University of Cyprus
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Essays in Financial Economics

Quality, Value, Board Composition, and Executive Compensation

Ph.D. Thesis

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Doctor of Philosophy

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To my parents

Androulla Voskaridou-Georgiou

& Anastasios Georgiou

and to my brother

George Georgiou

Περίληψη Διατριβής

Στο *Δοκίμιο Ι* εξετάζω τη σχέση μεταξύ της πιθανότητας επίτευξης αριστείας στη διοίκηση ποιότητας και της σύνθεσης του διοικητικού συμβουλίου (ΔΣ) της εταιρείας. Συγκεκριμένα, εξετάζω το ρόλο των συμβούλων i) που είναι επίσης και διοικητικά στελέχη της εταιρείας, ii) που έχουν κάποια ειδικότητα άμεσα σχετιζόμενη με το κύριο αντικείμενο των επιχειρηματικών δραστηριοτήτων της εταιρείας, και iii) που έχουν ειδίκευση στη διοίκηση επιχειρήσεων.

Τα αποτελέσματα δείχνουν ότι ο αριθμός των διοικητικών συμβούλων με ειδικές γνώσεις σχετικά με το κύριο αντικείμενο των επιχειρηματικών δραστηριοτήτων της επιχείρησης συνδέεται θετικά με την πιθανότητα να κερδίσει η εταιρεία το Βραβείο Ποιότητας Malcolm Baldrige (MBQA) ή κάποιο άλλο βραβείο ρητά βασισμένο στα ίδια κριτήρια.

Η μελέτη αυτή συμβάλλει στη βιβλιογραφία ρίχνοντας φως στην εταιρική διακυβέρνηση των εταιριών που στοχέυουν στην αριστεία στην ποιότητα. Επιπλέον, υπογραμμίζει το στρατηγικό ρόλο του ΔΣ, δείχνοντας ότι η σύνθεση του συμβουλίου και η αριστεία στην ποιότητα είναι συνδεδεμένες μέσω αυτού του ρόλου.

Στο *Δοκίμιο ΙΙ* διερευνώ εμπειρικά τη σχέση μεταξύ αμοιβής των ανώτατων διοικητικών στελεχών (ΑΔΣ) και διοίκησης ποιότητας (ΔΠ). Η στήριξη της στρατηγικής ΔΠ από τα ΑΔΣ είναι εξέχουσας σημασίας για την επίτευξη αριστείας στην ποιότητα, οπότε υποθέτω πως η στρατηγική ΔΠ θα αντικατοπτρίζεται στις αμοιβές των ΑΔΣ. Συγκεκριμένα, υποθέτω ότι η ευαισθησία της αμοιβής (τόσο της βραχυπρόθεσμης όσο και της μακροπρόθεσμης) σε μετρήσεις απόδοσης σχετικές με τη ΔΠ είναι μεγαλύτερη για τις εταιρείες που ακολουθούν μια στρατηγική ΔΠ. Τα εμπειρικά αποτελέσματα δείχνουν ότι η ευαισθησία της βραχυπρόθεσμης αμοιβής του ανώτατου εκτελεστικού διευθυντή (μισθός συν μπόνους) στις πωλήσεις του προηγούμενου έτους (ένα πελατοκεντρικό μέτρο απόδοσης) είναι μεγαλύτερη για τις εταιρείες ΔΠ παρά για αυτές ενός αντίστοιχου δείγματος ελέγχου κατά την περίοδο μετά το πέρας της υλοποίησης της στρατηγικής ΔΠ. Ως εκ τούτου, συμπεραίνω πως μια στρατηγική ΔΠ αντικατοπτρίζεται όντως στην αμοιβή των ΑΔΣ - ως επιβράβευση μετά το πέρας της υλοποίησης αλλά όχι ως κίνητρο κατά τη διάρκεια της υλοποίησης.

Στο *Δοκίμιο ΙΙΙ (Α)* δείχνω πως για εταιρείες που δραστηριοποιούνται κατά κύριο λόγο στο Διαδύκτιο, η ποιότητα του ιστότοπου τους - ως ένδειξη της ικανότητας μιας εταιρείας να διατηρήσει την πελατεία της – μπορεί να εξηγήσει τις παραφουσκωμένες τιμές των μετοχών της εταιρείας κατά τη διάρκεια της χρηματιστηριακής φούσκας που αφορούσε τις εταιρείες αυτές. Κατά την περίοδο που εξετάζεται, τα χρηματοοικονομικά

μεγέθη από μόνα τους δεν επαρκούσαν για να εξηγήσουν την ραγδαία αύξηση των τιμών των μετοχών των συγκεκριμένων εταιρειών.

Για να μετρήσω την ποιότητα, ανέπτυξα ένα εργαλείο (*Δοκίμιο ΙΙΙ (Β)*) που μετρά την ποιότητα των υπηρεσιών, όπως αυτή γίνεται αντιληπτή από μια *επίσκεψη* στην ιστοσελίδα της επιχείρησης και κατόπιν συσχετίζω την ποιότητα με την αξία των μετοχών μέσω ενός λογαριθμικού μοντέλου στηριγμένο σε μια παραλλαγή του μοντέλου του Ohlson (1995).

Τα αποτελέσματα δείχνουν ότι δύο από τις διαστάσεις της ποιότητας, ήτοι (i) η εμπιστοσύνη που εμπνέει ο ιστότοπος, και (ii) οι διαδραστικές δυνατότητες του ιστότοπου, σχετίζονται θετικά με την αγοραία αξία της εταιρείας, αφού αυτές οι δύο αυτές διαστάσεις μπορούν να λειτουργήσουν ως «εμπόδια μεταστροφής» που μπορούν να συντείνουν στην ικανότητα της εταιρείας να διατηρεί την πελατεία της.

Thesis Summary

In *Essay I* I examine the relationship between the likelihood of attaining quality excellence and board composition with respect to directors' expertise. Specifically, I examine the role of i) inside directors, ii) directors - experts on the main object of business operations, and iii) directors with management expertise.

Results show that the number of directors with expertise on the main object of business operations of the firm is positively related to the likelihood of winning the Malcolm Baldrige Quality Award (MBQA) or another award that is explicitly based on the MBQA. This study contributes to the literature by shedding light on the corporate governance of firms that take the leap to go beyond survival and pursue excellence; furthermore, it highlights the strategic role of the board by demonstrating that board composition and quality excellence are related through these roles.

In *Essay II* I empirically investigate the relationship between executive compensation and quality management (QM). Executive support for the QM strategy is of prominent importance in attaining quality excellence, thus I propose that the quality management strategy would be reflected in executive pay. Specifically, I hypothesize that the sensitivity of executive compensation (both short term and long term) to QM related measures of performance will be higher for quality management firms. I utilize a sample of 44 first time Malcolm Baldrige Quality Award winners during the time period 1996-2006 and a matching sample and examine the sensitivity of CEO compensation to sales - a customer oriented measure of performance - for two years before and two years after quality management implementation. The empirical results show that the sensitivity of short-term CEO compensation (salary plus bonus) and previous year sales during the early post-implementation period is higher for QM firms. Thus, I conclude that a QM strategy is reflected in executive compensation; yet, it is used as a reward after implementation rather than an incentive for QM efforts.

In *Essay III (A)* I show how online quality metrics as a proxy for the ability of a firm to *retain* customers can provide significant additional information context beyond fundamentals and the ability of the firm to attract customers in explaining the high valuation of pure Internet firms during the so-called Internet stock market bubble, a period during which fundamentals alone were not adequate to explain the soaring Internet stock prices.

I use Web perceived service quality (WPSQ) to proxy the firm's *customer retention* ability. To obtain information regarding Web perceived service quality, I develop an instrument (*Essay III (B)*) to measure service quality, as this is perceived by *visiting* a

firm's Web site and relate these metrics to firm value in a log-linear valuation model based on a restatement of Ohlson's (1995) model.

Results indicate that two of the WPSQ dimensions, namely (i) perceived trust and, (ii) the interactive capabilities of its Web site are positively associated with the market value of an Internet firm, since these two dimensions can act as switching barriers which in turn increase customer retention for Internet firms.

Ευχαριστίες

Είχα ακούσει πως ο δρόμος για το διδακτορικό είναι ένας δρόμος πολύ μοναχικός και αυτό το έχω όντως διαπιστώσει. Στην περίπτωση μου υπάρχουν άτομα τα οποία θέλω να ευχαριστήσω ακριβώς επειδή μου υπενθύμιζαν διαρκώς πως δεν ήμουν πραγματικά μόνη στο δρόμο αυτό.

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CHAPTER 1

ESSAY I

Board Composition and Value: The Case of Quality Excellence

Essay I

Board Composition and Value: The Case of Quality Excellence

ABSTRACT

I empirically investigate the relationship between board composition and the likelihood of attaining quality excellence. Since the *composition of the board* is a reflection of the firm's *strategy*, and *strategy* plays a pivotal role in attaining *quality excellence*, I propose and test whether board composition and the likelihood of attaining quality excellence are related. I focus on board composition with respect to directors' expertise. Specifically, I examine the role of i) inside directors, ii) directors - experts on the main object of business operations, and iii) directors with management expertise. I use a conditional logistic model to assess the relationship between board composition and the likelihood of achieving quality excellence. To proxy for quality excellence I use the winning of a Malcolm Baldrige Quality Award as criterion. The dataset consists of a unique, hand-collected sample comprising of 63 first time award winners during the time period 1996-2006 and a matching sample of 63 firms that never won a quality award. Empirical results show that the number of directors with expertise on the main object of business operations of the firm is positively related to the likelihood of being awarded. This study contributes to the literature by shedding light on the corporate governance of firms that take the leap to go beyond survival and pursue excellence; furthermore, it highlights the strategic role of the board by demonstrating that board composition and quality excellence are related through these roles.

1. INTRODUCTION

In this study I attempt to shed light on the corporate governance issues pertaining to firms that pursue quality excellence. I do so by empirically investigating the relationship between board composition and the likelihood of achieving quality excellence. Three observations from the literature motivate this proposition. First, achieving quality excellence in the production of goods and the delivery of services creates value for a firm[1]; thus, extending our understanding on organizational parameters that are related with quality excellence is important[2]. The second and third observations on which my motivation is based upon, justify why I investigate board composition specifically; these are the pivotal role of strategy in achieving quality excellence on one hand[3]; and the prominent role of the board of directors in strategy on the other [4]. Collectively, these observations lead to the following question: is there an appropriate way to structure the board so that the likelihood of attaining quality excellence is enhanced? Or put differently, is there a fit between quality management strategy and board composition?

I investigate the relationship between board composition and the likelihood of achieving quality excellence within a contingency framework[5]. Specifically, I investigate whether the likelihood of attaining quality excellence is enhanced when board composition *matches* the quality management strategy. I define "matching" based on the needs of a firm that pursues a quality management (QM) strategy[6], as these needs determine what types of directors would be more appropriate (Hillman et al., 2000). I focus on the needs of a quality management (QM) firm as a "complex" firm[7] (Wruck and Jensen, 1994) with increased advising requirements (Coles et al., 2008), a profile that emerges from the information intensiveness of a QM strategy (Wruck and Jensen, 1994). Thus, subsequently,

[1] See for example Hendricks and Singhal (1996; 1997; 2001a); Easton and Jarrel (1998; Corbett et al., 2005); Yang (2006); Joiner (2007); Tanninen, Puumalainen, and Sandstrom (2010).
[2] See for example Hendricks and Singhal (2001b), Benson et al.(1991), Sitkin et al.(1994); Reed et al. (1996), Maani, 1989; Powell (1995).
[3]Saraph, Benson, and Schroeder, 1989; Porter and Parker, 1993; Soteriou and Zenios, 1999; Sandholm, 2005; Soltani et al., 2008.
[4]See for example Stiles and Taylor (2001), Steane and Christie (2001), Lehn, Patro and Zhao (2004), Coles, Daniel and Naveen (2008).
[5]Contingency theory is considered to be one of the most widely used theoretical approaches to study organizations (Scott, 1998). The central philosophy behind this is that there is no best way to organize a corporation, and that, instead, the optimal course of action is contingent (dependent) upon the internal and external situation (Scott, 1998; Donaldson, 2001). Undertaking a contingency approach to study corporate governance has been explicitly suggested by Muth and Donaldson (1998). A few recent studies in the field of corporate governance have explicitly taken this path (see Pearce and Zahra, 1992; Boyd, 1995; Yin and Zajac, 2004).
[6] Henceforth also "a quality management firm" or "a QM firm".
[7] As this is defined by Jensen and Meckling (1976).

I look at board composition with respect to the directors' expertise necessary to serve the needs of a firm that pursues quality excellence since strategic needs determine what types of directors would be more appropriate (Hillman et al., 2000; Markarian and Parbonetti, 2007). I examine three hypotheses related to directors' expertise; specifically I propose that directors who are: i) inside directors, with their firm specific knowledge and skills, ii) experts on the main object of business operations, with their genuine interest in and deep understanding of the firm's main object of business operations and industry, and iii) management experts, increase the likelihood of attaining quality excellence.

To examine the hypotheses I employ a conditional logistic regression methodology (Hosmer and Lemeshow, 2000). The unique, hand-collected sample consists of 63 US publicly traded firms that won their first Malcolm Baldrige or Malcolm Baldrige based quality award during the period 1996-2006 and their matching counterparts. I use data from three years before the award-winning year[8].

The findings indicate that firms that excel in quality are more likely to have included on their board directors who are experts at the main object of their business operations. I explain this under the cognitive perspective of board composition (Rindova, 1999). Under this perspective, these directors' industry knowledge and deep understanding of and their genuine interest in the business operations leads to their greater involvement in strategy. This deep understanding and involvement in strategy contributes positively to quality management. Subsequent residual analysis that revealed that financial and operational performance is not contingent on the fit between board composition and quality strategy could be pointing towards a selection/evolutionary explanation (Drazin and Van De Ven, 1984; Pennings, 1992).

This study contributes to the literature in several ways: First, by investigating this relationship, this study sheds light on the corporate governance issues pertaining to firms that pursue quality excellence. The importance of this lies in that research on organizational excellence in the corporate governance literature has been limited; at the same time the literature is dominated by studies that focus on distress cases (Daily et al., 2003). By investigating corporate governance issues in the context of quality excellence, this study contributes to bridging this gap in the literature and also responding to Porter's

[8] Thus effectively observing what happens during the quality management implementation phase; more details on this in the methodology section.

(1991) urge to investigate both ends of organizational performance continuum when conducting management research.

Second, by exploring the relationship between board composition and quality excellence, this study provides insights concerning quality management success from a *strategic* point of view and thus adds to the efforts of researchers in the quality management field to pursue organizational parameters that are related to the likelihood of achieving excellence. These efforts have become an important part of the quality management literature[9] due to the aforementioned positive relationship between quality excellence and firm performance.

The paper proceeds as follows: in section two I present the background and I develop the hypotheses, whereas in section three I present the methodology. I present the empirical results in section four, and I conclude in section five.

2. BACKGROUND, MOTIVATION, AND HYPOTHESES DEVELOPMENT

Board composition is related to organizational strategy - they shape each other; in fact, the composition of the board of directors is viewed a reflection of the organizational strategy (Pfeffer, 1972; 1973). This is because, typically, the board of directors is where strategy is plotted. The strategic role of the board has been discussed in the literature (Lorsch and Maclver, 1989; Stiles and Taylor, 1996; 2001; Steane and Christie, 2001; Useem, 2003; Bart, 2007). This has even been demonstrated by empirical research (see for example Hillman et al., 2000; Lehn et al., 2004; Markarian and Parbonetti, 2007; and Coles et al., 2008).

The importance of investigating the relationship between board composition and strategy for quality management strategy specifically lies in the importance of quality management itself. The positive and persistent relationship between quality and firm performance is well established in the literature[10]. The documented benefits of achieving

[9]See for example Hendricks and Singhal (2001a); Benson et al. (1991), Sitkin et al.(1994); Reed et al. (1996), Maani, 1989; Powell (1995).

[10] A series of studies has shown how quality award winning and quality certification announcements create positive abnormal returns for firms (Hendricks and Singhal, 1996; Nicolau and Sellers, 2002; Corbett et al., 2005). Moreover, financial performance improvement can be observed as soon as an effective QM programme is in place (Hendricks and Singhal, 2001a; Przasnyski and Tai, 2002). This relationship appears to persist in the long run, both for performance measured by accounting variables as well as stock returns (Hendricks and Singhal, 2001a; Easton and Jarrell, 1998; Corbett et al., 2005).

quality excellence have guided researchers' attention towards further exploring the determinants of success of quality management initiatives[11].

This is where the board of directors and its strategic role enter the picture: From a strategic point of view, there is a consensus in the literature that a critical factor for achieving quality excellence is the existence of a sound quality strategy (Saraph et al., 1989; Porter and Parker, 1993; Sandholm, 2005). Absence of a sound strategy has often led to the failure of quality management initiatives (Deming, 1986; Oakland, 1998; Dale and Cooper, 1994; Kanji, 1998; Soltani *et al.*, 2008). Given these results, the more insights we have into quality management success from a strategic point of view, the better able we are to manage quality for excellence; and given the aforementioned relationship of board composition and strategy, board composition is something that should be examined with respect to quality management.

Moreover, quality management programs are viewed as efficiency improvement initiatives that impose major reorganization and restructuring using the rhetoric of quality (Wruck and Jensen, 1994). Indeed, if one looks at the criteria used to grant quality excellence awards, such as for instance the prestigious Malcolm Baldrige National Quality Award it can be argued that those embark upon all the fundamental parts of managing an organization, namely, leadership, strategic planning, customer focus, measurement, analysis, and knowledge management, workforce focus, process management, and business results (see Appendix 1 for a short description of the criteria). Most of those aspects of running an organization have in turn being addressed – separately – by studies in the corporate governance field. For example, the board of directors or corporate governance has been discussed in the contexts of leadership (see for instance Heracleous, 1999); strategic planning (see Henke, 1986; Bongjin et al., 2009); customer focus (see Cantista and Tylecote, 2007); information systems (Lazarides et al., 2009); workforce (see Deakin et al., 2002; Konzelmann et al., 2006). Though it appears that the constituents of quality management have been discussed in association with the board of directors and corporate governance, extant literature linking quality management as a conscious, integrated strategic effort with the board of directors and corporate governance is limited.

One reason for this omission is that the corporate governance literature has been for a long time dominated by research on the worst side of the organizational performance

[11]See for example Hendricks and Singhal (2001b), Benson et al.(1991), Sitkin et al.(1994); Reed et al. (1996), Maani, 1989; Powell (1995).

continuum, namely business distress cases, while the corporate governance of business excellence has been largely ignored in the corporate governance literature (Daily et al., 2003). This is cited as the reason that the agency model is used more than any other theoretical framework in the corporate governance literature (Daily et al., 2003; Donaldson, 1998) because when an organization is in distress, the interests between principals and agents are likely to have more divergence, for this is a situation when agents can become more opportunistic [12]. One should be skeptical whether to use this same theoretical framework to address excellence instead of distress. Departure of the agency model when studying corporate governance and the utilization of a contingency approach instead, has been explicitly suggested (Muth and Donaldson, 1998), after theoretical arguments on the contextuality of the optimal corporate governance structure in general as well as the optimal board composition (see Albanese et al., 1997; Davis et al., 1997a; b; Lan and Heracleous, 2010).

Indeed, by acknowledging contextuality of corporate governance mechanisms, a stream of empirical studies has revealed a spectrum of roles that directors are called to play and needed to be addressed besides their assumed monitoring and control roles assigned to them by the agency theory (Johnson et al., 1996). This research provides a background and a theoretical framework within which to investigate the relationship between corporate governance and business excellence in this study.

Specifically, Hillman et al. (2000) by departing from the widely used, agency theory based, manichaeistic inside/outside categorization of directors and using a taxonomy of directors based on the resources that each director can bring to the firm show that board composition changes to reflect the needs of a sample of US airline firms going under deregulation. They conclude that directors act out a resource dependence role by providing the firm with valuable linkages, knowledge, and information through their individual expertise and attributes appropriate for each firm's business situation (Hillman et al., 2000). Furthermore, according to Coles et al. (2008) and Lehn et al. (2004) the board is shaped according to the complexity of the firm's operations. More specifically, according to Lehn et al. (2004) the size and composition of boards are determined by tradeoffs between valuable information brought to boards by additional directors versus coordination and free-rider costs. Boone et al. (2007) find that board composition varies with

[12] In support of this, Charitou et al. (2007) detect earnings management prior to bankruptcy for firms with insufficient monitoring. To protect the shareholders' interests in such cases, more monitoring and control is needed, thus suggested corporate governance mechanisms tend to be agency based (Muth and Donaldson, 1998).

environmental as well as organizational variables. Addressing jointly directors' monitoring and advising roles, Linck et al. (2008) find that board composition across firms depends on the costs and benefits of the monitoring versus the advising roles of the board. Finally, Markarian and Parbonetti (2007) also find that the composition of the board with respect to directors' expertise changes according to the firm's complexity.

These studies collectively suggest that a universally optimal board composition does not exist. It is meaningless to speak of "good" or "bad" corporate governance structure without reference to a context. The effectiveness of the various alternative board structures is contextual and contingent on the organization's strategic needs. The possible contingent superiority of one governance structure over another could depend on its fit with the organization's strategy (Yin and Zajac, 2004). Moreover, these studies have shown that the board which was initially placed there to act as a "watchdog" has the ability to add value if the strategic needs of the firm are matched to an appropriate board composition with respect to the directors' characteristics and abilities.

Under the light of the abovementioned studies I utilize a contingency approach to explore this relation. The notion of "fit" is central to a contingency approach (Venkatraman, 1989; Donaldson, 2001). The proposition that a *fit* must exist between an organization's structure and process and its context is central to the structural contingency theory. While there are many ways to conceptualise fit (see Drazin and Van de Ven, 1985; Venkatraman, 1989; Ensign, 2001 for reviews and discussions), in this study I conceptualize fit as a theoretically defined matching between board composition (structure) and QM strategy (context), since "firms that have structures that more closely match the requirements of the context are more effective than those that do not" (Pfeiffer, 1982, p. 148). That is, I hypothesize that if the strategy *matches* board composition, this enhances the possibility of QM success. According to this conceptualization, fit is conceptualized as an alignment between two (or sometimes more) variables. Matching reflects a correspondence between two variables, and it can be said that a fit exists when conceptually similar dimensions are correspondingly high or low.

The operationalization of the matching for empirical investigation purposes depends on the requirements of the context - in this case the context is the quality management strategy, and the matching will depend on the needs of a firm that pursues such strategy. Strategic needs according to Hillman et al. (2000) will determine what types of directors would be more appropriate for fulfilling these needs. Thus, in order to operationalize the

"matching" in the context of a quality management strategy, the first step is to assess the *needs* of firms that pursue quality excellence. According to Wruck and Jensen (1994), implementing a QM strategy is a very information intensive task requiring inputs from all levels of organizational structure. In order to prevent QM failure is essential to collocate the "decision rights" pertaining to QM - which at the strategic level are owned by the board of directors - with the "specific knowledge" required for taking decisions for this strategy (Wruck and Jensen, 1994). That could mean to place directors (who from their position as directors have the right to take decisions) on the board of a QM firm who have the *ability* to take decisions pertaining to this strategy.

Director expertise, that is, knowledge and skills (Rindova, 1999) determines the ability to take informed decisions given a context. Extending this to a QM strategy context, we seek to find the knowledge and skills directors should possess to drive the organization to quality excellence. Quality management is an information intensive strategy - a firm that pursues quality excellence falls into Jensen and Meckling's (1976) definition of a "complex firm". Complex firms have increased *advising* requirements that need an appropriate board composition to accommodate them (Coles et al., 2008). These *advising requirements* will in turn be dictated by the very nature of a QM strategy and will determine the directors' *expertise* needed in order for directors to be capable to fulfill their advising role. That is, the "matching" under investigation here is the matching of a QM firms' *advising requirements* with directors' *expertise*. I motivate the hypotheses based on that.

According to Rindova (1999), *expertise* pertaining to boards falls into two categories: i) firm specific knowledge and skills, and ii) functional area knowledge and skills. Firm specific knowledge and skills refer to an "intimate" understanding of the firm's operations and internal management issues whereas functional area knowledge and skills refer both to the traditional domains of business (accounting, finance, marketing etc.), as well to domains specific to the firm's relationship with its environment (Rindova, 1999). With my hypotheses I examine both categories in a quality management context.

First, firm specific knowledge and skills are crucial for long-term ventures like quality management. One reason for that is that knowledge of the firm's day-to-day operations is necessary to assessing managerial competence and to evaluate the strategic desirability of initiatives regardless of their short-run performance outcome (Baysinger and Hoskisson, 1990). The importance of this for quality management emerges from the fact that more

often than not, short-term results of QM firms have to be sacrificed in favor of the strategy (Hendricks and Singhal, 1997). Firm specific knowledge is held by *inside* directors i.e. managers of the firm sitting on the board of directors; it has been argued that managers are the main sources of firm-specific information (Fama and Jensen, 1983). Insider directors do possess this type of knowledge, whereas outside directors do not (Baysinger and Hoskisson, 1990). Thus, because of their privilege to have access to inside information, inside directors are in a better position to perform an oversight function based on a system of strategic control, and evaluate top management on the basis of strategic control (Markarian and Parbonetti, 2007). Furthermore, the enhanced understanding of the firm's strategy that inside directors have makes them more emotionally attached to the strategy that outside directors are (Baysinger and Hoskisson, 1990; Chatterjee, 2009). For this reason, inside directors are possibly a valuable addition to a QM firm's board of directors.

But the above would not be the only reason that inside directors could enhance a firm's likelihood of achieving quality excellence. Furthermore, involving top management in quality management strategy decisions on the board level enhances top management's commitment – if they take part in the decision process, rather than having others' decisions imposed onto them, managers are more likely to follow the decisions. Top management commitment is a widely cited factor for quality management success (Soltani et al., 2008).

Another reason for including executives on the board of directors in a QM context is that the shifting of responsibility to management required by quality management calls for the analogous empowerment of the management (Soltani et al., 2008). That comes with the representation of managers as insider directors on the board (Muth and Donaldson, 1998).

However, empowering the management by increasing the representation of insider directors on the board has been highly criticized by scholars who ascribe to the agency theory school of thought and view the board as mainly a monitoring and controlling devise (see for example Weisbach, 1988; Byrd and Hickman, 1992; and Cotter et al., 1997). On the other hand, there is some evidence that boards dominated by outsiders can affect performance negatively (Agrawal and Knoeber, 1996; Bhagat and Black, 2002) and that insiders can even serve as good monitors, as they have access to superior information and a better understanding of the actions of the CEO (Boumosleh and Reeb, 2005). Again, the results are mixed; it seems that the impact of insiders could also be contextual; it is

possible that the direction and magnitude of the impact of insiders is contingent on the context and it should be examined as such.

The above discussion leads to the following hypothesis:

H1: The number of inside directors on the board is positively related to the likelihood of QM success.

The other category of director expertise I examine pertains to functional area knowledge and skills (Rindova, 1999). The most widely researched area of directors' expertise is financial expertise and its relationship with corporate financial decisions, financial performance, and the firm's access to funding (see for example Güner et al., 2008; Agrawal and Chadha, 2005; Defond et al., 2005). Several studies have also investigated other types of expertise in specific contexts; for example, Hillman et al. (2000) find that there is a greater likelihood of support specialists to be appointed as replacements on the board of US airline firms during regulation than during deregulation of the US airline industry experts such as lawyers bankers, insurance company representatives, and public relations experts; Markarian and Parbonetti (2007) find that internal complexity (defined as the complexity related to rapid technological change) is related to the presence of support specialists, i.e. specialists in the specific industrial sectors in which the firm operates. In this study, I identify the types of expertise relevant to quality management, namely i) expertise in the firm's main object of business operations, and ii) expertise in management and examine their relationship on the likelihood of attaining quality excellence. Below I present the rationale - based on the nature of quality management - for examining these specific types of expertise.

Why would directors with expertise in the firm's main object of business operations enhance the chances of a firm to attain quality excellence? Due to the customer-oriented nature of quality management programs (Mele and Colurcio, 2006), acquiring competitive advantage is crucial for firms that aim quality excellence. Capability building is according to the strategy literature one of the processes through which firms acquire competitive advantage and is especially important for firms that are complex, since for such firms intellectual capital and technological know-how are especially important for building a competitive advantage (Makadok, 2001; Markarian and Parbonetti, 2007). Capability building refers to the ability of a firm to internally build resources and competencies and requires from the board the capability to provide specific knowledge in creating a competitive advantage. (Makadok, 2001; Markarian and Parbonetti, 2007). According to

Markarian and Parbonetti (2007), capability building can be partly achieved through including "support specialists" on the board such as specialists in the specific industrial sectors in which the firm operates, who are in a position to advise management, assist acquire resources, and incorporate knowledge and provide companies with expertise and knowledge that support strategy formulation. Directors who are experts at the object of business operations[13] form a special type of "support specialists". These directors are considered to be industry experts, who can provide useful insights and know-how pertaining to the firm's products and services, and the industry in which the firm operates. Moreover, such directors have a genuine interest in and deep understanding of the firm's main object of business operations. This would make them more involved in the decision making process (Rindova, 1999). This involvement, combined with their ability to take informed decisions due to their expertise, makes these directors a valuable addition to the board of directors of a firm that pursues quality excellence.

Based on the discussion above, my next hypothesis is:

H2: The number of experts in the main object of business operations on the board is positively related to the likelihood of QM success.

The other type of context-specific expertise that is relevant to a quality management context is expertise in the field of management. Quality management is a systematic management process that requires expert consulting on management issues - as mentioned earlier, quality management programs can be viewed as efficiency improvement initiatives that impose major reorganization and restructuring using the rhetoric of quality (Wruck and Jensen, 1994)[14]. Reorganization and restructuring efforts benefit from directors that are experts in management issues Markarian and Parbonetti, 2007). Furthermore, such experts can provide alternative viewpoints about internal and external issues, and they posses expertise related to the markets and the competitive environment (Hillman et al., 2000; Markarian and Parbonetti, 2007). Moreover, directors who have management expertise are experts in systematic decision-making and problem solving (Hillman et al., 2000).

[13] Such as for example doctors or Ph.D.s in Pharmacology sitting on the board of a pharmaceutical firm, or Ph.D.s in Computer Science or Information Science sitting on the board of an information technology firm

[14] Of course, including experts in management on the board of directors is not the only way to bring expertise in quality management to the organization; to compensate for possible lack of expertise of the management in the specifics of quality management, external consultants may be appointed; management then is constrained to the role of resource provider via the budget process and results assessment (Sullivan, 1988; Franz and Foster, 1992). The use of expert systems specifically designed for quality management has also been discussed as an alternative to appointing human experts (Franz and Foster, 1992; Nwankwo, Obidigbo, and Ekwulugo, 2002).

Furthermore, the presence of directors with a deep academic knowledge and interest in management could as well ignite a QM strategy initiative. Thus, I hypothesize that:

H3: The number of management experts on the board is positively related to the likelihood of QM success.

3. METHODOLOGY

As already mentioned, in this study I conceptualize fit as "matching". One way to test the existence of fit under this conceptualization is to initially assess as a congruent relationship, without any reference to a criterion variable (i.e. performance). Subsequently one could examine the effect of fit on a set of criterion variables (Venkatraman, 1989). Following this methodology, at a first stage I assess the congruent relationship between quality management and board composition using a conditional (matched-pairs) logistic approach. At a second stage, I assess the contingency of firm performance on the successfulness of the matching. I do this by using residual analysis. In this section, I describe the methodology in detail: I discuss the sample and matched sample definition and selection, I present the empirical models, and finally, I describe the data collection process.

3.1. Sample Selection

To proxy the implementation of effective quality practices I use the winning of the Malcolm Baldrige National Quality award given annually by the National Institute of Standards and Technology (NIST) and also State quality awards that are explicitly based on the Baldrige award criteria. Several previous studies have used the winning of quality awards to proxy effective quality practices (Hendricks and Singhal, 1997; 1998; and 2001b)[15],[16].

[15] See Hendricks and Singhal (2001b) and York and Miree (2004) for a discussion on the superiority of Malcolm Baldrige based quality awards as a proxy for quality management success. Other studies have used ISO 9000 certification as a proxy for effective quality management implementation (Terziovski, Power, and Sohal, 2003; Corbett et al., 2005; Nicolau and Sellers, 2002).

[16] Here one must acknowledge the possible existence of "self-selection bias"; it is possible that there are some firm characteristics that *lead a firm to the decision to pursue a quality management strategy*, and eventually, these characteristics will end up in the results posing as if they are the characteristics that lead to successful quality management implementation. Furthermore, organizations that pursue a quality management strategy but fail are not likely to apply for a quality award (which is the proxy used in this study for successful quality management implementation. The fact that it is not possible to obtain the names of the organizations that have attempted to pursue a quality management strategy but have failed at it; there are no lists that include all the firms that applied for an award, all we can have access to is the list of firms that complicates things even further.

The initial sample consisted of 2714 award receiving units (divisions or whole firms)[17]. These were gathered from the lists provided by each State's quality council. From these I selected the awarded units that belong to publicly traded companies and from these in order to ensure data continuity I chose the ones that had not changed hands and or turned from private to public or vice versa during the time period of interest. The final sample consists of 63 publicly traded firms that won a quality award for the first time during 1996-2006 (Table 1).

3.2. Matching Sample

For each award-winning firm, I obtain a control firm with the primary concern to make sure that the control firm has never won quality or excellence awards of any kind. Initially, it was possible to match only 61 of the sample firms were to 61 control firms with the same two-digit SIC code and of similar size as measured by the book value of assets at the fiscal year-end before the winning of the quality award, with the constraint that the ratio of the book value of assets of the control and award winning firm is always less than a factor of three[18]. The two companies that were not matched were large firms, and it was their size that made matching harder. Eventually, I was able to match those two firms after allowing a single-digit SIC code matching, and all of The 63 sample firms were eventually matched. Matching on single-digit SIC is appropriate for large firms since they tend to be more diversified (Hendricks and Singhal, 1997).

3.3. Empirical model and data collection

In this section, I present the empirical model, and describe the main variables of interest as well as the control variables. Quality award-winning data were hand-collected as described in the previous subsections (sample and matching sample selection); board characteristics, director characteristics and corporate governance data were hand-collected from proxy statements (form def 14A) from the Web site of the Security and Exchange Commission (SEC); and finally, financial and accounting data were downloaded from the Compustat database.

[17] In most cases the award receiver is only a fraction of the organization (e.g. a division or a particular geographical site of an organization) and not the whole organization. The analysis conducted is for the whole organization since corporate governance and financial data are reported firm-wide; still, this should create no problem in as it would only make the tests more conservative in the sense that the effects of the award must be strong in order to be detected in a sample with many multi-site firms with only one awarded site (Hendricks and Singhal, 2001).

[18] When I attempted to use even a slightly lower factor (i.e. stricter matching) this left us with more than 50% of the sample firms unmatched.

As a first stage, I assess a congruent relationship between the likelihood to win a quality award and several board and firm characteristics. The dependent variable is a dichotomous variable that indicates whether a firm has won a quality award or not. Because it is a binary variable, I employ a logistic regression model; moreover, because by construction the sample is not random – but it is *matched* - a conditional logistic regression model is utilized (Hosmer and Lemeshow, 2000). The empirical model is shown in Table 4.

The main variables of interest are the variables representing the number of insider directors, the number of experts on the main object of business operations, and the number of experts in management.

