FIRM SELF-REGULATION THROUGH

INTERNATIONAL CERTIFIABLE STANDARDS:

DETERMINANTS OF SYMBOLIC VERSUS SUBSTANTIVE IMPLEMENTATION

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ABSTRACT

International certifiable management standards that have been advocated as a governance mechanism for firm self-regulation of environmental conduct, working conditions, and quality control are only effective if certified firms comply with standards' requirements. Our empirical analysis shows that ISO certified firms in China strategically select their level of compliance depending on customer preferences, customer monitoring, expected sanctions by customers and firm capabilities. These findings have important implications for the effectiveness of a global system of self-regulation based on certifiable standards.

INTRODUCTION

Globalization raises concerns about national governments' ability to regulate firms' environmental conduct and working conditions. Firms and industries might take advantage of differences in national regulations by shifting polluting and labor intensive activities to countries with lax regulations (Korten, 1995; Vernon, 1998). These concerns prompt interest in firm self-regulation of environmental conduct and working conditions (Rappaport & Flaherty, 1992; United Nations, 1993). Self-regulation refers to the adoption of environmental and labor standards beyond the requirements of government regulation. International certifiable standards provide a potential governance mechanism for firm self-regulation in the global economy (Boiral, 2003a; Cashore, 2002; Christmann & Taylor, 2001; Delmas & Terlaak, 2001; Potoski & Prakash, 2004; Rugman & Verbeke, 2001). However, there is virtually no data available to analyze how effectively systems of self-regulation based on certifiable standards currently perform (O'Rourke, 2003). In this paper we aim to contribute to a better understanding of the conditions under which international certifiable standards can be effective mechanisms for firm self-regulation by empirically examining the determinants of firms' compliance with certifiable standard requirements.

International certifiable standards have been proposed as a governance mechanism for corporate behavior where government regulation is unlikely to be effective. Standards such as the ISO 14000 environmental management system standard and the SA 8000 social accountability standard can contribute to firm self-regulation by specifying requirements that go beyond local government regulations. These standards are not developed and enforced by governments, but by non-governmental stakeholder groups including the International Organization for Standardization (ISO)

and advocacy organizations. Firms can obtain standard certification by independent third-party auditors who verify a firm's compliance with standard requirements. Firms can use certifications in their marketing their products. Thus, this governance mechanism is based on the assumption that firms will voluntarily adopt these standards because it is good for business – because customers prefer to purchase products from certified suppliers (Cashore, 2002; Christmann & Taylor, 2002; Florini, 2003).

For certifiable standards to be an effective governance mechanism for firm self-regulation, certified firms need to comply with the standard's requirements. Most empirical research on certifiable standards treats certification as a binary variable measuring the adoption of the practices specified by the standard (e.g., Corbett & Kirsch, 2001; Delmas, 2002; Guler, Guillen, & MacPherson, 2002), which assumes that the act of certification is related to the actual implementation of the specified practices. However, questions about auditor qualification, auditor independence and the periodic nature of audits raise concerns about the effectiveness of third-party certifications (Boiral, 2003b, 2005; O'Rourke, 2002; Stenzel, 2000; Swift, Humphrey, & Gor, 2000; Van der Wiele & Brown, 1997; Yeung & Mok, 2005). It is possible that firms could obtain standard certification to demonstrate their commitment to responsible environmental conduct and working conditions, while decoupling certification from actual practices in the organization (Meyer and Rowan, 1977). Recent research has shown that many firms that do that do not comply with a standard's requirements on an ongoing basis can still pass periodic audits for continued certification (Boiral, 2003b; 2005; Yeung & Mok, 2005). These findings question the strength of the relationship between certification and the implementation of the certified practices and the effectiveness of certifiable standards as a governance mechanism.

The conditions under which certifiable standards are effective governance mechanisms have not been adequately researched. Researchers have not paid attention to the factors that determine whether certified firms actually implement requirements as intended by the standard. To address this issue we examine the determinants of certified firms' quality of implementation of international certifiable standards. Firms with low quality standard implementation do not use the practices prescribed by certified standards in daily operations. We refer to this as symbolic implementation. In contrast, firms with high quality implementation consistently use the certified standards' practices, which we refer to as substantive implementation.

We propose that firms approach implementation of certifiable standards strategically by choosing a quality of standard implementation that matches their perceptions of costs and benefits. Assuming substantive implementation is more costly for firms than symbolic implementation, firms have incentives to choose a low quality of implementation unless they anticipate benefits beyond the symbolic value of standard certification itself. Because customer requirements have been identified as a primary determinant of firms' adoption of certifiable standards (Christmann & Taylor, 2001; Corbett & Kirsch, 2001; Guler, Guillen, & MacPherson, 2002; Potoski & Prakash, 2004) we focus on examining whether customer characteristics and characteristics of the exchange relationship between suppliers and their customers influence suppliers' quality of standard implementation. We further examine how the amount of time passed since initial certification affects quality of standard implementation to assess whether firms develop standard implementation capabilities or capabilities to pass certification audits over time. Using survey data from 172 ISO 9000 certified suppliers in China our empirical results confirm that suppliers strategically choose their quality of implementation of certified standards.

CERTIFIABLE MANAGEMENT STANDARDS IN THE GLOBAL ECONOMY: THEORY AND EMPIRICAL EVIDENCE

International certifiable standards address an increasingly wide range of issues such as quality management, environmental management, social accountability, and working conditions. The most widely diffused certifiable management standard with more than 500,000 certifications in 2003 (ISO, 2004) is the ISO 9000 quality management system standard, launched by the International Organization for Standardization in 1987. In response to calls for developing a global system for environmental self-regulation by the 1992 United Nation's Conference on Environmental and Development in Rio de Janeiro the International Organization for Standardization developed an environmental management system standard, ISO 14000, and launched it in 1996 (Delmas, 2002). By 2003, the number of ISO 14000 certifications surpassed 60,000 (ISO 2004). This environmental standard is modeled after ISO 9000 and uses a similar, compatible management system approach. Social Accountability International (SAI), a human rights organization focused on improving workplace conditions, extended the ISO management system approach to the area of social issues and working conditions. SAI introduced its Social Accountability 8000 standard (SA 8000) in 1998 and 710 certifications were awarded by July 2005. SA 8000 specifies a social management system modeled after the ISO standards in addition to setting standards for key labor rights.

All of these standards are management system standards that specify internal organizational processes and management practices that firms implement to obtain certification. These standards do not specify performance targets and are not concerned with the quality of products or services.

