MEASURING THE PERFORMANCE IMPLICATIONS OF BUSINESS MODEL DESIGN: EVIDENCE FROM EMERGING GROWTH PUBLIC FIRMS

by

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Abstract

Anchored in strategic network theory and in organizational design theory, this study develops hypotheses about the performance implications of business model design. A unique and detailed data set that contains financial data as well as rare information on business model design themes has been developed to empirically test these hypotheses. Our empirical analyses corroborate the basic premise that in a highly interconnected world engendered by advances in information technologies, one must look beyond firm and industry boundaries to evaluate how value is created by, and for, all stakeholders in a firm’s business model. We find strong support for the hypotheses that the more efficient the design of a business model and the more novel the design of the business model, the greater the value appropriated by the focal firm. We also find that increasing the complementarity embedded within the design of a business model does not increase the value appropriated by the focal firm.

Key words: Business model, design, configuration, value appropriation, firm performance.
Measuring the Performance Implications of Business Model Design: Evidence from Emerging Growth Public Firms

INTRODUCTION

Advances in digital technologies coupled with the interconnectivity engendered by the Internet have opened new horizons for the design and performance of strategic networks. The rapidly growing literature on these networks (see for example Gulati, Nohira, and Zaheer, 2000) has focused on the development of inter-organizational relationships among firms. These relationships allow network partners to use each other’s resources and capabilities. Strategic network design is concerned with how networks are structured (the structure of relationships), what kind of resources partners contribute (the content of relationships), and how the relationships among network partners are managed (the governance of relationships). The structure, content and governance of networks (e.g., alliances) have been shown to affect both network and firm performance (e.g., Baum, Calabrese and Silverman, 2000).

The technological innovations have enabled firms to fundamentally change the way they organize and engage in economic exchanges, both within and across firm and industry boundaries; these changes challenge us to reassess the relevant set of network design issues. In addition to considering the nature of the relationships among firms in a network, the richness and reach of Internet technology enables us to consider inter-organizational transactions as a unit of analysis in the design of strategic networks. Such a transaction-based perspective complements the traditional relationship-based perspective in the design of strategic networks.

We build on the business model construct (Amit and Zott, 2001), which depicts the design of economic exchanges, enabled by a focal firm, among partners and customers. The business model construct, which builds on strategic network theory, focuses on the architecture of economic transactions. In this paper, we measure empirically the impact of business model design on the financial performance of the focal firm in a business model. To this end, we apply insights from organizational design theory – specifically, configuration theory (see Meyer, Tsui and Hinings, 1993; Miller, 1981, 1986) – to the study of business model design: we conceptualize and measure business model configuration as a set of variables, which represent the business model’s major design themes (Miller, 1996). In developing and applying these measures, we capture the content, structure and governance of transactions among business model partners.
To link business model design with the financial performance of the focal firm in the business model, we first explain how the value that is created by a business model for all its stakeholders can be appropriated by the focal firm, focusing on the importance of business model design (not on execution) and its implications for the bargaining power of the focal firm in a business model. To this extent, we offer a framework that allows us to develop empirically testable theoretical hypothesis regarding the link between business model design themes – that is, efficiency, innovation, complementarities, and lock-in – and the focal firm’s value. To do this, we draw on bargaining theory that has been fruitfully applied to the study of value appropriation by stakeholders in other contexts.

To enable the empirical analysis, a unique and detailed data set that contains financial data as well as rare information on business model design themes has been developed. Among the empirical findings of this study, we find compelling evidence that the more efficient design of a business model and the more novel the design of the business model, the greater the value appropriated by the focal firm. We also find that greater complementarity embedded into the design of a business model does not increase the value appropriated.

The remainder of the paper is organized as follows. In the next section, we develop the theory and the four testable hypotheses. We proceed with a data and methods section and a results section in which we describe our empirical findings for both the pre- and post-2000 stock market decline. We conclude with a discussion and implications of our study for future research.