The number of inside directors is the number of directors that are also employees of the company. Because the inclusion of insiders on the board has been a controversial issue (see Jensen, 1993; Beasley, 1996; and Cotter et al., 1997) and research findings show that the inclusion of insiders on the board once independence has been achieved can be beneficial (Boumosleh and Reeb, 2005), I examine the role of insiders after controlling for board independence. That is, I multiply the number of inside directors with a dummy variable indicating whether the fraction of independent directors[19] is higher than 50% or not.

The number of experts on the main object of the firm's business operations is the number of directors that hold a Ph.D. in a field related with the main operations of the firm. Correspondingly, the number of experts in management is the number of directors that hold a Ph.D. in a management related field. This information about each director can be found in the curriculum vitae of each director in the proxy statement document of each firm.

In addition to the main variables of interest I also control for factors that according to the literature affect the success of QM implementation. One of the factors that might be affecting the likelihood of winning a quality award is firm size[20]: smaller firms may be

[19] Independent directors are directors that are not employees of the company and not affiliate directors; affiliated directors are directors that are not employees of the company but have but are former employees, relatives of the CEO, or have significant transactions and/or business relationships with the firm (as defined by Items 404(a) and (b) of Regulation S-X). Directors on interlocking boards (situations in which an inside director serves on a non-inside director's board, as defined by Item 402(j)(3)(ii)) are also defined as affiliates.

[20] As already stated, I have already matched firms based on size (total assets). However, because in order to be able to match all the firms I use a factor of three to match them – rather than a smaller factor –further taking into consideration size by including it in the regressions as a control variable was deemed necessary.

discouraged from embarking on a QM program because of the high upfront costs (Hendricks and Singhal, 2001b). I proxy firm size with total assets (ln). Additionally, I control for performance (natural logarithm of sales and ROE) since some studies (see for example York and Miree, 2004) argue that better performing firms are more likely to win a quality award. Another factor affecting quality management is the degree of firm diversification – it is easier for more focused firms to transfer QM implementation approaches across their uniform business units (Hendricks and Singhal, 2001b). This is measured by the Herfindahl index, which is defined as the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sales. The value of this index ranges from zero to one; a low value indicates a more diverse firm while a high value indicates a more focused firm. One more factor I control for is the degree of the firm's capital intensity – on one hand, the high degree of automation in higher capital-intensive firms may already enable these firms to have a high degree of inherent process control, but on the other hand, an important component of QM is the implementation of work practices and employees are the driving force for improvements that lead to quality management success, so this is expected to be the case in lower capital intensive firms (Hendricks and Singhal, 2001b). Capital intensity is the ratio of net property, plant and equipment to the number of employees.

Furthermore, I control for board size (natural logarithm of the total number of directors) since according to the comparisons between award winners and non-winners (see table 2), award winning firms are rather bigger in size and have larger boards of directors.

3.4. Assessing the impact of the fit between quality management success and board composition

Though evidence of a *congruent* relationship between board composition and the likelihood of award winning can be seen as adequate evidence of fit (Venkatraman, 1989), demonstrating a *contingent* relationship between the fit that would further support the argument for the existence of a fit between the two. To this end, after I assess the congruence between quality management and board composition I subsequently assess the impact of the "fit" between the two on firm performance.

Technically, I do that by assessing the impact of "*misfit*", i.e. the opposite off fit. "Misfit" is measured in this study by the absolute value of the *residuals* of the conditional regression of quality management success on the board composition and control variables.

Residuals in logistic regression are the differences between the observed and the predicted probability of the outcome. I use the Pearson residual (Hosmer and Lemeshow, 2000) defined as:

$$r = \sqrt{\frac{(1-\hat{\pi})}{\hat{\pi}}}$$

I expect that if the fit between quality management and board composition affects business performance positively, then the degree of (absolute) misfit would have a negative impact on performance. Thus, as a next step in the analysis, several measures of performance are regressed on the quality management-corporate governance fit (univariate regression). This methodology has been used in contingency studies to assess the impact of fit on performance (see for example Duncan and Moores, 1989; Gerdin, 2005); it has been called "Residual Analysis" by Dewar and Werbel (1979) who first introduced this methodology for assessing fit. Note that although a presence of statistical significance would enhance the argument of a fit between quality management success and corporate board composition, its absence does not necessarily imply the lack of fit.

3.5. Performance measures

I use several measures of performance to test the hypotheses including profitability, revenue, cost and financial measures of performance. These are described in this subsection in detail.

Quality may affect *profitability* through increased customer satisfaction and increased organizational efficiency, both of which lead to increased *revenues*; on the other hand quality may have an adverse effect on profitability because of implementation *costs*. Hendricks and Singhal (1997) find that quality award winning firms improve their operating income and also their operating income to assets (return on assets), to sales and to employees from year -1 from winning a quality award onwards, and that even before year -1 though profitability does not worsen due to implementation costs. Following Hendricks and Singhal (1997), as the primary profitability measure I use operating income before depreciation, to capture the economic value (cash flows). This measure has the benefit of being unaffected by the method of depreciation, capital structure or the gains or losses from the sales of assets. To control – at least to some extend - for acquisitions and divestitures, I also consider alternative income-based measures such as annual operating income divided by year-end assets (return on assets), and by annual sales (operating margin). The revenue measures are net sales, asset turnover (annual sales divided by year-

end assets, and sales per employee (annual sales divided by year-end number of employees). The cost measure is cost per dollar of sales (sum of annual cost of goods sold and selling, general and administrative expenses divided by annual sales). This also serves as an efficiency measure. In addition, I investigate the impact of the fit on capital expenditure and on the number of employees.

I also assess the impact of fit on several Fortune and Norton and Kaplan measures (see York and Miree, 2004) such as *profits* (net profit margin multiplied by 100), total assets, earnings per share, and return on equity. In addition, I use tobin's q and market-to-book.

4. EMPIRICAL RESULTS

4.1. Univariate analysis

First, paired tests for differences in means and medians (Table 2) indicate that the two samples (the quality award winners sample and its matching sample of non-awarded firms) differ with respect to a number of characteristics three years before they win a quality award; award winners have larger boards and a larger number of directors that are experts in the main object of operations of the firm. These differences between the two groups are consistent with my expectations: quality management firms are complex firms (Wruck and Jensen, 1994) and as such they have larger boards of directors with experts (Coles et al., 2008). In addition, although the two samples are matched for size, award-winning firms are larger (in terms of total assets) than their non-award winner counterparts. This reflects the difficulty in matching the sample to a matching sample, and this is the reason I decided to further control for firm size in the subsequent statistical analysis. Also, operating income, as well as net sales appears to be higher for awarded firms consistent with previous research (Hendricks and Singhal, 1997).

4.2. Correlations

Pairwise Pearson and Spearman correlations between several corporate governance variables, control variables and performance variables are presented in Table 3. Winning a quality award is – as expected - positively correlated with the number of directors that are experts in the main object of the firm's business operations. Notably, the number of directors who are experts in the main object of the firm's business operations is positively correlated with the number of management experts. By sample design there is no overlap between those two groups of experts, so this indicates that firms that include management

experts on their boards, also include directors that are experts in the main object of business operations. The number of inside directors is positively correlated with board size and (by definition) negatively correlated with board independence, as well as with capital intensity. Firm size (total assets) is positively correlated with board size, as well as with board independence. It is also positively correlated with capital intensity, and this was expected because of the definition of capital intensity (i.e. the ratio of net property, plant and equipment to the number of employees. Looking at non-parametric correlations (Spearman), I observe that the results are similar, but notably, board size is positively correlated with winning a quality award.

Looking at the Pearson correlations between board characteristics and firm performance measures, we see that the number of inside directors is only negatively related to performance measures namely ROA, operating margin, sales per employee, and ROE. This is consistent with previous research on the negative relationship between inside directors and firm performance in general (see for example Jensen, 1993; Beasley, 1996; and Cotter et al., 1997). The number of experts in the main object of the firm's business operations is negatively related to operating margin. Board size is positively correlated to operating income and net sales, while it is negatively correlated to the cost per dollar of sales. Firm size (total assets) is positively related to operating income, operating margin, net sales, sales per employee, and earnings per share, while it is negatively related to assets turnover and to the cost per dollar of sales. Board independence is positively correlated with ROA, net sales, and ROE. Firm diversification is positively related to ROA, net sales and asset turnover while it is negatively related to operating margin. Capital intensity is positively related to operating income before depreciation, operating margin and sales per employee, while it is negatively correlated with asset turnover.

Non-parametric Spearman correlations between board characteristics and firm performance measures reveal that: winning a quality award is positively correlated with sales per employee; board size is positively correlated with operating income, net sales, earnings per share, and ROE, while it is negatively correlated with Tobin's q; firm size (total assets) is positively correlated with operating income, operating margin, net sales, sales per employee, and earnings per share, whereas it is negatively correlated with asset turnover, cost per dollar of sales, and Tobin's q; board independence is positively correlated with operating income, net sales, earnings per share, and ROE; firm diversification is positively correlated with operating income, net sales, asset turnover, and earnings per share; and finally, capital intensity is positively correlated with operating

income, operating margin, and sales per employee, but negatively correlated with ROA, asset turnover, and cost per dollar of sales.

4.3. Multivariate analysis

In this subsection we examine whether there is a relationship between the likelihood of winning a quality award and board composition exists after we control for other firm characteristics that according to past literature affect the likelihood of obtaining such an award. Since by design we use matched pairs (and not random) sample we use conditional logistic regression models to test our hypotheses. Conditional logistic regression results are shown in Table 4. Five models are presented. The dependent (dichotomous) variable equals one for firms that have won a quality award and zero for the control firms for all models.

Model one presents the relationship between the dichotomous variable and control variables. The control variables are: firm size (natural logarithm of total assets), performance (natural logarithm of sales and ROE), firm diversification (Herfindahl index, i.e. the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sale - a low value indicates a more diverse firm while a high value indicates a more focused firm), the degree of the firm's capital (the ratio of net property, plant and equipment to the number of employees), and finally, board size (natural logarithm of the total number of directors). The variable representing firm size (the natural logarithm of total assets) appears to be statistically significant at the 0.05 level and positively related with the likelihood of winning a quality award. This result is consistent to our expectations, since larger firms would be in a better position to implement a quality management strategy because of the costs involved (Hendricks and Singhal, 2001b). Board size is also statistically significant (at the 0.1 level) and positively associated with the likelihood of winning a quality award. This result is also consistent with our expectations; research shows that complex firms may have larger boards to be in a better position to handle complexity (Coles et al., 2008).

Each one of models two through four examine separately each one of the main variables of interest, namely, the number of insiders in model two, the number of experts in the main objects of business operations in model three, and the number of experts in management in model four. Firm size is statistically significant at the 0.05 level with a positive coefficient in all models. One of the main variables of interest, namely the variable representing the number of inside directors (models two and five) is not statistically

significant, thus hypothesis 1 that the number of insider directors sitting on the board is positively related to the likelihood of winning a quality award is rejected. This could be because despite the emphasis of the quality management literature for encouraging top management commitment, it is in practice ignored (Soltani et al., 2008). The number of experts in the main objects of business operations – another variable of interest pertaining to hypothesis 2 is statistically significant (in models three and five), which is positively associated with the likelihood of winning a quality award. Thus hypothesis 2 that the number of experts in the main object of business operations is positively related to the likelihood of winning a quality award is not rejected. This result is consistent with research that finds that complex firms include expert directors on their boards (Markarian and Parbonetti, 2007; Coles et al., 2008). The third variable of interest, namely the number of management experts is not statistically significant, denoting that hypothesis 3 that the number of experts in management is positively associated to winning a quality award is not supported.

Model five includes all the variables of interest together, along with the control variables. The variables representing firm size and the number of experts in the main objects of business operations are statistically significant at the 0.05 and at the 0.1 levels of significance respectively, and they are both positively associated with the likelihood of winning a quality award. The pseudo-R-square of the model is increased when the variable of interest representing the number of experts in the main objects of business operations is present in the models (models 3 and 5). Specifically, while the pseudo-R-square of model one is 0.164, the pseudo-R-square of model three is 0.214 and that of model five is 0.226.

The results show that there is a non-linear positive relationship between the likelihood of winning a quality award and several firm and board characteristics, namely, the number of directors that are experts in the main object of operation, firm size, and board size.

The impact of the fit between quality management and board composition is assessed using univariate regressions of performance on the residuals from the previous regressions for the 63 award winners of the sample. From the results shown in Table 5 one can observe that the fit between quality management and board composition does not have any effect on any of the business measures between year -3 and the award year, since the coefficient of “misfit” from the regressions between “misfit” and several performance measures is

never statistically significant. However, this lack of significance does not necessarily mean a lack of fit between quality management and board composition – it could be pointing out to a selection/evolutionary perspective (Dewar and Werbel, 1979).

4.4. Robustness tests

Additional models with inside directors, of management experts, and of directors that are experts in the main object of business operations expressed as a percentage of the board size - instead of number (Table 6, Panel A), revealed that the variable representing firm size is statistically significant at the 0.1 level of significance in models 1, 2, and 4 and at the 0.05 level of significance in model 3; the variable representing board size is statistically significant at the 0.1 level of significance, and the variable representing percentage of experts in the main objects of business operations is statistically significant at the 0.1 level of significance and they are all positively related to the likelihood of winning a quality award.

In another set of models (Table 6, Panel B) dummies for the presence of directors with expertise in the main object of business operations, and directors with expertise in management are used instead of numbers or percentages. Results demonstrate that the variable representing firm size is statistically significant and positively associated with the likelihood of winning a quality award. Furthermore, the variable representing the size of the board of directors appears to be statistically significant and positive in some of the models (2 and 3). Neither of the dummies representing the presence of experts in the main object of business operations (in models 1 and 3) or the presence of experts in management (models 2 and 3) was statistically significant.

While the results in Panel A of Table 6, in association with the results in Table 4, show that the number and percentage of experts are positively associated with the likelihood of winning a quality award, results in Panel B of Table 6, show that the mere presence of experts is not enough, it seems that there is power in numbers and percentages.

Furthermore, in another model (Table 6, Panel C) I distinguished between insider and outsider experts. The adjusted-r-square of the model had increased to 0.238 from 0.226 of model five in Table 1, and furthermore, the coefficient of the variable representing the number of experts in the firm's business operations that are *outside* directors is positive and statistically significant (0.1 level). The corresponding coefficient for inside directors that are experts in the firm's business operations is not statistically significant. Notably, the size of the board is not statistically significant in this model. This result is consistent with prior research that finds that complex firms have large boards to include outside experts (Coles et al., 2008).

5. CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

In this study I examined the relationship between board composition and quality management success. Specifically, I examined the relationship between the likelihood of attaining quality excellence and the number of the members of the board of directors that are i) inside directors, ii) directors - experts on the main object of business operations, and iii) directors with management expertise.

Using a sample of 63 firms that won a Malcolm Baldrige or a Malcolm Baldrige based Quality Award for the first time between 1996-2006 and 63 matched firms of the same industries and similar size consisting of non-award winners, and after controlling for specific firm characteristics, I show that there is a congruent relationship between board composition and quality management success. Specifically, I demonstrate that the number of the members of the board of directors that are experts at the main object of business operations is positively associated with the likelihood of quality management success.

This result is consistent with research that shows that complex firms are likely to include more experts on their boards as these directors enhance the firm's ability to handle complexity (Markarian and Parbonetti, 2007; Coles et al., 2008). In a quality management context this kind of expertise appears to be valuable at the board level. These directors as "support specialists" contribute to capability building by supplying companies with expertise and knowledge pertaining to the industrial sectors in which the company operates, as well as with technical know-how, thus providing support to strategy formulation. This in turn assists companies to acquire competitive advantage (Markarian and Parbonetti, 2007). This is important for a customer-oriented strategy such as a quality management strategy (Mele and Colurcio, 2006). Furthermore, because of their expertise these directors have a deep understanding and genuine interest in the main object of business operations (they have a Ph.D. related to the firm's main object of business operations). Rindova (1999) proposes that the greater the strategic problem-solving expertise of directors the more likely it is to participate in strategic decision-making. Thus, the deep understanding of the business operations that emanates from these directors' expertise, along with their genuine interest in it would lead to their greater involvement in strategy. Along with their ability to really contribute to decision-making this enhances the effectiveness of decision-making pertaining to the quality management strategy.

Inside directors on the other hand do not seem to be associated with the likelihood of quality management success. In fact, there is not even a statistically significant difference between quality award winners and the matching sample with respect to inside directors. In spite of the emphasis given by the quality management literature on the empowerment and commitment of management (Soltani et al., 2008) quality management firms of the sample do not seem to include more inside directors on their boards. This confirms what Soltani et al. (2008) discuss: despite the fact that in the quality management literature top management involvement and commitment in quality management strategy is encouraged, in practice this aspect is overlooked. At least I cannot say that it is encouraged in the way hypothesized in this study by including more inside directors on the board.

The number of the board of directors that are experts in management issues does not appear to be associated with the likelihood of quality management success. In fact, there is not even a difference with respect to the number of such experts between the two subsamples. The reason could be that the firms may be appointing external consultants (Sullivan, 1988; Franz and Foster, 1992) or on expert systems specifically designed for quality management (Franz and Foster, 1992; Nwankwo, Obidigbo, and Ekwulugo, 2002).

Alternative model specifications revealed that the percentage of experts in the main object of business operations is also statistically significant. The dummy representing the presence or not of such experts on the board in a different model, however, was not statistically significant.

In the final univariate regressions to assess the impact of "misfit" on several operational and financial measures none of the coefficients is statistically significant. Although a presence of statistical significance would enhance the argument of a fit between quality management success and corporate board composition, its absence does not necessarily imply the lack of fit (Venkatraman, 1989). There are two explanations for that – one econometric in nature and the other theoretical - which I discuss below.

One explanation – econometric in nature - according to Dewar and Werbel (1979) who introduced the use of residual analysis for assessing fit, is that this method only operationalizes a linear notion of fit; if the fit is not linear then it cannot be detected using this methodology. The authors also admit that this test of fit is conservative and as such could underestimate contingency effects (Dewar and Werbel, 1979). Presence of specification error in the model due to the omission not of other determinants of quality

management success but of other determinants that have consonances with quality management that theoretically may affect performance could weaken contingency effects (Dewar and Werbel, 1979). Though in the base model (the conditional logistic regression model) I account for variables that according to Hendricks and Singhal (2001b) moderate the relationship between quality management success and firm performance, I do not exclude the possibility that more such variables exist, thus introducing this type of specification error in the contingency model.

Another explanation for the lack of significance when using the residual approach comes from a selection/evolutionary perspective (Dewar and Werbel, 1979). In the light of this, the sample QM firms have successfully evolved to a point at which their ability to survive a QM strategy is due to an equilibrium between board composition and the strategy they undertake. That is, the firms that embarked on a quality management strategy had shaped their boards (they had evolved) through time in such a way as to accommodate the strategy and be in a position to survive such a strategy. Though this adaptation was necessary for achieving quality excellence, the changes are not expected to further relate to any other measures of performance. It would be interesting if further studies investigated the evolution of the boards of firms that pursue excellence perhaps using a time-series methodology.

The study has revealed board structure characteristics that differentiate quality award winning firms from their matching counterparts thus expanding our knowledge on QM success from a strategic point of view. The findings have direct implications for practice, as they suggest that the presence of experts at the main object of business operations increases the likelihood of earning a Malcolm Baldrige quality award. Moreover, it confirms the notion that board composition is contextual and paves the path for further investigating issues pertaining the relationship of the board of directors - and corporate governance in general - with quality excellence.

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Table 1: The quality award receivers sample

This table presents details of the process utilized to collect the sample of the public firms that won a Malcolm Baldrige award or a state quality award explicitly based on the Malcolm Baldrige Award for the first time between the years 1996-2006, as well as information on the distribution of the awarded firms with respect to the year they received the award, and with respect to the industry in which they belong.

Panel A: The selection process

The panel below presents a summary of the sample selection process. The database consists of 2714 of award receiving divisions/firms, paired with award-providing organizations and the time the award receiving organization was given an award. Thus, for example, a firm winning an award from two different award-givers or at two different times has two records. Because of data availability reasons, this study focuses on publicly traded firms, so I was interested to match each division with its parent company. Each award receiver was looked up in the databases of Hoover's Online and Edgar Online (SEC Web site) in order to specify the corresponding parent organization at the time that the division was awarded, and to specify whether the parent organization is private, public, government owned or non-profit. I found that 634 out of the 2714 awards had gone to business divisions that actually belonged to 258 publicly traded firms. The remaining divisions belonged to either private, or not-for-profit, government or military organizations. For a few instances nothing could be found about a division, perhaps because those firms were too small or they may have been acquired by other firms or gone out of business. Having selected the awarded units that belong to publicly traded companies, I next researched the history of each awarded unit to verify that a) it had not changed hands, and b) it had not turned from private to public or vice versa during the time period of interest. This was done in order to ensure data continuity. There are 134 unique American publicly traded firms listed on NYSE, NASDAQ and AMEX that received a quality award during 1996-2006 (maybe for first time, maybe for 2nd or 3rd and so on). From these, I selected 78 firms that had won their first quality award during 1996-2006. It was verified through the firm's history that these firms had not won any quality awards through any of their other divisions, ever before. From these 78 firms, 15 were eliminated from the sample due to lack of data (6 firms had not sufficient financial data, while 9 firms did not have proxy data available for the time period of interest). Thus, the final sample consists of 63 publicly traded firms that won a quality award for the first time during 1996-2006.

Awards received (by divisions or organizations)	2714 awards
Awards received by publicly traded firms	634 awards
Number of publicly traded firms that won those 634 awards	258 firms
Unique publicly traded listed firms that received a quality award during 1996-2006	134 firms
Firms that won their first award in 1996-2006	78 firms
Eliminated due to lack of sufficient financial data such as performance data	6 firms
Eliminated due to lack of proxy data	9 firms
Remaining usable quality award receivers	63 firms

(Table 1 continued next page)

(continued) Table 1

Panel B: Time distribution of awards

This panel presents the distribution of the 63 firms in our sample that won a Malcolm Baldrige award or a state quality award explicitly based on the Malcolm Baldrige Award for the first time between the years 1996-2006, with respect to the year they received the award.

Year	Number of Firms Awarded for the First Time	Percentage
1996	3	4.76%
1997	5	7.94%
1998	12	19.05%
1999	5	7.94%
2000	6	9.52%
2001	8	12.70%
2002	5	7.94%
2003	6	9.52%
2004	10	15.87%
2005	2	3.17%
2006	1	1.59%
Total	63	100%

Panel B: Distribution of awarded firms by industry

This panel presents the distribution of the 63 firms in our sample that won a Malcolm Baldrige award or a state quality award explicitly based on the Malcolm Baldrige Award for the first time between the years 1996-2006, with respect to the industry in which they belong.

Industry	Number of Firms	Percentage
Manufacturing	34	53.97%
Transportation, Communications, Electric, Gas, And Sanitary Services	6	9.52%
Wholesale Trade	1	1.59%
Retail Trade	3	4.76%
Finance, Insurance, And Real Estate	7	11.11%
Services	12	19.05%
Total	63	100%

Table 2: Univariate comparison of corporate governance and control characteristics for 63 quality award winning firms and matched control firms (paired Student's t-tests for means and Wilcoxon signed-rank test for medians)

Board size is the total number of directors sitting on the board; board independence is a dummy variable taking the value of 1 when the fraction of independent directors is greater than 50%; numberof inside directors is the number of directors that are also employees of the company; number of outside directors is the number of directors that are not employees of the company; number of affiliated directors is the number of directors that are not employees of the company but have but are former employees, relatives of the CEO, or have significant transactions and/or business relationships with the firm (as defined by Items 404(a) and (b) of Regulation S-X). Directors on interlocking boards (situations in which an inside director serves on a non-inside director's board, as defined by Item 402(j)(3)(ii)) are also defined as affiliates. Number of independent directors is the number of directors that are neither insider nor affiliated; number of directors that have management expertise refers to directors that hold a Ph.D. in management. Number of experts at the main object of firm's business refers to directors that hold a Ph.D. in the area of the main operations of the firm. Capital intensity is the ratio of net property, plant and equipment to the number of employees; firm diversification is the Herfindahl Index which is defined as the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sales; total assets is the firm's total assets at the end of the fiscal year. The value of this index ranges from 0 to 1; a low value indicates a more diversity firm while a high value indicates a more focused firm.

	Comparison of Means					Comparison of Medians								
	Awarded	Not Awarded	Difference	t		Awarded	Not Awarded	Difference	z		Awarded		Not Awarded	
											Min	Max	Min	Max
Board characteristics														
Board size	10.73	9.873	0.857	2.206	**	11	9	2	2.465	**	5	26	4	21
Board independence (dummy)	0.667	0.54	0.127	1.382		1	1	0	1.372		0	1	0	1
Inside directors (num.)	2.333	2.19	0.143	0.554		2	2	0	0.239		1	7	1	8
Directors with management expertise (num.)	0.254	0.206	0.048	0.597		0	0	0	0.305		0	2	0	1
Directors with expertise on the business operations (num.)	0.841	0.413	0.429	2.634	**	0	0	0	2.108	**	0	5	0	3
Firm characteristics														
Capital intensity	95.206	98.537	-3.332	-0.178		42.848	42.574	0.274	0.345		0.149	931.135	2.328	865.186
Degree of diversification	0.443	0.454	-0.01	-0.292		0.333	0.333	0	-0.417		0	1	0.001	1
Total assets	12179.78	9679.594	2500.186	2.064	**	2525.082	1908.519	616.563	2.999	***	103.997	307569	59.531	242506
Firm performance														
Operating income before depreciation	870.705	670.109	200.596	1.53		346.655	208.655	138	2.465	***	-28.265	11788	-6.81	6200
ROA	0.048	0.042	0.006	0.355		0.047	0.051	-0.004	1.047		-0.627	0.354	-0.497	0.223
Operating margin	13.378	18.023	-4.646	-1.411		15.508	16.101	-0.593	-0.185		-135.642	41.544	-15.562	76.636
Net sales	4621.202	3731.705	889.497	1.477		2504.758	1279.993	1224.765	1.684	*	20.838	28375	43.76	22959.12
Asset turnover	1.059	1.065	-0.006	-0.051		0.969	0.988	-0.019	0.233		0.042	3.983	0.065	4.877
Sales per employee	233.303	261.564	-28.261	-0.988		188.2	181.426	6.773	0.004		5.094	845.32	56.85	1762.761
Cost per dollar of sales	0.851	0.848	0.004	0.131		0.849	0.868	-0.019	-1.039		0.585	1.748	0.513	1.156
EPS	1.452	1.608	-0.155	-1.006		1.66	1.38	0.28	-0.849		-6.02	7.01	-4.15	6.68
ROE	0.064	0.084	-0.02	-0.319		0.126	0.126	0	0.034		-3.064	0.484	-1.86	0.431
ROA	4.752	4.176	0.576	0.339		4.723	5.114	-0.391	1.027		-62.654	35.383	-49.739	22.332
Market to book	2.6	3.152	-0.552	-0.706		2.127	1.807	0.32	0.725		0.504	6.411	-1.252	16.031
Tobin's q	1.776	2.271	-0.495	-0.92		1.273	1.401	-0.128	0.607		0.697	5.563	0.966	13.934

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Table 3: Correlations: Pearson (below the diagonal) and Spearman (above the diagonal) correlations

This table presents pairwise Pearson (parametric) and Spearman (non-parametric) correlations among several firm and board characteristics as well as between firm and board characteristics and several measurements of performance. The "Quality award" dummy refers to whether the firm has been awarded with a quality award (1) or not (0). Board size is the total number of directors sitting on the board; Board Independence is a dummy variable taking the value of 1 when the fraction of independent directors is greater than 50%; Number of directors that have management expertise refers to directors that hold a Ph.D. in management. Number of Directors with expertise in the business operations refers to directors that hold a Ph.D. in the area of the main operations of the firm. Capital intensity is the ratio of net property, plant and equipment to the number of employees; firm diversification is measured by the Herfindahl Index which is defined as the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sales; The value of this index ranges from 0 to 1; a low value indicates a more diversity firm while a high value indicates a more focused firm. Total assets is the firm's total assets at the end of the fiscal year. Operating income before depreciation is computed as net sales minus cost of goods sold, minus selling and administrative expenses before depreciation, depletion, and amortization are deducted; ROA is return on assets calculated as annual operating income divided by year-end assets; operating margin is annual operating income divided by annual sales; net sales is the sales/turnover (net); asset turnover is calculated as annual sales/year-end assets; cost per dollar of sales equals the sum cost of goods sold and selling and administrative expenses, divided by annual sales; EPS is the firm's earnings per share; ROE is the firm's return on equity; market to book is the ratio of the firm's market value to the firm's book value; Tobin's q is computed as ((total assets - book equity)+market value of equity)/total assets.

		[1]	[2]	[3]	[4]	[5]	[7]	[6]	[7]	[8]	[9]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
Quality award dummy	[1]	1	0.058	0.012	0.165	0.158*	0.13	0.058	-0.001	-0.021	0.087	0.033	-0.038	0.1	0.031	0.008	-0.029	0.001	0.006	0.084	-0.031
Inside directors (num.)	[2]	0.051	1	0.007	-0.001	.338***	-.229***	0.058	-0.021	-0.072	0.007	-0.093	-0.026	-0.008	-0.076	-.210**	-0.013	0.032	-0.079	-0.032	-0.087
Directors with management expertise (num.)	[3]	0.05	-0.031	1	0.134	0.061	0.053	0.111	-0.114	-0.09	0.124	0.009	0.036	0.129	0.002	-0.034	-0.017	0.11	0.115	-0.016	-0.124
Directors with expertise in the business operations (num.)	[4]	.215**	0.025	.181**	1	0.139	0.085	0.107	0.068	-0.076	0.123	0.096	-0.041	0.129	-0.093	-0.169	0.011	0.106	0.139	0.123	0.071
Board size (num)	[5]	0.13	.387***	-0.004	0.078	1	0.104	.477***	.178**	.187**	.481***	-0.003	0.113	.458***	-0.1	-0.028	-0.162	.296***	.203**	-0.027	-0.239*
Board independence	[6]	0.13	-.302***	0.052	0.006	0.084	1	.218**	0.072	0.048	.230**	0.07	0.003	.229***	0.034	0.063	-0.012	.233***	.215**	0.203	0.049
Total assets	[7]	0.033	-0.019	0.075	0.025	.292***	0.115	1	0.124	.300***	.933**	-0.13	.298***	.881***	-.314***	.289***	-.309***	.463***	0.134	0.001	-.251**
Degree of firm diversification	[8]	-0.016	0.004	-0.062	0.023	0.151*	0.075	-0.011	1	0.015	.234***	.219*	-0.097	.286***	.315***	-0.046	0.091	.179**	0.11	-0.017	-0.025
Capital intensity	[9]	-0.009	-0.172*	0.005	-0.008	0.058	-0.036	0.044	-0.109	1	.253***	-.208**	.339***	0.131	-.403***	.468***	-.256**	0.049	-0.05	-0.033	-0.056
Operating income before depreciation	[10]	0.07	-0.002	0.094	0.128	.358***	0.132	.830***	0.05	0.151*	1	0.135	.342***	.937***	-0.108	.252***	-.364***	.519***	.306***	0.125	-0.073
ROA	[11]	0.03	-.299***	0.043	0.067	-0.067	.175*	-0.052	0.158*	-0.078	0.054	1	.224**	0.083	.454***	-0.077	-.294***	.404***	.768***	.386***	.487***
Operating margin	[12]	-0.122	-.250***	0.085	-.267***	0.073	0.055	.190**	-0.034	0.151*	.270***	.246***	1	0.039	-.588***	.179**	-0.650***	.225**	.369***	.266*	0.199
Net sales	[13]	0.081	-0.025	0.105	0.16*	.366***	.207**	.603***	.183**	0.035	.793***	0.047	0.11	1	0.108	.215**	-0.063	.465***	.211**	0.066	-0.118
Asset turnover	[14]	-0.004	-0.067	0.135	-0.04	-0.145	0.023	-.260***	.364***	-.290***	-.213**	.215**	-0.16*	0.111	1	-0.175*	.641***	0.022	0.154*	0.049	0.213*
Sales per employee	[15]	-0.065	-.182**	0.119	-0.089	-0.025	0.022	.213**	-0.018	.414***	0.127	0.017	.264***	0.165	-0.16	1	-0.165	.220**	0.098	-0.125	-0.243*
Cost per dollar of sales	[16]	0.043	0.048	-0.035	0.071	-0.169*	0.05	-.303***	0.042	-0.121	-.376***	-.309***	-0.640***	-0.168*	.320***	-0.071	1	-.265***	-.420***	-.352**	-.312*
EPS	[17]	-0.09	-0.082	-0.042	-0.056	-0.087	-0.108	.263***	-0.106	-0.035	.245***	-0.014	0.087	0.161*	-0.113	0.019	-0.137	1	.568***	0.019	-0.163
ROE	[18]	-0.028	-.330***	0.092	0.073	-0.022	.226**	0.052	0.08	0.01	0.124	.877***	.193**	0.108	0.023	0.061	-.257***	-0.001	1	.376***	.280**
Market to book	[19]	-0.1	-0.089	-0.051	0.045	-0.125	0.143	-0.064	0.014	-0.085	0.009	0.157	0.049	-0.029	0.049	-0.127	-0.197	-0.046	0.069	1	.833***
Tobin's q	[20]	-0.129	-0.084	-0.121	0.023	-0.201	0.02	-0.126	0.026	-0.119	-0.102	0.173	0.024	-0.15	0.036	-0.084	-0.155	-0.04	0.072	.910***	1

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level respectively

Table 4: Conditional logistic regression on the relation between corporate governance mechanisms and the likelihood of winning a quality award

This table presents the results from a conditional logistic regression linking board and control variables with the likelihood of winning a Malcolm Baldrige based quality award. Winning a Malcolm Baldrige based quality award is the proxy used in this study for successful quality management strategy implementation. The award-winning sample consists of 63 firms that won their first quality award during the period 1996-2006. Each award winning firm is matched to a control firm based on industry (2-digit code), firm size (total assets 3 years prior to winning the award), similar data availability and fiscal year end (January-June vs. June-December). Board size is the total number of directors sitting on the board. Inside (outside) directors are directors that are (not) employees of the company. Board Independence is a dummy variable taking the value of 1 when the fraction of independent directors is greater than 50%. experts at the main object of firm's business operations is the number of directors that hold a Ph.D. in the area of the main operations of the firm. Management experts are directors holding a Ph.D. in management. Firm diversification is measured by the Herfindahl index which is defined as the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sales. The value of this index ranges from 0 to 1; a low value indicates a more diversified firm while a high value indicates a more focused firm. Firm size is represented by the firm's total assets. Capital intensity is the ratio of net property, plant and equipment to the number of employees; sales represents the firm's sales for the year; ROE is the firm's return on equity. All variables are for three years prior to winning a quality award.

