46 firms (25.7 per cent) as Analyzers, and eight firms (4.6 per cent) as Reactors. Further, eleven firms indicated that none of the four categories applied to them. While Miles and Snow indicated that any firm not fitting the Defender, Prospector or Analyzer profile was by default a Reactor, we chose not to impute that classification on those eleven firms. This does not materially affect the reported empirical analysis.

Insert Table 1 about here
Univariate tests of differences in key variables between non-adopters and BSC adopters are reported in Table 2. Notably, the most common business strategy among non-adopters was the Defender strategy (32.9 per cent of the non-adopters), while the most common among BSC adopters was the Prospector strategy (50.0 per cent of BSC adopters.) Also worth observing was that SIZE is significantly higher ($p=0.0001$) for BSC adopters than non-adopters.

**Insert Table 2 about here**

**RESULTS**

To test the effect of contextual variables on the adoption of the BSC, we estimate the following probit regression Model 1:

$$
\Pr(\text{BSC}\_\text{Adopt}) = \beta_1 + \beta_2 \text{PROSP/ANALZ} + \beta_3 \text{SIZE} + \beta_4 \text{EU} + \beta_5 \text{INTANG} + \varepsilon
$$

where BSC\_Adopt is an indicator variable that equals one if the firm has adopted the BSC. We predict positive estimated coefficients for PROSP/ANALZ, SIZE, EU and INTANG.

In sensitivity tests, we also include indicator variables that correspond to one-digit SIC codes ($\alpha$) to control for industry effects in Model 2:

$$
\Pr(\text{BSC}\_\text{Adopt}) = \beta_1 + \beta_2 \text{PROSP/ANALZ} + \beta_3 \text{SIZE} + \beta_4 \text{EU} + \beta_5 \text{INTANG} + \sum_{i=1}^{8} \alpha_i + \varepsilon
$$

We also include return on assets (ROA), defined as mean operating profit before depreciation divided by total assets, to control for firm operating performance, in Model 3:

$$
\Pr(\text{BSC}\_\text{Adopt}) = \beta_1 + \beta_2 \text{PROSP/ANALZ} + \beta_3 \text{SIZE} + \beta_4 \text{EU} + \beta_5 \text{INTANG} + \beta_6 \text{ROA} + \sum_{i=1}^{8} \alpha_i + \varepsilon
$$
The empirical results are reported in Table 3. All continuous variables are winsorized at the 1 and 99 percentiles to control for the effect of outliers. The Pseudo $R^2$ for Model 1 is 0.25. In this model, PROSP/ANALYZ, SIZE and EU are positive, as predicted, and statistically significant at the $p < 0.01$ level. These findings suggest that the probability of BSC adoption is associated with firms following a Prospector or Analyzer strategy, and is associated with increasing firm size and environmental uncertainty. Investment in intangible assets (INTANG) does not appear to be associated with BSC adoption. However we caution that these findings should be interpreted cautiously. Measuring investment in intangibles in a meaningful way is challenging given that numerous definitions for intangibles exist and that the conservative financial accounting model is biased against the recognition of value for these assets.

Our results for Model 1 are quite consistent across Models 2 and 3 where industry and operating performance control variables are included. BSC adoption appears to be higher for firms in the 4000-4999 (Transportation, communication, power and sanitation) and the 8000-8999 (Health Services) SIC code ranges. We also find that our conclusions remain unchanged when we drop the 11 firms who characterize their strategy as “other” and when we do not winsorize the data.\(^\text{12}\)

\textbf{Insert Table 3 about here}

\(^{12}\) To assess potential multicollinearity of our model, we compute condition numbers of the matrices of explanatory variables (Greene 2003.) Condition numbers between 30 and 100 indicate moderate to strong dependencies among the variables (Judge et al. 1985). The highest condition numbers for the matrices of explanatory variables included in Table 3 are all below 15, indicating that multicollinearity is not a problem.
BSC AND PERFORMANCE