THEORY AND HYPOTHESES

Strategic Network Design and Firm Performance

In many industries, the locus of value creation and innovation appears to be shifting toward inter-organizational collaborative arrangements (Doz and Hamel, 1998; Powell et al., 1996). A growing number of management scholars agree with the statement that, “The search for the source of value-creating resources and capabilities should extend beyond the boundaries of the firm” (Gulati, Nohira and Zaheer, 2000:207). A strategic network is a boundary-spanning arrangement that enables a member firm to reach out to resources and capabilities owned or controlled by others. Strategic networks are composed of “inter-organizational ties that are enduring, are of strategic significance for the firms entering them, and include strategic alliances, joint ventures, long term buyer-supplier relationships, and a host of similar ties” (Gulati, Nohira and Zaheer, 2000: 203).
Major design elements of strategic networks are network structure, content and governance (Gulati, Nohira and Zaheer, 2000; Hoang and Antoncic, 2001). Network structure refers to structural characteristics of the network such as its density, its position centrality (Freeman, 1979), strength of its ties (Granovetter, 1973), and its structural holes (Burt, 1992). Network content refers to the identities, resources, status, and other characteristics of the network nodes. Finally, network governance refers to the set of rules and norms (e.g., trust, as discussed by Gulati, 1995) that govern behaviour in the network. Strategic network design is primarily concerned with relationships among firms and thus with issues that lie outside an organization’s boundaries.

The design of a strategic network appears to be more the outcome of an emergent process than the result of deliberate planning and choice (Kogut, 2000). As Gulati et al. note, “In terms of engineering the wider network, there is a limited amount of intentionality possible on the part of the focal firm” (2000:208). Yet, strategic network design clearly matters for firm performance. For example, the configuration of a firm’s network structure at the time of founding, in terms of the number and quality of horizontal and vertical alliances, is an important determinant of early firm performance (Baum, Calabrese, and Silverman, 2000). Firms’ positions in networks are another critical factor for firm performance (e.g., Freeman, 1979; Gulati, 1998). More specifically, Burt (1992) argues that advantageous positioning in a network (namely, in its “structural holes”) can bestow control benefits to a firm that may translate into superior performance. The content of a network, such as the identities and resources of alliance partners, also plays an important role in determining firm performance (Baum, Calabrese and Silverman, 2000). A firm can gain informational benefits such as access, timing and referral benefits (Burt, 1992) from its ties with critical resource providers (Granovetter, 1973). In fact, a network can be viewed as a repository of knowledge that is more valuable than the sum of its parts if it is properly managed and governed (Kogut, 2000). Thus, the quality of the governance of a network also determines the extent of rents that accrue to network members (Dyer and Singh, 1998; Gulati, Nohira and Zaheer, 2000; Kogut, 2000).

Two observations relevant for the present study emerge from a review of the strategic network literature. First, benefits that may arise from network structure, content and governance are often

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2 There is also an emerging literature on the performance of networks; see, for example, Gulati (1998) for a review of papers that study the performance of alliances. Since these studies are not critical to the arguments developed in this paper, we do not to review them here.
linked. For example, advantageous positioning in a network can lead to preferential access to information and other critical resources (Burt, 1992). In other words, control benefits generated from network structure overlap with informational advantages emanating from network content (Gulati, 1998). Similarly, network governance is linked with network structure. For example, ownership of bottleneck resources can lead to the emergence of a hub-and-spoke network structure (Kogut, 2000). While strategic network scholars have examined elements of network structure, content and governance in isolation, a holistic approach for studying the performance issues in networks seems suitable. Some scholars have made first steps in this direction by adopting a contingency approach (e.g., Rowley, Behrens and Krackhardt, 2000), which highlights the scope for applying insights from organization theory (specifically, from contingency and configuration theories) to this field.