Instead they focus on the management system by which a product or service is produced. A firm's management system plays a critical role in identifying internal problems and in building capacity for implementing needed changes. Management system standards provide general frameworks for any industry. All the major management system standards in use today are highly comparable in the manner in which they operate and are intended to be implemented.

Certifiable Standards as a Tool for Self-regulation

Globalization challenges the authority of national governments to regulate firms' environmental conduct and working conditions (Strange, 1996). Falling barriers to trade and foreign investment allow firms to exploit cross-country differences in government regulations. Critics contend that firms relocate their most polluting activities to subsidiaries or suppliers in countries with lax environmental regulations. (Korten, 1995; Vernon, 1998). Likewise, it is argued that countries with low labor standards attract labor intensive industries (Mah, 1997). National governments are forced to compete to attract foreign direct investment and make concessions to multinational enterprises (MNEs) (Lee, 1997), which increases risks of "races to the bottom" – downward spirals of ever lower environmental and labor regulations among countries competing to become the lowest-cost location for production activities (Spar & Yoffie, 2000).

The potential failure of government regulations to protect the environment and workers rights in a globalizing economy has led to increased interest in firm self-regulation (Christmann, 2004; Christmann & Taylor, 2001; Rappaport & Flaherty, 1992; United Nations, 1993). At the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 many

participants agreed that business self-regulation is essential to achieve sustainable development. International certifiable standards are an important governance mechanism for firm self regulation (Boiral, 2003a; Cashore, 2002; Christmann & Taylor, 2001; Delmas & Terlaak, 2001; Potoski & Prakash, 2004; Rugman & Verbeke, 2001).

Customer demands for corporate social responsibility provide incentives for firm self-regulation (McWilliams & Siegel, 2001). Empirical evidence shows that environmental and labor standard certifications are primarily driven by customer preferences for products from certified suppliers (Christmann & Taylor, 2001; Corbett & Kirsch, 2001). Some MNEs such as GM and Ford require all their suppliers to obtain ISO 14001 certification. Thus, certification has become a requirement for doing business for many suppliers.

Customer pressure for self-regulation is only effective if suppliers' corporate social responsibility characteristics can be discerned (McWilliams & Siegel, 2001). Suppliers may implement effective environmental or social management systems without potential customers being aware of their existence. Certification informs customers that a supplier has implemented a management system that conforms to specific standards. Certification helps to overcome information asymmetries between customers and suppliers by providing suppliers with a mechanism to disclose otherwise unobservable characteristics. In the absence of certifiable standards, customers would need to collect and verify information about desired but unobservable characteristics from all suppliers, which is costly especially in global supply chains. Consequently, management system certifications can be seen as signals of supplier characteristics that lower search and monitoring costs in supply chains (Christmann & Taylor, 2002; King, Lenox & Terlaak, forthcoming; Terlaak &

King, forthcoming). It provides a degree of transparency that enables customers to incorporate environmental and social responsibility in their purchasing criteria.

Research on Certifiable Standards

Research on certifiable standards has primarily addressed two issues: the determinants of standard certification and diffusion, and the effects of certification on firm performance with respect to the issue addressed by the standard. Research on the determinants of standard adoption and diffusion shows that pressures from actual and potential customers – especially if they are located in foreign countries – are an important external driver of standard certification (Christmann & Taylor, 2001; Corbett & Kirsch, 2001; Guler, Guillen, & MacPherson, 2002; Potoski & Prakash, 2004) and that other external factors such as and the domestic political and regulatory context matter as well (Delmas, 2002; Potoski & Prakash, 2004). Internal firm characteristics and capabilities also affect standard certification (Bansal & Hunter, 2003; Christmann & Taylor 2003; Darnell, 2003; Russo, 2002).

Studies addressing whether standard certification improves firm performance with respect to the issue addressed by the standard show inconclusive results. While some studies found that ISO 14000 certification improved firms' environmental performance (Potoski & Prakash, 2005), others found no such effect (Andrews et al. 2003; King et al., forthcoming). Indeed, King et al. (forthcoming) found that firms with lower environmental performance were actually more likely to obtain certification perhaps as an attempt to increase their legitimacy. Likewise, the empirical evidence for the effect of ISO 9000 certification on operational performance is mixed (Naveh&Marcus, 2004). If certification does not improve firm performance with respect to the

certified issue, doubt is cast on the effectiveness of certifiable standards as a tool for firm self-regulation. One possible reason for this finding may be that certified firms do not really comply with the standard's requirements.

Symbolic and substantive implementation of standards

In order for certifiable standards to serve as an effective governance mechanism for self-regulation, certified firms need to adhere to the standards' requirements. However, research has shown that firms often adopt policies or codes of conduct for symbolic purposes without necessarily applying them in practice (Stevens, Steensma, Harrison & Cochran, 2005; Westphal & Zajac, 1994; Westphal & Zajac, 2001). For example, Stevens et al. (2005) found that financial executives in many firms do not use their companies' ethics codes in their decision making. Thus, the act of adoption of a policy can be decoupled from actual implementation (Meyer & Rowan, 1977).

Third-party monitoring of standards by independent auditors reduces the risk that certification is decoupled from the implementation of certified practices (King et al., forthcoming). Certification refers to issuing of a written certificate by an independent, external auditor who has assessed an organization's management system and verified that it conforms to the requirements specified in the standard. In order to assure that standards are audited consistently throughout the world, standard setting bodies develop systems for accrediting auditors. For example, ISO auditors need to be accredited by national accreditation bodies.

Concerns about auditing quality suggest that certification may not assure a firm's ongoing compliance with a standard's requirements. First, some auditors lack sufficient business knowledge (Swift, et al., 2000) and technical knowledge of specific industries (Boiral, 2003b; O'Rourke, 2002; Seddon, 1997; Van der Wiele & Brown, 1997; Yeung & Mok, 2005). These problems are exacerbated by the fact that management system standards specify process requirements rather than specific outcomes making verification of compliance more difficult. Because certified firms play a vital role in the auditing process by providing documentation to external auditors, less qualified auditors may uncritically accept the internal report prepared by the firm (Yeung & Mok, 2005). The resulting differences in audit rigor allow firms to pass the audit carried out by one auditor while they would fail if the audit was carried out by another auditor (Boiral, 2003b; Yeung & Mok, 2005). Second, auditor independence is essential to assure unbiased certification, but auditors are selected and paid by the firm seeking certification. Firms may be inclined to select or continue business relationships with auditors who will provide the desired certification (Swift, et al., 2000). This creates a potential conflict of interest for auditors, who may not fail undeserving companies because this would lead to a loss of clients (Seddon, 1997). Third, the ongoing nature of complying with a standard diverges from the periodic nature of certification and recertification. Compliance with management system standards requires ongoing active utilization of the management system. Certification and recertification audits are scheduled periodically at pre-announced dates. For example, ISO 9000 and ISO 14000 need to be recertified every 3 years with less extensive pre-announced bi-annual or annual surveillance audits. Critics contend that auditing involves visits to factories that are too infrequent to evaluate normal day-to-day operations and the duration of the audit itself is too short to identify more than the most obvious problems, missing many important issues (Boiral, 2003b; O'Rourke, 2002, 2003).