Pre-adoption Performance

In addition to empirically testing our research hypotheses, we conducted further post hoc empirical analyses to further examine salient issues likely associated with BSC adoption. For example, one potential motivation for adopting any new management control system is that the firm’s current performance is not meeting the existing expectations of the management team or its shareholders. Therefore, we examine the role of performance on BSC adoption by presenting some preliminary findings on financial performance over the period prior to adoption. We use the approaches advocated by Barber and Lyon (1996) to measure and test for abnormal financial performance over a three-year period ending in the year of the decision to adopt the BSC. Under this approach, we estimate the expected change in return on assets for each adopting firm by the change in the median return on assets for a portfolio of firms with the same two-digit SIC (standard industry classification) code and with return on assets in the base year within 90% and 110% of the adopting firm.

\[ E(P_f) = P_b + (I_f - I_b) \]

\[ Abn = P_f - E(P_f) \]

where:

- \( P_i \) is the performance for the adopting firm in year \( i \)
- \( I_i \) is the median performance of the matched portfolio in year \( i \)
- \( b \) is the base year (the year in which the matched portfolio is identified)
- \( f \) is the future year begin predicted
- \( Abn \) is the abnormal performance
We run a paired t-test comparing the actual performance in the year \( f \) (the year of the decision to adopt the BSC) against its expectation across all adopting firms. Year \( b \) is defined as three years prior to the year of adoption. Performance is measured as both return on assets (\( \text{ROA} \)) and returns on sales (\( \text{ROS} \)). We refer to this approach as the SIC code-based or "sicc-based" method.

Barber and Lyon also find that for some non-random samples of smaller, higher performing firms, their recommended approach using SIC matching is not always well specified. For these firms they recommend forming the control portfolio not based on SIC code but instead based on size. Here, the control portfolio is comprised of all firms within 70\% to 130\% in size (total assets) and within 90\% to 110\% in performance (return on assets or return on sales) in the base year. We will refer to this approach as the "size-based" method.

\textbf{Insert Table 4 about here}

Table 4 reports the results using both the "sicc-based" and "size-based" approaches for return on assets (\( \text{ROA} \)) and return on sales (\( \text{ROS} \)). Thirty-nine (38) of the 42 BSC adopters had the necessary data to perform the sicc-based (size-based) tests. The results indicate that the mean and median abnormal performance\(^{13}\) over the three-year period up to the year of the decision to adopt the BSC is negative across both measures of performance and across both sicc-based and size-based methods. For example, the median abnormal \( \text{ROA} \) for the BSC adoption firms is \(-0.0080\); the median abnormal \( \text{ROS} \) is \(-0.0191\). Only the Wilcoxon (non-parametric) tests on abnormal \( \text{ROS} \) under the sicc-based method are statistically significant. Here only 34\% of the adopters have positive abnormal \( \text{ROS} \)

\(^{13}\) We report results for both uncapped and capped data, where observations are capped symmetrically at the 2.5\% levels of each tail to mitigate the impact of outliers.
performance. These findings provide weak exploratory evidence that poor performance (measured as increasing costs or declining margins) may be a factor in the decision to adopt the BSC.

**Post-implementation Performance**

Utilizing the same technique used to examine performance prior to adoption, we explore firm financial performance following the implementation of a BSC program. We examine a period of up to 3 years after the BSC was implemented using both sicc-based and size-based methods. Unfortunately, eight of our sample firms did not complete implementation of the BSC until 2003, so no forward looking financial data is available for those firms. Additionally, eight firms were lost due to mergers and acquisitions or missing Compustat data. Therefore the resulting sample of 26 firms represents just a subset of our original sample of BSC adopters, with many observations based on just one or two years of post-implementation data. Nevertheless, the results do provide a very preliminary look at post-implementation performance for BSC adopters.

*Insert Table 5 about here*

Table 5 indicates that none of the abnormal performance measures are statistically significantly different from zero. Therefore, this preliminary evidence documents no abnormal performance of BSC adopters in the period following implementation. However, it is important to note that the small sample size and limited forward-looking data make the results difficult to interpret. The question of longer-term performance effects of BSC implementation and the role of strategy in post-implementation performance remain important questions for future research.
DISCUSSION AND CONCLUSION

This research has begun to address an important shortcoming in the study of management control systems: the rigorous empirical examination of contingency variables associated with BSC adoption. Employing a mixed-methodology approach, utilizing both survey and archival data analysis, we provide intriguing evidence about the critical decision factors that motivate firms to adopt a BSC. Further, an understanding of these decision factors, here characterized as contingency variables, allows for a better profile of the type of organization most likely to adopt a BSC.