The second observation is that the mechanisms that link strategic network design with firm performance appear to warrant further exploration (Gulati, 1998). The existence of strategic networks implies that important sources of rents are located beyond a firm’s boundaries. Since the firm remains the unit of accrual, an important question that emerges is: how does strategic network design influence the competing claims to rents among the members of a network? Kogut (2000) states that for many networks (with the exception of those characterized by structural holes) the allocation of rents to individual members is “determined by rules of adjudication and relative bargaining power” (2000:414). By applying arguments from bargaining theory to the study of value appropriation in networks, this paper presents a step toward a more complete theory of strategic network design and firm performance.

**Business Models and Their Configuration**

Strategic networks have traditionally been analyzed in terms of the relationships among network members. However, the technological transformation introduced by networked information technology, in particular the Internet, has fundamentally changed the way firms organize and engage in economic exchanges. This change suggests that transactions may be another fruitful unit of analysis in the context of strategic networks. In this article, we therefore adopt a transaction-based perspective to the study of strategic networks. We do this by building on the business model construct (Amit and Zott 2001). The economic exchanges enabled by a business model may span firm and even industry boundaries. More specifically, a business model depicts the structure, content, and governance of transactions designed so as to create value through the
exploitation of business opportunities. *Transaction structure* refers to the parties that participate in the exchanges and the ways in which these parties are linked. Transaction structure also includes the order in which exchanges take place (i.e., their sequencing), and the adopted exchange mechanism. *Transaction content* refers to the goods or information that are being exchanged, and to the resources and capabilities that are required to enable the exchanges. Finally, *transaction governance* refers to the ways in which flows of information, resources, and goods are controlled by the relevant parties. It also refers to the legal form of organization, and to the incentives for the participants in transactions. (Adapted from Amit and Zott, 2000:511)

The business model construct extends the notion of a strategic network by focusing on transactions rather than on relationships, and by encompassing both exchanges with any outside stakeholders, such as customers, and exchanges within firms. This shift in perspective is promising because in this approach transactions can be designed to create value and thus may affect the performance of a business model stakeholder. For example, relational rents can be created by transactions that rely on inter-firm resources and routines (Dyer and Singh, 1998). In this view, customers become partners for co-producing value in transactions (Ramirez, 1991; von Hippel, 1986). A business model is hence viewed as a bundle of transactions enabled by a focal firm. This transaction-based perspective complements the traditional relationship-based view of strategic networks. Primary business model design elements are the structure, content and governance of transactions; these concepts mirror the main design elements of strategic networks.

There are some degrees of freedom in designing business models.3 Broadly construed, a business model represents a firm’s way of doing business, and thus forms part of the firm’s set of core strategic choices, along side such questions as in what businesses to be in and how to compete. We surmise that there is an important relationship between business model design and firm performance. Configuration theory (e.g., Meyer, Tsui and Hinings, 1993; Miller, 1981, 1986)
provides a useful basis from which to examine the impact of business model configuration on firm performance. Configuration theory (an extension of contingency theory)\(^4\) takes into account holistic configurations (gestalts, archetypes, generic types) of organizations (Miles and Snow, 1978; Miller, 1981, 1986; Mintzberg, 1979, 1983). Configurations are constellations of design elements that commonly occur together because their interdependence makes them fall into patterns (Meyer, Tsui and Hinings, 1993). One possibility for empirically studying the performance implications of configurations is to construct profiles of ideal types, measure the deviation of observed profiles from the ideal types and then relate these measurements to measures of performance (e.g., Doty, Glick, and Huber, 1993; Drazin and Van de Ven, 1985). However, this approach is limited by the assumption of few ideal designs. In reality, business model design elements combine in multiple ways, and not all changes involve quantum leaps between designs. Therefore, we follow Miller’s (1996) suggestion to study configuration as a variable, instead of relying on conceptually derived typologies or empirical taxonomies. He states, “Configuration…can be defined as the degree to which an organization’s elements are orchestrated and connected by a single theme” (p.509).