Empirical evidence from China, Canada, and Italy shows that auditing problems allow firms that do not meet ISO 9000 or ISO 14000 requirements to obtain certification (Biazzo, 2005; Boiral, 2003b; Yeung & Mok, 2005). Evidence that customers do not believe that third-party certification works effectively is presented by Swift et al. (2000), citing a study by the Institute of Quality Assurance that found third-party audits have not fully replaced customer audits, resulting in 63% of customers directly monitoring the quality management of their ISO 9000 certified suppliers. Customers frequently require their supplier in China to obtain certification by specific foreign auditors (Yeung & Mok, 2005) indicating that customers are concerned about variations in audit quality.

The fact that certification can be decoupled from the implementation of a standard's requirements results in a variance in the quality of implementation of certified standards across firms. Firms that exhibit a low quality of implementation do not consistently use the management system certified by the standard in their daily operations and make last minute efforts to get ready for certification audits. The standard serves a symbolic purpose (Meyer & Rowan, 1977) – allowing firms to obtain certification to satisfy customer requirements and maintain greater legitimacy (DiMaggio & Powell, 1991) – without substantive implementation of the standard's requirements. Consequently, we refer to low quality of implementation as symbolic implementation. Firms that exhibit a high quality of implementation have embedded the standard's requirements in their daily routines. Thus, for these firms the standard serves a substantive purpose – firms do not just obtain certification for the purpose of appearance. We refer to high quality of implementation as substantive implementation.

The quality of implementation of management system standards is critical for the effectiveness of these standards as a mechanism for firm self-regulation because a firm's quality of implementation affects the firm's performance regarding the issue addressed by the standard. For example, research has shown that the quality of implementation of the ISO 9000 quality management standard is closely linked to a firm's operational and quality performance (Naveh & Marcus, 2004).

HYPOTHESES DEVELOPMENT

We suggest that firms strategically choose a level of quality of implementation of certified standards that matches their perceptions of costs and benefits. We assume that substantive standard implementation is more costly for firms than symbolic implementation. This is because firms' ongoing costs of maintaining environmental management systems are substantial (Delmas, 2002). High costs of complying with the continual improvement principle of ISO 9000 and ISO 14000 are a main reason why ISO certified firms in China did not fully implement the standards (Yeung & Mok, 2005). We suggest that firms will only invest in substantive implementation of practices to the extent that their perceived benefits from this investment exceed their costs.

Response to customer pressures has been identified as a primary determinant of firms' management system certifications. So far, research on certifiable standards has treated customers as a homogeneous group. We provide a more differentiated view on customer pressures by explicitly considering customer preferences and activities as well as characteristics of the exchange relationship with customers in developing our hypotheses about the determinants of suppliers' quality of implementation.

In developing our hypotheses about the role of customers we draw on transaction cost economics (TCE). A central assumption of TCE is that firms behave opportunistically. Opportunism is defined as the seeking of self-interest with guile (Williamson, 1985). Using a TCE framework, symbolic implementation of certifiable management standards can be interpreted as opportunistic supplier behavior. Symbolic implementation of a standard means suppliers are "making … false or empty, that is self-disbelieved … promises" (Williamson, 1975), because they use certification as a signal without fully complying with the standard's requirements.

Some customers may only be concerned about their suppliers' standard certification and not their quality of standard implementation. A supplier's symbolic implementation would meet these customers' expectations. We explore this possibility in Hypothesis 1. TCE suggests that monitoring and the threat of sanctions are important instruments for assuring compliance with the terms of an agreement (Williamson, 1996). In Hypotheses 2 and 3 we explore the role of customer monitoring and in Hypotheses 4 and 5 we explore the role of sanctions.

Firm resources and capabilities such as management system implementation capabilities and environmental management capabilities (Corbett and Kirsch, 2001; Darnall, 2003) have also been identified as a determinant of firms' standard certification. We suggest that over time certified firms may develop capabilities to better implement the certified management system as well as capabilities to pass certification audits. We develop two competing Hypotheses (6a and b) to assess which of these capabilities is a more important determinant of suppliers' quality of standard implementation.

Suppliers need incentives to justify incurring the higher costs of substantive implementation. The importance that customers place on the issue that is addressed by a standard affects suppliers' incentives for substantive implementation. Some customers require their suppliers to obtain standard certification for symbolic reasons, to respond to legitimacy concerns by demonstrating that they are taking steps to control the conduct of firms in their supply chains. These customers are likely to be satisfied that their suppliers have obtained certification and without concern for their quality of implementation. If suppliers perceive that the issue is not of high importance to their customers there is no incentive for suppliers to invest more in standard implementation beyond what is minimally required to achieve certification. We expect suppliers to choose symbolic implementation. In contrast, customers who are deeply concerned about the issue addressed by a standard and about suppliers' performance regarding the issue are likely interested in high quality of standard implementation by suppliers. This gives suppliers incentives to choose substantive implementation because customers may reward suppliers for pursuing substantive implementation and/or punish suppliers for pursuing symbolic implementation.

H1: *The more important a supplier perceives the issue that is addressed by a certifiable management system standard to be for its customers the more likely the supplier will choose substantive implementation of the standard.*

Our next two hypotheses address how the probability that customers will detect their suppliers' quality of standard implementation affects suppliers' choice of symbolic versus substantive implementation. Without direct monitoring customers are unlikely to have sufficient information to determine their suppliers' quality of implementation. Transaction cost theory suggests

that limited information about partners' behavior in exchange relationships is an important determinant of opportunistic behavior (Alchian & Demsetz, 1972). When performance is difficult to measure, parties have incentives to limit their efforts toward fulfilling the agreement. Consequently, we suggest that suppliers who believe that their customers will not detect their suppliers' quality of standard implementation will be more likely to choose symbolic implementation, while suppliers who believe that their customers will be able to detect their quality of standard implementation will be more likely to choose substantive implementation.