Our research indicates, as predicted from the managerial accounting and strategic management literatures, that organizations needing to be innovative, as opposed to solely being efficient, are more likely to adopt a BSC. For Prospectors and Analyzers, the adoption of a BSC is a critical management choice that facilitates the alignment of the array of decisions made to best match strategic and tactical decisions and activities with environmental requirements. The BSC, in short, is a critical component of the firm’s adaptive decision patterns.

According to Miles and Snow (1978), every organization over time follows an “adaptive cycle” in order to develop a consistency of approach in addressing three overarching managerial problems.\footnote{Miles and Snow, in a recent published interview (Ketchen 2003), noted with some regret that their adaptive cycle has been underutilized vis-à-vis their strategic typology in the strategic management literature. In their view, “[perhaps] the adaptive cycle was too general or simplistic, but we have always felt that it would serve as a good starting point for empirical studies of organizational adaptation or for managers to use in their strategic planning.” (Ketchen 2003: 99).} To address these problems, the firm’s management has to constantly make decisions to solve,

... (1) an entrepreneurial problem set centering on the definition of an organization’s product-market domain; (2) an engineering problem set focusing on the choice of technologies and processes to be used for production and distribution; and (3) an
administrative problem set involving the selection, rationalization, and development of organizational structure and policy processes. (Conant et al. 1990: 366 [emphasis not in original]).

The importance for firms to make decisions that align solutions to these problems is important for further establishing the chosen strategic orientation. The BSC, given its focus on a broad range of performance dimensions, in our view represents an effective decision and activity integrating tool that facilitates the efforts of Prospectors and Analyzers to achieve the desired — and requisite — level of innovativeness.

The importance of firm size and environmental uncertainty as contingency variables associated with management control system design and use is well argued in the literature (Chenhall 2003). As such, the statistical significance of these contingency variables in this BSC adoption study is theoretically and managerially important. Managers, faced with increased internal organizational complexity and external environmental uncertainty, are constantly on the look out for business systems and tools that would allow them to better coordinate efforts and achieve certainty in results. This coordination and stabilizing nature of the BSC are likely key factors in the increasing usage and satisfaction with the BSC (Rigby 2003), even though adoption of the BSC may not result in improved financial performance. We suspect that firms driven to adopt the BSC approach strictly for future financial gains, or strictly non-financial improvements for that matter, are not likely to benefit from the full potential of the BSC and will eventually discontinue its use.

Kaplan and Norton (2004) have recently drawn attention to the importance of measuring the true value of the organization’s intangible assets. The management of these intangibles, or “intellectual capital” to some, is a continuing challenge for many organizations. As such, adopting a BSC — which explicitly requires a focus on intangible assets — appears to be a sound business investment for that reason alone. However, our
research suggests that investments in intangible assets are not a key independent BSC adoption factor. One caveat to our findings is that our measure for investment in intangibles is based on a financial accounting model that has been criticized as being overly conservative and increasingly irrelevant with regard to the measurement of intangibles (Lev 2002.) Therefore, our measure may not be effectively capturing our construct of interest. Alternatively, our finding may suggest that that investment in intangibles may be a variable more relevant to subsequent implementation of the BSC than its adoption. Future research in this area appears warranted to further probe the relation between investment in intangibles and the adoption and successful implementation of the BSC.