In the present study we hold that business model configurations are orchestrated and connected by common design themes. Miller (1996) cites innovation and efficiency enhancements as possible design themes\(^5\). Innovation and efficiency are sources of value creation; two additional sources of value may serve as common threads in the design of a business model: lock-in and complementarities (see Amit and Zott, 2001). Below, we first introduce a framework that links these business model design themes with the value appropriated by the focal firm. Based on this framework, we then proceed to develop specific hypotheses for each design theme about its alleged effect on firm performance.

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\(^4\) Organizational design is often viewed as driven by contingency factors, such as size, task uncertainty, technology, or strategy (see, for example, Chandler, 1962, who articulated the idea that “structure follows strategy”); performance is then a function of the match between the contingency factor and the organization design (Donaldson, 1996). Contingency theory promotes the investigation of incremental changes of design elements while holding other elements constant in order to understand firm performance (Meyer, Tsui and Hinings, 1993).

\(^5\) Describing innovation as one possible unifying theme of strategic and structural configurations, Miller (1996:509) states that, “Strategies may emphasize innovation and R&D, while control systems reward innovative activity, and information systems focus on technological data to support innovations.” In a similar fashion, innovation can be a unifying thread for business model design. For example, the structural configuration of transactions can contain novel design elements (e.g., a reverse auction) while at the same time novel content can be transacted (e.g., customer-created content) by novel governance mechanisms (e.g., self-governed virtual communities).
Business Model Design Themes and Value Appropriated By Focal Firm

The principal question we ask here is how the rents created by a business model are allocated to business model participants, in particular to the focal firm. We posit that the forces that shape the *gestalt* of a business model, and thus its rent-generating capacity, also affect the relative bargaining power of business model stakeholders. The overall effect of these forces on firm performance can be decomposed into a direct and an indirect effect, as shown in Figure 1.

The total value created by a business model for all stakeholders is an upper bound for the value appropriated by the focal firm. As seen in Figure 1, there is a direct relationship between the four design themes of a business model (i.e., efficiency, complementarities, lock-in and novelty) and the value appropriated by the focal firm. The four design themes can create value by enhancing the customers’ willingness-to-pay for the firm’s offerings (e.g., through complementary and novel offerings), by decreasing suppliers’ and partners’ opportunity costs (e.g., through improved transaction efficiency), and/or by increasing transaction volume (e.g., through lock-in of customers). Following Amit and Zott (2001), we assume that the direct effect of the business model design themes on the performance of the focal firm is positive.

The value that is eventually appropriated by the focal firm, however, hinges on the bargaining power of the focal firm relative to other business model stakeholders. This bargaining power, in turn, is influenced by the four design themes just discussed, thus generating the indirect effect of the business model design themes on the performance of the focal firm, as depicted in Figure 1. While other important determinants of value capture, such as effective managerial execution, have been clearly documented in the literature (for a review, see Thornhill and Amit, 2000), the impact of business model configuration on the bargaining power of the focal firm, and hence its overall effect on firm performance, is less well understood.

We view bargaining power as a mediating construct in the relationship between business model design themes and value appropriation. Following Coff (1999), we adopt the concepts of access to information, cost of replacing an exiting stakeholder, and switching cost for the exiting

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6 The customer’s willingness to pay is defined as the amount of money at which the customer is indifferent between owning a product/service and keeping the money. The opportunity cost of the supplier/partner is defined as the amount of money at which the supplier/partner is indifferent between owning the resource (and hence deploying it in an alternative use) and trading it for money. For a more detailed discussion, see Brandenburger and Stuart (1996).
stakeholder as the main components of bargaining power. Each of these components, in turn, might be affected by the design of the business model. For example, increasing the efficiency of a business model by giving customers more information about the prices and availability of competing offers, thus improving customers’ quality of decision-making, might also increase customers’ bargaining power by giving them improved access to crucial information.