TCE suggests that monitoring reduces information asymmetries between customers and suppliers (Balakrishnan and Koza, 1993) and that monitoring is a principal mechanism to reduce the likelihood of opportunistic behavior of exchange partners because deviations can result in sanctions such as penalties or termination of the contract (Lal, 1990). Customers can detect their suppliers' quality of standard implementation by directly monitoring suppliers' performance on the issue addressed by the certified management system. Given that direct monitoring of suppliers is costly for customers, customers may prefer to solely rely on third party monitoring and certification. However, as we mentioned above, direct customer monitoring of suppliers in addition to supplier certification is quite frequent (Swift, et al., 2000) probably due to concerns about the effectiveness of third-party monitoring. The probability that customers will detect symbolic standard implementation can be expected to be related to the frequency of customers' direct monitoring.

H2: *The more frequently customers monitor a supplier's performance on the issue that is addressed by a certifiable management system standard the more likely the supplier will choose substantive implementation of the standard.*

Some customers rely on supplier certification programs to develop a shortlist of approved suppliers from which they choose (Stump & Heide, 1996). These programs specify and measure criteria for supplier selection and retention such as quality performance, manufacturing capabilities, capabilities for environmental management, working conditions, and financial strength. Suppliers that do not meet the specified criteria will be eliminated from consideration. To avoid high costs of direct monitoring these programs frequently rely on criteria that customers can measure at relatively low cost such as suppliers' certification of management standards by third-party-auditors. Because these programs tend to rely on criteria verified by third-party certification the probability that customers who rely heavily on such programs will detect suppliers' quality of implementation is relatively low. Thus, we expect that suppliers will choose symbolic implementation of standards if their customers rely on supplier certification programs.

H3: *The higher customers' reliance on supplier certification programs the less likely the supplier will choose substantive implementation of management system standards.*

Our next two hypotheses explore how sanctions affect the quality of standard implementation. Transaction cost economics suggests that sanctions for opportunistic behavior reduce the likelihood that an exchange partner will act opportunistically (Williamson, 1996). Suppliers' perceptions of the likelihood that customers will impose sanctions on suppliers for symbolic implementation will affect suppliers' quality of standard implementation. The most severe sanction customers can impose is to terminate suppliers. The likelihood of a supplier being

terminated for symbolic implementation depends on two joint conditions: (1) customers' cost of switching to another supplier, and (2) the importance of suppliers' quality of standard implementation to customers. First, customer switching costs arise from the difficulties involved in replacing current suppliers (Heide and John, 1988). Customers with high switching costs are less likely to terminate suppliers for opportunistic behavior. Instead they may impose lesser sanctions or work with suppliers on correcting the situation. Thus, suppliers who perceive that their customers' switching costs are high may believe that they are less likely to be terminated for symbolic standard implementation. Second, customers are only likely to impose sanctions for symbolic implementation if the issue addressed by the standard is important to them. Both conditions, low switching costs and high issue importance for customers, need to be satisfied simultaneously. For example, in the case of ISO 9000 only customers who have low switching costs and are deeply concerned about their suppliers' quality performance are likely to terminate suppliers for symbolic implementation.

H4: *The likelihood that a supplier will choose substantive implementation of a certifiable management system standard is higher when suppliers perceive that their customers place a high importance on the issue certified by the standard <u>and</u> customers have low costs of switching suppliers.*

The costliness of sanctions to suppliers is another consideration that affects the likelihood of opportunistic behavior by suppliers. A supplier's cost of being terminated by a customer depends on the extent to which the supplier has made relationship-specific investments that are of higher value in their relationship with their current customer than in other customer relationships (Klein, Crawford, and Alchian, 1978; Williamson, 1979). Relationships specific investments include the investments

of time and effort required to establish working relationships with customers as well as investments in specialized assets such as equipment that is specific to a customer. These relationship-specific investments are worth less if the customer terminates the relationship. If a supplier made substantial relationship-specific investments, the supplier's cost of losing the customer is high. Thus, high levels of relationship-specific investments will make a supplier more committed to the relationship (Parkhe, 1993) and the supplier will be more likely to take efforts not to lose the customer. In relationships with customers that place a high importance on an issue addressed by a standard such efforts not to lose customers likely include substantive implementation of the standard. Thus, the effect of a supplier's level of relationship specific investments on the supplier's quality of standard implementation is moderated by the importance of the issue to the customer.

H5: *The likelihood that a supplier will choose substantive implementation of a certifiable management standard is higher when the supplier perceives that his customers place high importance on the issue addressed by the standard and the supplier has made investments that are specific to the relationship with particular customers.*

Firms can be expected to differ in their ability to pass certification audits while pursuing symbolic implementation. It has been suggested that some firms try to put on a façade during audits while limiting as much as possible the quality of implementation needed to achieve certification (Boiral, 2003b). Their goal is not to substantially implement the management system but to pass the audit. Firms seeking certification play a vital role in the audit by providing documentation to the auditors. Experienced firms have developed capabilities to prepare this internal documentation in ways that does not reflect the reality of the management system in the firm but that satisfies external

auditors (Yeung and Mok, 2005). The more time has passed since the initial certification of a standard the more time firms had to develop capabilities to pass certification audits. Firms that obtained certification early are also likely to have established a relationship with an auditor and to know which documents and processes the auditor is apt to focus on during the certification audit. This suggests that it will be easier for early certifiers to act opportunistically and pass re-certification audits while not be in full compliance with the standard's requirements. Furthermore, it may be difficult for firms to maintain the momentum after the initial implementation of a standard which required a significant commitment of time and resources throughout the certified organization. Over time, firms may loose focus on maintaining the certified management system, which increases the likelihood of symbolic implementation the more time has passed since the initial certification.

Conversely, firms could use the time passed since initial certification to develop capabilities to implement the management system, which suggests that the quality of implementation will improve over time. Furthermore, early adopters of standards may be more motivated by the internal desire to improve the firm's performance with respect to the certified issue than by appearing environmentally or socially responsible to external customers (Boiral, 2003b). This suggests that firms that have adopted a management standard early are more likely to pursue substantial standard implementation than late adopters. These opposing forces give rise to two competing hypotheses:

H6a: *Early certifiers are less likely to choose substantive implementation of management system standards.*

H6b: *Early certifiers are more likely to choose substantive implementation of management system standards.*

DATA AND METHOD

We test our hypotheses using regression analysis on survey data from a sample of 172 ISO 9000 certified firms in China.