Based upon post hoc analyses, we find tentative support for the supposition that BSC adopters experienced poorer financial performance prior to adoption than comparison firms. This suggests that a firm’s poor performance results may influence the decision to adopt a BSC. Additionally, we did not find any improvements in financial performance for BSC adopters post-implementation. There are several plausible explanations for this non-finding. First, the small sample of adopters we examined may not have provided us with enough statistical power to root out the true effect size of the BSC implementation and performance relationship. Second, the lag in achieving improved financial performance from BSC adoption may be longer than the 3 year window we employed. Third, we might have misspecified the BSC implementation and performance relationship. In particular, an assessment of non-financial performance improvements (e.g., operations-based, customer-based, etc.) may be more apt for our study; unfortunately we did not collect this data as part of this phase of our BSC project. Fourth, and most intriguing, perhaps the adopters in our sample had not yet achieved an effective implementation of the BSC.
While this study was motivated by the need for better understanding of BSC adoption, we concur with Ittner and Larcker’s (1998) surprise that there has not been more research effort in understanding BSC implementation and performance issues. Our post hoc analysis suggests that a potentially important next step in BSC research is the examination of implementation issues. Chenhall (2003) emphasizes the distinction between management control system adoption and the implementation of such systems. While there are a number of "step-by-step" guides related to BSC implementation (see Niven 2002), rigorously detailed study of BSC implementation efforts remain few and largely case-based (see Lohman et al. 2004). Implementation, in general, provides unique organizational challenges (Nutt 1986), and additional conceptual and theoretical understanding of the entrenchment of management practices (Zeitz et al. 1999) is required. Therefore, future BSC research should not only examine the BSC adoption and outcome relationship, but also the BSC usage and outcome relationship. Indeed, BSC usage may encompass a number of distinct stages (e.g., formulation and implementation), each requiring its own empirical scrutiny.

As noted in our introduction, the BSC was originally conceived of as a performance measurement system but has evolved into a strategic management tool critical for assessing firm decisions, activities, and performance. The BSC has, according to its advocates, become a business model that actually matters; such a business model would be of practical value for many organizations (Magretta 2002). Certainly, a scan of the organizations that have adopted and implemented a BSC approach so far (see listings from the Balanced Scorecard Collaborative [www.bscol.com] or the Balanced Scorecard Institute [www.balancedscorecard.org]) suggests the diverse interest in this management control system. Indeed, interest in the BSC is especially high from non-profit or public sector organizations (e.g., Chan 2004). As further evidence of the ongoing interest and relevance of
the BSC, functional standards have already been established that have resulted in a number of recent software applications (e.g., Microsoft Office Business Scorecards Accelerator), each meant to facilitate the adoption and implementation of the BSC approach. We believe that ongoing research in the adoption and implementation of Balanced Scorecards is required in order to ensure that theoretical and managerial understanding on this topic keeps pace with what is occurring in practice.
REFERENCES


FIGURE 1
The Balanced Scorecard

Source: Kaplan and Norton (1996)
FIGURE 2

Balanced Scorecard Adoption by Year

Number of Adoptions

Year

TABLE 1
Descriptive Statistics for the Sample

Panel A: Firm Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>179</td>
<td>4.996</td>
<td>2.256</td>
<td>4.839</td>
</tr>
<tr>
<td>EU</td>
<td>179</td>
<td>0.308</td>
<td>0.282</td>
<td>0.227</td>
</tr>
<tr>
<td>INTANG</td>
<td>179</td>
<td>0.076</td>
<td>0.109</td>
<td>0.036</td>
</tr>
<tr>
<td>MSALES</td>
<td>179</td>
<td>1408.5</td>
<td>3602.4</td>
<td>126.4</td>
</tr>
<tr>
<td>MTASETS</td>
<td>179</td>
<td>6489.2</td>
<td>32369.4</td>
<td>159.6</td>
</tr>
<tr>
<td>MROA</td>
<td>177</td>
<td>0.064</td>
<td>0.203</td>
<td>0.102</td>
</tr>
<tr>
<td>MROS</td>
<td>176</td>
<td>-1.526</td>
<td>8.710</td>
<td>0.100</td>
</tr>
<tr>
<td>MR&amp;D</td>
<td>74</td>
<td>3.532</td>
<td>11.542</td>
<td>0.076</td>
</tr>
</tbody>
</table>