Below, we explore in detail whether each design theme decreases the bargaining power of the focal firm relative to other business model stakeholders. A decrease in the bargaining power of the focal firm occurs when — all else equal — another stakeholder gets better access to crucial information, when the focal firm’s costs of replacing another stakeholder increase, and/or when the switching costs for another stakeholder decrease (Coff, 1999). If it can be shown that by accentuating a certain design theme, the focal firm’s bargaining power does not decrease (i.e., the indirect effect is non-negative) then, for a given level of competition, our framework suggests a positive association between that particular design theme and the value appropriated by the focal firm, because leveraging a design theme positively affects the value appropriation potential as argued above (i.e., the direct effect is positive).

**Business Model Design for Efficiency**

The essence of efficient business model design is the reduction in transaction costs it engenders. Transaction costs include “the time spent by managers and employees searching for customers and suppliers, communicating with counterparts in other companies regarding transaction details…the costs of travel, physical space for meetings, and processing paper documents,” as well as the costs of production and inventory management (Lucking-Reiley and Spulber, 2001). Transaction costs may also be borne by customers, for example in the form of search costs. In addition to these direct costs of economic transactions, there are indirect costs, such as the costs of adverse selection, moral hazard, and hold-up (Williamson, 1975). The latter are largely a function of the uncertainty surrounding a transaction, exchange frequency, and asset specificity (Klein, Crawford, and Alchian, 1978).

A business model can be designed in structure, content and governance to minimize transaction costs. For example, Tickets.com’s business model is geared toward enabling efficient

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7 We do not consider the ability of stakeholders to take unified action, Coff’s (1999) fourth component of bargaining power, as we believe that while clearly relevant in the context of stakeholders of the firm (i.e., management, employees, shareholder) it is less important in the context of business-model stakeholders (i.e., focal firm, partners, customers).
transactions in the ticketing business. Besides providing entertainment organizations with turnkey box office management systems, Tickets.com offers end-users tickets on a website that aggregates over 50,000 sporting and entertainment events, along with detailed information. Users can create personalized profiles to quickly access their preferable events, thus avoiding costly searches.

We propose the following four attributes of efficient business model design: transaction speed, degree of automation, breadth and depth of information provided, and ease of access to potential transaction participants. An increased transaction speed and a higher degree of automation mainly decrease direct transaction costs, while increased breadth and depth of information provided and increased ease of access to potential transaction participants help mitigate opportunism for all stakeholders in the business model. However, in order to assess the overall effect of efficient business model design on the value appropriated by the focal firm, it is necessary to evaluate the impact of the design attributes mentioned above on the bargaining power of the focal firm relative to its partner firms and customers. We do this next.

**Transaction speed.** Fast transactions are particularly important for industries in which the provision of timely information matters. In online brokering, for example, transaction speed is critical. Such transaction speed can be promoted by enabling instant trading, proprietary routing to market centers, and by offering features such as multiple streaming quotes windows, point-and-click trading for fast order entry, and live order status. We suggest that, on average, an increase in transaction speed will not negatively affect the focal firm’s bargaining power relative to other stakeholders because neither access to information by any party (to the detriment of another party), nor the replacement costs of any party, is affected. Other business model stakeholders’ switching costs may in fact increase by the incremental benefit they get from an incremental increase in transaction speed.

**Degree of automation.** Automated transactions allow business model stakeholders to avoid inventory and shipping costs, maintain real-time data on inventory quantities, incoming orders and replenishment needs, and avoid transaction errors, for example by providing online order tracking services. We suggest that, on average, an increase in transaction automation will not negatively affect the focal firm’s bargaining power relative to its partners or customers because even though other stakeholders may get better access to information, the same is likely to hold for the focal firm, which might, for example, gain a better understanding of the critical
performance metrics of its suppliers. In addition, deeper linkages among business model stakeholders are likely to increase switching costs for all parties so that on the aggregate the balance of power will not be shifted.

**Breadth and depth of information provided.** A hallmark of business enabled by modern information technology is the large amount of information available on transactions. Data provided to customers, for example, may include product descriptions, prices of competing products, editorial reviews originating from different sources, consumer forum quotes, and similar and related product descriptions. Which business model stakeholders benefit from these developments? While some observers think that improved information provision leads to “customer empowerment,” firms can also benefit by the ability to learn more about their customers and partners. The use of sophisticated software tools, including cookies, tracking software, filtering techniques, and data mining tools has increased each focal firm’s ability to understand the behavior and needs of its partners and customers. We therefore suggest that, on average, the breadth and depth of information provided in transactions has a symmetric effect on the focal firm and other business model stakeholders, thus not shifting the relative bargaining power.