		Model 1			Model 2			Model 3			Model 4			Model 5		
	Expected sign	Coef.		z	Coef.		z	Coef.		z	Coef.		z	Coef.		
Inside directors (num.), ln	+				0.109		0.130							0.194		0.220
Insiders*Board independence	+				0.853		0.680							0.737		0.540
Directors with expertise in the business operations (num.), ln	+							1.032	*	1.880				1.019	*	1.850
Directors with management expertise (num.), ln	+										-0.444		-0.500	-0.559		-0.570
Board independence (dummy)	+	0.581		1.33	-0.158		-0.110	0.713		1.570	0.555		1.260	0.094		0.060
Board size, ln	+	1.712	*	1.71	1.573		1.560	1.477		1.510	1.755	*	1.720	1.343		1.340
Firm size (total assets, ln)	+	1.144	**	2.03	1.143	**	1.970	1.260	**	2.080	1.168	**	2.050	1.270	**	2.020
Degree of firm diversification	-	-0.084		-0.08	-0.056		-0.050	-0.394		-0.350	-0.342		-0.280	-0.764		-0.570
Sales (ln)	+	0.217		0.69	0.258		0.760	0.120		0.330	0.275		0.810	0.217		0.530
Capital intensity	+/-	-0.001		-0.37	-0.001		-0.250	-0.001		-0.280	-0.001		-0.420	0.000		-0.210
ROE	+	-0.395		-0.58	-0.362		-0.510	-0.349		-0.550	-0.396		-0.570	-0.312		-0.470
Number of obs.		126			126			126			126			126		
LR chi-square		13.16			14.010			17.170			13.410			18.180		
Prob > chi-square		0.0682			0.122			0.028			0.098			0.078		
Pseudo R-square		0.1637			0.174			0.214			0.167			0.226		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Table 5: Residual analysis

As a next step in the analysis, performance is regressed on the quality management-corporate governance fit (univariate regression). Fit is the opposite of "misfit" measured in this study by the absolute value of the residuals of the conditional regression of quality management success on the board composition and control variables presented in panel A of this table. Residuals in logistic regression are the differences between the observed and the predicted probability of the outcome. I use the Pearson residual (Hosmer and Lemeshow, 2000) defined as:

$$r = \sqrt{\frac{(1-\hat{\pi})}{\hat{\pi}}}$$

I expect that if the fit between quality management and board composition affects business performance positively, then the degree of (absolute) misfit would have a negative impact on performance. The results presented here show that the fit between quality management-corporate governance does not affect performance. Note that although a presence of statistical significance would enhance the argument of a fit between quality management success and corporate board structure, its absence does not necessarily imply the lack of fit.

Operating income before depreciation is computed as net sales minus cost of goods sold, minus selling and administrative expenses before depreciation, depletion, and amortization are deducted; ROA is return on assets calculated as annual operating income divided by year-end assets; Operating margin is annual operating income divided by annual sales; Net Sales is the sales/turnover (net); Asset turnover is calculated as annual sales/year-end assets; Cost per dollar of sales equals the sum cost of goods sold and selling and administrative expenses, divided by annual sales; EPS is the firm's earnings per share; ROE is the firm's return on equity; Market to book is the ratio of the firm's market value to the firm's book value; Tobin's q is computed as ((Total Assets - Book Equity)+Market Value of Equity)/Total Assets.

Year	Operating Income BD	ROA	Operating Margin	Net Sales	Assets Turnover	Sales per Employee	Cost/$Sales	EPS	ROE	M-to-B	Tobin's q
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
-3	-0.8	0.01	3.024	-365.465	0.016	-11.737	-0.016	0.012	0.012	-0.296	-0.159
n	62	62	62	62	62	62	48	62	62	29	29
-2	-108	0.006	3.946	-521.076	87908	-16.505	-0.017	-0.095	-0.003	-0.104	-0.08
n	63	63	63	63	63	63	50	63	63	37	37
-1	-166	0.004	8.122	-726.686	119001	-22.539	-0.027	-0.157	-0.009	-0.09	0.052
n	62	62	62	62	62	62	51	62	62	41	41
0	-57	0.006	13.35	-762.197	-0.044	-29.792	-0.039	-0.093	0.003	-0.158	-0.067
n	63	63	63	63	63	63	52	63	63	54	54

Table 6: Robustness tests

This table presents the results from a conditional logistic regression linking board and control variables with the likelihood of winning a Malcolm Baldrige based quality award. Winning a Malcolm Baldrige based quality award is the proxy used in this study for successful quality management strategy implementation. The award-winning sample consists of 63 firms that won their first quality award during the period 1996-2006. Each award winning firm is matched to a control firm based on industry (2-digit code), firm size (total assets 3 years prior to winning the award), similar data availability and fiscal year end (January-June vs. June-December).Board size is the total number of directors sitting on the board. Inside (outside) directors are directors that are (not) employees of the company. Board Independence is a dummy variable taking the value of 1 when the fraction of independent directors is greater than 50%. Experts at the main object of firm's business operations is the number of directors that hold a Ph.D. in the area of the main operations of the firm. Management experts are directors holding a Ph.D. in management. Firm diversification is measured by the Herfindahl Index which is defined as the sum of the ratio of the squared fraction of sales of each business segment to the firm's total sales. The value of this index ranges from 0 to 1; a low value indicates a more diversified firm while a high value indicates a more focused firm. Firm size is represented by the firm's total assets. Capital intensity is the ratio of net property, plant and equipment to the number of employees; sales represents the firm's sales for the year; ROE is the firm's return on equity. All variables are for three years prior to winning a quality award.

Panel A: Using percentages for inside directors, directors with expertise in the main object of business operations, and directors with expertise in management

		Model 1			Model 2			Model 3			Model 4		
	Expected sign	Coef.		z	Coef.		z	Coef.		z	Coef.		z
Inside directors (%)	+	1.370		0.590							1.563		0.630
Insiders%*Board independence	+	0.794		0.180							0.290		0.060
Directors with expertise in the business operations (%)	+				3.795		1.560				4.036	*	1.650
Directors with management expertise (%)	+							-1.578		-0.330	-3.845		-0.700
Board independence (dummy)	+	0.632		0.640	0.702		1.560	0.571		1.300	0.846		0.790
Board size, ln	+	1.901	*	1.860	1.812	*	1.840	1.695	*	1.690	1.987	*	1.930
Firm size (total assets, ln)	+	1.087	*	1.900	1.129	*	1.930	1.167	**	2.040	1.126	*	1.830
Degree of firm diversification	-	-0.057		-0.050	-0.206		-0.190	-0.215		-0.180	-0.568		-0.440
Sales (ln)	+	0.309		0.900	0.128		0.360	0.262		0.760	0.262		0.640
Capital intensity	+/-	0.000		-0.160	-0.001		-0.250	-0.001		-0.400	0.000		-0.080
ROE	+	-0.332		-0.460	-0.349		-0.530	-0.403		-0.580	-0.290		-0.420
Number of obs.		126			126			126			126		
LR chi-square		13.830			15.900			13.270			16.960		
Prob > chi-square		0.129			0.044			0.103			0.109		
Pseudo R-square		0.172			0.198			0.165			0.211		

*, **, ***: statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Panel B: Using dummies for the presence of directors with expertise in the main object of business operations, and directors with expertise in management

		Model 1			Model 2			Model 3		
	Expected sign	Coef.		z	Coef.		z	Coef.		z
Inside directors (%)	+							1.593		0.650
Insiders%*Board independence	+							0.343		0.070
Presence of directors with expertise in the business operations dummy	+	0.684		1.260				0.704		1.280
Presence of directors with management expertise dummy	+				-0.506		-0.770	-0.624		-0.910
Board independence (dummy)	+	0.606		1.370	0.533		1.210	0.710		0.680
Board size, ln	+	1.536		1.570	1.778	*	1.720	1.751	*	1.710
Firm size (total assets, ln)	+	1.313	**	2.200	1.165	**	2.040	1.281	**	2.080
Degree of firm diversification	-	-0.463		-0.410	-0.463		-0.380	-0.975		-0.730
Sales (ln)	+	0.150		0.450	0.300		0.880	0.328		0.850
Capital intensity	+/-	-0.001		-0.500	-0.001		-0.430	-0.001		-0.340
ROE	+	-0.326		-0.500	-0.399		-0.560	-0.267		-0.380
Number of obs.		126			126			126		
LR chi-square		14.810			13.760			16.220		
Prob > chi-square		0.063			0.088			0.133		
Pseudo R-square		0.184			0.171			0.202		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Panel C: Splitting "Directors with expertise in the business operations" into "Outside directors with expertise in the business operations" and "Inside directors with expertise in the business operations"

		Coef.		z
Inside directors (num, ln)	+	0.300		0.320
Insiders%*Board independence	+	0.704		0.500
Outside directors with expertise in the business operations (num, ln)	+	1.312	*	1.870
Inside directors with expertise in the business operations (num, ln)	+	-0.004		0.000
Presence of directors with management expertise dummy	+	-0.657		-0.640
Board independence (dummy)	+	0.264		0.170
Board size, ln	+	1.402		1.390
Firm size (total assets, ln)	+	1.334	**	2.090
Degree of firm diversification	-	-0.842		-0.620
Sales (ln)	+	0.134		0.320
Capital intensity	+/-	-0.001		-0.220
ROE	+	-0.481		-0.640
Number of obs.		126		
LR chi-square		19.160		
Prob > chi-square		0.085		
Pseudo R-square		0.238		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level , respectively

Appendix 1: The Malcolm Baldrige National Quality Award

The Malcolm Baldrige National Quality Award (henceforth also referred to as "the Award") is an award granted annually to U.S. organizations in the business, health care, education, and nonprofit sectors for performance excellence. It is the only official recognition of performance excellence given by the President of the United States. The Award is administered by the National Institute of Standards and Technology (NIST) - an agency of the U.S. Department of Commerce, via the Baldrige National Quality Program.

To receive the Malcolm Baldrige National Quality Award, an organization must develop a management system that promotes continuous improvement in the delivery of products and/or services, efficient and effective operations, and ways of being responsive to customers and other stakeholders.

It should be mentioned that the Award is not given for specific products or services. Up to eighteen Awards may be given annually across six categories: manufacturing, services, small businesses, education, health care, and nonprofit organizations.

Apart from the Malcolm Baldrige National Quality Award, individual State Quality Councils give State Quality Awards annually, most of them explicitly based on the criteria of the Malcolm Baldrige National Quality Award. In the sample used in this stuffy I include quality award winners that received either the Malcolm Baldrige National Quality Award or a State Quality Award that is explicitly based on the Malcolm Baldrige National Quality Award criteria.

The requirements of the Criteria for Performance Excellence fall into seven categories:

1. Leadership
2. Strategic Planning
3. Customer Focus
4. Measurement, Analysis, and Knowledge Management
5. Workforce Focus
6. Process Management
7. Results

In more detail:

The Leadership Category examines how the organization's senior leaders guide and sustain the organization. Also examined are the organization's governance system and how the organization fulfills its legal, ethical, and societal responsibilities, and supports its key communities.

The Strategic Planning Category examines how the organization develops strategic objectives and action plans. Also examined are how those are deployed and changed if circumstances require, and how progress is measured.

The Customer Focus Category examines how the organization engages its customers for long-term success in the marketplace. This engagement strategy includes how the organization builds a customer-focused culture. Also examined is how the organization pays attention to the voice of its customers and uses this information to improve and identify opportunities for innovation.

The Measurement, Analysis and Knowledge Management Category examines how the organization selects, gathers, analyzes, manages, and improves its data, information and knowledge assets and how it manages its information technology.

The Workforce Focus Category examines how the organization's work systems and employee learning and motivation to enable employees to develop and utilize their full potential in alignment with the organization's mission, strategy, overall objectives and action plans. Also examined are the organization's efforts to build and maintain an inspiring work environment and an employee support climate conducive to performance excellence, and to personal and organizational growth.

The Process Management Category examines how the organization designs its work systems, and how it designs, manages and improves the key aspects of the organization's process management, including its key product(s), service(s), and business processes for creating customer and organizational value and key support processes. This Category encompasses all key processes and all work units.

The Results category examines the organization's performance and improvement in key business areas, i.e. customer satisfaction, product and service performance, financial and marketplace performance, human resource results, operational performance and governance and social responsibility. Also examined are performance levels relative to those of competitors.

Sources

2009-2010 Criteria for Performance Excellence, the Baldrige National Quality Program at the National Institute of Standards and Technology in Gaithersburg, MD.

The National Institute for Standards and Technology Web site at: www.nist.gov (last accessed 1st of June, 2010)

CHAPTER 2

ESSAY II

Is Quality Management Strategy Reflected on Executive Compensation?

Evidence from Quality Award Winners

Essay II

Is Quality Management Strategy Reflected on Executive Compensation? Evidence from Quality Award Winners

ABSTRACT

I empirically investigate the relationship between executive compensation and quality management (QM). Executive support for the QM strategy is according to the QM literature of prominent importance in attaining quality excellence, thus I propose that the quality management strategy will be reflected in executive pay. Previous studies have investigated the issue of compensation in a QM context, albeit focusing on non-executive compensation. I hypothesize that the sensitivity of executive compensation (both short term and long term) to quality management related measures of performance will be higher for quality management firms. I utilize a sample of 44 first time Malcolm Baldrige Quality Award winners during the time period 1996-2006 and a matching sample to examine the sensitivity of CEO compensation to sales - a quality management related measure of performance - for two years before and two years after quality management implementation. The empirical results show that the sensitivity of short-term CEO compensation (salary plus bonus) and previous year sales during the early post-implementation period is higher for QM firms. Thus, I conclude that a QM strategy is indeed reflected in executive compensation; yet, short-term compensation seems to be utilized as a reward for winning the award and it is not used as a reward or incentive during quality management implementation.

1. INTRODUCTION

This study investigates the relationship between executive compensation and quality management. Although some previous studies have investigated the issue of incentives and rewards in a quality management context, research on executive compensation in that context is limited.

Given the documented value added to shareholder' wealth that comes when a firm achieves quality excellence it would only make sense if firms – and shareholders - were willing to reward their executives for quality management efforts or to incentivize executives to pursue quality excellence[21]. This argument becomes stronger if one takes into consideration that executive support for the quality management strategy is emphasized in the literature as a critical factor for achieving quality excellence[22].

Yet evidence on the relationship between quality management and compensation is limited. Early studies on reward issues in a quality management context focused mainly on the compensation of non-managerial personnel but do not address executive compensation (see for example Symons and Jacobs, 1995 and Ittner and Larcker, 1995). A recent study by Tai (2008) that investigates the relationship between executive compensation and performance in a QM context finds that executive pay and performance are related for quality management firms; yet, it does not offer insights as to whether any observed relationships between performance and executive compensation can be actually attributed to quality management.

This study attempts to answer the question whether executive efforts to achieve quality excellence in the context of a quality management strategy are taken into consideration and thus, reflected in CEO compensation. I hypothesize that CEO compensation and quality management are related during and right after quality management strategy implementation. I expect that during and right after quality management implementation the sensitivity of short-term compensation (salary and bonus) to performance measures associated with a quality management strategy. Specifically, I hypothesize that the sensitivity of short-term compensation to sales - a customer-oriented

[21] Firms that have achieved quality excellence are doing better in sales growth (Hendricks and Singhal, 1997; Fynes and Voss, 2001), are more successful in controlling costs, demonstrate higher growth in employment and total assets (Hendricks and Singhal, 1997), higher ROI, earnings and market share (Fynes and Voss, 2001), and are clearly distinguishable in terms of financial performance (York and Miree, 2004). Furthermore, quality efforts seem to be received favourably by the stock market (Hendricks and Singhal, 1996, 2001a; Nicolau and Sellers, 2002; Corbett et al., 2005).

[22] See review and discussion by Soltani et al. (2008).

measure of performance[23] - will be stronger for firms that pursue quality excellence, because of the customer oriented nature of a quality management strategy (Mele and Colurcio, 2006).

Furthermore, I hypothesize that, because quality management is a long-term strategy and its impact on earnings and stock returns may take long to surface (Easton and Jarrell, 1998; Hendricks and Singhal, 1997; 2001), the sensitivity of long-term compensation such as long-term investment plans (LTIP), stock options and restricted stocks to performance measures associated with a quality management strategy will be higher for firms that pursue quality excellence, so that executives can reap the future benefits of their quality management efforts such as abnormal returns on the announcement of winning a quality award (Corbett et al., 2005; Hendricks and Singhal, 2001) or dividends from earnings due to the impact of quality on profitability (Fynes and Voss, 2001) in the future when they vest.

To examine the hypotheses I relate CEO pay with performance measures of a sample of 44 firms that have successfully implemented a quality management strategy during the time period 1996-2006 (using as a proxy the winning of a Malcolm Baldrige or a Malcolm Baldrige-based quality award) and a matched control sample. I test the hypotheses for both the pre-and the post- implementation period of the quality management strategy, specifically two years before and two years after.

Consistent with my expectations, results indicate that for firms that achieve quality excellence the sensitivity of short-term CEO compensation to sales is stronger than it is for the control firms for (at least) the first two years *after* successful quality management implementation. Thus, it appears that for quality management firms the sensitivity of short-term compensation to sales increases right after the successful implementation of the quality management strategy, as a reward for achieving quality excellence. However, the sensitivity remains the same during implementation and for long-term compensation; that could mean that those firms do not appear to use any kind of compensation, either short-

[23] Perhaps a more appropriate measures of performance to be used to test this hypothesis would be measures recorded in the literature as being used as a basis for reward systems in a quality management context such as defect rates, customer satisfaction, and delivery performance as a basis for reward systems (e.g., Said et al., 2003; Maiga and Jacobs, 2005; Van der Stede et al., 2006; Perego and Hartmann, 2009). Those measures are difficult to obtain, as they do not consist public information. Another appropriate measure to use would be a warranty allowance proxy, such as warranty expenses and liabilities; the problem with that though is that the disclosure of these items was voluntary until the issuance of Financial Interpretation no. 45 (FIN 45) - *Guarantor's Accounting and Disclosure Requirement for Guarantees, Including Indirect Guarantees of Indebtedness of Others* in 2002 (FASB, 2002). Because it was voluntary to disclose such measures until 2002, given that my dataset includes observations timed before 2002, using this measure would introduce bias into the sample.

term (as an immediate reward for quality efforts) or long-term as an incentive for achieving quality excellence.

This study contributes to the literature in several ways: First, it addresses the issue of compensation in a quality management context at the *executive* level empirically. Second, it adds to the literature on the relationship between executive compensation and firm performance in general, while at the same time - unlike the majority of studies on compensation and performance - this study focuses on non-financial performance (i.e. quality excellence). Third, it provides a better understanding of the widely emphasized role of the executives in a quality management context (Soltani et al., 2008), and specifically of how executive compensation (as an incentive and reward mechanism) may be related to the quality performance of a firm.

This study proceeds with a discussion of the background and hypotheses development in section two, methodology follows in section three, and in section four the empirical results are presented, followed by conclusions and discussion in section five.

2. BACKGROUND AND HYPOTHESES DEVELOPMENT

The literature on compensation in a quality management context is limited because for a long time quality experts had considered quality management philosophy to be incompatible with performance measurement and reward systems (see review by Masterson and Taylor, 1996). Their main reservation was that performance variation was attributable to problems beyond the employees' control and that it was rather the result of decisions taken by those higher in the organizational hierarchy (i.e. *top executives* and *the board of directors*); thus to base compensation on such results would be considered neither appropriate or fair (Deming, 1986; Masterson and Taylor, 1996). I take this as a calling to investigate the relationship between quality management and compensation at the *executive* level.

The fact that rewards had been a long-time taboo for the quality management literature had inhibited research on the quality-compensation issue for years and in fact empirical research on the QM-compensation linkage was long missing (Gomez-Mejia and Balkin, 1992). The first steps towards investigating the quality-compensation relationship included seeking a performance measurement system that could be used in rewarding quality management efforts, since the alignment of performance measurement systems with organizational strategy is considered essential (Simons, 2000; Kaplan and Norton, 2006; Perego and Hartmann, 2009). In fact, evidence supports that the existence of a strategy-measurement "fit" can affect performance (Said et al., 2003). In one of the first

attempts to address the quality management – compensation issue, Symons and Jacobs (1995) rather prescriptively suggest a basic structure of a quality management compensation system based on non-financial performance measures that would provide employees with incentives to pursue quality management goals. While this study had remarkably shed light on how the quality performance of the production line could be measured and rewarded independently from conventional, aggregate, financial measures of performance, the study was focused on non-managerial personnel and specifically on production workers.

Nonetheless, subsequent research shows that firms that adopt quality management practices employ a range of forward looking, non-financial measures to track performance in addition to financial ones, but with an emphasis on the non-financial ones (Ittner and Larcker, 1995; Van der Stede et al., 2006; Stivers et al, 1998). Moreover, performance measurement based on forward looking, non-financial measures is more systematic in companies with more advanced quality practices and in addition to that, they also find that the measurements are propagated as high as the board of directors (Ittner and Larcker, 1995). While Ittner and Larcker (1995) focus on the performance of first-line supervisors, non-management personnel, and middle managers, Ittner et al.(1997) found that the adoption of a quality management strategy is likely to increase the dependence of CEO bonus on non-financial measures of performance. By taking the first step to approach issues pertaining to executive compensation in a quality management context, Ittner et al. (1997) had paved the path for investigating the relationship between executive pay and quality management success, we are far from constructing a picture of how the two are related. More recent studies provided further evidence on the utilization of non-financial measures such as for example defect rates, customer satisfaction, and delivery performance as a basis for reward systems (e.g., Said et al., 2003; Maiga and Jacobs, 2005; Van der Stede et al., 2006; Perego and Hartmann, 2009).

However, research on the relationship of executive compensation and quality management has been limited. It wasn't until quite recently when Tai (2008) using a sample of 27 Malcolm Baldrige Quality Award winners demonstrated that there is a synchronous and lagged relationship between CEO pay and financial performance (stock returns) for these firms, with the direction running from CEO pay to performance and not vice-versa. However, the study does not take into consideration the relationship between quality management and financial performance that has been demonstrated by numerous

studies[24]. In addition, as the author acknowledges, the results are limited by the small sample size (Tai, 2008). Moreover, although Tai (2008) has demonstrated that the relationship between CEO pay and performance holds for quality management firms, no comparison has been made to a control sample to confirm that the relationship is contingent on quality management.

To summarize, previous relevant literature either 1) focused only on the compensation of non-managerial personnel and failed to address the compensation issue of top management, 2) focused on the performance measurement systems used in a quality management context without connecting this directly to compensation, or 3) suffered from methodological issues that prevent us to discern whether relationships could be attributed specifically to quality management or not. As a result, the empirical evidence is limited on the direct relationship between executive compensation and quality management strategy implementation and outcomes.

To fill in this gap in the literature I investigate the relationship between quality management strategy and executive compensation. As mentioned earlier, executives have a major role to play in quality management strategy success (Soltani et al., 2008). Since, according to the literature, executive compensation is utilized - both as a means of incentive and reward - to support a firm's strategic efforts (Perego and Hartmann, 2009), I hypothesize that the QM strategy would be reflected on executive compensation, and specifically, on its sensitivity to quality management related measures of performance.

Quality management is a long-term strategy and the effects of top management's decisions on conventional financial performance measures - such as stock prices and returns - may not be apparent until a number of years later; the literature suggests that five years after quality management implementation is completed is a normal time period to wait in order to discern an impact on the firm's financial performance (see for example Easton and Jarrell, 1998; Hendricks and Singhal, 1997). Taking into consideration that it can take from three to five years to implement a quality management program effectively (Hockman, 1992) this would mean that if executive compensation is based solely on financial performance measures the executive team responsible for quality management success might not get directly rewarded for it[25]. Thus, first, relying solely on conventional financial performance measures - such as stock prices and returns - to set executive pay

[24]See for example Hendricks and Singhal (1996; 2001a; 2001b), Przasnyski and Tai (2002), Nicolau and Sellers (2002), Corbett et al. (2005), Sila (2007) on the relationship between firm performance and quality management; see Hendricks and Singhal (2001a), Easton and Jarrell (1998), Corbett et al. (2005) on the long-run persistence of this relationship.

[25] Of course this will also depend on the tenure of the executives.

may not be appropriate in a quality management context. Second, the time dimension, i.e. short-term and long-term compensation may be important in quality management.

Regarding the first point (i.e. performance measurement), as part of their explicitly quality-driven cultures, firms that adopt a quality management strategy are expected to link executive compensation to distinct quality management implementation outcomes such as defect rates, customer satisfaction, and delivery performance as a basis for reward systems (Ittner and Larcker, 1995; Strives et al, 1998; Said et al., 2003; Maiga and Jacobs, 2005; Van der Stede et al., 2006; Perego and Hartmann, 2009). Due to the lack of access to internal company data, I was in a position to only observe quality management implementation outcomes such as last year sales, a customer-related measure of performance, relevant to the customer-oriented nature of quality management programs (Evans and Lindsay, 2002; Mele and Colurcio, 2006). According to Hendricks and Singhal (1997), sales improve as early as during the quality management implementation period, and improvement persists also post-implementation. Therefore, I would expect firms that pursue quality excellence to consciously link the short-term compensation (salary and bonus) of their executives more tightly with such measures of performance, both before and after effective quality management implementation. Thus, I expect that:

H1: A quality management strategy strengthens the relationship between short-term executive compensation (salary plus bonus) and quality management related measures of performance during and post quality management strategy implementation.

Also, as mentioned above, quality management is a long-term strategy that can affect future financial performance (see Hendricks and Singhal, 2001a; Easton and Jarrell, 1998; Corbett et al., 2005). For example, abnormal returns have been observed during the early post-implementation period (Hendricks and Singhal, 2001a; Easton and Jarrell, 1998). Moreover, as already pointed out, it can sometimes take as much as five years after quality management implementation is completed to perceive any impact on the firm's financial performance (see for example Easton and Jarrell, 1998; Hendricks and Singhal, 1997). However, the quality efforts in the context of the QM strategy have already been taken during the implementation period, i.e. between three and five years before completion. Thus, I would expect that firms that pursue quality excellence would incentivize their executives through long-term rewards such as LTIPs, options, and restricted stocks during the quality management implementation period so that the

executives responsible for quality management success could reap the financial benefits of their efforts in the future. Thus, I hypothesize that:

H2: Long-term executive compensation (LTIP payouts, options and restricted stock grants) is positively related to the quality management strategy during and post quality management strategy implementation.

3. METHODOLOGY

3.1. Dataset

In this essay, I proxy the adoption and successful implementation of a quality management strategy by the winning of the Malcolm Baldrige National Quality award given annually by the National Institute of Standards and Technology (NIST) and state quality awards that are explicitly based on the Baldrige award criteria. The winning of quality awards to proxy effective quality practices is widely used in the literature (Hendricks and Singhal, 1997; 2001a, b; Tai, 2008; Charitou, Georgiou, and Soteriou, 2010)[26]. Therefore, my primary sample consists of firms that have won such an award.

The initial sample consisted of 2714 award receiving units (divisions or whole firms)[27]. These were gathered from the lists provided by the National Institute of Standards and Technology (NIST) and by each US State's quality council. From these 2714 award receiving units I selected those that belong to publicly traded companies and from these - in order to ensure data continuity - I chose the ones that had not changed hands or turned from private to public or vice versa during the time period of interest. Some firms were eliminated because no data was found either in Compustat or ExecuComp. The final primary sample consists of 44 publicly traded firms that won a quality award for the first time during 1996-2006 (See table 1).

For each award-winning firm, I obtain a control firm with the primary concern to make sure that the control firm has never won quality or excellence awards of any kind. Following Hendricks and Singhal (1997), I match each one of the 44 sample firms with a

[26] See Hendricks and Singhal (2001a) and York and Miree (2004) for a discussion on the superiority of Malcolm Baldrige based quality awards as a proxy for quality management success. Other studies have used ISO 9000 certification to proxy for that (Terziovski, Power, and Sohal, 2003; Corbett et al., 2005; Nicolau and Sellers, 2002).

[27] In most cases the award receiver is only a fraction of the organization (e.g. a division or a particular geographical site of an organization) and not the whole organization. The analysis conducted is for the whole organisation since corporate governance and financial data are reported firm-wide; still, this should create no problem in as it would only make the tests more conservative in the sense that the effects of the award must be strong in order to be detected in a sample with many multi-site firms with only one awarded site (Hendricks and Singhal, 2001).

control firm within the same 2-digit SIC code category and similar size as measured by the book value of assets at the fiscal year-end before the winning of the quality award, with the constraint that the ratio of the book value of assets of the control and award winning firm is always less than a factor of 3[28]. Two of the firms due to their large size were matched after allowing a single-digit SIC code matching. Matching on single-digit SIC is appropriate for large firms since they tend to be more diversified (Hendricks and Singhal, 1997).

3.2. Measurement of variables

I use two CEO compensation variables: 1) short term compensation, which consists of salary and bonus on one hand, and 2) long term compensation which consists of LTIP payouts, options[29] and restricted stock grants. Those are used in the empirical models (described in the following section) as dependent variables.

I use a dummy to indicate whether a firm follows a quality management strategy, i.e. whether it has won a Malcolm Baldrige award or one explicitly based on that award, as described in the previous section. Statistical significance of this variable would denote a difference in intercepts between award-winners and the rest of the firms.

I use the natural logarithm of previous year's sales as a customer-oriented measure of performance. The coefficient of the interaction term of previous year sales with the dummy indicating whether the firm has won a quality award or not, is the coefficient of our main variable of interest. If the coefficient turns out to statistically significant, this would indicate a difference in the sensitivity of executive compensation to this measure of performance between award-winners and non-award-winners; if it is positive means that for award winners there is higher sensitivity, denoting that quality management (QM) firms link executive compensation tighter with last year's sales. This case would be in line with our hypotheses.

In addition, I control for other measures of performance that according to the literature are associated with executive compensation: following previous research on CEO compensation (Lambert and Larcker, 1987; Sloan, 1993; Davila and Venkatachalam, 2004) I use as measures of performance logarithmic returns (that is, $\ln(\mathrm{Price}_t / \mathrm{Price}_{t-1})$, and the accounting return on equity (ROE, i.e. Net Profit/Shareholders' Equity).

I additionally control for firm risk that is expected to be positively associated with compensation (Davila and Venkatachalam, 2004) using as risk measure the debt to equity ratio. Another firm characteristic I control for is growth opportunities, as this variable is

[28] When I attempted to use even a slightly lower factor, i.e. stricter matching left us more than 50% of the sample firms remained unmatched.
[29] As calculated with the Black-Scholes formula.

found in previous studies to be positively related to compensation (Smith and Watts, 1992). I measure growth opportunities with the market to book ratio. Also, I control for CEO specific characteristics: CEO ownership and CEO power and quality. CEO ownership could be either positively or negatively correlated with CEO compensation: positively as it can be a proxy for power (Holderness and Sheehan, 1988) and on the other hand negatively, since firms with low level of CEO ownership – and thus according to Jensen and Meckling (1976) with more agency problems – could be linking tighter performance with compensation in order to create more incentives for CEOs (Core et al., 1999). CEO ownership is measured as the percentage of shares outstanding held by the CEO. Moreover, I control for CEO power and CEO quality (Bushman et al., 1996) using CEO tenure measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year, and CEO age which is the age of the CEO at the point of time under examination.

Financial and compensation data are collected from Compustat, ExecuComp, and proxy statements filed with the SEC by each firm.

3.3. Empirical model

I examine the relationship between CEO compensation and QM strategy implementation and success by associating the two variables of interest (compensation and quality) after controlling for other performance measures, as well as other factors that – according to previous literature – affect CEO compensation. Specifically, I use the following empirical model:

where t = { -3, -2, -1, 0}, and where κ performance measures other than last year's sales and λ other factors that may affect CEO compensation are used as controls. Notably, QM_i is the dummy variable that takes the value of one if firm i has won a quality award, or zero otherwise; the coefficient β_3 is the coefficient of the interaction term of previous year

sales with the QM_i dummy, and it is the coefficient of the main variable of interest; the vector $\beta_{5\kappa}$ contains the coefficients of the interaction terms of κ performance measures other than previous year sales with the QM_i dummy. Should a coefficient of an interaction term turns out to be statistically significant, that would mean there is a difference in the strength of the relationship between that particular measure of performance and executive compensation among award-winners and non-award-winners.

I effectively examine the relationship for the last two years of the quality management implementation period when I examine the relationship for three and two years ("year -3" and "year -2") before the winning of the quality award, and the two first years of the post-implementation period from one year before winning the award and award year ("year -1" and "year 0") [30],[31]. See Appendix 1 for explanation of the timeline of winning a Malcolm Baldrige Quality Award (or one explicitly based on its criteria) in relation with quality management implementation stages.

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

T-tests and Wilcoxon tests for differences in medians reveal that there are some differences between award-winners and non-award winners. CEO tenure appears to be higher for non-award winners three years before the award and the award year. CEO ownership seems to have a lower median for award winners for all years under examination. Also, consistent to expectations and with previous literature according to which award-winners have better performance (see for example Hendricks and Singhal, 2001b; 1997), ROE seems to be higher for award-winners the year of the award.

Examining differences in compensation variables, I observe that consistent to the expectations short-term compensation (salary and bonus) appears to be higher for award-

[30] It can take from 3 to 5 years to implement a quality management program effectively (Hockman, 1992). Following Hendricks and Singhal (2001b) who assume that QM implementation is effective 12 months before the time of winning the first quality award - let this be "year 0", then, years -3 and -2 fall into the QM implementation period, while year -1 is considered to be the year when implementation was effective, thus years from year -1 onwards fall into the post-implementation period. In this study I examine years -3, -2, -1, and 0, effectively two years before and two years after QM implementation is effective (see Appendix 1).

[31] Though it would have been ideal to have data dated six years before winning the first quality award and cover the whole implementation period (Hockman, 1992), three years before (i.e. starting from "year -3") is the best that can be done, given the fact that proxy data is only available since 1994, covering the years 1993 and beyond. Should I had required taking into consideration earlier years, the sample size would have shrunk considerably to include only the most recent award winners and analysis would have been impossible.

winners on award year as well. There does not appear to be any difference in long-term compensation.

4.2. Correlations

Pearson and Spearman correlations (table 3, panels A through D) show that as expected, short term compensation (sum of salary and bonus) three years before the winning of the award is positively correlated with long term compensation, previous year sales, previous year stock returns, risk, size, growth, and previous year ROE, while it is negatively correlated with CEO ownership (Panel A). Two years before the award is positively correlated with long term compensation, previous year sales, previous year stock returns, risk, size, and growth, while it is negatively correlated with CEO ownership (Panel B). One year before the award is positively correlated with long term compensation, previous year sales, previous year stock returns, risk, size, growth, and previous year ROE, while it is negatively correlated with CEO ownership (Panel C). On the year of the award, short term compensation is positively correlated with long term compensation, previous year sales, previous year stock returns, risk, size, growth, previous year ROE, and the dummy that denotes whether a firm is an award winner (Panel D).

Long term compensation (sum of LTIP payouts, options grant value, and restricted stock grant) is as expected, positively correlated with short term compensation, previous year stock returns, growth, size, CEO age, sales, previous year ROE, and negatively correlated with CEO ownership three years before the award. Two years before the award it is also positively correlated with CEO tenure. One year before the award, long term compensation is positively correlated with short term compensation, growth, previous year sales, previous year ROE, risk, size, and CEO ownership. In the year of the award, it is positively correlated with short term compensation, previous year ROE, growth, CEO ownership, previous year sales, previous year stock returns, and size.

4.3. Regressions

4.3.1. Short-term compensation

Table 4 presents the relationship of several performance measures and CEO characteristics with short term compensation (sum of salary and bonus) for every year under examination, i.e. years, -3, -2, -1, and 0 (Panels A, B, C, and D, respectively). So, effectively, Panels A and B cover part of the implementation period, while Panels C and D cover part of the post-implementation period. Table 4 pertains to Hypothesis H1, which states that quality management strategy strengthens the relationship between short-term executive compensation (salary plus bonus) and customer-oriented measures of performance (i.e. sales) during and after quality management strategy implementation.