Research Setting

To test our hypotheses we need to select a research setting in which many customers require suppliers to obtain standard certification and some customers consider their suppliers' quality standard implementation to be very important and invest in direct monitoring. In the case of environmental conduct and working conditions, most customers have less incentive to directly monitor their suppliers' conduct than in the case of quality management. Only few customers are singled out by special interest groups or the media and face close scrutiny of their suppliers' environmental and labor practices which may provide incentives to invest in direct monitoring beyond requiring certification. In contrast, the physical quality of the products purchased from suppliers is of great concern to many customers, who will have incentives to monitor their suppliers' quality performance beyond requiring certification. Therefore, we test our hypotheses in the context of the ISO 9000 quality management system. Given the similarities in the design of different management system standards and in the role of customer pressures as a motivation for adoption of ISO 9000, ISO 14000, and SA 8000 we expect our findings to hold for all these standards.

China, which is the country with the highest number of ISO 9000 certifications worldwide (ISO 2004), provides an ideal research setting for testing our hypothesis because concerns about the audit system for third-party certification are high and because firms' primary motivation for obtaining certification is to fulfill customer requirements (Christmann & Taylor, 2001; Yeung & Mok, 2005). Concerns about the auditing system include a shortage of qualified auditors resulting in lack of auditors with sufficient experience or qualifications as well as problems with the regulation and supervision of the many auditors in China. As a result many ISO certified firms in China do not meet the requirements set by ISO standards (Yeung & Mok, 2005). Demands for foreign customers have led to a tremendous growth in the number of ISO 9000 certifications in China – from 507 certification in 1995 to almost 97,000 in 2003 (Christmann & Taylor, 2001; ISO 2004; Yeung & Mok, 2005). Firms view ISO certification primarily as a requirement for exporting and have no intrinsic motivation to pursue substantial implementation.

Sample, Survey Design, and Data Collection

Given that data on the variables included in our study are not available from public sources and that our hypotheses suggest that suppliers' perception of customer preferences and activities determine their quality of standard implementation, we needed to collect survey data to test our hypotheses. We were able to secure the cooperation of the China Quality Certification Center (CQC), the largest standard auditor in China, to support the data collection for our study. CQC has issued ISO 9000 certificates to more than 5000 facilities in China, which constituted our study population. We mailed surveys to a sample of 550 firms that were randomly selected from the database. This mailing sample size was large enough to obtain sufficient responses for our data

analysis and a small enough to perform intensive follow-up with non-respondents to ensure a high response rate.

We designed the survey in several steps. We first designed a preliminary version, which we discussed with managers and auditors from CQC during a visit to China in 2001. We revised the survey based on their comments and discussed the new version again with CQC auditors as well as with Chinese quality managers. We created a final version of the survey incorporating their feedback, which was professionally translated into Chinese and back-translated into English in order to assure accuracy of the translation.

The target respondent for the survey was the person in charge of ISO 9000 certification, whose name was included in the CQC database. In almost all cases this individual was the quality manager of the firm. While this methodology restricted us to using only one respondent per firm, we identified the most knowledgeable and appropriate person to complete the questionnaire, the principal methodological solution to using single respondents (Campbell, 1955; John & Reeves, 1982).

The survey was mailed in 2003. The mailing of the survey included a cover letter from CQC explaining the purpose of the survey, and guaranteeing respondents that CQC would not have access to data for individual companies. To assure a high response rate and to obtain truthful answers, respondents were not asked to identify themselves or their company on the survey. The surveys only had a control number to keep track of respondents versus non-respondents. Firms that did not return the survey received a follow-up phone call by CQC staff. In addition, non-respondents received a follow-up mailing of the survey three months after the initial mailing. We obtained 206 completed

responses resulting in a response rate of 37 percent, a very high response rate for a mail survey. Some responses needed to be eliminated from our analysis due to missing data, which left us with a sample of 172 for this study. The median firm size for respondents was 101-500 employees and about 23 percent were wholly or partially foreign owned.

In order to evaluate whether respondents are representative of the mailing sample it would be desirable to compare respondents to non-respondents along known characteristics. Unfortunately, we did not have access to information about non-respondents that would allow us to perform this analysis. We were, however, able to use wave analysis, which measures non-response bias by comparing respondents who respond readily to the survey to those who respond after the follow-up steps are taken. This procedure is based on the observation that in mail surveys, late respondents tend to be more similar to non-respondents than early respondents (Fowler, 1993). Comparisons of means and correlations for surveys that were received after the first mailing and after the second mailing show that the two groups do not differ significantly in the level of and the relationships between variables. Thus, a non-response bias is unlikely to exist.

Measures

Unless otherwise noted the measurement items were measured on a 5-point Likert scale.

Dependent Variable. The dependent variable quality of management system standard implementation was measured as the average of three survey items which had previously been used by Naveh & Marcus (2004): (1) "To what extent are the documents created for the purpose of ISO 9000

used in daily practice?" (2) "To what extend has the ISO 9000 system become part of your regular routine?" and (3) "To what extent are preparations for external audits made at the last minute?" (reverse scored) (1=not at all, 5=to a very large extent). A low score indicates symbolic implementation and a high score indicates substantial implementation. A Cronbach Alpha of 0.71 indicates good reliability of the measure.

Independent Variables. The independent variable importance of issue to customers was measured by the average of two survey items "How important are the following criteria for your major customers in their selection of supplier? (1) quality of products, (2) On-time delivery." (1=not important, 5=most important). A Cronbach Alpha of 0.73 indicates good reliability.

The independent variable frequency of direct customer monitoring was measured by the average of two survey items: (1) "Our major customers assess our quality performance through formal evaluations." and (2) "Our major customers provide us with feedback about the results of their evaluations." (1=never, 5=very frequently). A Cronbach Alpha of 0.81 indicates good reliability.

The independent variable supplier certification program was measured by the survey item "Our major customers use a supplier certification program to certify suppliers' quality." (1=never, 5=very frequently).

Perceived customer switching costs were measured by the survey item "It is easy for our major customers to find alternative suppliers for the products we are providing." (1=strongly disagree, 5=strongly agree). Note that for this variable a high score means low customer switching costs.

Relationship-specific investments by suppliers are measured by the survey item "Establishing a working relationship with new customers is a time consuming process." (1=strongly disagree, 5=strongly agree).