**Ease of access to potential transaction participants.** Besides increasing the “richness” of information exchange, modern communication technology also enhances the potential “reach” of business models (Evans and Wurster, 1999), mainly by lowering search and transaction costs. We suggest that, on average, an increase in the number of potential customers or partners that can be reached, or an increase in the number of services offered through a business model does not negatively affect the focal firm’s power position relative to its partners or customers. This is because increasing the reach of a business model implies a consequent reduction in the cost to the focal firm of replacing the stakeholders whose marginal contribution to the value created in the business model has decreased. The increase in reach might also entail increasing other parties’ switching costs, for example if there are positive network externalities (Katz and Shapiro, 1985). On average, therefore, the power position of the focal firm will be strengthened rather than weakened through improved access to potential transaction participants.

These arguments together suggest a positive association between business model design for efficiency, and the focal firm’s ability to appropriate value. We thus have the following hypothesis:
**Hypothesis 1:** The more efficient the design of a business model, the higher the value appropriated by the focal firm.

**Business Model Design For Complementarities**

The essence of business model design for complementarities is the bundling of either resources and capabilities (inputs), or of products and services (outputs). Complementarities are present when the value of the bundle exceeds the sum of the values of the elements of the bundle. The resource-based view of the firm (RBV) focuses on bundling of resources and capabilities, and highlights the role of complementarities among strategic assets (Amit and Shoemaker, 1993), while other strands of the management literature emphasize the importance of providing complementary outputs to customers, alone or with the help of other firms. Brandenburger and Nalebuff (1996) term such firms “complementors.”

A business model can be designed in structure, content and governance to enhance the extent of bundling it provides. The provision of Internet-based education is a case in point. Business models in this space (e.g., Click2Learn) may promote bundles of content-creation services and tools, platform hosting, technical support, and even the integration of e-learning solutions into corporate knowledge management systems and HR management systems. Such complementary goods and services provided often rely critically on complementarities among the resources and capabilities of the focal firm and its partners.

Complementarities among resources and capabilities, as well as complementarities among products and services create value mainly by increasing customers’ willingness-to-pay for a firm’s offerings (Brandenburger and Nalebuff, 1996). They thus improve the scope for revenue increases. However, in order to assess the effect of complementary business model design on the value appropriated by the focal firm, it is necessary to evaluate the impact of complementary design attributes on the bargaining power of the focal firm relative to its partner firms and customers.

**Bundling of resources and capabilities.** Among the resources and capabilities of emerging growth Internet-based firms, technology is often key. Different technologies can be combined in a business model to yield unique products and services. Consider, for example, the provision of voice-over-IP communications services. Providers of such services often combine proprietary technologies (e.g., dial software) with technologies from partners (e.g., broadband connection technologies, operating systems). In such cases, would more bundling of resources
and capabilities negatively affect the relative share of value that the focal firm receives? The answer to this question depends on who controls the resources and capabilities that are included, and how unique they are. In essence, it depends on how much it would cost the focal firm to replace the resources and capabilities of the stakeholder if the stakeholder exits. Resources and capabilities from partners that are easy to replace could add value without detracting from the focal firm’s ability to capture value. On the other hand, if a partner brings in very special skills and assets that are rare and difficult to imitate (Barney, 1991), the focal firm may find itself in a weaker position due to the increased value associated with the critical business model stakeholder. We suggest that increased bundling of resources and capabilities in a business model is more likely to increase rather than decrease the likelihood of this scenario.