Model 1 in each panel represents the relationship between short-term compensation and variables that have been found in previous studies to be associated with compensation. In Model 2, I also add the main variable of interest, i.e., the interaction term consisting of the product of the dummy that denotes whether a firm has won a quality award or not, and previous year sales, along with the dummy variable that denotes whether the firm has won a quality award or not. Model 3, includes additional interaction terms with the dummy that denotes whether a firm has won a quality award or not and other performance measures, as well as ownership characteristics[32].

In Panel A of Table 4 (regarding three years before the award), one can see that consistent with my expectations and previous studies (e.g. Smith and Watts, 1992), growth is positively associated with short term compensation in all models (at the 0.05 level of significance), Annual return is also significantly and positively associated with the dependent variable (at the 0.1 level of significance). Previous year's sales is statistically significant in models 1 and 2 (at the 0.05 level), but the main variable of interest, i.e. the product of the dummy that denotes whether a firm has won a quality award or not, and previous year sales is not statistically significant contrary to my expectations. Notably, in model 3, CEO ownership is - consistent with literature (Core et al., 1999) - negatively associated with short-term compensation. However, for awarded firms, the association is not negative, but it is rather positive (discernable if one adds up the coefficient of CEO ownership with the coefficient of the interaction term of CEO ownership with the dummy denoting whether a firm is an award-winner or not).

In Panel B of table 4 (regarding two years before the award), one can observe the exact same pattern with CEO ownership and the CEO ownership interaction term (Model 3) as in Panel A. The main variable of interest, i.e. the product of the dummy that denotes whether a firm has won a quality award or not, and the previous year sales is not statistically significant in any of the models. Notably, in Model 3, the award dummy is negatively associated with short-term compensation denoting that the basal short-term pay (i.e. the intercept) for the CEOs of firms that are into a quality management implementation process is lower than that of the control firms.

Since the main variable of interest (i.e. the interaction term consisting of the product of the dummy that denotes whether a firm has won a quality award or not, and previous year sales, along with the dummy variable that denotes whether the firm has won a quality award or not) was not statistically significant in any of the models of Panels A or

[32] Any heteroscedasticity issues have been taken care of by using Huber-White robust estimates of the standard errors.

B, Hypothesis H1, is not supported concerning the period before winning the quality award; for firms that follow a quality management strategy, the sensitivity of short-term CEO compensation to customer-oriented measures of performance (i.e. sales) *during quality management strategy implementation* (i.e. years -3 and -2) is not different than of the sensitivity for the control sample. Short-term compensation seems to be utilized as a reward for winning the award and it is not used as a reward or incentive during quality management implementation.

Panels C and D refer to the early post-quality management implementation period (i.e. years -1 and 0). I expect that the coefficient of the main variable of interest will be positive and statistically significant. Focusing on Panel C of table 4 (regarding one year before the award), one can see that in Model 1, previous year annual return and firm risk are consistently with our expectations and past literature (Lambert and Larcker, 1987; Sloan, 1993; Davila and Venkatachalam, 2004) positively associated with short-term compensation. CEO ownership, is again, negatively associated, while the interaction term between the award dummy and CEO ownership is again, positively associated with short-term compensation (Model 3). In Models 2 and 3, the award dummy is again negatively associated with short-term compensation. Notably, the main variable of interest, namely, the interaction between the award dummy and the previous year sales is positive and statistically significant in Models 2 and 3 (at the 0.1 and 0.05 levels of significance respectively). In all models, consistently with my expectations, previous year annual return is positively associated with short-term compensation.

In Panel D of table 4 (award year) one can see that the main variable of interest, i.e. the interaction between the award dummy and previous year sales is positive and statistically significant (Models 2 and 3). Again, the award dummy is statistically significant and negatively associated with short-term compensation. For once more, one can observe the same pattern with CEO ownership: CEO ownership is negatively associated with short-term compensation (Models 2 and 3), while the interaction term between the award dummy and CEO ownership is again, positively associated with short term compensation (Model 3).

In summary, regarding table 4, one can say that consistently with H1, at the beginning of the post-quality management implementation period, namely years -1 and 0 (Panels C and D), the sensitivity of short-term compensation to previous year sales is higher for firms that follow a quality management strategy. This hypothesis, though, is not supported for the years during quality management implementation, since we do not observe the same relationship during the implementation period, namely years -3 and -2

(Panels A and B). In addition, it appears that the part of short-term pay that does not depend on any of the independent variables (i.e. the intercept) for the CEOs of firms that are into a quality management implementation process is lower than that of the control firms, starting from two years before they win a quality award. This could be due to the omission of variables in the model specification, i.e. to the omission of variables that represent quality management outcomes such as defect rates, customer satisfaction, and delivery performance that according to the literature are used by firms that pursue quality excellence as a basis for reward systems (Ittner and Larcker, 1995; Strives et al, 1998; Said et al., 2003; Maiga and Jacobs, 2005; Van der Stede et al., 2006; Perego and Hartmann, 2009). As discussed earlier, I did not have access to such data.

Also, it seems that for all years, CEO ownership is negatively associated with short-term pay for control firms, but for firms that follow a quality management strategy, the sensitivity of short-term pay to CEO ownership (obtained by adding the coefficient of the variable representing CEO ownership and the coefficient of the relative interaction term) is either positive (Panel A, B, and C) or at least less negative (Panel D), since the interaction between the award dummy and CEO ownership is consistently positively associated with short term compensation. The negative association of CEO ownership with compensation is consistent with literature that says that CEO ownership and executive compensation can be negatively related since firms with low CEO compensation – and thus according to Jensen and Meckling (1976) more agency problems – may link tighter performance with compensation in order to create more incentives for CEOs (Core et al., 1999). However, as discussed above, for award-winning firms, the relationship is positive in most case or at least less negative. The issue whether this is because the agency model is not so relevant to a culture of a firm that pursues quality excellence, and whether these firms have less agency problems, is an interesting one and merits further investigation.

4.3.2. Long-term compensation

Results in table 5 pertain to Hypothesis H2 that firms that follow a quality management strategy link their CEO long term compensation (LTIP payouts, options and restricted stock grants) tighter to customer-oriented measures of performance (i.e. sales). If the coefficient of the main variable of interest is statistically significant and positive, H2 is supported.

In table 5, I present the results about long-term compensation (the sum of LTIP payouts, option value and restricted stock grant) for every year under examination, i.e. years, -3, -2, -1, and 0 (Panels A, B, C, and D, respectively). So, effectively, Panels A and

B cover part of the implementation period, while Panels C and D cover part of the post-implementation period. Model 1 in each panel represents the relationship between short-term compensation and variables that have been found in previous studies to be associated with compensation. In Model 2 I also add the main variable of interest, i.e., the interaction term consisting of the product of the dummy that denotes whether a firm has won a quality award or not, and previous year sales. Model 3, includes additional interaction terms with the dummy that denotes whether a firm has won a quality award or not and other performance measures, as well as ownership characteristics.

In Panel A of table 5 (three years before the award), consistently with our expectations, the variables CEO age and firm growth are statistically significant and positively related to long-term pay in all three models, as well as CEO ownership which is negatively associated with long-term pay. In Models 2 and 3, the award dummy is negatively associated with long-term compensation, and it is significant at the 0.1 level of significance, denoting that the basal long-term pay (i.e. the intercept) for the CEOs of firms that are into a quality management implementation process is lower than that of the control firms.

In Panel B of table 5 (two years before winning a quality award), one can see that in the first two models, previous year ROE, CEO tenure, and firm size are statistically significant. In Model 3, CEO ownership is negatively associated with long-term pay, while the interaction term between the award dummy and CEO ownership is positively associated with short-term compensation. CEO tenure and firm size are also statistically significant.

In Panel C of table 5 (one year before the award), in all models, previous year annual return, CEO age, firm growth, and CEO ownership are all statistically significant (all positively except from CEO ownership) with long-term compensation, in all models. There is no difference in coefficients between firms that follow a quality management strategy and their controls except in the case of previous year ROE, since the interaction term between the award dummy and previous year ROE is statistically significant (at the 0.1 level) and positive denoting that firms that follow a quality management strategy link their long-term pay closer to previous year ROE.

In Panel D of table 5 (year of the award), CEO ownership is statistically significant and negatively associated to long-term pay, while firm size and growth are both statistically significant and positively associated to long-term pay in all models. Previous year ROE is statistically significant and positive in models 2 and 3. There is no difference in the coefficients of firms that follow a quality management strategy and control firms.

In summary, regarding long-term compensation, results are weaker than those of short-term compensation regarding the main variable of interest, i.e. the interaction term consisting of the product of the dummy that denotes whether a firm has won a quality award or not, and previous year sales is statistically significant in only one of the models. Thus, H2 is not supported.

5. CONCLUSIONS

In this study I examined the sensitivity of executive compensation to quality management (QM) related measures of performance. Specifically, I examined whether the sensitivity of (1) short-term executive compensation (i.e. salary and bonus), and (2) long-term executive compensation (i.e. sum of long-term investment plans, stock options and restricted stocks) to previous year's sales – as a proxy for customer oriented measures of performance – is higher for firms that pursue quality excellence.

By using data for a sample of 44 first-time Malcolm Balrdrige Quality Award (MBQA) winners or winners of a quality award explicitly based on the MBQA during the time period 1996-2006 and a matching sample, I show that after controlling for CEO and firm characteristics and performance, the sensitivity of short-term CEO compensation (salary plus bonus) and previous year sales during the early post-implementation period is higher for firms that pursue quality excellence. However, I find no difference in the sensitivity of award-winners vs. the control sample when it comes to short-term compensation during the quality management implementation period. Thus, short-term compensation seems to be utilized as a reward for winning the award and it is not used as a reward or incentive during quality management implementation.

In addition, the part of short-term pay that does not depend on any of the independent variables (i.e. the intercept) for the CEOs of firms that are into a quality management implementation process is lower two years before they win a quality award onwards. This could be due to the omission of variables in the model specification, i.e. to the omission of variables that represent quality management outcomes that according to the literature are used by firms that pursue quality excellence as a basis for reward systems that I had no access to. Possibly due to the same reason, I find no differences in sensitivity when it comes to long-term compensation neither.

Another result of interest is that while for the control sample CEO ownership is negatively related to short-term compensation, for firms that pursue quality excellence is in most cases positive or at least less negative. This could mean that there are less agency problems in a quality management context (Jensen and Meckling, 1976; Core et al., 1999),

or, it could mean that for firms that pursue quality management excellence, CEO ownership is linked to CEO power more so than for the control group.

My results provide some support for the consideration of quality management outcomes in executive compensation consistent with studies that suggest this for non-executive compensation (Ittner and Larcker, 1995; Strives et al, 1998; Said et al., 2003; Maiga and Jacobs, 2005; Van der Stede et al., 2006; Perego and Hartmann, 2009). On the other hand, the results of the study are limited by the lack of access to actual measures of quality management outcomes.

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Table 1: Sample selection

The table below presents a summary of the sample selection process. The database consists of 2714 of award receiving divisions/firms, paired with award-providing organizations and the time the award receiving organization was given an award. Thus, a firm winning an award from 2 different award-givers or at 2 different times has 2 records. Because of data availability reasons, this study focuses on publicly traded firms, so I was interested to match each division with its parent company. Each award receiver was looked up in the databases of Hoover's Online and Edgar Online (SEC Web site) in order to specify the corresponding parent organization at the time that the division was awarded, and to specify whether the parent organization is private, public, government owned or non-profit. I found that 634 out of the 2714 awards had gone to business divisions that actually belonged to 258 publicly traded firms. The remaining divisions belonged to either private, or not-for-profit, government or military organizations. For a few instances nothing could be found about a division, perhaps because those firms were too small or they may have been acquired by other firms or gone out of business. Having selected the awarded units that belong to publicly traded companies, I next researched the history of each awarded unit to verify that a) it had not changed hands and b) it had not turned from private to public or vice versa during the time period of interest. This was done in order to ensure data continuity. There are 134 unique American publicly traded firms listed on NYSE, NASDAQ and AMEX that received a quality award during 1996-2006 (maybe for first time, maybe for 2nd or 3rd and so on). From these, I selected 78 firms that had won their first quality award during 1996-2006. It was verified through the firm's history that these firms had not won any quality awards through any of their other divisions, ever before. From these 78 firms, 15 were eliminated from the sample due to lack of data (6 firms had no financial data, while 9 firms did not have proxy data available for the time period of interest). Nineteen firms were removed because there was not sufficient executive compensation data for them on the ExecuComp database. Thus, the final primary sample consists of 44 publicly traded firms that won a quality award for the first time during 1996-2006.

Awards received (by divisions or organizations)	2714 awards
Awards received by publicly traded firms	634 awards
Number of publicly traded firms that won those 634 awards	258 firms
Unique publicly traded listed firms that received a quality award during 1996-2006	134 firms
Firms that won their first award in 1996-2006	78 firms
Eliminated due to lack of financial data	6 firms
Eliminated due to lack of proxy data	9 firms
Eliminated due to lack of sufficient executive compensation data	19 firms
Remaining Usable Quality Award Winners	**44 firms**

Table 2: Descriptive statistics

This table presents comparisons of means between the two sub-samples (award winners and their matching counterparts) for two years before effective quality management implementation (-2 and -1) and two years after (0 and +1). Short-term compensation is the sum of salary and bonus; salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year; long-term compensation is the sum of LTIP, options, and restricted stock grants. LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year; long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders') during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1); size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio.

Table 2: Descriptive statistics

		Means					Medians				
Variable	Year	Awarded	Non-awarded	Difference		Pr(|T| > |t|)	Awarded	Non-awarded	Difference		z-score
Short-term compensation	-3	1966.324	1712.716	253.608		0.290	1284.110	1115.851	168.259		1.503
	-2	2154.094	1852.036	302.058		0.310	1400.000	1278.353	121.647		0.900
	-1	2201.250	1922.183	279.067		0.428	1432.490	1477.608	-45.118		1.394
	0	2307.958	1599.840	708.119	**	0.019	1507.500	1129.106	378.394	**	2.136
Long-term compensation	-3	4674.875	4674.875	-431.661		0.798	1250.295	1607.340	-357.045		-0.097
	-2	3587.722	4517.582	-929.860		0.549	1176.757	1213.412	-36.655		-0.065
	-1	8646.940	4568.720	4078.220		0.118	2467.642	1477.608	990.034		1.350
	0	11961.400	4419.880	7541.520		0.150	2087.755	1863.142	224.613		0.493
CEO age	-3	75.426	74.444	0.981		0.909	59.000	58.000	1.000		-0.026
	-2	76.638	76.311	0.327		0.908	60.000	60.000	0.000		-0.174
	-1	77.333	77.578	-0.244		0.876	61.000	60.000	1.000		0.133
	0	78.535	78.786	-0.251		0.639	56.000	58.000	-2.000		0.410
CEO tenure	-3	6.310	10.181	-3.871	**	0.041	5.003	6.042	-1.039		-1.308
	-2	6.207	8.484	-2.277		0.170	5.067	5.088	-0.021		-0.517
	-1	5.532	7.683	-2.151		0.175	4.552	4.568	-0.016		-0.779
	0	5.235	7.438	-2.203	*	0.076	4.553	4.983	-0.430		-0.901
CEO ownership	-3	1.137	1.907	-0.770		0.440	0.136	0.322	-0.186	*	-1.848
	-2	0.977	2.049	-1.072		0.277	0.089	0.255	-0.165	**	-2.004
	-1	0.815	1.949	-1.134		0.239	0.089	0.224	-0.135	**	-2.183
	0	1.469	1.731	-0.262		0.835	0.134	0.218	-0.084		-1.275
Growth (Market/Book)	-3	3.227	2.854	0.373		0.479	2.176	1.900	0.276		1.106
	-2	3.368	3.075	0.293		0.652	2.206	2.234	-0.028		0.264
	-1	3.932	3.476	0.456		0.706	2.875	2.273	0.601		0.784
	0	4.786	2.765	2.020		0.121	2.805	1.938	0.867		1.627
Sales (t-1)	-3	7828.488	6354.241	1474.247		0.362	3796.468	2281.307	1515.161		1.429
	-2	8044.452	6967.693	-0.735		0.530	4000.625	2337.958	1662.667		1.348
	-1	8845.148	7499.541	1345.607		0.475	4254.556	2374.462	1880.094		1.312
	0	10604.869	7579.796	3025.073		0.208	4565.594	2559.246	2006.348		1.268
ROE (t-1)	-3	0.131	0.112	0.020		0.520	0.129	0.124	0.005		0.662
	-2	0.133	0.127	0.005		0.853	0.141	0.125	0.016		0.696
	-1	0.155	0.110	0.045		0.106	0.144	0.110	0.034		0.916
	0	0.120	0.072	0.048		0.222	0.130	0.105	0.026	*	1.883
Stock returns (ln) (t-1)	-3	-0.063	-0.006	-0.057		0.525	0.964	0.695	0.269		0.510
	-2	-0.035	0.056	-0.091		0.228	0.998	0.556	0.441		-0.916
	-1	0.071	0.022	0.049		0.524	1.076	0.531	0.545		-1.114
	0	-0.011	-0.114	0.103		0.224	1.100	0.598	0.502		0.887
Risk (Debt/Equity)	-3	2.307	2.211	0.096		0.558	1.303	1.374	-0.071		-0.556
	-2	2.467	2.159	0.308		0.676	1.194	1.468	-0.275		-0.510
	-1	2.462	2.083	0.379		0.542	1.387	1.465	-0.078		-0.034
	0	2.380	2.198	0.182		0.754	1.203	1.522	-0.318		-0.246
Size	-3	906.313	884.417	21.896		0.816	945.500	885.000	60.500		0.169
	-2	891.458	965.042	-73.583		0.432	951.500	1019.500	-68.000		-0.806
	-1	948.771	887.000	61.771		0.517	1052.000	926.500	125.500		0.542
	0	950.604	947.000	3.604		0.970	1118.500	978.000	140.500		0.022

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Table 3: Correlations (Pearson and Spearman)

This table presents pairwise Pearson correlations (below the diagonal) and Spearman correlations (above the diagonal) between compensation data and performance, as well as corporate governance variables (n=88). Salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year; short-term compensation is the sum of salary and bonus; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year; long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; award dummy is a dummy that takes the value of 1 firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year and serves as a proxy of CEO power and quality; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders') during the previous fiscal year; Sales t-1 is the firm's turnover during the previous fiscal year; Stock Return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel A: year = -3

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Short Term Compensation	[1]	1	0.433***	0.164	0.602***	0.007	0.373***	0.204*	0.251**	0.193*	0.522***	0.134	-0.148	-0.201*
Long Term Compensation	[2]	0.220	1	-0.011	0.345***	-0.053	0.067	0.208*	0.333***	0.144	0.373***	-0.158	0.298***	-0.243**
Award dummy	[3]	0.116	-0.028	1	0.147	0.053	0.143	0.068	0.114	-0.058	0.055	-0.145	-0.003	-0.208
Sales t-1	[4]	0.509***	0.13	0.118	1	-0.074	0.48***	0.153	0.04	0.47***	0.843***	0.052	-0.116	-0.329***
Stock Return t-1	[5]	-0.036	0.07	0.059	0.007	1	0.351***	-0.108	0.12	0.028	-0.008	-0.122	0.096	0.054
Stock Return t-1 (ln)	[6]	0.418***	0.238**	0.069	0.518***	0.149	1	0.108	0.18*	0.276**	0.474***	-0.091	-0.11	-0.367***
ROE t-1	[7]	0.101	-0.117	0.099	0.02	-0.101	0.174*	1	0.478***	-0.028	0.095	0.045	0.084	-0.005
Growth (Market/Book)	[8]	0.116	0.36***	0.073	-0.092	0.054	0.071	0.264**	1	-0.202*	0.044	0.076	-0.004	0.084
Risk (Debt/Equity)	[9]	0.240**	0.127	0.015	0.378***	0.158	0.390***	0.043	-0.179*	1	0.623***	-0.139	0.113	-0.226**
Size (Total Assets)	[10]	0.328***	0.301***	0.038	0.525***	0.185*	0.729***	0.052	-0.064	0.692***	1	0.115	-0.005	-0.295***
CEO tenure	[11]	0.121	-0.085	-0.227	-0.001	-0.143	-0.088	0.043	-0.023	-0.062	0.051	1	-0.357***	0.395***
CEO age	[12]	-0.158	0.261**	0.013	-0.045	0.14	0.042	0.057	0.037	0.157	0.136	-0.478***	1	-0.162
CEO ownership	[13]	-0.208*	-0.151	-0.118	-0.167	0.069	-0.203*	0.083	-0.037	-0.135	0.004	0.346	-0.098	1

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 3 continued next page)

(continued) Table 3: Correlations (Pearson and Spearman)

This table presents pairwise Pearson correlations (below the diagonal) and Spearman correlations (above the diagonal) between compensation data and performance, as well as corporate governance variables (n=88). Salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year; short-term compensation is the sum of salary and bonus; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year; long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; award dummy is a dummy that takes the value of 1 firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year and serves as a proxy of CEO power and quality; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders') during the previous fiscal year; Sales t-1 is the firm's turnover during the previous fiscal year; Stock Return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel B: year = -2

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Short Term Compensation	[1]	1	0.478***	0.095	0.629***	-0.035	0.482***	0.186	0.212*	0.27**	0.546***	0.119	-0.138	-0.179
Long Term Compensation	[2]	0.268**	1	-0.007	0.215**	-0.151	0.049	0.299	0.303**	0.153	0.363***	-0.21**	0.218**	-0.204**
Award dummy	[3]	0.108	-0.064	1	0.138	-0.094	0.116	0.071	0.027	-0.053	0.038	-0.055	-0.018	-0.221**
Sales t-1	[4]	0.58***	0.077	0.094	1	-0.133	0.473***	0.151	0.045	0.421***	0.815***	0.161	-0.129	-0.322***
Stock Return t-1	[5]	-0.01	-0.187*	-0.066	-0.041	1	0.295***	-0.045	0.178*	-0.069	-0.16	-0.1	-0.203*	0.1
Stock Return t-1 (ln)	[6]	0.626***	0.069	0.079	0.532***	0.082	1	0.191	0.219**	0.254**	0.43***	0.116	-0.23**	-0.248**
ROE t-1	[7]	0.164	-0.074	0.066	0.055	-0.008	0.16	1	0.523***	0.039	0.175*	0.157	-0.113	0.183*
Growth (Market/Book)	[8]	0.035	0.202*	0.047	-0.092	0.232	0.133	0.397	1	-0.212**	0.02	0.061	0.017	0.096
Risk (Debt/Equity)	[9]	0.247**	0.072	0.044	0.344***	-0.166	0.2*	0.079	-0.153	1	0.61***	0.018	0.02	-0.083
Size (Total Assets)	[10]	0.554***	0.205*	0.035	0.537***	-0.108	0.578**	0.049	-0.075	0.627***	1	0.174	-0.048	-0.312***
CEO tenure	[11]	0.116	-0.134	-0.148	0.094	-0.051	-0.01	0.118	-0.036	0	0.11	1	-0.239**	0.37***
CEO age	[12]	-0.112	0.341***	-0.012	-0.093	-0.182	-0.058	-0.144	0.095	0.096	0.103	-0.425***	1	-0.194*
CEO ownership	[13]	-0.204*	-0.094	-0.174	-0.127	-0.044	-0.206*	0.123	0.074	-0.049	0.012	0.401	-0.087	1

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 3 continued next page)

(continued) Table 3: Correlations (Pearson and Spearman)

This table presents pairwise Pearson correlations (below the diagonal) and Spearman correlations (above the diagonal) between compensation data and performance, as well as corporate governance variables (n=88). Salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year; short-term compensation is the sum of salary and bonus; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year; long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; award dummy is a dummy that takes the value of 1 firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year and serves as a proxy of CEO power and quality; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders') during the previous fiscal year; Sales t-1 is the firm's turnover during the previous fiscal year; Stock Return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel C: year = -1

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Short Term Compensation	[1]	1	0.468***	0.146	0.577***	0.059	0.41***	0.345***	0.218**	0.227**	0.528***	0.247**	-0.084	-0.178*
Long Term Compensation	[2]	0.32***	1	0.142	0.29***	0	0.113	0.25**	0.228**	0.281***	0.375***	-0.074	0.272***	-0.216**
Award dummy	[3]	0.084	0.168	1	0.135	-0.114	0.077	0.094	0.08	-0.004	0.047	-0.083	0.014	-0.234**
Sales t-1	[4]	0.362***	0.062	0.065	1	0.201*	0.547***	0.285***	0.038	0.331***	0.826***	0.196*	-0.186*	-0.115
Stock Return t-1	[5]	0.039	0.055	-0.124	0.198*	1	0.534***	0.188*	0.19*	-0.026	0.122	0.05	-0.042	-0.045
Stock Return t-1 (ln)	[6]	0.509***	0.033	0.083	0.528***	0.182*	1	0.408***	0.151	0.217**	0.47***	0.107	-0.102	-0.202*
ROE t-1	[7]	0.209**	0.152	0.019	0.126	0.239**	0.242**	1	0.496***	0.1	0.197*	0.043	-0.055	-0.044
Growth (Market/Book)	[8]	0.113	0.494***	0.056	-0.046	0.233**	0.069	0.514***	1	-0.23**	0.036	0.09	-0.035	0.015
Risk (Debt/Equity)	[9]	0.29***	0.117	0.064	0.294***	-0.03	0.37***	0.069	-0.152	1	0.548***	0.025	-0.001	0.044
Size (Total Assets)	[10]	0.472***	0.073	0.047	0.537***	0.013	0.764***	0.066	-0.069	0.655***	1	0.222**	-0.064	-0.199*
CEO tenure	[11]	0.106	0.068	-0.143	0.142	-0.04	0.082	0.042	0.023	-0.04	0.156	1	-0.288***	0.239**
CEO age	[12]	-0.057	0.136	0.016	-0.163	0.033	0.009	-0.105	0.073	0.105	0.081	-0.431***	1	-0.256**
CEO ownership	[13]	-0.147	0.079	-0.186	0.007	0.149	-0.165	0.023	0.244**	-0.074	0.027	0.302***	-0.153	1

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 3 continued next page)

(continued) Table 3: Correlations (Pearson and Spearman)

This table presents pairwise Pearson correlations (below the diagonal) and Spearman correlations (above the diagonal) between compensation data and performance, as well as corporate governance variables (n=88). Salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year; short-term compensation is the sum of salary and bonus; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year; long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; award dummy is a dummy that takes the value of 1 firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year and serves as a proxy of CEO power and quality; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders') during the previous fiscal year; Sales t-1 is the firm's turnover during the previous fiscal year; Stock Return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel D: year = 0

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Short Term Compensation	[1]	1	0.534***	0.224**	0.582***	-0.049	0.405***	0.163	0.293***	0.167	0.563***	0.086	-0.005	-0.245
Long Term Compensation	[2]	0.376***	1	0.052	0.368***	0.013	0.332***	0.339***	0.45***	0.041	0.481***	0.038	0.187	-0.27
Award dummy	[3]	0.248**	0.155	1	0.13	0.091	0.123	0.193*	0.167	-0.025	0.08	-0.095	0.043	-0.135
Sales t-1	[4]	0.526***	0.169	0.074	1	-0.149	0.421***	0.187*	0.211**	0.37***	0.834***	0.184*	-0.235	-0.088
Stock Return t-1	[5]	-0.029	0.108	0.066	-0.064	1	0.364***	-0.137	0.048	-0.04	-0.101	-0.194*	0.246	-0.016
Stock Return t-1 (ln)	[6]	0.592***	0.081	0.082	0.455***	0.061	1	0.274***	0.222**	0.177*	0.409***	0.035	-0.091	-0.296
ROE t-1	[7]	0.199*	0.417***	0.166	0.046	-0.056	0.166	1	0.591***	-0.133	0.114	0.02	-0.024	-0.011
Growth (Market/Book)	[8]	0.296***	0.773***	0.16	0.088	0.034	0.042	0.647***	1	-0.278***	0.167	-0.087	0.058	-0.227
Risk (Debt/Equity)	[9]	0.236	0.036	0.032	0.282***	0.069	0.451***	-0.051	-0.12	1	0.548***	0.029	-0.112	0.079
Size (Total Assets)	[10]	0.499	0.064	0.042	0.534***	0.088	0.842***	0.038	-0.043	0.661***	1	0.21**	-0.104	-0.146
CEO tenure	[11]	0.017	-0.095	-0.149	0.178*	-0.007	0.111	0.001	-0.051	0.021	0.204*	1	-0.296	0.301
CEO age	[12]	-0.042	0.143	0.05	-0.2*	0.189*	0.017	0.095	0.121	0.046	0.043	-0.449***	1	-0.168
CEO ownership	[13]	-0.181	0.225**	-0.118	0.137	-0.009	-0.144	0.139	0.244**	-0.048	0.062	0.409***	-0.173	1

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Table 4: Regressions with short term compensation as dependent variable

This table presents regressions with short term compensation as the dependent variable. Short-term compensation is the sum of salary and bonus; salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel A: year - 3

		Model 1			Model 2			Model 3		
Dep.: Short term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-0.210		-0.220	-1.164		-1.160
Award dummy * Sales (t-1)	+				0.035		0.300	0.151		1.180
Award dummy * Annual return (t-1)	-							-0.014		-0.930
Award dummy * ROE (t-1)	-							-1.397		-1.290
Award dummy * CEO ownership	+/-							0.651	***	2.980
Sales (t-1)	+	0.287	**	2.480	0.263	**	2.160	0.201		1.450
Annual return (ln)	+	0.015	*	1.870	0.015	*	1.800	0.019	*	1.690
ROE (t-1)	+	0.012		0.020	0.057		0.100	0.403		0.580
CEO ownership	+/-	-0.227		-1.280	-0.219		-1.280	-0.457	**	-2.380
CEO age	+	0.000		0.030	0.000		0.040	-0.004		-0.430
CEO tenure	+	0.008		0.880	0.008		0.980	0.015	*	1.790
Size (total assets, ln)	+	-0.094		-0.640	-0.090		-0.600	-0.024		-0.210
Growth (market/book)	+	0.052	**	2.240	0.050	**	2.170	0.053	**	2.080
Risk (debt/equity)	+	0.027		1.020	0.026		0.960	0.014		0.720
Intercept		5.331	***	5.370	5.445	***	4.980	5.094	***	5.190
Adjusted R-square=		0.347			0.331			0.414		
n=		88			88			88		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 4 continued next page)

(continued) Table 4: Regressions with short term compensation as dependent variable

This table presents regressions with short term compensation as the dependent variable. Short-term compensation is the sum of salary and bonus; salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel B: year -2

		Model 1			Model 2			Model 3		
Dep.: Short term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-0.963		-0.900	-2.328	*	-1.700
Award dummy * Sales (t-1)	+				0.124		0.940	0.252		1.550
Award dummy * Annual return (t-1)	-							-0.010		-0.310
Award dummy * ROE (t-1)	-							-0.158		-0.120
Award dummy * CEO ownership	+/-							0.969	*	1.830
Sales (t-1)	+	0.421	*	1.750	0.372		1.660	0.308		1.350
Annual return (ln)	+	0.037		1.590	0.038		1.640	0.040		1.240
ROE (t-1)	+	0.428		0.860	0.489		0.980	-0.006		-0.010
CEO ownership	+/-	-0.531		-1.480	-0.513		-1.460	-0.877	*	-1.780
CEO age	+	0.007		0.660	0.007		0.640	-0.001		-0.080
CEO tenure	+	0.022		0.840	0.022		0.840	0.033		1.200
Size (total assets, ln)	+	-0.241		-0.820	-0.255		-0.870	-0.201		-0.750
Growth (market/book)	+	-0.009		-0.250	-0.013		-0.330	-0.012		-0.280
Risk (debt/equity)	+	0.011		0.510	0.010		0.430	0.006		0.270
Intercept		6.236	***	4.890	6.702	***	4.480	6.307	***	4.440
Adjusted R-square=		0.251			0.236			0.299		
n=		88			88			88		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 4 continued next page)

(continued) Table 4: Regressions with short term compensation as dependent variable

This table presents regressions with short term compensation as the dependent variable. Short-term compensation is the sum of salary and bonus; salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel C: year -1

		Model 1			Model 2			Model 3		
Dep.: Short term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-2.497	*	-1.670	-4.304	**	-2.360
Award dummy * Sales (t-1)	+				0.336	*	1.770	0.524	**	2.090
Award dummy * Annual return (t-1)	-							-0.021		-0.930
Award dummy * ROE (t-1)	-							-0.739		-0.450
Award dummy * CEO ownership	+/-							1.452	***	3.190
Sales (t-1)	+	0.310		1.240	0.150		0.570	0.062		0.210
Annual return (ln)	+	0.032	*	1.980	0.032	**	2.050	0.046	*	1.880
ROE (t-1)	+	0.495		0.790	0.947		1.210	1.244		0.840
CEO ownership	+/-	-0.807	**	-2.410	-0.720	**	-2.360	-1.156	***	-3.040
CEO age	+	0.007		0.570	0.008		0.670	0.007		0.650
CEO tenure	+	0.035		1.500	0.036		1.530	0.052	**	2.090
Size (total assets, ln)	+	-0.309		-1.170	-0.313		-1.220	-0.279		-1.190
Growth (market/book)	+	0.035		0.990	0.011		0.360	-0.031		-1.240
Risk (debt/equity)	+	0.066	**	2.040	0.047	*	1.750	0.029		1.030
Intercept		7.277	***	5.750	8.569	***	4.900	9.115	***	4.710
Adjusted R-square=		0.223			0.242			0.357		
n=		88			88			88		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 4 continued next page)

(continued) Table 4: Regressions with short term compensation as dependent variable

This table presents regressions with short term compensation as the dependent variable. Short-term compensation is the sum of salary and bonus; salary is the dollar value of the base salary earned by the chief executive officer (CEO) during the fiscal year; bonus is the dollar value of a bonus earned by the CEO during the fiscal year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel D: year 0

		Model 1			Model 2			Model 3		
Dep.: Short term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-2.716	**	-2.060	-3.181	**	-2.000
Award dummy * Sales (t-1)	+				0.351	**	2.070	0.395	*	1.930
Award dummy * Annual return (t-1)	-							-0.013		-0.620
Award dummy * ROE (t-1)	-							-0.519		-0.520
Award dummy * CEO ownership	+/-							1.057	**	2.260
Sales (t-1)	+	0.230		1.250	0.099		0.500	0.074		0.360
Annual return (ln)	+	0.018		1.250	0.019		1.480	0.033		1.270
ROE (t-1)	+	-0.734		-1.270	-0.664		-1.150	-0.307		-0.480
CEO ownership	+/-	-1.225	***	-2.750	-1.169	***	-2.910	-1.279	***	-2.850
CEO age	+	0.011		1.160	0.009		0.970	0.005		0.500
CEO tenure	+	0.040		1.400	0.041		1.500	0.042		1.470
Size (total assets, ln)	+	-0.087		-0.410	-0.131		-0.590	-0.114		-0.500
Growth (market/book)	+	0.073	***	2.910	0.065	***	3.100	0.030	*	1.870
Risk (debt/equity)	+	0.007		0.200	0.000		0.000	-0.021		-0.550
Intercept		6.613	***	6.110	7.767	***	5.110	7.659	***	4.790
Adjusted R-square=		0.348			0.376			0.379		
n=		88			88			88		

*, **, ***: statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 4 continued next page)

Table 5: Regressions with long term compensation as dependent variable

This table presents regressions with long term compensation as the dependent variable. Long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period. Panel A: year -3