Our measure of early certification is a dummy variable that took the value 1 if the year that the firm had first obtained certification to any standard in the ISO 9000 series was 2000 or earlier and the value 0 otherwise. We selected the year 2000 as a cutoff date for two reasons: First, given that our survey was administered in 2003 and that ISO 9000 needs to be recertified every 3 years the year 2000 separates firm that have obtained their initial certification from firms that had already been recertified. Second, there was a large increase in first-time certifications in 2001. The total range of first-time certifications was 1993 to 2003 and about 76 percent of firms obtained certification 2001 or later. We tested the robustness of our findings by estimating models including the measure years since initial certification. Results are consistent with our dummy variable results. Because the year measure was highly skewed and not normally distributed we decided to report the dummy variable results.

Control Variables. Because ISO 9000 standards are considered less well adapted to small organizations and small firms often lack the resources to implement management systems substantive implementation may be easier for larger firms. We control for *firm size* using the number of employees in China (measured on a 7-point scale from 1=less than 50 to 7=more than 10,000). Foreign MNEs may be able to transfer superior implementation capabilities and financial resources from their operations abroad to their Chinese subsidiaries. We control for this effect by including the *percent of foreign ownership* as a control variable. ISO 9000 standards are better adapted to the

manufacturing sector than to the service sector resulting in service firms being more likely to pursue symbolic implementation (Boiral, 2003b). We control for industrial sector by including a dummy variable that takes the value 1 for *service firms* and 0 for manufacturing firms. Finally, it is likely to be easier for firms to achieve a substantive implementation if the technology used in the firm's production processes is relatively stable and does not change over time. To control for this effect we include a survey item that asks respondents to rate their *process technology* on a 5-point scale from 'evolving' to 'mature'.

Preliminary Data Analysis and Method

Descriptive statistics and correlations for all variables are presented in table 1. The relatively high mean value (4.2) for the dependent variable quality of standard implementation warrants attention. Such a high value is to be expected given that all the firms in our sample were ISO 9000 certified, which requires that they have implemented the certified practices to some extent. Values for this variable range from 2.67 to 5 and its distribution is non-normal. If the dependent variable and, thus, the error term is not normally distributed ordinary least square (OLS) is not the most efficient method of estimating the slope parameters of a multiple regression model (Judge et al. 1988). Robust regression, an iterative estimation technique in which smaller weights are assigned to outlying data points to minimize their impact on the estimation process, yields more efficient estimates in this situation (Rousseeuw & Leroy, 1987). When the assumptions of OLS are met, robust regression produces estimates identical to OLS (Western, 1995). To assess the extent to which the non-normal distribution of the dependent variable affects our results we report results of robust regression analysis using Andrew's weight function as well as OLS regression results.

To test hypotheses 4 and 5 we constructed interaction terms between the variables issue importance for customers and customer switching cost and relationship-specific investments respectively. To reduce multicollinearity between the main and the interaction effects, we computed the interaction terms in our tests of hypotheses 4 and 5 as the product of standardized construct scores (Aiken & West, 1991).

Before testing the hypotheses we analyzed the likely extent of multicollinearity in the data by analyzing the correlations between the independent variables. Most of the correlations are below 0.3 indicating no problems of multicollinearity (see table 1). We also evaluated the presence of multivariate multicollinearity in our OLS regression using several diagnostic tests suggested by Belsley, Kuh, and Welsch (1980). An examination of variance inflation factors and condition indexes revealed that no multicollinearity was present in the data.

Common method bias can pose problems for survey research that relies on self-reported data (Campbell & Fiske, 1959) by artificially inflating observed relationships between variables. In order to diminish if not avoid the effects of consistency artifacts the dependent variables were placed after the independent variables in the survey (Salancik & Pfeffer, 1977). In addition, a post hoc analysis using Harman's single-factor test (Podsakoff & Organ, 1986) showed no evidence of common method variance.

RESULTS

Our regression results for both robust and OLS regression can be seen in table 2. Model (1) shows control variables only, model (2) adds main effects, and model (3) shows the complete model including interaction effects. The coefficient estimates of the OLS regression and the robust regression are substantively similar indicating that the non-normality of the error term does not affect this study's findings. Therefore, we only describe our robust regression results in this section. Comparing models (2) and (3) indicates that adding interaction effects does not change our findings regarding the hypotheses regarding the main effects (Hypothesis 1, 2, and 3).

Hypothesis 1 states that the importance that customers place on the issue addressed by a standard contributes to substantive standard implementation by suppliers. This hypothesis is supported by the data. The coefficient for the variable issue importance to customers is positive and significant ($p<0.001$).

Hypothesis 2 states that direct customer monitoring contributes to substantive standard implementation by suppliers. This hypothesis is supported by the data. The coefficient for the variable frequency of customer monitoring is positive and significant ($p<0.05$).

Hypothesis 3 states that supplier certification programs contribute to symbolic standard implementation by suppliers. This hypothesis is supported by the data. The coefficient for the supplier certification program variable is negative and significant ($p<0.01$).

Hypothesis 4 suggests that suppliers are more likely to choose substantive implementation when their customers place a high importance on the issue addressed by the standard and have low

costs of switching suppliers. This hypothesis is supported by the data. The coefficient for the interaction term between issue importance to customers and low customer switching costs is positive and significant ($p<0.001$).

Hypothesis 5 states that suppliers are more likely to choose substantive implementation when customers place high importance on the issue addressed by the standard and the supplier has made high levels of relationship-specific investments. This hypothesis is supported by the data. The coefficient for the interaction term between importance to customers and supplier's relationship-specific investment is positive and significant ($p<0.01$).

Hypothesis 6a states that early certifiers are less likely to choose substantive standard implementation, while the competing Hypothesis 6b states that they are more likely to do so. Hypothesis 6a is supported by the data. The coefficient for early standard certification is negative and significant ($p<0.001$).

CONCLUSIONS

The effectiveness of international certifiable management standards as a governance mechanism for self-regulation of firm conduct in the global economy may be limited. For self-regulation through certifiable standards to work effectively, firms need to continuously comply with standard requirements. Problems with the quality of third-party auditing allow some firms to obtain standard certification without continuously complying with the standard's requirements. Our study suggests that firms exploit this shortcoming by strategically choosing symbolic implementation to

avoid the higher costs of substantive implementation unless they perceive symbolic implementation to have adverse consequences. We find that suppliers choose symbolic standard implementation if they perceive that their customers do not place high importance on the issue addressed by the standard, that customers are not likely to detect their quality of implementation, and that sanctions are unlikely or not costly for them. Further, we find that suppliers that have been certificated for a long time are more likely to choose symbolic implementation, which suggests that develop capabilities to pass certification audits. Our findings have important implications for the prospects of firm self-regulation of environmental and social conduct through certifiable management system standards, for future research on certifiable standards, and for management practice.