**Bundling of products and services.** Similar arguments hold in the case of bundled outputs. Increased bundling of goods provided by partner firms increases the chance that the focal firm will have to rely on a partner who would be costly to replace. On the other hand, if the focal firm itself offered a larger array of complementary products and services, its performance might be negatively affected if providing these products and services may not be its core competency. As well, customers have an alternative to engaging in transactions with the focal firm: presumably, they could purchase the different parts of the bundle from various providers in the marketplace. To the extent that transaction costs are small, customers’ switching costs will not increase with increased bundling of products and services. The firm’s bargaining position relative to customers will not be enhanced if complementarities in outputs are increased, while its bargaining position relative to partner firms might weaken.

Taken together, these arguments suggest that there is not a clear positive association between business model design for complementarities and the focal firm’s ability to appropriate value. It is, however, difficult to predict whether this association will be negative or not; a possible overall

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8 This argument is linked to the focal firm’s ability to execute effectively. It is supported by Murray’s (1999) finding that internal sourcing of supplementary services is negatively related to the market performance of service firms.

9 There are cases in which increased bundling may help increase stakeholders’ switching costs. Consider online communities such as SnowBall, which operates a network of websites targeted at young adults. Other firms who are business model stakeholders offer several products (apparel, books, games, music, video, accessories), content (news, reviews) and community hubs (fed by end-users, i.e., registered Snowball members). The focal firm (SnowBall) complements this range of offerings with chat moderation, user surveys, links and content aggregation. The complementarities offered are clearly designed to foster the sense of community, and thus create switching costs through network externalities and sunk investments (e.g., building relationships with other community members).
decrease of the focal firm’s bargaining power with increased complementarities (the indirect effect in Figure 1) might be offset by a large increase in the total value created (the direct effect in Figure 1), even though the likelihood of this scenario is not very high due to increased diseconomies of scope (Rangan and Adner, 2001). We thus have the following hypothesis:

**Hypothesis 2:** Enhanced complementarities in the design of a business model will not increase the value appropriated by the focal firm.

**Business Model Design for Lock-in**

Business model design for enhanced lock-in is enabled by giving incentives to customers and partners to engage in repeat transactions, and by the creation of dis-incentives to switch to rivals. Lock-in is manifested in switching costs that are engendered by network externalities (Katz and Shapiro, 1985; Shapiro and Varian, 1999), transaction costs (Williamson, 1975) and by certain strategic assets, such as brand name, and buyer-seller trust, as RBV theory suggests (Amit and Shoemaker, 1993).

An example of a business model specifically designed for lock-in is that of the knot, an online vendor of wedding supplies. This business model offers customizable content such as personal interface, web page, checklist, notebook and gift registry. These content features, combined with wedding planning tools, are geared toward increasing customer switching costs, which rise when customers invest time and effort in tailoring the features to their liking, and when their wedding guests start using the site. The business model also incorporates structural elements that promote lock-in, for example by leveraging positive network externalities. There is an active community of customers who share wedding advice.

We propose the following four critical attributes of business model design for lock-in: direct incentives, trust and reliability, network effects and irreversible up-front investments. Improving any of these measures is aimed at increasing transaction volume and hence, *ceteris paribus*, the potential for value appropriation. However, in order to assess the overall effect of lock-in on the value appropriated by the focal firm, one needs to evaluate the impact of the lock-in design attributes on the bargaining power of the firm relative to its partner firms and customers.

**Direct incentives.** Direct incentives include loyalty programs, customized offerings, warranties, service and lowest price guarantees, and return policies. While loyalty programs, which are aimed at repeat customers, may increase transaction volume and switching costs, and
hence reduce customer migration, they may also shift the balance of power in favor of customers, who benefit from reduced effective prices or other bonuses.

**Trust and reliability.** A business model can incorporate design elements that promote trust and reliability. Trust and reliability are promoted, for example, by the use of independent third parties for monitoring, mediation or arbitration, the adoption of opt-in and opt-out programs, rating of transaction participants, and the reliance on brand and reputation, to name only a few. To the extent that these measures are controlled by the firm, or offered by partners who would be relatively easy to replace, they serve to increase other business model stakeholders’ switching costs, thus strengthening the focal firm’s position. Hence, on average, we do not expect that increased trust and reliability of transactions undermine the focal firm’s position.