		Model 1			Model 2			Model 3	
Dep.: Long term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.	
Award dummy	?				-5.785	*	-1.810	-6.133	*
Award dummy * Sales (t-1)	+				0.604		1.650	0.679	*
Award dummy * Annual return (t-1)	-							0.016	
Award dummy * ROE (t-1)	-							-3.761	
Award dummy * CEO ownership	+/-							0.629	
Sales (t-1)	+	0.453		1.500	0.353		1.050	0.301	
Annual return (ln)	+	0.026		0.840	0.023		0.770	0.038	
ROE (t-1)	+	-0.200		-0.080	0.610		0.260	2.334	
CEO ownership	+/-	-1.310	***	-3.330	-1.205	***	-3.130	-1.419	**
CEO age	+	0.112	***	3.550	0.104	***	3.450	0.102	***
CEO tenure	+	0.003		0.060	-0.013		-0.330	-0.005	
Size (total assets, ln)	+	0.281		0.790	0.148		0.420	0.203	
Growth (market/book)	+	0.343	***	3.660	0.338	***	3.630	0.357	***
Risk (debt/equity)	+	-0.016		-0.210	-0.016		-0.220	-0.023	
Intercept		9.041	***	3.070	10.666	***	3.530	10.314	***
Adjusted R-square=		0.432			0.462			0.444	
n=		88			88			88	

*, **, ***: statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 5 continued next page)

(continued) Table 5: Regressions with long term compensation as dependent variable

This table presents regressions with long term compensation as the dependent variable. Long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel B: year -2

		Model 1			Model 2			Model 3		
Dep.: Long term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-0.399		-0.090	-2.000		-0.410
Award dummy * Sales (t-1)	+				-0.044		-0.090	-0.024		-0.040
Award dummy * Annual return (t-1)	-							0.038		0.540
Award dummy * ROE (t-1)	-							4.544		0.940
Award dummy * CEO ownership	+/-							1.718	*	1.770
Sales (t-1)	+	-0.316		-0.580	-0.180		-0.290	-0.130		-0.190
Annual return (ln)	+	0.049		1.020	0.048		0.950	0.075	***	2.040
ROE (t-1)	+	5.275	*	1.960	5.342	**	2.150	1.656		0.540
CEO ownership	+/-	-0.863		-1.580	-0.934		-1.610	-1.632	***	-2.730
CEO age	+	0.045		1.100	0.044		1.060	0.018		0.420
CEO tenure	+	-0.105	*	-1.960	-0.107	**	-1.980	-0.095	*	-1.800
Size (total assets, ln)	+	0.897	*	1.790	0.809	**	1.680	0.866	*	1.790
Growth (market/book)	+	0.102		0.730	0.110		0.800	0.129		0.970
Risk (debt/equity)	+	-0.066		-1.040	-0.051		-0.810	-0.037		-0.560
Intercept		5.197		1.300	5.123		1.270	2.995		0.710
Adjusted R-square=		0.211			0.204			0.217		
n=		88			88			88		

*, **, ***: statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 5 continued next page)

(continued) Table 5: Regressions with long term compensation as dependent variable

This table presents regressions with long term compensation as the dependent variable. Long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel C: year -1

		Model 1			Model 2			Model 3		
Dep.: Long term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				3.817		0.990	3.754		0.840
Award dummy * Sales (t-1)	+				-0.417		-0.870	-0.290		-0.490
Award dummy * Annual return (t-1)	-							0.058		0.870
Award dummy * ROE (t-1)	-							8.779	*	1.750
Award dummy * CEO ownership	+/-							0.666		0.830
Sales (t-1)	+	0.517		1.100	0.614		1.080	0.357		0.560
Annual return (ln)	+	0.067	*	1.890	0.069	*	1.880	0.114	*	1.820
ROE (t-1)	+	2.057		0.790	1.712		0.580	6.268		1.580
CEO ownership	+/-	-1.897	***	-4.590	-1.919	***	-4.880	-2.069	***	-3.670
CEO age	+	0.089	***	2.740	0.088	**	2.620	0.099	***	2.820
CEO tenure	+	0.026		0.540	0.029		0.600	0.047		0.930
Size (total assets, ln)	+	0.194		0.440	0.262		0.590	0.476		1.030
Growth (market/book)	+	0.223	***	3.530	0.238	***	3.360	0.223	***	3.000
Risk (debt/equity)	+	0.148		1.200	0.157		1.230	0.112		0.900
Intercept		6.846	**	2.390	5.244		1.310	5.896		1.370
Adjusted R-square=		0.301			0.295			0.293		
n=		88			88			88		

*, **, ***: statistically significant at the 0.10, 0.05 and 0.01 level, respectively

(Table 5 continued next page)

(continued) Table 5: Regressions with long term compensation as dependent variable

This table presents regressions with long term compensation as the dependent variable. Long-term compensation is the sum of LTIP payouts, option value, and restricted stock grant; LTIP payouts is the amount paid out to CEO under the company's long-term incentive plan; option value is the value of the option grant using a modified Black-Scholes method; restricted stock grant is the value of restricted stock granted during the year. The independent variables are: award dummy is a dummy that takes the value of 1 if firm won a quality award, zero otherwise; CEO tenure is the tenure of the CEO measured as the number of years that the CEO has been in the CEO position by the end of the fiscal year; CEO age is the age of the CEO; CEO ownership is the CEO's share holdings as a percentage of shares outstanding; ROE t-1 is the accounting return on equity (i.e. net profit/shareholders' equity) during the previous fiscal year; sales t-1 is the firm's turnover during the previous fiscal year; stock return t-1 (ln) is the logarithmic return, i.e. ln(stock price t / stock price t-1), while stock return t-1 is the arithmetic return; size (assets, ln) is the natural logarithm of the firm's total assets; growth is the market to book ratio, i.e the firm's market value divided by book value; risk is the firm's debt to equity ratio. Panels A, B, C, and D present years -3, -2, -1, 0 respectively, where year 0 is the year when the firm won a quality award. Years -3 and -2 belong to the quality management implementation period, while years -1 and 0 belong to the post-implementation period.

Panel D: year 0

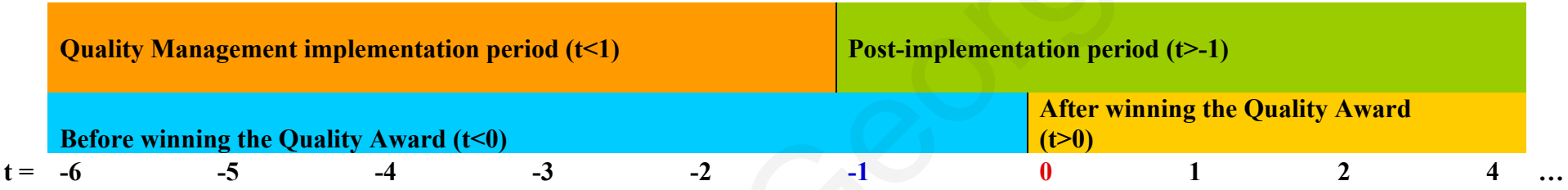
		Model 1			Model 2			Model 3		
Dep.: Long term compensation (ln)	Expected sign	Coef.		t	Coef.		t	Coef.		t
Award dummy	?				-1.710		-0.480	-1.049		-0.270
Award dummy * Sales (t-1)	+				0.082		0.200	0.035		0.070
Award dummy * Annual return (t-1)	-							0.048		1.010
Award dummy * ROE (t-1)	-							1.735		0.290
Award dummy * CEO ownership	+/-							-0.454		-0.240
Sales (t-1)	+	-0.737		-1.290	-0.662		-1.120	-0.604		-0.990
Annual return (ln)	+	0.006		0.200	0.004		0.140	0.043		0.860
ROE (t-1)	+	3.665		1.550	3.948	*	1.850	3.620	*	1.900
CEO ownership	+/-	-1.887	***	-2.690	-2.059	***	-2.890	-2.079	**	-2.600
CEO age	+	0.036		1.100	0.037		1.140	0.040		1.210
CEO tenure	+	-0.020		-0.350	-0.026		-0.450	-0.022		-0.370
Size (total assets, ln)	+	1.305	**	2.550	1.246	**	2.390	1.248	**	2.330
Growth (market/book)	+	0.147	***	3.330	0.156	***	3.610	0.164	*	1.820
Risk (debt/equity)	+	-0.155		-1.550	-0.152		-1.440	-0.131		-1.120
Intercept		4.319	*	1.790	4.787		1.620	4.635		1.480
Adjusted R-square=		0.273			0.282			0.257		
n=		88			88			88		

*, **, *** : statistically significant at the 0.10, 0.05 and 0.01 level, respectively

Appendix 1: The Quality Management Implementation timeline

We define the year that a firm has won the Malcolm Baldrige Quality Award or a State Quality Award explicitly based on the Baldrige, as year t = 0. Hendricks and Singhal (2001) assume that QM implementation is effective 12 months before the time of winning the first quality award; thus one year before year t = 0, that is, year t = -1 is considered to be the year when quality management implementation was effective. Then, the time period before year t=-1 fall into the quality management implementation period, while thus years from year -1 onwards fall into the post-implementation period.

It can take from 3 to 5 years to implement a quality management program effectively (Hockman, 1992). Therefore, the "quality management implementation period" *starts* somewhere between year t=-5, and year t=-3 and ends at t=-1.



CHAPTER 3

ESSAY III (A)

Web Perceived Service Quality and the Performance of B2C Pure Internet Firms in Financial Markets

Essay III (A)

Web perceived service quality and the performance of pure B2C Internet firms in financial markets

ABSTRACT

This study documents the value relevance of the quality of services offered through the Web site of an Internet firm. Although prior evidence shows that quality can be value enhancing for firms, no previous study considered online quality to be a candidate as a driver of Internet firm stock prices. I employ a log-linear regression model to investigate the relationship between Web perceived service quality metrics and financial metrics of B2C pure Internet companies for a sample of 278 firm-quarters over the period 1996-1999. Results indicate that Web perceived service quality affects the market value of B2C pure Internet firms over and above fundamentals and Web traffic. Specifically, concerning Web perceived service quality, the analysis shows a positive relationship between the market value of an Internet firm and, (*i*) perceived trust and, (*ii*) the interactive capabilities of its Web site. According to previous research these two can be viewed as switching barriers or/and overall satisfaction enhancers which in turn increase customer retention for Internet firms. Thus, I conclude that the market values the ability of Internet firms to retain customers over and above fundamentals and over and above their ability to attract customers.

1. INTRODUCTION

This study is based on the hypothesis that an important value driver for an Internet firm is the quality of services offered through its Web site. Service quality in general has been shown to create value for firms through customer base enhancement and by increasing customer loyalty and retention (Heskett et al., 1994; Odekerken-Schröder et al., 2001; Venetis and Ghauri, 2004). For Internet firms specifically, it has been shown that the actual conversion of Web site traffic to sales, the volume and frequency of customer purchases, as well as customer retention depend on the quality of the online experience, which can provide a competitive edge to Internet firms (Kotha et al., 2004; Hahn and Kauffman, 2003). Particularly for online businesses perceived service quality has been shown to enhance customer retention through increasing overall satisfaction (Tsai, Huang, Jaw, and Chen, 2006).

Although literature on the drivers of Internet firm stock prices has already employed non-financial metrics in evaluation, the focus has been on metrics that proxy for the ability of Internet firms to attract customers (e.g. Web traffic metrics); yet, studies have so far failed to address the possible impact of the ability of these firms to retain the customers they may attract. Based on the association of quality and customer retention, one should expect that online quality metrics may serve as a valuable input when evaluating Internet firm stock. Despite the abundance of literature on the value drivers of Internet stocks on one hand and the evidence concerning the role of quality as a firm value creator on the other, the relationship between quality and Internet stock prices has not been investigated. In this study I investigate the relationship between quality and Internet stock prices and suggest that Web perceived service quality is an important value driver of Internet stock prices.

Employing non-financial metrics in firm valuation is not a new approach. Amir and Lev (1996) highlighted the complementarity between financial and non-financial measures by demonstrating that non-financial metrics are highly value relevant for wireless communication firms. A substantial body of research on the value drivers of Internet stocks has revealed that both non-financial and financial metrics are value relevant. In addition to basic accounting information (Hand, 2000; 2001), research also demonstrates that investors employ non-financial metrics when evaluating Internet firms in an effort to assess the firms' ability to generate profits in the future. For example, Web traffic (i.e. the number of people a Web site attracts), seen as a proxy for the ability of a firm to attract customers and create network effects, was found to be highly value relevant for the prices of Internet stocks in many studies

(Trueman et al., 2000; Kotha et al., 2003; Demers and Lev, 2001; Hand, 2001). Attracting customers and creating network effects increases the firm's customer base, thus creating value (Kotha et al., 2003).

I expect that in addition to the ability of a firm to attract customers, the ability of the firm to retain them is also value relevant. As already mentioned Quality has been shown to increase customer retention rates, loyalty and subsequently the firm's customer base (Heskett et al., 1994; Odekerken-Schröder et al., 2001; Venetis and Ghauri, 2004). And for Internet firms recent research exemplifies the role of service quality as well as the role of trust, community building and service personalization in customer retention since these elements can serve as switching barriers and overall satisfaction enhancers (Tsai et al., 2006). Thus, I hypothesize a positive and significant relationship between Web perceived service quality metrics and Internet stock prices and I expect to find that Web perceived service quality is value relevant over and above fundamentals and Web traffic.

This study provides an empirical linkage of Web perceived service quality and market value of equity. Specific questions examined include: (i) Is Web perceived service quality associated with market value? and (ii) Which specific dimensions of Web site perceived service quality - if any - associate with market value for Internet companies? To address these questions, I develop an instrument to measure service quality as this is perceived by visiting a firm's Web site and calibrate it using 72 pure[33] Internet companies. This instrument was used to obtain information regarding Web perceived service quality in order to relate it to the firm's market value. Furthermore, the quality assessment and the database I use are dated back at the so called Internet stock bubble period[34], a market bubble that left unanswered questions as it still remains a puzzle for investors and academics (Bhattacharya et al., 2009). It has been suggested that the origins of the current financial crisis can be traced back at the so-called dot-

[33]That is, firms that conduct all their business online, their revenues comes from online activities, they would not exist without the Internet and the service encounter occurs solely on the Web.

[34]The Internet stock market bubble has attracted much attention from both academia and the media. During that period from 1996 to early 2000, price-to-earnings ratios (or price-to-revenues in the complete absence of earnings in most cases) as well as market capitalizations of Internet firms were extremely high (Trueman, Wong, and Zhang, 2000). The Internet sector had earned over 1000% over its public equity during the two-year period from early 1998 through 2000 and Internet sector equaled 6 percent of the market capitalization of all U.S. public companies and 20 percent of all publicly traded equity volume (Ofek and Richardson, 2003). The Internet stock bubble (or "dotcom bubble" as it is usually referred to) burst on March 10, 2000, when NASDAQ reached a high of 5048.62, double than it was the year before that. During the spring of 2000 the NASDAQ fell by almost 35%, while during the same period the Internet Stock Index (ISDEX) fell more than 33%. Much research has been devoted to analyzing the causes and effects of the Internet stock bubble and its eventual burst. A large part of this research focused on understanding why in the case of Internet firms investors would spend fortunes to buy stock in Internet firms that had never realized a profit or in some cases were not even realizing revenues.

com bubble; the dot-com bubble has been in fact a landmark in financial history that contributed to the real-estate bubble and subsequently to the subprime mortgage crisis in the late 2007 (Smith, 2010; Faulkender et al. 2010).

This is also to keep the continuity with past research on Internet stock price drivers while demonstrating that quality metrics can have incremental explanatory power. Non-financial metrics were particularly important during the bubble period because as most firms were making losses than profits the market seemed to rely more on the perceived future profitability of an Internet firm rather on its current profitability. That is where quality and the ability of a firm to retain customers enter the picture.

The results indicate that Web perceived service quality does affect the value of Internet firms. Specifically, I demonstrate that: (i) Web perceived service quality is a major value driver of Internet stock prices and has incremental explanatory power over and above both financial and Web traffic metrics, and (ii) two specific quality dimensions, namely perceived *trust*, and *interactiveness* allowed by the Web site are shown to play an important role in explaining an Internet firm's market value. These two metrics can be viewed as switching barriers and/or satisfaction enhancers for Internet firms that increase customer retention according to recent research on the subject (Tsai et al., 2006). Thus, I conclude that the market values the ability of an Internet firm to retain its customers by imposing switching barriers and promoting customer satisfaction. Past literature has shown that switching barriers are important determinants of future profitability as they increase loyalty and tend to reduce competition (Klemperer, 1995). The positive contribution of customer satisfaction and profitability has also been documented (Heskett et al., 1994; Hallowell, 1996).

The study contributes to the existing literature in the following ways: (i) it provides solid evidence towards the linkage of perceived service quality with market value for the case of Internet firms, (ii) identifies specific dimensions that must be taken into consideration when designing a commercial Web site, (iii) reveals the importance of trust and interactiveness as switching barriers and/or satisfaction enhancers for Internet firms' market values and finally, (iv) develops and calibrates an instrument to measure Web perceived service quality specifically of B2C *pure* Internet companies. To the best of my knowledge no prior studies have demonstrated a linkage between online quality and market value.

The remainder of the paper is organized as follows: Section two provides a review of the literature relevant to this work. Specifically, I focus on literature that (i) identifies the value drivers of Internet stocks, (ii) explores quality and especially online quality and its value for

the firm, and (iii) examines conceptualization and measurement issues of online quality. Section three provides a detailed description of the methodology and data used, while section four presents the results of this study. Finally, a discussion of the results and concluding remarks follow in section five.

2. REVIEW OF THE LITERATURE

As there are three distinct literatures that I draw from in this study, this section is divided into three parts. The first part focuses on research exploring the value drivers of Internet stocks. The second presents theoretical underpinnings on quality and its value for the firm, highlighting the case of Internet firms, while the third focuses on literature on online quality conceptualization and measurement.

2.1 Value Drivers of Internet Stocks

In addition to fundamentals, non-financial metrics as well as unconventional financial measures have been highly employed in valuation models for Internet firms. This was because at first it seemed as if Internet stock prices could not be explained by fundamentals and conventional accounting measures. Bhattacharya et al. (2009) observe that though Internet firms that had their IPOs between 1992 and 2000 had very weak fundamentals, yet these IPOs had an impressive average first-day return of over 80%. Hand (2000) provides a description of the "conventional wisdom" presented early in popular and business press featuring Internet stock prices as "defying any form of valuation" and not being able to be explained by known "yardsticks". Thus, researchers turned to non-financial metrics in order to explain the high prices that Internet stocks reached during the Internet stock bubble era. Employing non-financial metrics to explain market behaviour was not new to accounting and finance research, especially when researching high growth technology sector firms. For example, Amir and Lev (1996) did the same for the wireless communication industry, finding non-financial metrics like population coverage and market penetration to be highly value relevant and moreover, highlighting the complementarity between financial and non-financial measures.

Similarly, for Internet firms, empirical evidence shows that both fundamentals as well as non-financial metrics play an important role in Internet stock valuation. The value relevance of non-financial metrics seems to be based either on the view that investors had blind faith in the Internet firm business model, or on the view that they rationally evaluated the future profitability of the firm based on non-financial data. For example, announcements of mere

corporate name changes to Internet related dot.com names (e.g. a name change from "ABC Inc." to "abc.com" or "abc.net") would cause striking positive stock price reactions and cumulative abnormal returns of 77% for the ten-day period surrounding the announcement day (Cooper et al., 2001). Moreover, this was not a transitory effect, and it existed regardless of the extent of the firm's involvement with the Internet. But it seems that investors looked beyond than just the name of the firm they were investing in. In the absence of earnings and profits during the Internet stock bubble era investors employed several non-financial metrics to proxy a firm's ability to produce revenues in the future. One proxy for the firm's ability to attract customers, and thus build future profitability is Web traffic which was found to be an important non-financial indicator of the market value of business-to-consumer (B2C) Internet firms (Kotha et al., 2003). Moreover, Web traffic metrics provide incremental explanatory power even when basic accounting data, like bottom-line net income fail to be associated with the firm's market prices (Trueman et al., 2000). Other studies also support the view that Web traffic is value-relevant to the share prices of Internet companies (Demers and Lev, 2001; Hand, 2001). Web traffic serves as a summary measure of the strategies that firms use to attract visitors to their Web sites and in addition, the stock market appears to use Web traffic as a measure of an Internet firm's ability to create valuable network effects[35] (Kotha et al., 2003). Moreover, Web traffic was found to be significantly positively priced not only during the Internet stock bubble, but both at and after the peak of Internet stock prices (Hand, 2001).

Less traditional methods based on accounting data have also been utilized by investors to value Internet stocks. In the absence of positive revenues and profits, investors seemed to pay more attention to alternative financial measures. For instance, investors would use gross profit as a less noisy measure of an Internet firm's profitability in the place of bottom-line net income; no significant association between bottom-line net income and market prices seemed to exist, but when decomposing net income in its major components, gross profit is positively and significantly associated with stock prices (Trueman et al., 2000). Moreover, investors valued expenditures for technology acquisition, customer acquisition and retention and research and development highly, not viewing them as expenses, but rather capitalizing them as investments that would eventually bring profits to Internet firms in the future; thus, it appeared as if the market rewarded losses and not profits, especially for online retailing or unprofitable firms (Hand, 2001; Trueman et al., 2000). This was reversed after the bubble

[35] Network effects occur when the value of a Web site to a visitor may depend on how many others visit that site (Kotha et al. , 2003)

burst as the market became more skeptical about the prospects of Internet firms (Hand, 2001; Demers and Lev, 2001). Furthermore, financial metrics that are not typically used as value drivers for well-established, non-Internet firms, like "cash burn"[36] served as good value driver of Internet stock prices (Demers and Lev, 2001). It seemed that even during the Internet stock bubble investors were not that irrational in valuing Internet stocks. They did seem to rely heavily on unconventional financial measures or on non-financial measures, though, as they appear to consider bottom-line figures provided by financial statements as inadequate for Internet stock valuation purposes.

Yet, there is sufficient evidence to show that traditional business valuation methods based on accounting fundamentals apply to Internet firms as well. With the use of log-linear models it can be demonstrated that basic accounting data are highly value-relevant albeit in a non-linear manner for Internet firms (Hand, 2000). Internet firms' market values were shown to be linear and increasing in book equity, concave and increasing in positive net income, but concave and decreasing in negative net income. Furthermore, Web traffic was found to be a major moderator of the relationship between fundamentals and market value of Internet firms (Hand, 2001).

In summary, market prices of Internet companies are affected by financial as well as by other metrics having to do with the firm's online presence that add value to a firm by increasing its customer base. In this study, I hypothesize that Web perceived service quality metrics are value relevant over and above fundamentals and Web traffic measures for an Internet firm's market value, as quality has been shown in previous studies to affect the value of a firm positively.

2.2 Quality of Services and its Value for the Firm

Several studies provide evidence that the quality of services offered by a firm is highly value relevant. Quality creates value through increasing customer loyalty and retention rates, thus increasing a firm's customer base (Heskett et al., 1994; Odekerken-Schröder et al., 2001; Venetis and Ghauri, 2004; Boulding et al., 1993). This can in turn lead to improved financial results, since customer loyalty is considered to be a major driver of profitability and growth (Heskett et al., 1994; Hallowell, 1996).

[36] Cash burn is calculated as net cash flow of operations divided by total revenues, and is a measure of the speed at which a firm is spending its cash holdings. The value relevance of "cash burn" indicates that the market did not favor unprofitable Internet firms that were fast spending their cash holdings (Demers and Lev, 2001).

Indeed, empirical evidence on the impact of quality on the firm's financial performance shows a positive relationship between the two. Highlighting some of the findings of relevant studies, it turns out that firms, which successfully implement a quality strategy do better on sales growth (Hendricks and Singhal, 1997; Fynes and Voss, 2001), are more successful in controlling costs, show higher growth in employment and total assets (Hendricks and Singhal, 1997), show higher ROI, earnings and market share (Fynes and Voss, 2001), and are clearly distinguishable in terms of financial performance (York and Miree, 2004). Furthermore, quality efforts seem to be viewed favorably by the stock market (Hendricks and Singhal, 1996, 2001; Nicolau and Sellers, 2002; Corbett et al., 2005).

Specifically for Internet firms, the quality of the online customer experience seems to play an important role in acquiring Web traffic and converting Web traffic to sales (Kotha et al., 2003). Better online experience was found to create value by increasing both purchase volume and the frequency of purchase transactions, as well as customer retention (Hahn and Kauffman, 2003). Kotha et al. (2004) using a sample of 46 e-commerce firms found a positive association between a widely acceptable measure of financial performance (Tobin's q), and a third-party composite score of online buying experience quality provided by Gomez.com. Specifically, customer confidence in the Web business and relationship services appear to provide a competitive edge for Internet firms (Kotha et al., 2004). A recent study by Tsai et al. (2006) finds that perceived service quality is an antecedent to overall satisfaction which along with switching barriers influences purchasing intentions. In the same framework, elements presented in other studies as dimensions of service quality such as trust and community building are also antecedents of either overall satisfaction or switching barriers for online businesses (Tsai et al., 2006).

Yet, the effect of online service quality on the market value of equity of an Internet firm has never been investigated. The main hypothesis is that quality, as a means to enhance loyalty and customer retention, and thus as a proxy for future profitability, is a major driver of Internet stock prices.

2.3 Conceptualization and Measurement of Online Quality

The first formal definition of electronic service quality (e-SQ) is given by Zeithaml et al. (2000) who define e-SQ as the extent to which a Web site facilitates efficient and effective shopping, purchasing and delivery of products and services. Parasuraman et al. (2005) further point out that studying online service quality (e-SQ) requires development of measurement

instruments extending beyond just adapting existing offline ones; the development of a quality instrument specific to measure the quality of services of online businesses has become a necessity during the years of e-commerce growth.

Since the appearance of e-commerce, many researchers have studied the dimensions of e-SQ (Zeithaml et al., 2000; Wolfinbarger and Gilly, 2003; Loiacono, Watson and Goodhue, 2007; Parasuraman et al., 2005; Collier and Bienstock, 2006). Though a lack of consensus in the literature as to how many dimensions e-SQ has, some studies find certain dimensions in common. Those concern issues of trust, privacy and security, Web site usability, reliability, interactivity and personalization capabilities of the Web site, responsiveness, and Web site aesthetics and experiential issues. In a review of the extant literature, Zeithaml et al. (2002) acknowledge five broad dimensions relevant to e-SQ perceptions, namely (a) information availability and content, (b) ease of use or usability, (c) privacy/security, (d) graphic style, and (e) reliability/fulfillment.

Many studies link e-SQ dimensions with visitors' perceptions concerning quality and furthermore with consumer behavioral intentions, mainly patronage behaviors, purchase intentions and loyalty. Vidgen and Barnes (2002) identified the Web site's "trustworthiness" as the most important dimension. Wolfinbarger and Gilly (2003) identify "reliability/fulfillment" as the strongest predictor of customer satisfaction, while they identify Web site "functionality" as the strongest predictor of the intention to purchase. Novak et al. (2000) find that task-oriented activities such as work and online search for product information and purchase, relate most strongly to skill and control. Their results suggest that interactivity metrics of duration time and browsing depth are positively correlated with a compelling online customer experience (Novak et al., 2000). One may conclude that certain Web site characteristics influence visitors' perceptions about the quality of services offered through the Web site, which in turn influence consumer attitudes and behavioral intentions.

Some studies have gone beyond examining what can be judged about the online service offered by just experiencing the Web site of the firm (e.g. the "process quality" of online services) to examining issues relating to the outcome of the online service experience (fulfillment) and to issues pertaining to service recovery (Wolfinbarger and Gilly, 2003; Parasuraman et al., 2005; Collier and Bienstock, 2006). For instance, in addition to a 22-item instrument (E-S-QUAL) measuring electronic service quality, Parasuraman et al. (2005) come up with a complementary 11-item measurement instrument that measures electronic service

recovery (E-RecS-QUAL) that applies to cases in which actual transactions have taken place and service recovery issues emerged. In this study however, I focus on the perception of quality as this is given to the visitor *through* the firm's Web site. As such, outcome quality and service recovery issues are beyond the scope of this study. The aim was to measure quality discernable from experiencing a firm's Web site, as this can be experienced and perceived not only by customers and prospective customers, but also by other stakeholders as well, such as by investors and potential investors.

3. DATA AND METHODOLOGY

This section describes the methodology employed in this study and the sources of data used. Before presenting the empirical log-linear valuation models used to associate Web perceived service quality (WPSQ) metrics to the market value of equity of these firms, I first describe how an instrument for measuring WPSQ was devised using factor analysis techniques and was used to gather WPSQ data for the sample of Internet firms.

3.1 Instrument Development

In order to develop an instrument for measuring Web perceived service quality (WPSQ), I first created a pilot questionnaire. After considering the relevant marketing and MIS literature, I identified 56 items relevant to e-commerce to include in the pilot questionnaire (Table 1). Data were gathered using online questionnaires administered to randomly selected business school students. Using mature business students as a sample is considered an appropriate, acceptable and widely used practice in Internet research (Collier and Bienstock, 2006; Yoo and Donthu, 2001). Factor analysis resulted in a questionnaire with nine dimensions (29 items) as shown in Table 2. Each dimension was represented by three or four items. The instrument passed both reliability and validity tests (convergent validity[37] tests and nomological or predictive

[37] To assess convergence validity, I checked correlations between the measurements associated with the dimensions of the questionnaire and two other independent measures of the same concept - namely "Overall Web Site Quality Impression" (OWSQI) and "Overall Web Site Service Quality Impression" (OWSSQI). Most correlations were found to be statistically significant at the 0.01 level, therefore ensuring the convergent validity of the instrument. OWSQI and OWSSQI were assessed by asking respondents to give a score for the Overall Site Quality and the Overall Quality of Services provided by the Web site using a scale from 1 to 7. Nine new variables based on the nine dimensions of the instrument were created. Each variable consisted from the average score of each dimension (i.e. the sum of the scores of the items included in a dimension divided by the number of items in the dimension). Those were regressed on the OWSQI measure as well as on the OWSSQI provided by the Web site measure to reveal statistically significant correlations.

validity[38] tests), indicating that the WPSQ instrument was appropriate to be used for evaluating the Web perceived service quality levels of Internet companies.

3.2 Data Collection

Using the above described questionnaire, I gathered WPSQ data for a sample of Internet companies as described below. Financial data were collected using Compustat and Web traffic data were collected using a third-party service (Nielsen/NetRatings Audience Measurement Service). A more detailed description of the data collection procedure follows.

3.2.1 Sample selection

The company sample was selected from Internet.com's InternetStockList™. In this study, I adopt the approach followed by Internet.com and define an Internet company as a company that generates 51% or more of its revenues from online activities. Five out of the twelve categories comprising the Internet Stock Index (ISDEX) were selected, namely, "E-tailers", "Search and Portal", "ISP/Access", "Internet Services" and "Content/Communities". The rest of the categories were excluded from the sample; "Financial Services" were excluded due to their unique financial characteristics; other categories were excluded because of their business-to-business (B2B) nature. The selected categories included 72[39] companies. Another criterion that I used was that every company in the sample should have quarterly financial data for at least one quarter during the period 1996:Q1 to 1999:Q4. The final sample consists of 278 firm-quarter observations, from 60 firms.

3.2.2 Collection of Web perceived service quality data and creation of WPSQ variables

A total of 604 valid responses were received from respondents who were asked to evaluate the Web perceived service quality offered by each of the 72 sampled firms, using the instrument I developed.

Factor analysis using VARIMAX rotation, was performed using the SPSS Statistical Software Package and LISREL[40]. The analysis resulted in eight factors (Table 3). The

[38] Nomological validity was verified using two additional variables about the intention to revisit and the intention to purchase. Those variables were used as dependent variables in two regressions having the nine dimensions of the instrument as independent variables. Regressions resulted in acceptable levels of R^2-adjusted and statistically significant coefficients of the dimensions, demonstrating the nomological validity of the instrument.

[39] We did use all 72 firms to calibrate the WPSQ measurement instrument. However, when I applied financial screenings I was left with 60 firms to use in the regression models relating market value to value drivers.

[40] The Measures of Sampling Adequacy (MSA) for each variable – the diagonal elements of the Anti-Image Correlation Matrix fell in acceptable levels of MSA, thus in this case no variable needed to be eliminated due to MSA problems. Also, the sample size of 604 (which is well above the acceptable minimum of 100 for factor analysis) provides an adequate basis for the calculation of the correlations between variables. The value of the Bartlett test is Chi-Square 7788.48 with 406 degrees of freedom and 0.000 significance meaning that the null hypothesis that the variables in the population correlation matrix are uncorrelated is rejected. The Measure of Sampling Adequacy (MSA) has the value of 0.89 which is very desirable and well above the acceptable level of

instrument passed all validity tests, namely the reliability test[41], the convergent validity test[42], and the nomological validity test[43].

Variables were constructed by obtaining the mean of the items in each dimension, as indicated by the factor analysis. Each dimension represented a WPSQ variable for each one of the 60 B2C pure Internet firms (Table 3). The WPSQ variables were used in the regression models as independent variables along with financial and qualitative variables in order to test the value relevance of these variables.

3.2.3 Financial and Web traffic data

Since the aim is to explain the variation of the market value of equity of Internet companies, the (logged) market value of equity (MVE) was chosen as the dependent variable in all empirical models. The financial variables used as independent variables were (logged) pre-income book value (LPIBV) and (logged) core net income (LCNI), which according to the literature to explain a high proportion of the variation in the MVE of Internet companies (Hand, 2000). Following Hand (2000), I replaced the end of period book equity (BV) with pre-income book equity (PIBV), defined as book equity minus net income. Thus, since net income (NI) is part of BV but not part of PIBV, by replacing BV with PIBV permits a more accurate estimation of the marginal impact of CNI on MVE (Hand, 2000). CNI is defined as net income less special items in order to filter out one-time distortions in profitability. Quarterly financial data were obtained using Compustat for the time period 1996-1999. A total of 278 observations (firm-quarters) concerning 60 pure Internet firms were obtained. The financial variables used in the models are shown and defined in Tables 4 and 5.

In addition to the WPSQ and financial variables, I also included as an independent variable a proxy for the traffic that a Web site attracts. Results in prior studies showed that Web traffic is a significant value driver of Internet stock prices (Trueman et al., 2000; Kotha et al., 2003; Demers and Lev, 2001; Hand, 2001). Web traffic data were collected from Nielsen/Netratings.

0.50. The Kaiser-Meyer-Olkin (KMO) measure of sampling has the value of 0.894. Large values for the KMO measure indicate that a factor analysis of the variables is appropriate.

[41] Reliability is measured using Cronbach's alpha. Each dimension had an alpha that was significantly higher than the lower bound acceptable alpha levels of .60 to .80. This means that the instrument is reliable (Table 3).

[42] The instrument passes convergent validity tests since correlations between the measurements of the questionnaire and other measures of the same concept, namely "Overall Web Site Quality Impression" (OWSQI) and "Overall Web Site Service Quality Impression" (OWSSQI) are high. All dimensions are correlated with both OWSQI and OWSSQI, and also all correlations are significant either at the 0.01 or the 0.05 level.

[43] Nomological validity was verified using two additional variables about the intention to revisit and the intention to purchase. Those variables were used as dependent variables in two regressions having the above eight dimensions as independent variables. Regressions resulted acceptable levels of R^2-adjusted and statistically significant coefficients of dimensions, thus demonstrating the nomological validity of the instrument.