Discussion

For suppliers in emerging economies such as China the primary pressure for self-regulation emanates from customers in industrialized countries requiring adoption of certifiable standards by their suppliers (Christmann & Taylor, 2001; Corbett & Kirsch, 2001; Guler, Guillen, & MacPherson, 2002). Our results suggest that the role of customers in promoting effective international self-regulation goes beyond requiring their suppliers to obtain standard certification. Customers directly affect their suppliers' quality of standard implementation through their preferences and actions. Our results show that suppliers do not perceive customer pressures for standard certification as homogenous requirements: variations in customer monitoring activities and in the perceived costs and likelihood of customer sanctions affect supplier's compliance with standards' requirements.

Our results highlight the importance of monitoring and sanctions in assuring effective self-regulation through certifiable management system standards. When customers rely too heavily on standard certification without maintaining some of their own direct monitoring effort, and when costly sanctions for poor standard implementation are not expected by suppliers, suppliers are likely to act opportunistically. Suppliers circumvent the intent of certifiable standards by doing the minimum necessary to maintain certification knowing that their customers will either not notice this failure or that sanctions are not likely or not costly.

The finding that early certifiers of ISO 9000 are more likely to choose symbolic implementation raises concerns about the long-term prospects of certifiable management system standards as a tool for firm self-regulation. This finding suggests that certifiable standards are loosing their effectiveness over time. Two processes contribute to the increase in symbolic implementation over time. First, over time firms develop capabilities to pass certification audits and discover the preferences and habits of their auditor, which allows them to pass certification audits while they do not comply with the standard's requirements. Second, over time firms loose the momentum generated by the initial implementation of the standard, which mobilized individuals from various parts of the organization and required a substantial investment of time, effort, and money.

Implications

While our empirical results are based on the ISO 9000 quality standard, our findings have important implications for international certifiable standards that have the ambition of providing a

foundation for firm self-regulation of environmental conduct and working conditions in the global economy. Management system standards addressing environmental and social issues such as ISO 14000 and SA 8000 are very similar to ISO 9000 in terms of their requirements for implementing and using a management system and their reliance on third-party certification. However, customers are less likely to invest in directly monitoring these standards than ISO 9000 and consequently suppliers may be more inclined towards symbolic implementation. Thus, in terms of their usefulness for self-regulation certifiable environmental and social management system standards face even larger credibility challenges than ISO 9000.

Our results show that periodic third-party audits are not sufficient to assure credible firm self-regulation. Additional monitoring and sanctions are required for substantive implementation. This suggests that either customers need to play a more active role in monitoring their suppliers' conduct or that third-party auditing needs to be made more effective to assure substantive implementation. Our study highlights the important contribution of direct customer monitoring to effective self-regulation. However, directly monitoring suppliers' conduct is costly for customers. These high costs may deter customers from investing in directly monitoring their suppliers' environmental conduct and working conditions. Certification provides a more cost-efficient mechanism to reduce information asymmetries in global supply chains because the task of collecting and verifying information about unobservable supplier characteristics will occur only once as compared to having all customers individually audit all potential suppliers. Thus, increasing the effectiveness of third-party certification is the preferred solution to decrease the likelihood of symbolic implementation. This can be achieved by changing monitoring practices, increasing the transparency of audit findings, and increasing the

accountability of auditors (O'Rourke, 2002; Stenzel, 2000). This will increase the credibility of standards as signals of unobservable supplier attributes and thus the effectiveness certifiable standards as a governance mechanism for firm self-regulation in the global economy.

Our findings suggest that researchers need to pay more attention to firms' actual implementation of standards' requirements and not only to certification. Certification is a symbolic act that is distinct from the implementation of the certified practices. While previous research has shown that firms may implement management systems but do not obtain certification (Terlaak & King, forthcoming), and that some certified firms may go beyond standards' requirements (Naveh & Marcus, 2004), our research suggests that the quality of standard implementation varies among certified firms as they exploit auditing systems that allow them to strategically select the extent to which they comply with the standard's requirements. All of these findings suggest that it may not be appropriate to use certification as a measure the adoption of certified practices in empirical studies. Researchers need to acknowledge the limitation of this measure and evaluate how variations in the quality of standard implementation may affect their results. For example, symbolic implementation might help explain why many studies (e.g., Andrews et al. 2003; King et al., forthcoming) found certification not to improve firms' performance with respect to the issue addressed by the standard.

While research on certifiable standards has so far conceptualized customer pressures for self-regulation as a unified variable our study demonstrates the value of analyzing customer pressures in a more differentiated way. Our results show that suppliers' responses vary depending on customer preferences and activities. This suggests that future research may benefit from going beyond

measuring customer pressures as a unified variable by more specifically including the types of requirements and preferences that different customer impose on suppliers.

Our study suggests that firm capabilities that contribute to certification do not only include the implementation capabilities identified in previous research but also firm capabilities to pass certification audits. While this study provides an important first step in suggesting that capabilities to pass certification audits are important, future research needs to further unbundle these capabilities by identifying them (e.g. document preparation capabilities or learning about auditor preferences) and understanding how they impact firm strategy and standard adoption and implementation.

Our findings also have implications for practicing managers in firms that use certifiable management standards in selecting their suppliers. Until the system of third-party certification is strengthened customers cannot rely on certifiable standards to assure their suppliers' conduct. Customers who are interested in more than symbolic implementation need to make sure that their suppliers know that they are not only interested in certification but in the actual implementation of the standard's requirements and will invest in direct monitoring. Our findings also suggest that customers should pay attention to their suppliers' relationship-specific assets and to their initial timing of certification when deciding how much to invest in monitoring. Suppliers that have been certified for a long time may be more able to pass audits while pursuing symbolic implementation, which suggests that customers may be well advised to monitor these suppliers more frequently. However, suppliers with high investments in relationship-specific assets may be less likely to pursue symbolic implementation, which suggests that customers do not have to monitor these suppliers as frequently as suppliers without such investments.