Panel B: Industry Membership

<table>
<thead>
<tr>
<th>Industry Sector (by 1-digit SIC code)</th>
<th>SIC Codes</th>
<th>Number of Firms</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining and Construction</td>
<td>1000-1999</td>
<td>22</td>
<td>12.3%</td>
</tr>
<tr>
<td>Process manufacturing</td>
<td>2000-2999</td>
<td>30</td>
<td>16.8%</td>
</tr>
<tr>
<td>Industrial, commercial and high-tech manufacturing</td>
<td>3000-3999</td>
<td>44</td>
<td>24.6%</td>
</tr>
<tr>
<td>Transportation, communications, power, sanitation</td>
<td>4000-4999</td>
<td>20</td>
<td>11.2%</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>5000-5999</td>
<td>13</td>
<td>7.3%</td>
</tr>
<tr>
<td>Finance, insurance, and real estate</td>
<td>6000-6999</td>
<td>22</td>
<td>12.3%</td>
</tr>
<tr>
<td>Services: business</td>
<td>7000-7999</td>
<td>22</td>
<td>12.3%</td>
</tr>
<tr>
<td>Services: health</td>
<td>8000-8999</td>
<td>6</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Panel C: Firm Strategy

<table>
<thead>
<tr>
<th>Miles and Snow (1978) Strategy</th>
<th>Number of Firms</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defender</td>
<td>51</td>
<td>28.5%</td>
</tr>
<tr>
<td>Prospector</td>
<td>63</td>
<td>35.2%</td>
</tr>
<tr>
<td>Analyzer</td>
<td>46</td>
<td>25.7%</td>
</tr>
<tr>
<td>Reactor</td>
<td>8</td>
<td>4.5%</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

179                                   | 100.0%          |

All variables in Panel A are taken from COMPUSTAT and are measured over the adoption decision period, defined as 1996 through 2003. SIZE is the log of the mean sales for the firm. EU or environmental uncertainty is measured as the coefficient of variation in sales. INTANG is the ratio of intangible assets to total assets. MSALES is the mean sales and MTASETS in the mean total assets. MROA is the mean operating profit before depreciation divided by total assets. MROS is the mean operating profit before depreciation and amortization divided by total sales. MR&D is the mean ratio of R&D expense to sales. All variables are winsorized at the 1 and 99 percentiles. SIC codes are taken from COMPUSTAT for 2003.
### TABLE 2
Univariate Tests of Differences Between Non-adopters and BSC Adopters

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>t-test</th>
<th>Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFEND</td>
<td>0.3285</td>
<td>0.4714</td>
<td>0.0000</td>
<td>0.1429</td>
<td>0.3542</td>
<td>0.0000</td>
<td>0.0075</td>
<td>0.0202</td>
</tr>
<tr>
<td>PROSP</td>
<td>0.3066</td>
<td>0.4628</td>
<td>0.0000</td>
<td>0.5000</td>
<td>0.5061</td>
<td>0.5000</td>
<td>0.0307</td>
<td>0.0221</td>
</tr>
<tr>
<td>ANALYZ</td>
<td>0.2336</td>
<td>0.4247</td>
<td>0.0000</td>
<td>0.3333</td>
<td>0.4771</td>
<td>0.0000</td>
<td>0.2288</td>
<td>0.1976</td>
</tr>
<tr>
<td>REACT</td>
<td>0.0511</td>
<td>0.2210</td>
<td>0.0000</td>
<td>0.0238</td>
<td>0.1543</td>
<td>0.0000</td>
<td>0.3714</td>
<td>0.4582</td>
</tr>
<tr>
<td>OTHER</td>
<td>0.0803</td>
<td>0.2727</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0008</td>
<td>0.0593</td>
</tr>
<tr>
<td>SIZE</td>
<td>4.5533</td>
<td>1.9962</td>
<td>4.5903</td>
<td>6.4395</td>
<td>2.4678</td>
<td>6.7282</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>EU</td>
<td>0.3045</td>
<td>0.2643</td>
<td>0.2361</td>
<td>0.3183</td>
<td>0.3363</td>
<td>0.2002</td>
<td>0.8082</td>
<td>0.6337</td>
</tr>
<tr>
<td>INTANG</td>
<td>0.0767</td>
<td>0.1165</td>
<td>0.0287</td>
<td>0.0730</td>
<td>0.0790</td>
<td>0.0429</td>
<td>0.8153</td>
<td>0.3447</td>
</tr>
<tr>
<td>ROA</td>
<td>0.0615</td>
<td>0.2035</td>
<td>0.1019</td>
<td>0.0728</td>
<td>0.2038</td>
<td>0.0884</td>
<td>0.7543</td>
<td>0.6854</td>
</tr>
</tbody>
</table>