3.3 Descriptive Statistics and Correlation Analysis

Panel A of Table 4 presents and compares the means and medians of the variables used in the regressions for the sample firms, across firm-quarters with negative versus positive core net income. To be included in the analysis, an Internet firm had to be traded at the end of one or more fiscal quarters during the period 1996-1999 and to have positive pre-income book equity. The dataset consists of 278 firm-quarter observations. From those observations, 80.58% were unprofitable firm-quarters and only 19.42% were profitable. Consistent with the expectations, results in Panel A of Table 4 show that profitable Internet firms have larger mean and median dollar market value and book value. In general, firm-quarters with negative core net income appear to be significantly different from firm-quarters with positive core net income with respect to both financial as well as non-financial (i.e. Web traffic and Web perceived service quality) variables.

As far as correlation analysis is concerned I observe in Panel B of Table 4 that when core net income is negative, the logged pre-income book value is positively correlated with logged market value while core net income is negatively correlated with logged market value. When core net income is positive, the correlations between logged market values (LMVE) and logged financial data (LPIBV and LCNI) are positive and statistically significant. The variable representing Web traffic metrics is significant and positively related to the LMVE in both cases. Some of the WPSQ variables are also significantly correlated with LMVE[44].

3.4 Empirical Models

The empirical models are an extension of Hand's (2000) log-linear valuation models of Internet firms, which are derived based on a restatement of Ohlson's (1995) clean surplus relation. In Hand's (2000) models, logged market value of equity is expressed as a function of logged book value and earnings[45]. I extend these models by including Web perceived service quality metrics as explanatory variables. According to Hand (2000), while Trueman et al. (2000), as well as Kotha et al. (2003) include controls for book equity and realized earnings, their regressions are run after deflating all variables by book equity (and in the case of Kotha et al., 2003, by total assets). However, with a logarithmic transformation this need to include controls is eliminated. Hand (2000) supports the use of log-linear regression for the following

[44]Because some of the independent variables correlate with each other, the models were tested for multicollinearity. The final results indicated that multi-collinearity is not an issue. The maximum variance inflation factor (VIF) in all models is 3.97.

[45] None of the sampled Internet firms had paid any cash dividends and stock repurchase was very rare during the period this study focuses on.

reasons: (i) the flexibility log-linear models provide in accommodating concavity, linearity or convexity[46] (ii) log-linear regressions typically reduce the influence of anomalous or outlier observations in financial data and (iii) log-linear regressions typically achieve greater homoscedasticity in regression residuals. These concerns are significant because of the high degree of skewness observed in Internet firms' equity market values, net income and book equity (Hand, 2000). It was also demonstrated that log-linear regressions yield lower pricing errors than do regressions using per-share or unscaled data for both Internet and non-Internet stocks (Hand, 2000). The general regression model has the following form:

$$\text{LMVE} = a + b_1 * \text{LFIN} + b_2 * \text{Web traffic} + b_3 * \text{WPSQ} + \text{error}$$

where LMVE, the dependent variable is the logged market value of equity of the Internet firm, LFIN is the vector of logged financial variables, namely pre-income book value and core net income, b_1 is the vector of the coefficients of the logged financial variables, b_2 is the coefficient of the Web traffic variable, and b_3 is the vector of the coefficients of the WPSQ variables.

The main variables of interest are the WPSQ variables. I hypothesize that at least one of the elements of the vector of coefficients of the WPSQ variables (b_3) is positive and statistically significant.

I treat firm-quarters with negative earnings (CNI < 0) separately from firm-quarters with positive earnings (CNI > 0), since there is a differentiation in the pricing of negative and positive earnings (Hand, 2001). Thus, the regressions were run on two sets of data: (i) a set including only the observations that had negative CNI, i.e. non-profitable firm-quarters (224 firm-quarters), and (ii) a set including only the observations that had positive CNI, i.e. profitable firm-quarters (54 firm-quarters).

[46] The log-transformed model is $\log_e(Y + 1) = a + b \log_e(X + 1) \Leftrightarrow LY = a + b\, LX \Leftrightarrow Y = e^a (X + 1)^b - 1$, where Y is the dependent variable and X is an explanatory variable. The parameter b captures the degree and type of non-linearity in the relation between X and Y. For $X > 0$, the relation between X and Y in the above equation is concave if $0 < b < 1$, linear if $b = 1$, and convex if $b > 1$. When $X < 0$ but log-transformed per equation in the way shown above, the relation between X and Y is concave if $-1 < b < 0$, linear if $b = -1$, and convex if $b < -1$. If $b = 0$, then X and Y are unrelated no matter what the sign of X. If $\log_e(Y + 1)$ is a linear function of more than one logged independent variable, say X and W, then b reflects the marginal concavity, linearity or convexity of X (that is, the concavity, linearity or convexity of X, holding constant W). Slope coefficients in log-linear models are elasticities and measure the percentage change in the dependent variable associated with a one percent change in the corresponding independent variable, when all other variables are held constant; the intercept is a scaling factor, while the variation of the multiplicative error term is proportional to the magnitude of the dependent variable (Hand 2000).

4. EMPIRICAL RESULTS

In general, the results of this study reveal that two particular dimensions of Web perceived service quality (WPSQ), namely "Trust" and "Interactiveness", are important factors in explaining the market value of Internet companies. This section presents results regarding the dimensionality of the WPSQ instrument, and the relationship between fundamentals and WPSQ for Internet firms.

4.1 Dimensionality of the WPSQ Instrument

In order to identify the important factors that explain the market value of Internet companies, I initially devised an instrument specific for measuring the WPSQ of B2C pure Internet companies. According to the WPSQ assessment tool, WPSQ is operationalized by eight dimensions as shown in Table 3.

The WPSQ dimensions are consistent with those presented in prior studies. "Web Site Impression - Emotions/Feelings/Aesthetics" refers to the impression the Web site creates to a visitor and the feelings or emotions it inspires to them (Zeithaml et al., 2000; Loiacono et al., 2007; Liu and Arnett, 2000). The dimension "Interactiveness: User-Web Site Interaction" refers to the degree of user-Web site interaction capabilities of the Web site and in general in what degree the Web site gives the users control over their activities on the Web site. This dimension was formally defined by Zeithaml et al. (2000) as "…how much and how easily the site can be tailored to individual customers' preferences, histories, and ways of shopping" and has been identified in many other studies (Loiacono et al., 2007; Wolfinbarger and Gilly, 2003; Vidgen and Barnes, 2002). The dimension of "Web Site Response Time" (e.g. how responsive the Web site is in terms of navigation time) is also found in Loiacono et al. (2007) and could also be considered as part of the "Responsiveness" dimension in Zeithaml et al. (2000). The dimension of "Trust" refers to the trust the Web site inspires to the visitor concerning both transactions security and privacy. This dimension is present in most online quality studies. Elements of "Trust", as defined in this study, are present in the dimensions "Assurance/Trust" and "Security/Privacy" of Zeithaml et al. (2000). Wolfinbarger and Gilly (2003) and Loiacono et al. (2007) also identify dimensions concerning this issue, while Liu and Arnett (2000) handle this issue as part of a broader dimension. "Image" relates to whether the image projected by the Web site is consistent with the image of the company (Loiacono et al., 2007). This concept is also part of the "Assurance/Trust" dimension in Zeithaml et al. (2000). The notion of "Web Site as a Viable Substitute to Service Personnel" refers to what

extent the Web site can serve as a viable substitute for activities such as calling a company representative on the phone. Loiacono et al. (2007) originally included this dimension, but it could also be a part of the dimension "Responsiveness" in Zeithaml et al. (2000). The dimension "Web Site Ease of Use" refers to how easy or complicated it is for a visitor to use the Web site (Zeithaml et al., 2000; Wolfinbarger and Gilly, 2003; Vidgen and Barnes, 2002). Finally, the dimension "Quality of Information" refers to the timeliness, accuracy and reliability of the information provided by the Web site (Vidgen and Barnes, 2002; Zeithaml et al., 2000).

4.2 Empirical Results on the Value Relevance of Financial and WPSQ Information

Table 5 presents regression results on the association between financial and Web perceived service quality (WPSQ) variables with the market value of the firm. In general, results indicate that though the largest portion of the variability of logged market value of Internet firms can be explained by financial metrics, two of the WPSQ variables, namely "Trust" and "Interactiveness" are found to play an important role in explaining firm value, over and above financial metrics.

Models in Panel A concern cases when core net income (CNI) is negative (i.e. unprofitable firm-quarters)[47]. As one can observe, unprofitable firm-quarters exceed in number profitable ones (224 vs. 54). Model A3 in Panel A of Table 5 shows that for firm-quarters with negative CNI a great proportion (62%) of the variance of the firm's (logged) market value of equity can be explained solely by the two financial variables, namely pre-income book value (log-transformed, i.e. LPIBV) and LCNI. Consistent with Hand (2000), results indicate that the LPIBV variable is statistically significant and positively related to LMVE. Logged core net income (LCNI) is statistically significant and negatively related to the LMVE. That indicates that for pure Internet firms during the bubble era losses correlated with higher, not lower market values. The estimated elasticity of log-transformed negative CNI is -0.251. Since the CNI variable in this sample takes only negative values, this means that if CNI becomes more negative by 1%, MVE will increase by 0.251%.

Models A4 and A5 in Panel A of Table 5 extend model A3 by introducing non-financial metrics (i.e. WPSQ and Web traffic metrics) as explanatory variables. Consistent with prior studies (Hand, 2000; 2001; Trueman et al., 2000; Demers and Lev, 2001) that find Web traffic

[47] Models of Panel A have all been tested and corrected for heteroscedasticity until homoscedasticity was ensured. Heteroscedasticity was not an issue in any of the models of Panel B.

to be value relevant for B2C Internet firms, I find that the inclusion of the Web traffic variable increases the model's R^2-adjusted from 62% (model A3) to 63.4% (model A4). The coefficient of the Web traffic variable is positive and statistically significant at the 1% level. At the extent that Web traffic metrics proxy for the ability of Web firms to attract customers, consistent with previous studies, the results show that the investors value (beyond financial metrics) an Internet firm's ability to attract users (customers and potential customers) to its Web site. The results (model A5) indicate that one of the WPSQ metrics, namely "Trust" turns out to be statistically significant at the 1% level and affects the market value of Internet firms positively. Furthermore, comparing models A4 and A5, I observe that the R^2-adjusted increases from 63.4% to 67.9% when the WPSQ variables are added in the model that previously included only the financial variables and the Web traffic metric. This demonstrates the value relevance of WPSQ metrics over and above fundamentals and over and above the ability of pure Internet firms to attract customers. In addition, the LPIBV variable and the Web traffic metric remains statistically significant.

Models in Panel B concern cases when core net income (CNI) is positive (i.e. profitable firm-quarters). More specifically, model B3 in Panel B of Table 5 shows the association between the firm's (logged) market value of equity and the two financial variables LPIBV and LCNI, for firm-quarters with positive CNI. Consistent with Hand (2000), results indicate that the LPIBV variable is statistically significant and positively related to the LMVE. A great portion (64.5%) of the variance of LMVE at profitable firm-quarters can be explained by accounting data alone, before I introduce any non-accounting data into the model. Logged core net income (LCNI) is not statistically significant in this model, nor it increases the R^2-adjusted of the model, though it is found to be statistically significant (with a positive coefficient) in the absence of LPIBV (model B2). LPIBV can explain 62.2% of the variability in LMVE when alone in the model (model B1).

Models B4 and B5 in Panel B of Table 5 extend model B3 by introducing non-financial metrics as explanatory variables[48]. Like in the case of unprofitable firm-quarters and consistent with prior studies (Hand, 2000; 2001; Trueman et al., 2000; Demers and Lev, 2001), Web traffic appears to be value relevant; the inclusion of the Web traffic variable

[48] However, the specification of model B5 of Panel B differs from its corresponding model A5 of Panel A. The reason that B5 does not contain all the variables included in model A5 is that when I attempted to use the same model specification for model B5 there had been some multicollinearity problems. To fix that, in B5 I only included the WPSQ variables that in individual regressions having as independent variable any of the financial variables or the Web traffic metric or with any other WPSQ variable. The maximum variance inflation factor for model B5 was 3.97.

increases R^2-adjusted from 64.5% (model B3) to 77.02% (model B4). The coefficient of the Web traffic variable is positive and statistically significant at the 1% level. The results (model B5) indicate that "Trust" and "Interactiveness" affect the market value of Internet firms positively. These two WPSQ dimensions are statistically significant and positively related to the LMVE. Furthermore, comparing models B4 and B5, I observe that the R^2-adjusted increases from 77.02% to 88.8% when the WPSQ variables are added to the model that previously included only the financial variables and the Web traffic metric. Evidently, two of the WPSQ metrics, namely trust and interactiveness are statistically significant at the 0.01 and 0.05 levels of significance respectively. In addition, the LPIBV variable and the Web traffic metric remain statistically significant. Though the important role of the dimensions pertaining to the trustworthiness and interactiveness of Web sites for Internet firms has been suggested by other studies (Vidgen and Barnes, 2002; Novak et al., 2000), the association of these WPSQ dimensions with the market value of the firm was not previously empirically investigated.

The results extend the evidence provided in prior studies that showed that (i) financial data are important in explaining the pricing of Internet stocks (Hand 2000; 2001; Trueman et al., 2000; Demers and Lev, 2001), (ii) Web Traffic data are relevant in evaluating Internet stocks (Trueman et al., 2000; Kotha et al., 2003; Demers and Lev, 2001; Hand, 2001), and (iii) quality can impact the value of the firm (Hendricks and Singhal, 1996; Nicolau and Sellers, 2002; Corbett et al., 2005) [49].

Moreover, the study goes a step further to investigate the value relevance of specific quality dimensions beyond financial variables. Even though several research studies suggested that the two dimensions of "Trust" and "Interactiveness" are important, (Loiacono et al., 2007; Vidgen and Barnes, 2002; Zeithaml et al. 2000; Novak et al., 2000), their value relevance had never been empirically investigated before. In this study I demonstrate a direct relationship between specific WPSQ metrics and the market value of Internet firms.

5. CONCLUSIONS

The aim of this study was to explore the value relevance of the Web perceived service quality of an Internet firm. Even though existing research on Internet firms has explored both online quality issues and the value drivers of Internet firms, no attempt had been made in prior

[49] Robustness tests are presented in Table 6.

studies to examine Web perceived service quality (WPSQ) as a possible driver of Internet stock prices. This study establishes a relationship between WPSQ and firm value.

The study's design is based on a WPSQ measurement tool. Data reflecting the WPSQ levels of Internet companies were gathered and statistically analyzed. The results indicate that Web perceived service quality metrics are value relevant for Internet firms over and above fundamentals and they positively affect the market value of Internet companies. Specifically, concerning WPSQ metrics, the analysis shows a positive relationship between the market value of an Internet company and (i) the trust that the Web site inspires to a customer and (ii) the interactive capabilities of its Web site. These two WPSQ dimensions can be viewed as switching barriers or/and satisfaction enhancers for Internet firms (Tsai et al., 2006). Thus the results indicate that the market values the ability of an Internet firm to impose switching barriers to its customers or enhance satisfaction, both being drivers of customer retention (Tsai et al., 2006).

Trust can be viewed as a switching barrier for online commerce since once a customer gets to trust an online business, switching to a competitor implies a risk (cost). In addition, trust can affect overall satisfaction significantly (Chiou, 2004; Harris and Goode, 2004). Likewise, interactiveness can also be viewed as a switching barrier for online commerce, because once a customer has invested time and effort to learn how to interact with an online business and customize his/her experience with the Web site, switching to a competitor bears the cost of having to learn the process of interacting with the Web site of the competitor all over again. Part of the "interactiveness" construct consists of personalization and community building aspects; personalization or "service heterogeneity" is considered to strengthen perceptions of switching barriers, while community building has been shown to have a great influence on repurchase intentions (Tsai et al., 2006).

Switching barriers increase loyalty, tend to reduce competition and are important determinants of future profitability (Klemperer, 1995). Customer satisfaction is a concept closely related in the literature with service quality (Cronin and Taylor, 1992; Parasuraman et al., 1994). A high level of profitability and growth are primarily stimulated or driven by customer loyalty which is in turn driven by customer satisfaction (Heskett et al., 1994; Hallowell, 1996). In addition, Anderson et al. (2004) find that the association between the American Customer Satisfaction Index (ACSI) and Tobin's q is positive. From this point of view, the results show that the market valued the ability of an Internet company to impose switching barriers to its customers or/and increase satisfaction and thus its ability to increase

the likelihood of retaining its customers over and above a firm's ability to attract customers and its financial fundamentals.

In the absence of profits and revenues, at a time that Internet firms focused on spending vast amounts in capturing customers and building brand awareness rather than caring about making immediate profits, the market values the ability of an Internet company to impose switching barriers to its customers or to enhance satisfaction (and thus to increase the probability of retaining customers), over and above fundamentals and over and above the firm's ability to attract people to its Web site. That is why trust and interactiveness viewed as representing switching barriers or/and satisfaction enhancers were found to be important factors in explaining the market prices of Internet firms. The value added to an Internet firm by the ability of the firm to attract and retain customers (as indicated by Web traffic and online quality, as well as by other non-financial metrics) was not reflected in fundamentals, thus indicating the inefficiency of traditional accounting practices and metrics such as revenues and profits to fully reflect an Internet firm's market value. Investors were able to see through this inefficiency of the traditional accounting practices though, as they paid attention to non-traditional financial and non-financial metrics when evaluating Internet stocks.

The results have practical implications for the information management of Internet companies. In order to increase their value, Internet companies have to focus on building Web sites through which users can *interact* with the company, and Web sites which inspire *trust* to customers concerning private information confidentiality and transaction security.

Future research could focus on specific practices through which these can be achieved. Future work could also refine the operationalization of the specific dimensions of WPSQ found in this study that affect the value of Internet firms (trust and interactiveness). Finally, future studies could examine the impact of these two dimensions on the survival of Internet firms in the long-run.

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Table 1: Pilot questionnaire items

This table presents a list of the 56 pilot questionnaire items (P1-P56). The pilot questionnaire was created by identifying 56 items from the literature relevant to e-commerce. In order to prevent item order bias two different random order versions of the instrument were created. A seven point Likert scale was used to measure each item ranging from "Strongly Agree" (7) to "Strongly Disagree" (1) with no verbal labels for the intermediate scale points 2 through 6. An additional category for "Cannot Respond/Not Applicable" was also included ("Cannot Respond/Not Applicable" responses were assigned the average score of the item eventually in analysis). Some score items were originally negatively worded to keep respondents alert and eliminate response bias. Later, during the analysis the score of these items was reversed. The two versions of the pilot questionnaire were published on the Web for respondents to access. The respondents were asked to visit and evaluate two e-commerce Web sites (amazon.com and seekbooks.com). Exactly 157 valid responses were received.

P1. I trust the Web site administrators will not misuse my personal information I provided
P2. The Web site displays a visually pleasing design
P3. The Web site creates a memorable experience
P4. The Web site is visually appealing
P5. The Web site has interactive features, which help me accomplish my task
P6. All my business with the company can be completed via the Web site
P7. The Web site has an attractive appearance
P8. Has a good reputation
P9. The Web site's image matches the image of the company
P10. The Web site projects an image consistent with the company's image
P11. Creates a sense of personalization
P12. Feels safe to complete transactions
P13. The Web site allows me to interact with it to receive tailored/personalized information
P14. When I use the Web site there is very little waiting time between my actions and the Web site's response
P15. Promotes good communications
P16. The information on the Web site is pretty much what I need to carry out my tasks
P17. I trust the Web site to treat my personal information in a confidential manner
P18. I find the Web site easy to use
P19. The Web site adequately meets my information needs
P20. The Web site allows transactions on-line
P21. The site generates a sense of competency
P22. The information on the Web site is effective
P23. I feel sociable when I use the Web site
P24. Provides accurate information
P25. The Web site is innovative
P26. The site has a design appropriate to the type of site
P27. The Web site is an alternative to calling customer service or sales
P28. I feel cheerful when I use the Web site
P29. Can be depended upon to deliver goods/services promised
P30. Most of all business processes can be accomplished via the Web site
P31. Personal information feels secure
P32. Provides timely information
P33. I feel happy when while using the Web site
P34. Provides easy to understand information
P35. The display pages within the Web site are easy to read
P36. The Web site fits with the image I have of the company
P37. Provides information at the right level of detail
P38. Provides relevant information
P39. The text on the Web site is easy to read
P40. The Web site loads quickly
P41. It is easier to use the Web site to complete my business with the company than it is to telephone, fax or mail a representative
P42. Presents the information in an appropriate format
P43. Provides believable information
P44. The Web site is creative
P45. The site is easy to find
P46. I feel safe in my transactions with the Web Site
P47. Learning to operate the Web site is easy for me
P48. I can interact with the Web site in order to get information tailored to my specific needs
P49. It would be easy for me to become skilful using the Web site
P50. The Web site design is innovative
P51. The Web site does not take long to load
P52. The Web site labels are easy to understand
P53. The Web site is easier to use than calling an organizational representative on the phone
P54. The site is easy to navigate
P55. Builds a sense of community
P56. The Web site is visually pleasing

Table 2: Resulting dimensions of Web perceived service quality

This table shows the factor analysis results of the pilot online questionnaire consisting of 56 items. Factor analysis aimed at reducing the number of items in order to obtain a smaller, more usable questionnaire. Analysis resulted in a questionnaire that included 9 dimensions (29 items) as shown below. Each dimension was represented by 3 or 4 items (the top three or four items that loaded on each factor according to the size of their factor loading). The instrument passed the reliability test - meaning that there is no measurement error (each dimension had a Cronbach´s alpha that was significantly higher than the lower bound acceptable alpha levels of .60). It also passed all the validity tests (convergent validity tests and nomological or predictive validity tests) showing that the measurement instrument measures what it is supposed to measure and thus, signaling that the Web perceived service quality (WPSQ) instrument was ready to be used for evaluating the WPSQ of Web sites of Internet companies.

Dimension	Alpha	Item
Feelings/Emotions created by the Site experience	0.844	The Web site creates a memorable experience
		The Web site has an attractive appearance
		I feel cheerful when I use the Web site
		I feel happy when I use the Web site
Ease of Use	0.860	The Web site presents the information in an appropriate format
		I find the Web site easy to use
		The Web site labels are easy to understand
		The Web site is easy to navigate
Security/safety	0.844	I trust the Web site administrators will not misuse my personal information I provided
		I feel safe in my transactions with the Web site
		I trust the Web site to treat my personal information in a confidential manner
Trust	0.638	The Web site can be depended upon to deliver the goods/services promised
		The Web site provides accurate information
		The Web site provides believable information
Image/Integrated Communications	0.778	The Web site's image matches the image of the company
		The Web site fits with the image I have of the company
		The Web site projects an image consistent with the company's image
Viable Substitute	0.861	It is easier to use the Web site to complete my business with the company than it is to telephone, fax or mail a representative
		The Web site is easier to use than calling an organizational representative on the phone
Making it more "real life" – like: Community/Communications /Personalization	0.7394	The Web site promotes good communications
		The Web site builds a sense of community
		The Web site creates a sense of personalization
Interactiveness: User-Web Site Interaction	0.729	It would be easy for me to become skillful using the Web site
		The Web site allows me to interact with it to receive tailored/personalized information
		I can interact with the Web site in order to get information tailored to my specific needs
Response Time	0.699	The Web site does not take long to load
		When I use the Web site there is very little waiting time between my actions and the Web site's response
		The Web site loads quickly
		The Web site provides timely/updated information

Table 3: Factor analysis - factor names and Cronbach alpha for each factor

This table presents factor analysis results of the responses to the 29 questions using data from the sample (604 evaluations concerning 72 B2C pure Internet firms received in total). Eight dimensions resulted after the items were sorted according to their loading on each factor as per the factor solution and the items with the smallest loading for each dimension were deleted until the alpha of the dimension was improved. This process resulted in a set of 27 items with Cronbach´s alpha values ranging from 0.6948 to 0.8506 across 8 dimensions. The items representing each dimension are presented in the table below along with the Cronbach´s alpha of each dimension. Each dimension had an alpha that was significantly higher than the lower bound acceptable alpha levels of .60, indicating that the instrument passes the reliability test (absence of measurement error).

Dimension	Alpha	Item
Web Site Impression: Emotions/Feelings/Aesthetics	0.851	I feel happy while using the Web site I feel cheerful when I use the Web site The Web site creates a memorable experience The Web site has an attractive appearance
Web Site Response Time During Navigation	0.742	The Web site loads quickly The Web site does not take long to load When I use the Web site there is very little waiting time between my actions and the Web site's response
Trust: Safety and Privacy	0.751	I trust the Web site to treat my personal information in a confidential manner I trust the Web site administrators will not misuse the personal information I provided I feel safe in my transactions with the Web site
Image/Integrated Communications	0.808	The Web site projects an image consistent with the company's image The Web site fits with the image I have of the company The Web site's image matches the image of the company
Web Site as a Viable Substitute to Service Personnel	0.814	It is easier to use the Web site to complete my transactions with the company than it is to telephone,, fax or mail a representative The Web site is easier to use compared to calling an organizational representative on the phone
Interactiveness: User-Web Site Interaction	0.809	The Web site allows me to interact with it to receive tailored/personalized information I can interact with the Web site in order to get information tailored to my specific needs The Web site creates a sense of personalization The Web site promotes good communications The Web site builds a sense of community It would be easy for me to become skilful in using the Web site
Web Site Ease of Use	0.742	The Web site labels are easy to understand I find the Web site easy to use The Web site is easy to navigate
Quality of Information	0.695	The Web site provides timely/updated information The Web site provides accurate information The Web site provides believable information

Table 4: Descriptive statistics

Comparisons (of means and medians) and correlations of the variables used in regressions for firm-quarters for the period 1996:Q1-1999:Q4 representing 60 B2C pure Internet firms publicly traded at the end of at least one fiscal quarter during that period. Variable explanations are given at the end of Table 4.

Panel A:
(in $ millions for financial variables, scores for WPSQ variables)

	Means					Medians				
	CNI<0[a]	CNI>0[b]	Difference	t-test [c]	sig-2-tailed	CNI<0[a]	CNI>0[b]	Difference	z-statistic [d]	sig-2-tailed
MVE	2105.424	18177.709	-16072.284***	-3.311	0.002	384.989	3668.594	-3283.606***	7.813	0.000
CNI	-17.745	35.966	-53.712***	-5.355	0.000	-5.721	5.255	-10.976***	11.405	0.000
PIBV	161.946	602.882	-440.937***	-3.249	0.002	61.655	344.478	-282.824***	6.562	0.000
WEB TRAFFIC	0.205	0.778	-0.572***	-9.001	0.000	0.000	1.000	-1.000***	7.941	0.000
FEEL	4.715	4.767	-0.051	-1.023	0.308	4.656	4.841	-0.184	1.512	0.131
TIME	4.923	4.543	0.380***	5.684	0.000	5.074	4.583	0.491***	-5.612	0.000
TRUST	4.223	4.074	0.149***	3.397	0.001	4.182	4.145	0.037***	-2.808	0.005
IMAGE	5.015	5.144	-0.129***	-5.486	0.000	5.032	5.133	-0.101***	4.019	0.000
SUBST	5.194	4.975	0.219***	4.242	0.000	5.196	5.031	0.165***	-3.372	0.001
INTERACT	5.024	5.084	-0.060**	-1.988	0.049	5.080	5.074	0.006	0.758	0.449
EASY	5.358	5.119	0.239***	4.372	0.000	5.395	5.100	0.295***	-4.000	0.000
INFOQ	5.307	5.245	0.062**	2.545	0.012	5.337	5.332	0.005**	-2.214	0.027
#obs.	224	54				224	54			

a N = 224 firm quarters that had negative quarterly core net income
b N = 54 firm quarters that had positive quarterly core net income
c t- statistic testing for a difference in means
d z-statistic on Wilcoxon 2-sample rank sums test for a difference in medians

(continued) Table 4, Panel B:

Correlations CNI<0 (Spearman above, Pearson below diagonal), #obs.: 224 firm-quarters

	LMVE	LCNI	LPIBV	WEB TRAFFIC	LFEEL	LTIME	LTRUST	LIMAGE	LSUBST	LINTERACT	LEASY	LINFOQ
LMVE	1	-0.567**	0.812**	0.264**	0.021	-0.025	0.066	0.259**	-0.174**	-0.018	-0.077	0.046
LCNI	-0.602**	1	-0.653**	-0.161*	-0.112	0.017	-0.057	-0.233**	0.057	0.018	-0.017	-0.118
LPIBV	0.781**	-0.659**	1	0.195**	0.085	-0.096	-0.102	0.223**	-0.101	0	-0.019	0.137*
WEB TRAFFIC	0.299**	-0.182**	0.219**	1	0.141*	-0.105	-0.167*	0.562**	-0.196**	0.162*	0.089	-0.069
LFEEL	0.018	-0.107	0.076	0.196**	1	0.057	0.242**	0.417**	0.440**	0.589**	0.724**	0.385**
LTIME	-0.117	0.117	-0.142*	-0.073	0.056	1	0.331**	-0.101	0.324**	0.297**	0.410**	0.113
LTRUST	0.074	-0.061	-0.137*	-0.099	0.245**	0.230**	1	0.115	0.124	0.260**	0.132*	0.216**
LIMAGE	0.184**	-0.158*	0.155*	0.492**	0.449**	-0.114	0.125	1	-0.01	0.306**	0.226**	0.144*
LSUBST	-0.185**	0.085	-0.116	-0.186**	0.352**	0.289**	0.165*	0.092	1	0.475**	0.547**	0.290**
LINTERACT	0.02	0.035	0.024	0.251**	0.651**	0.288**	0.268**	0.330**	0.515**	1	0.556**	0.399**
LEASY	-0.122	0.047	-0.052	0.078	0.640**	0.498**	0.237**	0.166*	0.512**	0.653**	1	0.273**
LINFOQ	0.062	-0.075	0.127	-0.039	0.362**	0.085	0.203**	0.225**	0.403**	0.398**	0.256**	1

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

Correlations CNI>0 (Spearman above, Pearson below diagonal), #obs.:54 firm -quarters

	LMVE	LCNI	LPIBV	WEB TRAFFIC	LFEEL	LTIME	LTRUST	LIMAGE	LSUBST	LINTERACT	LEASY	LINFOQ
LMVE	1	0.531**	0.742**	0.343*	0.403**	-0.457**	0.632**	0.285*	0.297*	0.15	-0.605**	-0.131
LCNI	0.542**	1	0.643**	0.054	0.480**	-0.359**	-0.081	0.291*	0.036	-0.207	-0.199	0.208
LPIBV	.812**	.670**	1	-0.023	.430**	-0.256	0.196	0.16	0.345*	0.132	-0.321*	0.251
WEB TRAFFIC	0.368**	0.042	0.02	1	0.156	-0.518**	0.399**	0.596**	-0.411**	0.266	-0.469**	-0.521**
LFEEL	0.108	0.356**	0.235	0.289*	1	-0.476**	0.119	0.231	0.425**	-0.185	-0.471**	-0.027
LTIME	-0.438**	-0.409**	-0.337*	-0.438**	-0.456**	1	-0.377**	-0.751**	0.227	0.133	0.776**	-0.149
LTRUST	0.471**	-0.172	0.016	0.613**	-0.344*	-0.315*	1	0.086	0.292*	0.275*	-0.659**	-.371**
LIMAGE	0.396**	0.345*	0.298*	0.608**	0.342*	-0.763**	0.312*	1	-0.364**	-0.065	-0.700**	0.049
LSUBST	0.112	-0.012	0.217	-0.452**	-0.079	0.188	-0.16	-0.261	1	0.222	-0.18	0.065
LINTERACT	0.277*	0.038	0.176	0.412**	0.17	-0.014	0.027	0.081	0.192	1	-0.017	0.144
LEASY	-.511**	-0.251	-0.318*	-0.450**	-0.206	0.894**	-0.566**	-0.795**	-0.006	0.049	1	0.12
LINFOQ	0.053	0.358**	0.314*	-0.318*	0.261	-0.469**	-0.468**	0.252	0.206	0.238	-0.270*	1

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

MVE is the market value of equity at the end of the fiscal quarter; PIBV is the book value of equity at the end of the fiscal quarter less quarter's net income; CNI is core net income for the quarter (i.e. net income less special items); LMVE, LPIBV, and LCNI are the logarithmic transformations of the variables MVE, PIBV, and CNI, respectively; FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ are the variables representing the score of each firm on the Web perceived service quality dimensions of "Web Site Impression - Emotions/Feelings/Aesthetics", "Web Site Response Time During Navigation", "Trust: Safety and Privacy", "Image Consistency", "Web Site as a Viable Substitute to Service Personnel", "Interaction Capabilities", "Ease of Use" and "Quality of Information", whereas LFEEL, LTIME, LTRUST, LIMAGE, LSUBST, LINTERACT, LEASY, LINFOQ are their respective logarithmic transformations. WEB TRAFFIC is a dummy variable indicating whether the firm was included in Nielsen//Net Rating's Top 25 Properties in terms of Web site visits.

Table 5: Regression results

This table presents regression results on the association between some financial and non-financial variables (including WPSQ) and the Logged Market Value of Equity (LMVE) of Internet companies for the period 1996:Q1 to 1999:Q4. The financial variables (gathered using Compustat) used as explanatory ones in all models tested are: LPIBV (Logged Book Value of Equity at end of fiscal quarter before inclusion of quarter's net income), and LCNI (Logged Core Net Income for fiscal quarter where Core Net Income - CNI - is Net Income less Special Items). Only observations with positive PIBV are considered in the sample. The Web perceived service quality (WPSQ) variables used as explanatory variables are: FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ and represent the score of each firm on the Web perceived service quality dimensions of "Web Site Impression - Emotions/Feelings/Aesthetics", "Web Site Response Time During Navigation", "Trust: Safety and Privacy", "Image Consistency", "Web Site as a Viable Substitute to Service Personnel", "Interaction Capabilities", "Ease of Use" and "Quality of Information", respectively. The natural logarithm of these variables was used in the regressions. The WPSQ values for each company formed by the data that was gathered after the end of the period for which financial data was gathered and were applied to every quarter concerning that company. The dummy variable WEB TRAFFIC concerns the Web site traffic and was created using the Nielsen//NetRatings Audience Measurement Service "Top 25 Web Properties" report.

Panel A: OLS multiple regressions where dependent variable is LMVE (CNI < 0 and PIBV>0): Five models are presented in Panel A (models A1-A5). In all these models the Core Net Income (CNI) of the sample firm-quarters is negative (unprofitable firm-quarters). The dependent variable in all five models is LMVE. The value relevance of financial metrics is investigated in models A1, A2 and A3. The value relevance of Web traffic is examined in model B4. The value relevance of the WPSQ metrics (namely, FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ, here log-transformed) is tested in model A5 that shows the value relevance of the WPSQ metrics over and above both financial metrics and Web traffic. All models were tested for heteroscedasticity and corrected when heteroscedasticity was an issue. Tests for multicollinearity (variance inflation factors test) indicated that multicollinearity was not an issue.