Limitations and Suggestions for Future Research

We have tested our hypotheses in the context of a single country, China, which raises concerns about the generalizability of our findings to other countries. China is characterized by very high concerns about the adequacy of the auditing system for third-party certification (Yeung & Mok, 2005), but the resulting problem of symbolic standard implementation is not unique to China. Symbolic implementation has also been shown to exist in industrialized countries such as Italy and Canada (Biazzo, 2005; Boiral, 2003b, 2005). Thus, the problems for self-regulation presented in this paper are likely to be global.

Using data from a single country allowed us to hold the cultural and political environment constant, but it may be possible that our findings are not be generalizable to countries with different cultural and political environments. Previous research has shown that the responses to monitoring and sanctions vary across cultures (Yamagishi, 2003) and that the process of implementing management standards is affected by national cultural traits (Casper & Hancke, 1999). In addition, the adoption of certifiable standards is influenced by the domestic political and regulatory environment (Delmas, 2002; Potoski & Prakash, 2004). Thus, future research should explore the sources of variation in quality of standard implementation in other countries with different cultures and political environments. Cross-country studies could explore how cultural and political factors affect the quality of standard implementation.

Using data from firms that have been certified by a single auditing firm (CQC) allowed us to hold auditor quality constant, but precluded us from examining whether there is an 'auditor effect' on the quality of standard implementation. An interesting extension of this study would be to include firms that have been certified by different auditors, to examine to whether there differences in the quality of implementation by firms that have been certified by different auditors.

Because our study only included certified firms, we cannot address differences in management system implementation between certified and non-certified firms. Thus, it is possible that firms pursuing symbolic standard implementation have better management systems in place than firms that have not obtained certification, which would imply that some self-regulation benefits of certification exist. All we can say is that there is a variance in the implementation of management systems in certified firms and firms are tying to avoid to fully comply with standards' requirements by strategically choosing their quality of implementation.

Despite these limitations, our study provides important insights into the conditions that affect substantive implementation of standards, which is necessary for the functioning of a governance system for firm self-regulation based on certifiable standards.

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TABLE 1

Descriptive Statistics and Correlation Matrix

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**Issue importance to customers[a]**	0.00	1.02	1.00												
2	**Frequency of customer monitoring**	4.09	0.81	.26***	1.00											
3	**Supplier certification program**	3.14	1.08	.08	.20**	1.00										
4	**Low switching costs for customers[a]**	-0.00	0.98	.07	.07	-0.12	1.00									
5	**Suppliers' relationship-specific investments[a]**	0.00	0.95	.23**	.22**	.00	0.12	1.00								
6	**Issue importance to customers * Customers' switching costs**	0.12	0.97	-.19*	-.07	0.02	.17†	.04	1.00							
7	**Issue importance to customers * Supplier's relationship-specific investments**	0.18	0.96	.08	.08	.00	.05	.28***	.15†	1.00						
8	**Early standard certification**	0.23	0.42	-.10	.09	-0.14†	.08	-.05	.05	-.00	1.00					
9	**Number of employees**	2.99	1.16	-.03	.08	-.06	.09	-.06	-.11	-.09	.23**	1.00				
10	**Percent of foreign ownership**	0.16	0.33	-.02	.05	.02	-.20*	-.07	-.13†	.01	.15†	.15†	1.00			
11	**Mature process technology**	3.83	1.00	.09	.05	.18*	-.03	-.08	-.09	-.08	-.08	.09	.08	1.00		
12	**Service industry**	0.06	0.25	.06	.16*	.09	.14†	.04	.05	.02	-.09	-.14†	-.07	-.02	1.00	
13	**Quality of ISO 9000 implementation**	4.22	0.65	.33***	.20**	-.09	.09	.12	.07	.11	-.14†	-.05	-.07	.17†	.02	1.00

† p<.10 * p<.05 ** p<.01 *** p<.001

[a] Results for standardized scores

TABLE 2

Regression Results

	Dependent Variable: Quality of ISO 9000 implementation					
	Robust Regression			***OLS Regression***		
	(1) Control variables only	**(2) Main effects only**	**(3) Full model**	**(1) Control variables only**	**(2) Main effects only**	**(3) Full model**
Intercept	3.97*** *(0.19)*	4.01*** *(0.25)*	4.03*** *(0.23)*	3.79*** *(0.22)*	3.60*** *(0.33)*	3.52*** *(0.32)*
Explanatory Variables						
Issue importance to customers[a]		0.21*** *(0.04)*	0.25*** *(0.04)*		0.14** *(0.05)*	0.20*** *(0.05)*
Frequency of customer monitoring		0.11* *(0.05)*	0.11* *(0.04)*		0.16* *(0.06)*	0.17** *(0.06)*
Supplier certification program		-0.13*** *(0.03)*	-0.09** *(0.03)*		-0.11* *(0.05)*	-0.14** *(0.04)*
Low switching costs for customers [a]		0.05 *(0.04)*	0.01 *(0.03)*		0.03 *(0.05)*	0.01 *(0.05)*
Supplier's relationship-specific investments[a]		0.02 *(0.04)*	-0.05 *(0.04)*		0.01 *(0.05)*	-0.01 *(0.05)*
Early standard certification		-0.26** *(0.08)*	-0.35*** *(0.08)*		-0.21† *(0.12)*	-0.25* *(0.11)*
Issue importance to customers * Customers' switching costs			0.14*** *(0.04)*			0.12* *(0.05)*
Issue importance to customers * Supplier's relationship-specific investments			0.09** *(0.03)*			0.10* *(0.05)*
Control Variables						
Number of employees	-0.08* *(0.04)*	-0.03 *(0.03)*	-0.05† *(0.03)*	-0.02 *(0.04)*	-0.02 *(0.04)*	0.00 *(0.05)*
Percent of foreign ownership	-0.20† *(0.12)*	-0.09 *(0.11)*	-0.15 *(0.10)*	-0.15 *(0.15)*	-0.12 *(0.14)*	-0.09 *(0.14)*
Service industry	-0.03 *(0.17)*	-0.11 *(0.14)*	-0.15 *(0.13)*	0.04 *(0.20)*	-0.06 *(0.20)*	-0.06 *(0.19)*
Mature process technology	0.16*** *(0.04)*	0.11** *(0.04)*	0.09** *(0.03)*	0.14** *(0.05)*	0.13** *(0.05)*	0.12** *(0.05)*
R^2	0.11	0.36	0.43	0.05	0.19	0.24
Adjusted R^2	0.09	0.32	0.39	0.03	0.14	0.18

Standard errors are in parentheses. † p<.10 * p<.05 ** p<.01 *** p<.00

[a] Standardized scores