**DEFEND** is an indicator variable that equals one if the firms has characterized its strategy as being the Defender type. Similarly, **PROSP, ANALYZ, and REACT** are indicator variables representing the remaining three Miles and Snow (1978) strategy types: Prospector, Analyzer, and Reactor, respectively. **SIZE, EU, INTANG, and MROA** are taken from COMPUSTAT and are measured over the adoption decision period, defined as 1996 through 2003. **SIZE** is the log of the mean sales in the mean total assets. **EU** or environmental uncertainty is measured as the coefficient of variation in sales. **INTANG** is the ratio of intangible assets to total assets. **MROA** is the mean operating profit before depreciation divided by total assets. All variables are winsorized at the 1 and 99 percentiles. **SIC codes** are taken from COMPUSTAT for 2003.
TABLE 3  
Probit Regression Results: Dependent Variable is BSC_Adopt

<table>
<thead>
<tr>
<th>Predicted sign</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.9823</td>
<td>-3.4210</td>
<td>-3.4186</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>PROSP/ANALYZ</td>
<td>0.6751</td>
<td>0.6704</td>
<td>0.6645</td>
</tr>
<tr>
<td></td>
<td>(0.0092)</td>
<td>(0.0172)</td>
<td>(0.0195)</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.2802</td>
<td>0.2899</td>
<td>0.3202</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>EU</td>
<td>1.1719</td>
<td>1.3391</td>
<td>1.1472</td>
</tr>
<tr>
<td></td>
<td>(0.0074)</td>
<td>(0.0035)</td>
<td>(0.0341)</td>
</tr>
<tr>
<td>INTANG</td>
<td>-0.8207</td>
<td>-1.6750</td>
<td>-1.7384</td>
</tr>
<tr>
<td></td>
<td>(0.4715)</td>
<td>(0.1885)</td>
<td>(0.1714)</td>
</tr>
<tr>
<td>ROA</td>
<td>-</td>
<td>-0.6841</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.4144)</td>
<td></td>
</tr>
<tr>
<td>SIC 2000-2999</td>
<td>?</td>
<td>0.1299</td>
<td>0.0613</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.8090)</td>
<td>(0.9107)</td>
</tr>
<tr>
<td>SIC 3000-3999</td>
<td>?</td>
<td>0.1712</td>
<td>0.1107</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.7165)</td>
<td>(0.8174)</td>
</tr>
<tr>
<td>SIC 4000-4999</td>
<td>?</td>
<td>1.1844</td>
<td>1.1668</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0236)</td>
<td>(0.0269)</td>
</tr>
<tr>
<td>SIC 5000-5999</td>
<td>?</td>
<td>-0.2838</td>
<td>-0.3559</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.6667)</td>
<td>(0.5924)</td>
</tr>
<tr>
<td>SIC 6000-6999</td>
<td>?</td>
<td>0.4615</td>
<td>0.5212</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.3870)</td>
<td>(0.3512)</td>
</tr>
<tr>
<td>SIC 7000-7999</td>
<td>?</td>
<td>0.6173</td>
<td>0.6222</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2507)</td>
<td>(0.2480)</td>
</tr>
<tr>
<td>SIC 8000-8999</td>
<td>?</td>
<td>1.0092</td>
<td>0.9540</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.1477)</td>
<td>(0.1764)</td>
</tr>
<tr>
<td>N</td>
<td>179</td>
<td>179</td>
<td>177</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-78.55</td>
<td>-72.19</td>
<td>-70.33</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.25</td>
<td>0.32</td>
<td>0.34</td>
</tr>
</tbody>
</table>