	Model A1			Model A2			Model A3			Model A4			Model A5		
	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t
LPIBV	1.055***	14.660	0.000				0.909***	10.840	0.000	0.879***	10.890	0.000	0.955***	11.320	0.000
LCNI				-0.988***	-9.880	0.000	-0.251**	-2.440	0.015	-0.237**	-2.550	0.012	-0.155	-1.560	0.120
WEB TRAFFIC										0.548***	2.690	0.008	0.618***	2.600	0.010
LFEEL													-1.278	-1.000	0.319
LTIME													0.348	0.310	0.761
LTRUST													4.996***	5.320	0.000
LIMAGE													0.102	0.050	0.959
LSUBST													-1.132	-0.880	0.377
LINTERACT													2.368	0.940	0.350
LEASY													-3.504	-1.450	0.148
LINFOQ													-1.166	-0.580	0.565
intercept	1.473***	4.870	0.000	3.875***	15.980	0.000	1.542***	5.320	0.000	1.585***	5.590	0.000	1.026	0.240	0.812
R^2-adjusted	0.600			0.359			0.620			0.634			0.679		
#obs	224			224			224			224			224		

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

(Table 5 continued at the next page)

(continued) Table 5: Regression results

Panel B: OLS multiple regressions where dependent variable is LMVE (CNI > 0 and PIBV>0): Five models are presented in Panel B (models B1-B5). In all these models the Core Net Income (CNI) of the sample firm–quarters is positive (profitable firm-quarters). The dependent variable in all five models is LMVE. The value relevance of financial metrics is investigated in models B1, B2 and B3. The value relevance of Web traffic is examined in model B4. The value relevance of the WPSQ metrics is tested in model B5 that shows the value relevance of the WPSQ metrics over and above both financial metrics and Web traffic. All models were tested for heteroscedasticity which was not an issue in the unprofitable firm-quarters sample. Multicollinearity (indicated by the presence of some variance inflation factors larger than 10) was corrected by excluding the variables that caused the problem. In the specifications shown below multicollinearity is not an issue.

	Model B1			Model B2			Model B3			Model B4			Model B5		
	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t	coefficient	t	P>t
LPIBV	1.157***	10.020	0.000				1.160***	7.390	0.000	1.168***	9.240	0.000	0.925***	9.480	0.000
LCNI				0.635***	4.650	0.000	-0.004	-0.030	0.976	-0.025	-0.240	0.809	0.218	2.710	0.009
WEB TRAFFIC										1.574***	5.360	0.000	0.019	0.050	0.964
LTRUST													17.459***	6.890	0.000
LINTERACT													8.115**	2.070	0.044
LSUBST													0.991	0.440	0.662
intercept	1.849***	2.770	0.008	6.846***	17.430	0.000	1.841**	2.520	0.015	0.625	0.990	0.327	-42.132***	-5.170	0.000
R^2-adjusted	0.652			0.280			0.645			0.7702			0.888		
#obs	54			54			54			54			54		

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

Table 6: Robustness tests

This table presents robustness tests on the association between some financial and non-financial variables (including WPSQ) and the Logged Market Value of Equity (LMVE) of Internet companies for the period 1996:Q1 to 1999:Q4. The financial variables (gathered using Compustat) used as explanatory ones in all models tested are: LPIBV (Logged Book Value of Equity at end of fiscal quarter before inclusion of quarter's net income), and LCNI (Logged Core Net Income for fiscal quarter where Core Net Income - CNI - is Net Income less Special Items). Only observations with positive PIBV are considered in the sample. The Web perceived service quality (WPSQ) variables used as explanatory variables are: FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ and represent the score of each firm on the Web perceived service quality dimensions of "Web Site Impression - Emotions/Feelings/Aesthetics", "Web Site Response Time During Navigation", "Trust: Safety and Privacy", "Image Consistency", "Web Site as a Viable Substitute to Service Personnel", "Interaction Capabilities", "Ease of Use" and "Quality of Information", respectively. The natural logarithm of these variables was used in the regressions. The WPSQ values for each company formed by the data that was gathered after the end of the period for which financial data was gathered and were applied to every quarter concerning that company. The dummy variable WEB TRAFFIC concerns the Web site traffic and was created using the Nielsen//NetRatings Audience Measurement Service "Top 25 Web Properties" report.

Panel A: OLS multiple regressions where dependent variable is LMVE (CNI < 0 and PIBV>0): Five models are presented in Panel A. In all these models the Core Net Income (CNI) of the sample firm-quarters is negative (unprofitable firm-quarters). The dependent variable in all five models is LMVE. The value relevance over and above both financial metrics and Web traffic of each one of the eight Web WPSQ metrics (namely, FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ, here log-transformed) is tested in each one of the eight models.

	Models							
	1	2	3	4	5	6	7	8
LPIBV	0.877	0.879 ***	0.950 ***	0.879 ***	0.871 ***	0.880 ***	0.872 ***	0.884 ***
LCNI	-0.248	-0.237 **	-0.156	-0.238	-0.237 **	-0.233 **	-0.233 **	-0.237 **
WEB TRAFFIC	0.609 **	0.549 ***	0.613 ***	0.560 ***	0.494 **	0.576 ***	0.586 ***	0.540 ***
LFEEL	-1.380 *							
LTIME		0.065						
LTRUST			4.122 *					
LIMAGE				-0.261				
LSUBST					-1.930 *			
LINTERACT						-0.944		
LEASY							-2.756	
LINFOQ								-1.174
intercept	3.958	1.468	-5.368	2.050	5.146	3.277	6.707 ***	3.725
R^2-adjusted	0.638	0.633	0.664	0.633	0.638	0.633	0.641	0.634
#obs	224	224	224	224	224	224	224	224

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

(Table 6 continued at the next page)

(continued) **Table 6:** Robustness tests

Panel B: OLS multiple regressions where dependent variable is LMVE (CNI > 0 and PIBV>0): Five models are presented in Panel A. In all these models the Core Net Income (CNI) of the sample firm-quarters is negative (unprofitable firm-quarters). The dependent variable in all five models is LMVE. The value relevance over and above both financial metrics and Web traffic of each one of the eight Web WPSQ metrics (namely, FEEL, TIME, TRUST, IMAGE, SUBST, INTERACT, EASY, and INFOQ, here log-transformed) is tested in each one of the eight models.

	Models							
	1	2	3	4	5	6	7	8
LPIBV	1.167 ***	1.164 ***	1.016 ***	1.187 ***	1.092 ***	1.174 ***	1.112 ***	1.188 ***
LCNI	0.066	-0.034	0.158 *	0.004	0.016	-0.028	-0.033	0.012
WEB TRAFFIC	1.850 ***	1.528 ***	0.381 *	1.855 ***	1.840 ***	1.602 ***	1.300 ***	1.409 ***
LFEEL	-7.771							
LTIME		-0.571						
LTRUST			15.301 ***					
LIMAGE				9.579 *				
LSUBST					4.682			
LINTERACT						0.893 *		
LEASY							-4.062	
LINFOQ								-11.367
intercept	13.799	1.684	-22.862 ***	17.615	-7.615	2.190	8.518 **	21.369
R^2-adjusted	0.766	0.766	0.876	0.772	0.779	0.766	0.780	0.776
#obs	54	54	54	54	54	54	54	54

*, **, ***: Significant at the 0.10, at the 0.05, and at the 0.01 level of significance respectively

ESSAY III (B)

Web Perceived Service Quality of Online Businesses: Measurement and Assessment

Essay III (B)

Web Perceived Service Quality of Online Businesses: Measurement and Assessment

ABSTRACT

The objective of this essay is to build a multiple-item instrument for measuring the web perceived service quality (WPSQ) of business-to-consumer (B2C) pure Internet companies. The instrument was built and validated using factor analysis techniques. It was tested and refined using a sample of 72 B2C pure Internet companies belonging to several different industries. Results show that there are eight dimensions underlying WPSQ of B2C pure Internet companies, namely: "Web Site Impression - Emotions/Feelings/Aesthetics", "Web Site Response Time During Navigation", "Trust: Safety and Privacy", "Image Consistency", "Web Site as a Viable Substitute to Service Personnel", "Interaction Capabilities", "Ease of Use" and "Quality of Information". The resulting instrument can be readily used by B2C pure Internet companies to assess their WPSQ and thus become aware of how the quality of their services is perceived not only by customers but by any visitor of their web site, including important stakeholders such as investors and prospective customers and employees. Furthermore, researchers aiming to better understand the behaviour of online businesses could employ this instrument to link perceived service quality – as opposed to actual service quality and fulfilment - with other business measures such as financial measures or market measures. While most other relevant studies have focused on instruments to measure quality offered by companies that engage in business online, this instrument is especially devised for and tested on B2C pure Internet companies and focuses on the service quality perceived by interested stakeholders – not just consumers - through the company's web site.

1. INTRODUCTION

Academic evidence illustrates the value of quality for firms (Hendricks and Singhal, 1997, 2001a; Fynes and Voss, 2001; Hendricks and Singhal, 1996; 2001b; Easton and Jarrell, 1998) and points towards the benefits of adopting a service quality strategy. In order to pursue such a strategy firms should be able to quantify their goals. Thus, firms should be able to measure service quality in order to be able to manage it. Numerous studies have provided conceptualisations and measurements of service quality (e.g. Parasuraman *et al.*, 1988; 1991; see Zeithaml *et al.*, 2002 for a review). Subsequent research clearly indicates that considerable customisation of generic service quality measurement instruments is required to accommodate differences in service settings (Carman *et al.*, 1990; Dabholkar *et al.*, 1996; Pitt *et al.*, 1995; 1997; Van Dyke *et al.*, 1997).

Quality literature has been to a great extent dominated by human-delivered services thus, when about a decade ago the Internet started forming into the big marketplace it is now, simple adaptations of existing service quality measurement instruments (see Gefen, 2002) were considered inadequate to capture the specific character of the new business paradigm (Parasuraman *et al.*, 2005). A number of studies have offered instruments devised especially to measure service quality online (see for example Barnes and Vidgen, 2000; Loiacono, Watson and Goodhue, 2007; Parasuraman *et al.*, 2005; Wolfinbarger and Gilly, 2003). Most of these instruments have been judged as focusing on the technical aspects of a Web site or not capturing all aspects of the purchasing or fulfilment processes (Parasuraman *et al.*, 2005).

Aspects of the purchasing and fulfilment processes are necessary for a full assessment of the quality of services offered by a firm online. Yet the perception (impression) of service quality offered by a business, as this is communicated through its Web site would still be a useful piece of information; perceived quality was shown to influences satisfaction which in turn influences consumer loyalty (Cristobal *et al.* 2007). In addition to consumers however, certain stakeholders of the firm may need to infer service quality from cues other than an actual transaction with the firm. Stakeholders such as prospective investors - event studies around the announcements of quality awards and certifications indicate that the market does take into consideration information about the quality of products and services of firms (see for example Easton and Jarrell, 1998; Hendricks and Singhal, 1996; 2001b), prospective employees or even prospective customers may visit the Web site of a firm upon deciding to engage into a relationship with a firm. For this reason, I focus on building an instrument to

measure the perception of service quality offered by a business given to a visitor exclusively through the business Web site.

Modern theories on service quality support that service quality needs to be built in the service or product during the design process (Hendricks and Singhal, 1996). As a result, the company's quality philosophy is reflected in the design of its Web site. Since in the case of pure Internet firms (that is, firms that conduct all their business online, their revenues come from online activities and they would not exist without the Internet) the service encounter occurs solely on the Web, service quality concerns of Internet companies must be considered when designing the firm's Web site, the frontstore of their business. In this study, I focus on the measurement of the Web perceived service quality (WPSQ) of pure Internet firms.

More specifically, using factor analysis techniques I developed a WPSQ instrument consisting of 29 items across eight dimensions. I test and refine this instrument using a sample of 72 business-to-consumer (B2C) pure Internet companies. The WPSQ instrument resulted by the study can be used by Internet companies to measure the level of the WPSQ offered through their Web sites. This would make them aware of how the quality of their services is perceived not only by customers but by any visitor of their web site, including important stakeholders such as investors and prospective customers and employees. This awareness is necessary as a first step to their service quality improvement efforts. Furthermore, researchers aiming to better understand the behaviour of online businesses could employ this instrument to link perceived service quality – as opposed to actual service quality and fulfilment - with other business measures such as financial measures or market measures.

Following this introduction, section two sets the background of online service quality research. Section three describes the research design of the study. Section four discusses the importance of the resulting WPSQ dimensions, while the last section, section five summarizes the results and discusses the implications of this paper.

2. BACKGROUND

As Zeithaml *et al.* (2002) point out most researchers in the domain of "electronic service quality" (e-SQ) do not provide a definition of e-SQ. A formal definition is given by Zeithaml *et al.* (2000b): "e-SQ can be defined as the extent to which a Web site facilitates efficient and effective shopping, purchasing and delivery of products and services", this including both pre- and post- Web site service issues. Despite the fact that only a few researchers have attempted

to define e-SQ, a number of researchers have attempted to identify the dimensions of e-SQ and construct instruments to measure online service quality. Most of the studies measuring online service quality abide with the spirit of SERVQUAL, the multiple-item service quality measurement tool contributed by the early work of Parasuraman *et al.* (1988) that set the ground in this field by defining and founding the concept of service quality. Since further research in the service quality field suggests that considerable customisation is required to accommodate differences in service settings (Carman *et al.*, 1990; Dabholkar *et al.*, 1996; Pitt *et al.*, 1995; Van Dyke *et al.*, 1997), and that studying e-SQ requires measurements that extend beyond merely adapting traditional service quality measurments (Zeithaml *et al.* 2005) researchers have developed an interest in devising instruments specific to measuring e-SQ as a response to the rise of e-commerce during the last decade.

Though there is no consensus in the literature as to how many dimensions e-SQ has, some studies find certain dimensions in common. Those pertain to issues of trust, privacy and security, Web site usability, reliability, interactivity and personalization capabilities of Web site, responsiveness, and Web site aesthetics and experiential issues. Specifically, in a review of the extant literature, Zeithaml *et al.* (2002) have recognized five broad dimensions relevant to e-SQ perceptions, namely (a) information availability and content, (b) ease of use or usability, (c) privacy/security, (d) graphic style, and (e) reliability/fulfilment. Furthermore, some of these aspects of e-SQ can be judged by just having the experience of visiting the Web site, while some other aspects can be judged only by having the experience of transactions through the Web site.

An example of what can be judged by just visiting a Web site is Web site aesthetics (see for instance the "Site Aesthetics" category in Zeithaml *et al.*, 2000a or the "Visual Appeal" dimension of Loiacono *et al.*, 2007). Some other studies also include experiential concerns. For example, the instrument presented by Loiacono *et al.* (2007), includes the categories "Flow/Emotional Appeal" while Liu and Arnett (2000) have a dimension labelled "Playfulness".

Another aspect of e-SQ that can be judged by a visit to a Web site is how easy it is to use it. This concept appears in Zeithaml *et al.* (2000a) under the categories "Ease of Navigation" (means that a site contains functions that help customers find what they need without difficulty, possesses a good search engine, and allows the customer to navigate easily and quickly back and forth through the pages) and "Efficiency" (a site is simple to use,

structured properly, and requires a minimum of information to be input by the customer). Parasuraman *et al.* (2005) include a dimension called "Efficiency" covering this aspect in their 22-item scale. Likewise, Wolfinbarger and Gilly (2002) have a "Usability/Ease of Use" category and Vidgen and Barnes (2002) have a "Usability category", while this concept is very close to the "Ease of Use" construct of Loiacono *et al.* (2007) which has two dimensions, "Ease of Understanding" and "Intuitive Operations".

Whether the Web site offers a user the opportunity to personalise it and smoothly interact with it, is also something that can be judged by visiting the Web site Customisation/Personalization" is according to Zeithaml *et al.* (2000a) "how much and how easily the site can be tailored to individual customers' preferences, histories, and ways of shopping". This category is also present in Wolfinbarger and Gilly (2002), and it is also present in Loiacono *et al.* (2007) – labelled as "Tailored Information" - and Vidgen and Barnes (2002) - as part of "Interaction". Because Web site users use the Web site and interact with it in order to complete certain tasks that can go beyond just taking a look or finding specific information, one could argue that a user who has completed transactions through the Web site may judge the Web site differently with respect to this dimension than someone who has not the experience of a transaction. Thus, with usability and interactivity-personalisation dimensions we are entering a grey area concerning the usefulness of having completed transactions through the Web site in order to be in a position to judge e-SQ.

The notion of "Reliability" in this context refers to the reliability of the Web site rather than referring to the reliability of the service as this is known in the service quality literature. Reliability in the e-SQ context is described by Zeithaml *et al.* (2000a) as "the correct technical functioning of the site and the accuracy of service promises, billing, and product information". This dimension too belongs to a grey area, as part of its manifestation (e.g. technical functioning) can up to a point be judged merely by a visit to a Web site, while one could argue that a person with transaction experience with the Web site may have more to say on this. Moreover, reliability can appear in the same dimension with fulfilment as in Wolfinbarger and Gilly (2002) ("Reliability/Fulfillment"and "Informativeness"). Fulfilment requires the experience of transactions with the firm in order to be judged. Loiacono *et al.* (2007) include elements of reliability in a dimension called "Information Fit-to-Task", while Vidgen and Barnes (2002) include elements of reliability in a dimension called "Information". Liu and Arnett (2000) include these concepts in the categories "System Design Quality" and "Quality

of Information and Service". Parasuraman *et al.* (2005) have two separate categories, one for "System Availability" and one for "Fulfilment".

Another e-SQ dimension present in most relevant studies pertains to trust, privacy and security issues. Zeithaml *et al.* (2000a) have two categories referring to these issues. One is labelled "Assurance/Trust" and refers to the confidence that the customer feels in dealing with the site. Assurance/trust according to Zeithaml *et al.* (2000a) stems from the reputation of the site and of the products or services it sells as well as from the clarity and truthfulness of the information presented. Their other relevant category is "Security/Privacy" which refers to the degree to which the customer believes the site is safe from intrusion and that personal information is protected (Zeithaml *et al.*, 2000a). Parasuraman *et al.* (2005) include only a "Privacy" dimension. Wolfinbarger and Gilly (2002) place these concerns in one category labelled as "Security/Privacy". The instrument developed by Loiacono *et al.* (2007) has a dimension labelled "Trust". Liu and Arnett (2000) include security concerns in the broader category of "System Use" along with other related concerns (like for example if the Web site delegates control to users). Whether a Web site inspires trust and protection of privacy can be judged by just visiting the Web site, however, past transaction experience with the Web site will possibly affect a visitor's judgement on this aspect of e-SQ.

The concept represented by the dimension of "Responsiveness" is defined by Zeithaml *et al.* (2000a) as "quick response and the ability to get help if there is a problem or question". Wolfinbarger and Gilly (2002) deal with this concern in their "Customer Service" category, while Loiacono *et al.* (2007) includes a "Response Time" category having to do with the Web site response time and deals with the rest of the concept as described by Zeithaml *et al.* (2000a) with including the "Viable Substitute" category which is close, only it takes the issue relatively to the sphere of offline experience rather than regarding it as standalone responsiveness of the Web site itself.

Regarding the importance of e-SQ dimensions, Vidgen and Barnes (2002) find that the most important factor identified in their study was the trustworthiness of the Web site. Wolfinbarger, and Gilly (2002) find that reliability/fulfilment ratings are the strongest prediction of customer satisfaction while Web site functionality ratings are the strongest prediction of loyalty/intention to purchase (Wolfinbarger, and Gilly, 2002). Customer service ratings predict loyalty/intention to repurchase but not as strongly as do fulfilment and Web site design. Novak *et al.* (2000) find that task-oriented activities such as work and online search

for product information and purchase relate most strongly to skill and control, thus "interactivity metrics" of duration time and browsing depth are highly positively correlated with a compelling online customer experience.

In summary, based on the aforementioned studies, there is no consensus in the literature concerning the dimensions of online service quality. There is an overlap among categories of different studies. Some studies have broader categories, while some other studies identified more refined dimensions. However, the most dominant dimensions in the literature are the aforementioned ones. It can be argued that some of the instruments are closer to measuring what Zeithaml *et al.* (2002) define as e-SQ, while others are closer to assessing Web sites focusing on technical aspects that would affect a customer's experience with a business Web site. It is inevitable to include aspects of technical Web site quality when examining online service quality, as this was found to have a critical impact on customer satisfaction (Kim and Eom, 2002). However, measuring the technical quality is not enough; Zeithml *et al.* (2005) have criticised previous measurement instruments that despite the fact they claim to measure service quality they omit aspects of service quality and fulfilment while what they measure is actually the technical quality of the Web site or perception of service quality. And that defies Zeithaml *et al.* (2002) definition of e-SQ that - as previously mentioned - includes "post-Web site" service issues. Moreover, in their attempt to construct a 22-item instrument (E-S-QUAL) measuring e-SQ, Parasuraman *et al.* (2005) they also come up with an additional complementary 11-item measurement instrument that measures e-service recovery (E-RecS-QUAL). That instrument includes the dimensions of "Responsiveness", "Compensation" and "Contact" applies to cases in which actual transactions have taken place and service recovery issues emerged (Zeithaml *et al.*, 2002). On the other hand, Cristobal *et al.* (2007) built an instrument that explicitly addresses e-service quality as this is perceived by prospective consumers. They identify four dimensions, namely "Customer Service" - which includes elements of the previously explained notions of reliability, responsiveness and customization, "Web design" - that includes aspects of the ease of use of the Web site as well, "Assurance" which includes elements of trust, data security, and reliability, and finally "Order management". In this study, I construct an instrument to measure the quality of services of B2C pure Internet companies, as perceived by Web site visitors. I employ factor analysis to construct the instrument and I test it using a sample of 72 B2C pure Internet firms that belong to several different sectors of the economy (industries).

3. RESEARCH DESIGN

In this section I describe the research design used to arrive at the final instrument. As a first step a pilot questionnaire was developed and placed online. After analysing the responses received using factor analysis techniques, a refined version of the instrument resulted and was tested in evaluating 72 B2C pure Internet companies. Based on this evaluation, the instrument was further refined to get the final instrument. I next describe the generation of scale items, data collection and instrument purification for the pilot questionnaire. Then I describe the data collection phase and purification of the instrument until I arrived to the final instrument.

3.1 Generation of Scale Items

After considering the relevant marketing and management information systems (MIS) literature, I identified 56 items from the literature relevant to e-commerce to include in the pilot questionnaire. Items requiring complete transactions to be answered were omitted. The items included in the pilot questionnaire are shown in Table 1. In order to prevent item order bias two different random order versions of the instrument were created. In both versions items assumed to pertain to the same construct were not placed next to each other. A seven point Likert scale was used to measure each item ranging from "Strongly Agree" (7) to "Strongly Disagree" (1) with no verbal labels for the intermediate scale points 2 through 6. An additional category for "Cannot Respond/Not Applicable" was added. "Cannot Respond/Not Applicable" responses were eventually replaced with the average score of the item during the analysis that followed. Some score items were negatively worded to keep respondents alert and eliminate response bias. Later, during the analysis the score of these items was reversed.

3.2 Data Collection and Scale Purification

The instrument (questionnaire) was subjected to two stages of data collection and refinement like in Parasuraman *et al.* (1988). During the first stage, the instrument was refined by reducing the number of its items and grouping those items in distinct categories. The second stage was confirmatory in nature, allowing for the final dimensions to be formed. The reliability and validity of the instrument was assessed.

3.2.1 Data Collection, First Stage

The two versions of the pilot questionnaire were published on the Web for respondents to access. Respondents were chosen among Business School students. Using mature business students as a sample is considered an appropriate, acceptable and widely used practice in Internet research (Collier and Bienstock, 2006; Yoo and Donthu, 2001). The respondents were

initially asked to evaluate two specific e-commerce Web sites. Exactly 157 valid responses were received.

3.2.2 Scale Purification, First Stage

Factor analysis techniques were applied to pooled data (data from WPSQ evaluation for both firms in one single dataset). The purpose of this analysis was to identify the structure of the set of the variables (the responses of 56 questionnaire items – items P1 through P56 as shown in Table 1) and also to provide a process for reducing the 56 variables (items) to a smaller number, and thus to a more usable questionnaire with fewer items.

After assessing the nature of the data, the adequacy of the sample size, the Measures of Sampling Adequacy (MSA) both for each variable separately as well for all the variables collectively, and verifying the existence of correlations among the variables (items), it was decided that R-type factor analysis with Kaiser's Varimax rotation was appropriate to use in this case. All the variables are metric and constitute a homogeneous set appropriate for factor analysis. Concerning the adequacy of the sample size, the Measures of Sampling Adequacy (MSA) for each variable are in all cases above the acceptable threshold of 0.50, thus no variable needed to be eliminated due to MSA problems. Also, the sample size of 157 is well above the acceptable minimum of 100 required for factor analysis. As Table 2 shows, the Chi-Square of the Bartlett test of Sphericity is approximately 4891.500 with 1540 degrees of freedom and 0.000 significance, implying that nonzero correlations among the items do exist at the significance level of 0.0001. The overall test of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) has the value of 0.786 which is very desirable and well above the acceptable level of 0.50. The large value of the Kaiser-Meyer-Olkin measure of Sampling Adequacy indicates the appropriateness of using factor analysis for the data.

After ensuring that the criteria that justify the use of factor analysis were met, the next step was to perform factor analysis. Since the analysis at this stage was meant to be exploratory in nature, I let the factors extract without predetermining the number of factors to be extracted. Table 3 displays information regarding the thirteen possible factors that were extracted and their relative explanatory power as this is expressed by the percent of variance that each one of them can explain and by their eigenvalues (sum of squared factor loadings). The thirteen factors extracted explain 71.432% of the variance. Therefore, the power of this factor solution in explaining the variance is high, and the variables are in fact highly related to one another. The large communality value for each variable shown in Table 4, indicate that the variance of each variable of the dataset is accounted for by the factor solution.

In order to improve the alpha of each dimension, I used the factor loadings as a criterion to screen the items that would remain in each dimension. The items were sorted according to their loading for each construct. Then the items with the smallest loading for each construct were deleted until the alpha of the construct was improved. Some items that were forming a construct by themselves were moved to the construct that their second largest loading belonged to, provided it would increase that construct's alpha. This process resulted in a set of 29 items, with alpha values ranging from 0.6377 to 0.8613 across 9 dimensions as shown on Table 5. The instrument passed the reliability test (absence of measurement error, measured using Cronbach's alpha), since each construct had an alpha that was significantly higher than the lower bound acceptable alpha levels of 0.60 to 0.80 (Nunnally, 1978).

Table 6 presents the convergent validity testing of the instrument. When a measuring instrument has convergence validity, this implies that the instrument is consistent and agrees with other independent measures of the construct I want to measure. More specifically, as shown in Table 6, checking correlations between the measurements (dimensions) of the questionnaire and two other independent measures of the same construct (namely Overall Web Site Quality Impression and Overall Web Site Service Quality Impression) revealed that in this case most correlations were found to be statistically significant at the 0.01 level, therefore ensuring convergent validity. The two other measures assumed to be measuring the same construct as the instrument were assessed by asking respondents to assess the Overall Site Quality and the Overall Quality of Services Provided by the Web site using a scale from 1 to 7. Nine new variables based on the nine dimensions were created. Each variable consisted from the average score of each dimension (i.e. the sum of the scores of the items included in a dimension divided by the number of items in the dimension). Those were regressed on the Overall Site Quality measure as shown in Panel A of Table 6 and the Overall Quality of Services provided by the Web site measure as shown in Panel B of Table 6.

Table 7 presents results concerning the nomological (or predictive) validity testing of the instrument. An instrument is said to be nomologically valid when it can accurately indicate a known causal relationship. This was verified using two additional variables about the Intention to Revisit, and the Intention to Purchase as those are shown in Table 7. Those variables were used as dependent variables in regressions having the nine dimensions of the instrument as independent variables. Regressions resulted acceptable levels of R^2-adjusted and statistically significant coefficients of dimensions, thus the instrument is nomologically valid.

After ensuring its reliability and validity, the WPSQ instrument consisting of 29 items as shown in Table 8 was ready to be used for evaluating the WPSQ of the 72 Internet companies of the company sample.

3.2.3 Data Collection, Second Stage

In order to further refine the instrument and gain further insights on WPSQ dimensions, I used the instrument to collect WPSQ data concerning 72 Internet companies. The data collected was analysed using factor analysis techniques and the instrument was further refined.

The sample of Web sites to be evaluated was selected among the Web sites of US publicly traded firms. I used two main criteria for a firm to be included in the sample. First, to be selected a firm had to be a pure Internet firm; this means that the firm would not exist if it was not for the Internet and also that its revenue comes from online activity. They should distribute their products and/or services solely through the Internet. Thus, company Web sites that were serving as sources of pre-purchase information for firms that conducted their business offline or Web sites that offered just an alternative channel for a firm's products and/or services were excluded from the sample. The other criterion was that firms whose targeted clientele has a background that did not agree with the experience background of the respondents' sample (e.g. they appealed to an audience of doctors or technicians) were eliminated. For the same reason business-to-business (B2B) companies were excluded from the sample as well. The screening resulted in a sample of 72 companies that represented five Internet sectors: retailers, search and portal, Internet service providers/access, Internet services and content/communities.

A sample of Business School students was selected to distribute the online questionnaire to. Participants were asked to visit the company Web site and perform a specific task, depending on the nature of the products/services offered through that particular Web site. I finally received 604 valid responses. Each one of the companies was evaluated by at least five respondents.

3.2.4 Scale Purification, Second Stage

It was decided that R-type Factor Analysis with Varimax Rotation was appropriate to use in order to analyse the data, after it was verified that the set of variables (the 29 questionnaire items shown in Table 8) meets the fundamental requirements for factor analysis. The Measures of Sampling Adequacy (MSA) for each variable (the diagonal elements of the Anti-Image Correlation Matrix) fell in acceptable levels of MSA, thus in this case no variable needed to be eliminated due to MSA problems. Also, the sample size of 604 (which is well

above the acceptable minimum of 100 required for factor analysis) provides an adequate basis for the calculation of the correlations between variables. As shown in Table 9, The Chi-Square of the Bartlett test is approximately 7788.48 with 406 degrees of freedom and 0.000 significance meaning that the null hypothesis that the variables in the population correlation matrix are uncorrelated is rejected. The Measure of Sampling Adequacy (MSA), which in this case has the value of 0.89 which is very desirable and well above the acceptable level of 0.50. The Kaiser-Meyer-Olkin measure of sampling adequacy (an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients) has the value of 0.894. Large values for the KMO measure indicate that a factor analysis of the variables is appropriate.

The next step was to perform factor analysis on the data, in order to extract the factors. Table 10 contains information regarding the eight possible factors returned by the factor analysis and their relative explanatory power as expressed by their percent of variance they can explain and by their eigenvalues (sum of squared factor loadings). As shown in Table 10, 66.38% of the variance is explained by the factor solution. Therefore, the power of this factor solution in explaining the variance is high, and the variables are in fact highly related to one another. Table 11 that presents the communalities for each variable shows that the variance of each variable is accounted for by the factor solution, as the communality value for each variable is high.

Table 12 shows the dimensions formed and the items loaded on each dimensions, along with the factor loading of each item on the dimension to which they belong as resulted after Varimax Rotation. In order to improve the alpha of each dimension, I used the factor loadings as a criterion. I moved items around along categories (provided they loaded on the target category) and checked alphas to see if they increase. Some items that were forming a construct by themselves were moved to the construct their second largest loading belonged to, provided it would increase the constructs alpha.

The instrument passed all validity tests; It passes the reliability test since the alphas of the constructs range from 0.69 to 0.85 as shown in Table 12; it passes the convergent validity test since correlations between the measurements of the questionnaire and other measures (in this case, Overall Site Quality and Overall Quality of Services Provided by the Web Site) of the same construct are high. All constructs are correlated with both Overall Site Quality and Overall Quality of Services Provided by the Web Site and also all correlations are significant either at the 0.01 or the 0.05 level, as shown in Table 13; and also passes the nomological

validity test since regressions of the eight constructs on two additional variables about the intention to Revisit and the Intention to Purchase used as dependent variables resulted in acceptable levels of R^2-adjusted and statistically significant coefficients of constructs as shown in Table 14.

The instrument resulted is shown in Table 15 consisting of 29 items grouped in categories representing the eight WPSQ dimensions.

4. DISCUSSION ON THE RESULTING WPSQ DIMENSIONS

Table 15 shows the eight dimensions of Web perceived service quality and the items that represent each dimension. This study finds that there are eight dimensions underlying Web perceived service quality of Internet companies. "Web Site Impression - Emotions/Feelings/Aesthetics", "Web Site Response Time During Navigation", "Trust: Safety and Privacy", "Image Consistency", "Web Site as a Viable Substitute to Service Personnel", "Interaction Capabilities", "Ease of Use" and "Quality of Information".

More specifically, "Trust: Safety and Privacy" as shown in Table 15, is operationalised with three questions that address concerns about a user's private information submitted to a Web site, as well as concerns about the safety of transactions performed on the Web site. Trust as a dimension of online service quality is discussed in many other studies (Loiacono *et al.*, 2007; Zeithaml *et al.* 2002). Vidgen and Barnes (2001) find trust –seen as part of their "interaction quality" dimension- to be the most highly rated factor in terms of customer importance. Also, trust is one of the qualities included in the definition of a "successful Web site in the context of e-commerce" as defined by Liu and Arnett (2000). Trust can be represented by two concerns: Security concerns and Private information concerns. Security concerns are about the security of the transactions (for example, safety of credit card number during the transaction, accuracy of the charged amount etc.). In both 2000 and 2001, the UCLA Internet Report found that all users are seriously concerned about privacy, and especially about credit card security (Page 53). Furthermore, the single most-cited reason mentioned by 28.4 percent of Internet purchasers for waiting too long to make any purchases online is concern about giving out a credit card number, and third reason given was concern about deception (p. 43). Private information concerns are about how the Web site will handle the private information the users provide. The UCLA Internet Report of 2001 found that nearly all respondents (94.5 percent) report some level of concern about the privacy of their

personal information when or if they buy online (page 53). The study finds that the issue of privacy continues to raise barriers to online sales – especially among infrequent purchasers.

Another important factor indicated by this study is “Interactivity”. It can be argued that interactivity is what differentiates the Web from other marketing media. This is operationalised in this study as shown in Table 15 with questions about at what degree the users feel that the Web site allows customisation and personalisation of the context they receive through the Web site (User-Web Site Interaction), as well as questions about the extend at which the users feel that the Web site gives them the opportunity to interact with the organisation or other users of the Web site. Interaction is one of the differentiating qualities of the Web compared to other marketing media. Haugtvedt and Roehm (1999) defined interactivity as: "some level of real-time dialogue in which the involved entities (human or otherwise) play both the role of sender and receiver of information at some point in the dialogue." Definitions of this dimension in the literature have mainly focused on two distinct aspects of interactivity, namely, reciprocal communication and control (Liu, 2003). Reciprocal communication refers to the degree that the Web site allows the user to interact with the company that owns it or even with other customers exchanging information in online communities about the transaction and the products/services (amazon.com is an example of a Web site that allows this at a high degree). Control refers to whether the Web site gives the users the opportunity to control the information they get, for example if they can personalize the Web site according to their needs. Control of the content, order and duration of product relevant information improves consumers’ ability to integrate and remember and thus to use information in more useful and valuable ways (Ariely, 2000). Almost all the relevant studies discussed here include this dimension.

Trust and Interactivity can collectively be viewed as a case of how much control over the transaction is given to the customer. That is, control over the information a customer gives out and the information s/he receives.