BSC_Adopt is an indicator that equals one if the firm has adopted the BSC. PROSP/ANALYZ is an indicator variable that equals one if the firm has characterized its strategy as being either the Prospector or the Analyzer type. SIZE, EU, INTANG and MROA are taken from COMPUSTAT and are measured over the adoption decision period, defined as 1996 through 2003. SIZE is the log of the mean sales in the mean total assets. EU or environmental uncertainty is measured as the coefficient of variation in sales. INTANG is the ratio of intangible assets to total assets. MROA is the mean operating profit before depreciation divided by total assets. All variables are winsorized at the 1 and 99 percentiles. SIC codes are taken from COMPUSTAT for 2003.
### TABLE 4
Relative Performance Prior to Adoption of the BSC

#### Panel A: SICC-based

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>ROS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean Abn</td>
<td>Median Abn</td>
</tr>
<tr>
<td></td>
<td>Years -3 to 0</td>
<td>Years -3 to 0</td>
</tr>
<tr>
<td>Abnormal Perf. (Uncapped)</td>
<td>-0.0311</td>
<td>-0.0080</td>
</tr>
<tr>
<td>Abnormal Perf. (Capped)</td>
<td>-0.0241</td>
<td>-0.0080</td>
</tr>
<tr>
<td>Per cent positive</td>
<td>46.15%</td>
<td>34.21%</td>
</tr>
<tr>
<td>Significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncapped</td>
<td>-1.34</td>
<td>-1.00</td>
</tr>
<tr>
<td>Capped</td>
<td>-1.56</td>
<td>-1.03</td>
</tr>
</tbody>
</table>

#### Panel B: Size-based

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>ROS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean Abn</td>
<td>Median Abn</td>
</tr>
<tr>
<td></td>
<td>Years -3 to 0</td>
<td>Years -3 to 0</td>
</tr>
<tr>
<td>Abnormal Perf. (Uncapped)</td>
<td>-0.0217</td>
<td>-0.0049</td>
</tr>
<tr>
<td>Abnormal Perf. (Capped)</td>
<td>-0.0179</td>
<td>-0.0049</td>
</tr>
<tr>
<td>Per cent positive</td>
<td>43.59%</td>
<td>44.44%</td>
</tr>
<tr>
<td>Significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncapped</td>
<td>-1.03</td>
<td>-0.77</td>
</tr>
<tr>
<td>Capped</td>
<td>-1.28</td>
<td>-0.77</td>
</tr>
</tbody>
</table>
### TABLE 5
Relative Performance After Implementation of the BSC

#### Panel A: SICC-based

<table>
<thead>
<tr>
<th>N</th>
<th>ROA</th>
<th></th>
<th>ROS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Abn Years 0 to +3</td>
<td>Median Abn Years 0 to +3</td>
<td>Mean Abn Years 0 to +3</td>
<td>Median Abn Years 0 to +3</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Abnormal Perf. (Uncapped)**
  - Mean: -0.0093
  - Median: -0.0001
  - Per cent positive: 50.00%
  - Significance: t-Test: -0.62, Wilcoxon: -0.18

- **Abnormal Perf. (Capped)**
  - Mean: -0.0013
  - Median: -0.0001
  - Per cent positive: 57.69%
  - Significance: t-Test: -0.14, Wilcoxon: -0.13

#### Panel B: Size-based

<table>
<thead>
<tr>
<th>N</th>
<th>ROA</th>
<th></th>
<th>ROS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Abn Years 0 to +3</td>
<td>Median Abn Years 0 to +3</td>
<td>Mean Abn Years 0 to +3</td>
<td>Median Abn Years 0 to +3</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Abnormal Perf. (Uncapped)**
  - Mean: 0.0199
  - Median: 0.0021
  - Per cent positive: 53.85%
  - Significance: t-Test: 0.46, Wilcoxon: 0.43

- **Abnormal Perf. (Capped)**
  - Mean: 0.0065
  - Median: 0.0021
  - Per cent positive: 46.15%
  - Significance: t-Test: 0.48, Wilcoxon: 0.46