As the web becomes more interactive, with users performing transactions and tasks on a regular basis, the importance of the Ease of Use of a Web site, or Usability is increasing. Ease of Use/Usability of a Web site is an issue that attracted the attention of both academia and Web site design practitioners. In this study, as shown in Table 15, Ease of Use is operationalised with questions concerning how easy it is to understand a Web site’s labels, to navigate the Web site and in general how easy it is to use the Web site. Usability or Ease of Use is not a new concept for customer service, as usability is analogous to the traditional

concepts of store layout and design (Lohse and Spiller, 1998), ease of navigating through the store, and fast checkout (Arnold *et al.*, 1983). For Microsoft (2007), ease of use of a Web site comes down to "letting people know what they should do and how to do it" and they warn that the audience will move on and leave the Web site, if the Web site is not easy to use. According to Palmer (2002), usability conceptualised as the ease or difficulty users experience with online systems and processes is a crucial element in Web site success. Businesses with Web sites that address usability and incorporate other essential design criteria report higher traffic, more repeat visitors, and greater customer satisfaction (Palmer, 2002).

While usability is a key to the long-term success of a Web site, Tarasewich *et al.* (2001) suggest that aesthetics play their part in the overall Web experience. Aesthetic as well as experiential issues are addressed in this study with questions about the emotions of the user while using the Web site, the impression of the experience the user has from using the Web site and the appearance of the Web site, as shown in Table 15. According to Tarasewich *et al.* (2001), factors such as graphics, animation, colour, and overall appearance seem to influence how attractive people find a Web site, and factors that are related to aesthetics, such as pictures, layout, style, simplicity, and colours, seem to play a part in the perceived usability of a site. People experience a range of emotions, both positive and negative, as they interact with a Web site. Tarasewich *et al.* (2001) believe that good management of a Web site's aesthetics can increase Web site's revisits, as well as extend the time spent on the Web site, by making the experience for users more enjoyable. Aesthetics also promote interactivity and a feeling of security and well-being that can lead to trust in the Web site and in the organization (Tarasewich *et al.*, 2001). This again is not new to retailing, as in offline environments too, experiential issues were associated with more impulsive and increased spending (Babin *et al.*, 1994).

Another WPSQ dimension that has attracted much attention from both scholars and practitioners is Web Site Response Time. As shown in Table 15, Response Time is operationalised in this study by how quickly or slow the Web site loads (always according to the user's impression) and the impression that users have of the time that elapses between their actions and the Web site response. Anyone who has used the Internet either for work or for pleasure has experienced at some point the frustration of slow page or file downloads. In most cases, frustrated users simply abandon the Web site and seek an alternative Web site that is faster. In e-commerce this means customers or potential customers lost to competition. It is estimated that slow performance loses e-commerce Web sites as much as $4.35 billion

annually (Norris, 2000). Dellaert and Kahn (1999) found that Web waiting time affects consumer evaluation of Web site content only negatively especially when slow speeds are not well managed, for example, by failing to provide information on waiting times.

In online business, information quality is a crucial dimension of WPSQ because everything involved in an online transaction except for physical products is information. Generally speaking, information quality represents measures of information systems output (accuracy, precision, currency, timeliness, reliability of information provided). In line with that, as shown in Table 15, information quality in this study is operationalised by timeliness, accuracy and how believable it is, always according to the impression given to users while using the Web site. In the context of e-commerce, according to Zeithaml *et al.* (2000a) information quality is part of "Reliability". When the information quality of an e-commerce Web site is low, this can cause frustration and even mistrust towards the company to the point that the image of the company is negatively affected or at least is not communicated as it should. In the study of Chen and Wells (1999), informativeness has the strongest effect on overall Web site ratings than any other factor they considered.

In order for a Web site to add value to its customers' Web experience, the Web site should serve as a viable substitute to service personnel for customers to interact with the business for at least some purposes (Loiacono *et al.*, 2007). It must increase the effectiveness and the efficiency of the online transaction experience compared to the possible alternative offline experience (Seybold, 1998). Users report they appreciate and prefer that they can obtain information concerning the product/service or the transaction itself directly without having to go through a salesperson and explicitly link this quality of the online environment with a sense of increased freedom and control (Wolfinbarger and Gilly, 2000). It has been suggested that a Web site interface can "replace" the salesperson during a transaction, though there are some aspects of in-store service that cannot be captured by a Web site (Lohse and Spiller, 1998). As shown in Table 15, in this study, the concept of a Web site serving as a viable substitute to service personnel is operationalised with questions concerning whether it is easier or not for a user to use the Web site or complete their transactions on the Web site compared to contacting a representative of the organization using traditional media like phone, fax or mail.

The image of a firm is formed in the minds of audiences by advertising and by the firm's public relations. Usually a person has formed an image of a company even before they

engage into transactions with the company. That means, that a user that visits a Web site for the first time, may have had formed an image of the company, long before they visit the company's Web site. The image of the company projected by the Web site should be consistent with the image that has already been formed in the user's mind before they visit the Web site. When consistency is violated, especially with a well-established mark, the viewer usually perceives something is wrong. This reduces the credibility of the message. Therefore, in order to inspire credibility through the Web site, image consistency across media should be ensured. This dimension is operationalised in this study as shown in Table 15, with questions assessing how close the customers believe is the image they had for the organization with the image of the organization projected by its Web site.

5. CONCLUDING REMARKS

This study develops and proposes a measurement tool for Web perceived service quality. The WPSQ measurement instrument was developed using factor analysis and it consists of 29 items across the aforementioned eight dimensions, as shown in Table 15. The instrument was tested on a sample of 72 B2C pure Internet companies. The instrument passed all validity and reliability tests.

The study provides an insight as to how those eight service quality dimensions are operationalised in the context of online businesses, and therefore gives a better understanding of the notion of Web perceived service quality (WPSQ) itself. Moreover, the instrument provided by this study is specific for measuring the WPSQ of pure Internet companies and can be used by Internet companies that wish to measure the WPSQ of their Web sites in order to better manage and improve their service quality delivery efforts. Furthermore, this instrument can be used by researchers that wish to better understand the behaviour of online businesses as for example, in observing the relationship between the WPSQ of Internet companies and other business measures like financial measures or market measures to get a more holistic picture of this relatively new type of businesses.

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Table 1: Pilot questionnaire items

This table presents a list of the 56 pilot questionnaire items (P1-P56). The pilot questionnaire was created by combining items from relevant marketing and MIS studies. There were 56 items in total. In order to prevent item order bias two different random order versions of the instrument were created. In both versions items pertaining to a similar construct according to previous research were not placed next to each other. A seven point Likert scale was used to measure each item ranging from "Strongly Agree" (7) to "Strongly Disagree" (1) with no verbal labels for the intermediate scale points 2 through 6. An additional category for "Cannot Respond/Not Applicable" was also included ("Cannot Respond/Not Applicable" responses were assigned the average score of the item eventually in analysis). Some score items were originally negatively worded to keep respondents alert and eliminate response bias. Later, during the analysis the score of these items was reversed. The two versions of the pilot questionnaire were published on the Web for respondents to access. The respondents were asked evaluate two specific e-commerce Web sites. Exactly 157 valid responses were received from 87 persons.

P1. I trust the Web site administrators will not misuse my personal information I provided
P2. The Web site displays a visually pleasing design
P3. The Web site creates a memorable experience
P4. The Web site is visually appealing
P5. The Web site has interactive features, which help me accomplish my task
P6. All my business with the company can be completed via the Web site
P7. The Web site has an attractive appearance
P8. Has a good reputation
P9. The Web site's image matches the image of the company
P10. The Web site projects an image consistent with the company's image
P11. Creates a sense of personalization
P12. Feels safe to complete transactions
P13. The Web site allows me to interact with it to receive tailored/personalized information
P14. When I use the Web site there is very little waiting time between my actions and the Web site's response
P15. Promotes good communications
P16. The information on the Web site is pretty much what I need to carry out my tasks
P17. I trust the Web site to treat my personal information in a confidential manner
P18. I find the Web site easy to use
P19. The Web site adequately meets my information needs
P20. The Web site allows transactions on-line
P21. The site generates a sense of competency
P22. The information on the Web site is effective
P23. I feel sociable when I use the Web site
P24. Provides accurate information
P25. The Web site is innovative
P26. The site has a design appropriate to the type of site
P27. The Web site is an alternative to calling customer service or sales
P28. I feel cheerful when I use the Web site
P29. Can be depended upon to deliver goods/services promised
P30. Most of all business processes can be accomplished via the Web site
P31. Personal information feels secure
P32. Provides timely information
P33. I feel happy when while using the Web site
P34. Provides easy to understand information
P35. The display pages within the Web site are easy to read
P36. The Web site fits with the image I have of the company
P37. Provides information at the right level of detail
P38. Provides relevant information
P39. The text on the Web site is easy to read
P40. The Web site loads quickly
P41. It is easier to use the Web site to complete my business with the company than it is to telephone, fax or mail a representative
P42. Presents the information in an appropriate format
P43. Provides believable information
P44. The Web site is creative
P45. The site is easy to find
P46. I feel safe in my transactions with the Web Site
P47. Learning to operate the Web site is easy for me
P48. I can interact with the Web site in order to get information tailored to my specific needs
P49. It would be easy for me to become skilful using the Web site
P50. The Web site design is innovative
P51. The Web site does not take long to load
P52. The Web site labels are easy to understand
P53. The Web site is easier to use than calling an organizational representative on the phone
P54. The site is easy to navigate
P55. Builds a sense of community
P56. The Web site is visually pleasing

Table 2: First stage - KMO and Bartlett's test

This table presents evidence that the method of factor analysis was appropriate to use with the dataset obtained from the responses to the pilot questionnaire. All the variables are metric and constitute a homogeneous set appropriate for factor analysis. Regarding the adequacy of the sample size, I observe that the Measures of Sampling Adequacy (MSA) for each variable (item) - the diagonal elements of the Anti-Image Correlation Matrix - are in all cases above the acceptable threshold of 0.50, thus no variable (item) needed to be eliminated due to MSA problems. Also, the sample size of 157 is well above the acceptable minimum of 100 required for factor analysis. The Chi-Square of the Bartlett Test of Sphericity is approximately 4891.500 with 1540 degrees of freedom and 0.000 significance, this meaning that nonzero correlations among the items exist at the significance level of 0.0001. The overall test of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) has the value of 0.786 which is very desirable and well above the acceptable level of 0.50 indicating the appropriateness of using factor analysis with the data.

First Stage - KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.786
Bartlett's Test of Sphericity	Approx. Chi-Square	4891.500
	df	1540
	Sig.	0.000

Table 3: First stage - factor analysis: Total variance explained

This table presents information regarding the thirteen possible factors that were extracted from the factor analysis and their relative explanatory power as this is expressed by their percent of variance that they can explain and by their eigenvalues (sum of squared factor loadings). The power of this factor solution in explaining the variance is high, and the variables (items) are in fact highly related to one another, as the 13 factors extracted explain 71.432% of the variance.

First Stage - Factor Analysis:
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.910	26.624	26.624	14.910	26.624	26.624	5.772	10.308	10.308
2	5.543	9.898	36.522	5.543	9.898	36.522	5.703	10.184	20.491
3	3.021	5.394	41.916	3.021	5.394	41.916	3.787	6.762	27.253
4	2.966	5.296	47.212	2.966	5.296	47.212	3.507	6.262	33.515
5	2.043	3.647	50.860	2.043	3.647	50.860	3.221	5.752	39.267
6	1.893	3.380	54.240	1.893	3.380	54.240	2.896	5.171	44.438
7	1.722	3.074	57.314	1.722	3.074	57.314	2.772	4.949	49.388
8	1.574	2.810	60.124	1.574	2.810	60.124	2.666	4.761	54.149
9	1.511	2.699	62.823	1.511	2.699	62.823	2.485	4.438	58.586
10	1.354	2.419	65.242	1.354	2.419	65.242	2.198	3.924	62.511
11	1.253	2.238	67.479	1.253	2.238	67.479	1.786	3.190	65.700
12	1.153	2.059	69.539	1.153	2.059	69.539	1.613	2.880	68.581
13	1.060	1.893	71.432	1.060	1.893	71.432	1.597	2.852	71.432

Table 4: First stage - factor analysis: Communalities

This table presents the communality value for each variable (item). Communalities provide summary statistics detailing how well each variable (item) is "explained" by the thirteen components and they show the amount of variance in a variable that is accounted for by the thirteen factors taken together. The large Communality value for each variable indicates that the variance of each variable (item) of the dataset is accounted for by the factor solution.

Communalities – Initial extraction					
P1	1	0.748	P29	1	0.595
P2	1	0.711	P30	1	0.722
P3	1	0.677	P31	1	0.683
P4	1	0.757	P32	1	0.754
P5	1	0.804	P33	1	0.812
P6	1	0.610	P34	1	0.705
P7	1	0.769	P35	1	0.675
P8	1	0.550	P36	1	0.722
P9	1	0.726	P37	1	0.807
P10	1	0.801	P38	1	0.721
P11	1	0.746	P39	1	0.681
P12	1	0.725	P40	1	0.764
P13	1	0.652	P41	1	0.790
P14	1	0.706	P42	1	0.656
P15	1	0.712	P43	1	0.652
P16	1	0.712	P44	1	0.736
P17	1	0.823	P45	1	0.606
P18	1	0.749	P46	1	0.810
P19	1	0.748	P47	1	0.737
P20	1	0.759	P48	1	0.694
P21	1	0.691	P49	1	0.532
P22	1	0.681	P50	1	0.801
P23	1	0.630	P51	1	0.677
P24	1	0.566	P52	1	0.709
P25	1	0.712	P53	1	0.801
P26	1	0.747	P54	1	0.836
P27	1	0.547	P55	1	0.771
P28	1	0.754	P56	1	0.743

Extraction Method: Principal Component Analysis (SPSS).

Table 5: Pilot questionnaire factor analysis - factor names and alpha (Cronbach) for each factor

This table presents the nine dimensions resulted after the items were sorted according to their loading on each factor according to the factor solution and the items with the smallest loading for each construct were deleted until the alpha of the construct was improved. Some items that were forming a construct by themselves were moved to the construct their second largest loading belonged to, provided it would increase the constructs alpha. This process resulted in a set of 29 items with alpha values ranging from 0.6377 to 0.8613 across 9 dimensions. The Cronbach´ s alpha of each dimension is also shown in the table. Each dimension had an alpha that was significantly higher than the lower bound acceptable alpha levels of 0.60 to 0.80 (Nunnally 1978), indicating that the instrument passes the reliability test (absence of measurement error). The items forming each dimension along with their factor loading on the dimensions to which they belong are also presented in the table below.

Dimension	alpha	Variable label	Factor loadings	Item
Feelings/Emotions created by the Site experience	0.844	P3	0.68	The Web site creates a memorable experience
		P7	0.69	The Web site has an attractive appearance
		P28	0.82	I feel cheerful when I use the Web site
		P33	0.85	I feel happy when I use the Web site
Ease of Use	0.860	P42	0.64	The Web site presents the information in an appropriate format
		P18	0.71	I find the Web site easy to use
		P52	0.74	The Web site labels are easy to understand
		P54	0.82	The Web site is easy to navigate
Security/safety	0.844	P1	0.74	I trust the Web site administrators will not misuse my personal information
		P46	0.81	I feel safe in my transactions with the Web site
		P17	0.85	I trust the Web site to keep my personal information safe
Trust	0.638	P29	0.54	The Web site cannot be depended upon to deliver the goods/services promised
		P24	0.67	The Web site does not provide accurate information
		P43	0.73	The Web site does not provide believable information
Image Consistency	0.778	P9	0.65	The Web site's image does not match the image of the company
		P36	0.76	The Web site fits with my image of the company
		P10	0.8	The Web site projects an image consistent with the company's image
Viable Substitute	0.861	P41	0.79	It is easier to use the Web site to complete my business with the company than it is to telephone, fax or mail a representative
		P53	0.8	The Web site is easier to use than calling an organizational representative on the phone
Community/Communications /Personalization (Making it more “real life” - like)	0.739	P15	0.55	The Web site promotes good communications
		P55	0.74	The Web site builds a sense of community
		P11	0.75	The Web site creates a sense of personalization
Site-User Interaction	0.729	P49	0.58	It would be easy for me to become skilful using the Web site
		P13	0.66	The Web site allows me to interact with it to receive tailored information
		P48	0.71	I can interact with the Web site in order to get information tailored to my specific needs
Response Time	0.699	P51	0.58	The Web site takes long to load
		P14	0.66	When I use the Web site there is very little waiting time between my actions and the Web site's response
		P40	0.73	The Web site loads quickly
		P32	0.06	The Web site provides timely information

Table 6: Pilot questionnaire - convergent validity test

This table presents the convergent validity testing of the instrument. When a measuring instrument has convergence validity, this implies that the instrument is consistent and agrees with other independent measures of the construct I want to measure. More specifically, as shown in the table below, checking correlations between the measurements (dimensions) of the questionnaire and two other independent measures of the same construct (namely Overall Web Site Quality Impression and Overall Web Site Service Quality Impression) revealed that in this case most correlations were found to be statistically significant at the 0.01 level, therefore ensuring convergent validity. The two other measures assumed to be measuring the same construct as the instrument were assessed by asking respondents direct to the Overall Site Quality and the Overall Quality of Services Provided by the Web Site using a scale from 1 to 7. Nine new variables based on the nine dimensions were created. Each variable consisted from the average score of each dimension (i.e. the sum of the scores of the items included in a dimension divided by the number of items in the dimension). Those were regressed on the Overall Site Quality (Panel A) and the Overall Quality of Services provided by the Web Site (Panel B) measures. The acronyms in the table below represent the nine dimensions as follows: FEEL: Feelings/Emotions created by the Site experience, EASE: Ease of Use, SAFE: Security/safety, TRUST: Trust, IMAGE: Image Consistency, SUBST: Viable Substitute, LIFE: Community/Communications/Personalization (Making it more "real life" - like), INTERACT: Site-User Interaction, TIME: Response Time.

Panel A: Overall Web Site Quality Impression

First Sample of respondents (Sample Size = 154), two different online bookshops

Correlation of Each Dimension with Overall Web Site Quality Impression

		FEEL	EASE	SAFE	TRUST	IMAGE	SUBST	LIFE	INTERACT	TIME
OVERALL QUALITY	Pearson Correlation	0.488**	0.662**	0.535**	0.107	0.262**	0.527**	0.379**	0.367**	0.418**
	Sig. (2-tailed)	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00
	Sample size	154	153	156	154	154	157	156	155	155

** Correlation is significant at the 0.01 level (2-tailed).

Panel B: Overall Quality of Services Provided by the Web Site Impression

First Sample of respondents (Sample Size = 154), two different online bookshops

Correlation of Each Dimension with Overall Web Site Service Quality Impression

		FEEL	EASE	SAFE	TRUST	IMAGE	SUBST	LIFE	INTERACT	TIME
OVERALL SERVICE QUALITY	Pearson Correlation	0.259**	0.522**	0.449**	0.255**	0.116	0.490**	0.251**	0.347**	0.388**
	Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
	Sample size	153	152	155	153	153	156	155	154	154

** Correlation is significant at the 0.01 level (2-tailed).

Table 7: Nomological or predictive validity test

This table presents the nomological (or predictive) validity testing of the instrument using the first sample of 154 respondents who answered questions about two different online bookshops. An instrument is said to be nomologically valid when it can accurately indicate a known causal relationship. This was verified using two additional variables about the Intention to Revisit and the Intention to Purchase. Those variables were used as dependent variables in regressions having the nine dimensions of the instrument as independent variables. Regressions resulted acceptable levels of R^2-adjusted and statistically significant coefficients of dimensions, thus the instrument is nomologically valid. The acronyms in the table below represent the nine dimensions as follows: FEEL: Feelings/Emotions created by the Site experience, EASE: Ease of Use, SAFE: Security/safety, TRUST: Trust, IMAGE: Image Consistency, SUBST: Viable Substitute, LIFE: Community/Communications/Personalization (Making it more "real life" - like), INTERACT: Site-User Interaction, TIME: Response Time.

	Intention to revisit the Web site				Intention to purchase			
	Coef. (unstandardized)	Coef. (standardized)	t	Sig.	Coef. (unstandardized)	Coef. (standardized)	t	Sig.
FEEL	.358 a	0.255	2.901	0.004	-0.79		-0.747	0.457
EASE	0.197	0.118	1.236	0.219	.311b	0.182	2.077	0.04
SAFE	.299 a	0.283	3.337	0.001	0.017	0.008	0.087	0.931
TRUST	-0.021	-0.017	-0.199	0.843	.446a	0.346	4.103	0
IMAGE	-0.134	-0.11	-1.261	0.209	-0.105	-0.07	-0.824	0.411
SUBST	0.046	0.038	0.451	0.653	-0.1	-0.068	-0.78	0.437
LIFE	.237 c	0.166	1.88	0.062	-0.058	-0.04	-0.466	0.642
INTERACT	-0.12	-0.074	-0.87	0.386	0.2	0.115	1.312	0.192
TIME	0.005	0.003	0.037	0.97	0.215	0.109	1.287	0.2
(Constant)	1.336		1.531	0.128	0.193	0.104	1.189	0.236
R^2- adjusted	0.3				0.305			
Sample size	154				154			

a, b, c : statistically significant at the 1% , 5%, and 10% level respectively

Table 8: The 29 – item Web perceived service quality assessment instrument

This table presents the 29 items used to evaluate the Web perceived service quality of the companies in the sample. The 29 items resulted by analysing the responses of the pilot questionnaire. A new questionnaire consisting of those 29 items was constructed. Items pertaining to a similar dimension were not placed next to each other in the new questionnaire. A seven point Likert scale has been used to measure each item ranging from "Strongly Agree" (7) to "Strongly Disagree" (1) with no verbal labels for the intermediate scale points 2 through 6. An additional category for "Cannot Respond/Not Applicable" was included in order to cover all the possibilities. "Cannot Respond/Not Applicable" responses were assigned the average score of the item eventually in the analysis that followed data collection. Some score items were originally negatively worded to keep respondents alert and eliminate response bias. Later, during the analysis the score of these items was reversed. The 29-item questionnaire was placed online. I selected a sample of about 150 respondents to distribute the online questionnaire to. Each respondent was instructed to evaluate a group of 5 or 6 companies from the company sample list. I finally received 604 valid responses. Each one of the companies was evaluated by at least five respondents during the period of October-November 2001.

Q1. The Web site creates a memorable experience
Q2. I trust the Web site administrators will not misuse the personal information I provided
Q3. I feel cheerful when I use the Web site
Q4. The Web site does not have an attractive appearance
Q5. When I use the Web site there is little waiting time between my actions and the Web site's response
Q6. The Web site labels are not easy to understand
Q7. The Web site provides believable information
Q8. I do not feel safe in my transactions with the Web site
Q9. The Web site provides timely/updated information
Q10. The Web site does not provide accurate information
Q11. The Web site builds a sense of community
Q12. I can interact with the Web site in order to get information tailored to my specific needs
Q13. I trust the Web site to treat my personal information in a confidential manner
Q14. I find the Web site easy to use
Q15. It is easier to use the Web site to complete my transactions with the company than it is to telephone, fax or mail a representative
Q16. I feel happy while using the Web site
Q17. The Web site fits with the image I have of the company
Q18. The Web site loads quickly
Q19. The Web site is easy to navigate
Q20. The Web site projects an image consistent with the company's image
Q21. The Web site does not take long to load
Q22. It would be easy for me to become skilful in using the Web site
Q23. The Web site allows me to interact with it to receive tailored/personalized information
Q24. The Web site promotes good communications
Q25. The Web site creates a sense of personalization
Q26. The Web site is easier to use compared to calling an organizational representative on the phone
Q27. The Web site's image does not match the image of the company
Q28. The Web site can be depended upon to deliver the goods/services promised
Q29. The Web site presents the information in an appropriate format

Table 9: Second stage - KMO and Bartlett's test

The Measures of Sampling Adequacy (MSA) for each variable (the diagonal elements of the Anti-Image Correlation Matrix) fell in acceptable levels of MSA, thus in this case no variable needed to be eliminated due to MSA problems. Also, the sample size of 604 (which is well above the acceptable minimum of 100 required for factor analysis) provides an adequate basis for the calculation of the correlations between variables. The Chi-Square of the Bartlett test is approximately 7788.48 with 406 degrees of freedom and 0.000 significance meaning that the null hypothesis that the variables in the population correlation matrix are uncorrelated is rejected. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) - an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients - has the value of 0.894 which is very desirable and well above the acceptable level of 0.50. Large values for the KMO measure indicate that a factor analysis of the variables is appropriate.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.894
Bartlett's Test of Sphericity	Approx. Chi-Square	7788.48
	df	406
	Sig.	0

Table 10: Second stage - factor analysis - total variance explained

The table below (extracted from the SPSS Factor Analysis Output) contains information regarding the eight possible factors (dimensions) and their relative explanatory power as expressed by their percent of variance they can explain and by their eigenvalues (sum of squared factor loadings). Analysis returned eight dimensions. I can see that 66.38% of the variance is explained by the factor solution. Therefore, the power of this factor solution in explaining the variance is high, and the variables are in fact highly related to one another.

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.568	29.544	29.544	8.568	29.544	29.544	3.262	11.247	11.247
2	2.343	8.078	37.622	2.343	8.078	37.622	2.900	9.999	21.246
3	1.832	6.318	43.940	1.832	6.318	43.940	2.720	9.381	30.626
4	1.636	5.640	49.580	1.636	5.640	49.580	2.348	8.096	38.723
5	1.498	5.166	54.746	1.498	5.166	54.746	2.298	7.926	46.648
6	1.217	4.196	58.943	1.217	4.196	58.943	2.070	7.140	53.788
7	1.155	3.982	62.925	1.155	3.982	62.925	2.070	7.139	60.927
8	1.002	3.455	66.380	1.002	3.455	66.380	1.581	5.452	66.380

Extraction method: principal component analysis (SPSS).

Table 11: Second stage - factor analysis: communalities

The table below presents the communality value for each variable. Communalities provide summary statistics detailing how well each variable is "explained" by the thirteen components and they show the amount of variance in a variable that is accounted for by the eight factors taken together. The large communality values for each variable in this case indicate that the variance of each variable of the dataset is accounted for by the factor solution.

	Initial	Extraction
Q1	1.000	.722
Q2	1.000	.716
Q3	1.000	.761
Q4	1.000	.620
Q5	1.000	.486
Q6	1.000	.709
Q7	1.000	.537
Q8	1.000	.682
Q9	1.000	.664
Q10	1.000	.664
Q11	1.000	.527
Q12	1.000	.682
Q13	1.000	.771
Q14	1.000	.664
Q15	1.000	.796
Q16	1.000	.769
Q17	1.000	.752
Q18	1.000	.833
Q19	1.000	.694
Q20	1.000	.789
Q21	1.000	.787
Q22	1.000	.448
Q23	1.000	.697
Q24	1.000	.566
Q25	1.000	.664
Q26	1.000	.785
Q27	1.000	.710
Q28	1.000	.367
Q29	1.000	.386

Extraction method: principal component analysis (SPSS).

Table 12: Second stage - questionnaire factor loadings

This table presents the eight final dimensions of the instrument along with the items that belong to each dimension. In order to improve the alpha of each dimension, I used the factor loadings as criterion. I moved items around along categories (provided they loaded on the target category) and checked alphas to see if they increase. Some items that were forming a construct by themselves were moved to the construct their second largest loading belonged to, provided that it would increase the constructs alpha. Cronbach´ s alpha measures the internal consistency (reliability) of the instrument, i.e. how much error is present in measuring the questions' underlying concepts (the extend at which measurements are repeatable or the extend to which multiple questions addressing the same construct are in agreement). The alphas of each item as shown in the table below are quite high. This means that the instrument is reliable.

Dimension	alpha	Variable	Factor Loadings of Items on Dimensions to Which They Belong	Item
Web Site Impression - Emotions/Feelings/Aesthetics	0.851	Q16	0.8	I feel happy while using the Web site
		Q3	0.82	I feel cheerful when I use the Web site
		Q1	0.76	The Web site creates a memorable experience
		Q4	0.55	The Web site does not have an attractive appearance
Web Site Response Time During Navigation	0.742	Q18	0.89	The Web site loads quickly
		Q21	0.87	The Web site does not take long to load
		Q19	0.53	When I use the Web site there is little waiting time between my actions and the Web site's response
Trust: Safety and Privacy	0.751	Q13	0.83	I trust the Web site to treat my personal information in a confidential manner
		Q2	0.74	I trust the Web site administrators will not misuse the personal information I provided
		Q8	0.77	I do not feel safe in my transactions with the Web site
Image/Integrated Communications	0.808	Q20	0.83	The Web site projects an image consistent with the company's image
		Q17	0.84	The Web site fits with the image I have of the company
		Q27	0.76	The Web site's image does not match the image of the company
Web Site as a Viable Substitute to Service Personnel	0.814	Q15	0.85	It is easier to use the Web site to complete my transactions with the company than it is to telephone, fax or mail a representative
		Q26	0.83	The Web site is easier to use compared to calling an organizational representative on the phone
Interaction Capabilities	0.809	Q23	0.76	The Web site allows me to interact with it to receive tailored/personalized information
		Q12	0.69	I can interact with the Web site in order to get information tailored to my specific needs
		Q25	0.75	The Web site creates a sense of personalization
		Q24	0.63	The Web site promotes good communications
		Q11	0.45	The Web site builds a sense of community
		Q22	0.38	It would be easy for me to become skilful in using the Web site
Ease of Use	0.742	Q6	0.75	The Web site labels are not easy to understand
		Q14		I find the Web site easy to use
		Q19		The Web site is easy to navigate
Quality of Information	0.695	Q9		The Web site provides timely/updated information
		Q10	0.67	The Web site does not provide accurate information
		Q7	0.66	The Web site provides believable information

Table 13: Convergent validity test of the Web perceived service quality instrument

This table presents the convergent validity testing of the instrument. When a measuring instrument has convergence validity, this implies that the instrument is consistent and agrees with other independent measures of the construct I want to measure. More specifically, as shown in the table below, checking correlations between the measurements (dimensions) of the questionnaire and two other independent measures of the same construct (namely Overall Web Site Quality Impression and Overall Web Site Service Quality Impression) revealed that in this case correlations were found to be statistically significant at the 0.01 level, therefore ensuring convergent validity. The two other measures assumed to be measuring the same construct as the instrument were assessed by asking respondents direct questions about the Overall Site Quality and the Overall Quality of Services Provided by the Web site in the questionnaire. Eight new variables based on the eight dimensions were created. Each variable consisted from the average score of each dimension (i.e. the sum of the scores of the items in a dimension divided by the number of items in the dimension). Those were regressed first on the Overall Site Quality (Panel A) and the Overall Quality of Services provided by the Web site (Panel B) measures.The acronyms in the table below represent the nine dimensions as follows: FEEL: Feelings/Emotions created by the Site experience, TIME: Response Time, TRUST: Security/safety, IMAGE: Image Consistency, SUBST: Viable Substitute, INTERACT: Interaction Capabilities, EASY: Ease of Use, INFOQ: Information Quality.

Panel A: Overall Web Site Quality
Second Sample of respondents (Sample Size = 604), 72 ISDEX Companies

Correlations of Overall Quality with Each Construct

		FEEL	TIME	TRUST	IMAGE	SUBST	INTERACT	EASY	INFOQ
OVERALL QUALITY	Pearson Correlation	0.650**	0.318**	0.293**	0.369**	0.359**	0.529**	0.570**	0.477**
	Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sample size	604	604	604	604	604	604	604	604

**Correlation is significant at the 0.01 level (2-tailed).

Panel B: Overall Quality of Services Provided by the Web Site
Second Sample of respondents (Sample Size = 604), 72 ISDEX Companies

Correlations of Overall Service Quality with Each Construct

		FEEL	TIME	TRUST	IMAGE	SUBST	INTERACT	EASY	INFOQ
OVERALL SERVICE QUALITY	**Pearson Correlation**	0.512**	0.337**	0.303**	0.286**	0.424**	0.574**	0.487**	0.476**
	Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sample size	604	604	604	604	604	604	604	604

** Correlation is significant at the 0.01 level (2-tailed).

Table 14: Nomological validity test of the Web perceived service quality instrument

This table presents the nomological (or predictive) validity testing of the instrument with a sample of 604 responses based on the Web sites of 72 companies from the Internet Stock Index (ISDEX). An instrument is said to be nomologically valid when it can accurately indicate a known causal relationship. This was verified using two additional variables about the Intention to Revisit and the Intention to Purchase. Those variables were used as dependent variables in regressions having the eight dimensions of the instrument as independent variables. Regressions resulted acceptable levels of R^2-adjusted and statistically significant coefficients of dimensions, thus the instrument is nomologically valid. The acronyms in the table below represent the nine dimensions as follows: FEEL: Feelings/Emotions created by the Site experience, TIME: Response Time, TRUST: Security/safety, IMAGE: Image Consistency, SUBST: Viable Substitute, INTERACT: Interaction Capabilities, EASY: Ease of Use, INFOQ: Information Quality.

	Intention to revisit the Web site				Intention to purchase			
	B (unstandardized)	Beta (standardized)	t	Sig.	B (unstandardized)	Beta (standardized)	t	Sig.
FEEL	0.652 a	0.421	9.409	0.000	0.366 a	0.261	5.491	0.000
TIME	0.116 b	0.075	2.010	0.045	0.070	0.051	1.269	0.205
TRUST	0.311 a	0.189	5.474	0.000	0.516 a	0.347	9.430	0.000
IMAGE	-0.039	-0.015	-0.411	0.681	0.019	0.008	0.210	0.834
SUBST	-0.049	-0.030	-0.827	0.408	0.162 a	0.111	2.848	0.005
INTERACT	0.301 a	0.140	3.179	0.002	0.210 a	0.108	2.306	0.021
EASY	0.010	0.006	0.126	0.900	-0.057	-0.035	-0.729	0.466
INFOQ	0.091	0.041	1.033	0.302	-0.203 a	-0.100	-2.397	0.017
(Constant)	-2.158 a		-4.091	0.000	-1.710 a		-3.371	0.001
R^2 - adjusted	0.387				0.306			
Sample size	604				604			

a, b, c : statistically significant at the 1% , 5%, and 10% level respectively

Table 15: The Web perceived service quality assessment instrument

Dimension	Item
Web Site Impression - Emotions/Feelings/Aesthetics	I feel happy while using the Web site
	I feel cheerful when I use the Web site
	The Web site creates a memorable experience
	The Web site has an attractive appearance
Web Site Response Time During Navigation	The Web site loads quickly
	The Web site does not take long to load
	When I use the Web site there is little waiting time between my actions and the Web site's response
Trust: Safety and Privacy	I trust the Web site to treat my personal information in a confidential manner
	I trust the Web site administrators will not misuse the personal information I provided
	I feel safe in my transactions with the Web site
Image/Integrated Communications	The Web site projects an image consistent with the company's image
	The Web site fits with the image I have of the company
	The Web site's image matches the image of the company
Web Site as a Viable Substitute to Service Personnel	It is easier to use the Web site to complete my transactions with the company than it is to telephone, fax or mail a representative
	The Web site is easier to use compared to calling an organizational representative on the phone
Interaction Capabilities	The Web site allows me to interact with it to receive tailored/personalized information
	I can interact with the Web site in order to get information tailored to my specific needs
	The Web site creates a sense of personalization
	The Web site promotes good communications
	The Web site builds a sense of community
	It would be easy for me to become skilful in using the Web site
Ease of Use	The Web site labels are easy to understand
	I find the Web site easy to use
	The Web site is easy to navigate
Quality of Information	The Web site provides timely/updated information
	The Web site provides accurate information
	The Web site provides believable information