**Network effects.** Positive demand side as well as supply side externalities are becoming increasingly important in the face of emerging interactive media and information technologies (Shapiro and Varian, 1999). Network effects may have an overall ambiguous impact on the focal firm’s bargaining power. *Ex-post,* that is, after establishment of the network, they increase the switching costs to the networked parties. For example, members of a community may find it costly to leave and join another community-based business model because of the smaller community size in the new model and the need to develop new relationships. In addition, with increasing network size, the focal firm’s costs of replacing any particular exiting business model stakeholder decrease. This obviously benefits the focal firm in terms of its bargaining power. *Ex-ante,* that is, before establishment of a critical number of networked participants, however, the focal firm may have to make considerable concessions (e.g., in price) to potential partners and customers in order to initiate network dynamics. The establishment of a network is thus a chicken-and-egg problem (Kaplan and Sawney, 2000).

**Up-front investments.** Business model stakeholders might be asked to invest time, effort, and money, and even to deploy (co-)specialized assets before engaging in transactions with the focal firm. Any of these choices will only be acceptable to stakeholders if they expect that their net value gain will be positive. Once business model stakeholders have made their investments, they may face considerable *ex-post* barriers to switching to competing business models with similar up-front requirements. *Ex-post,* therefore, the focal firm’s bargaining power is unlikely to be reduced. *Ex-ante,* that is, before the required up-front investments from other business model
stakeholders, however, it may be imperative for the focal firm to make it worthwhile for their partners and customers to incur the ex-post switching costs, that is, to make concessions that may in fact reduce its bargaining power.

These arguments suggest that design for lock-in can be a two-edged sword in terms of the effect it has on the bargaining power of the focal firm. While increased lock-in increases a focal firm’s bargaining position *ex-post* (mainly through increasing other stakeholders’ switching costs), it may also reduce its bargaining power *ex-ante* by requiring concessions from the focal firm to make other stakeholders overcome their possible fear of the anticipated lock-in. Such *ex-ante* concessions are worthwhile for the focal firm if they are offset by an expected *ex-post* gain in transaction volume, that is, if customers purchase more frequently. Therefore, considering all lock-in design attributes, we expect a non-negative association between business model design for lock-in, and the focal firm’s ability to appropriate value, as expressed in the following hypothesis:

**Hypothesis 3:** Enhanced lock-in in the design of a business model will not, on average, decrease the value appropriated by the focal firm.

**Business Model Design For Novelty**

The essence of business model design for novelty is the conception and adoption of new ways of conducting economic exchanges, which can be achieved, for example, by connecting previously unconnected parties, by linking transaction participants in new ways, or by designing new transaction mechanisms. This kind of innovation in the business model differs from classic notions of innovation, such as product or process innovation — here the same product or service can be made available in a new way (e.g., airline tickets can be sold by reverse auction instead of a fixed price mechanism). This adds a new source of innovation to Schumpeter’s typology of innovation in products and services, methods of production, distribution or marketing, and in markets (Schumpeter, 1934). Innovation in business model design is a holistic concept with the transaction as its main focus; it is a form of strategic entrepreneurship (Hitt et al., 2001). In fact, the design of a new business model strikes at the core of entrepreneurship (McGrath and MacMillan, 2000).

A business model design can be novel in structure, content or governance. A comprehensive example in this context is InfoSpace, a global provider of Internet infrastructure solutions. InfoSpace designed and built a large network of customers and vendors, thereby
innovating its business model structure. The business model comprised over 2500 thematic sites and included several million products offered via affiliated merchant sites. The company also extended its business model to embrace opportunities in the wireless space, for example by enabling end-users to receive promotions on wireless devices. InfoSpace thus offered novel business model content. Finally, the governance of transactions enabled by Infospace’s business model relied on trade secrets and patents on technology and business solutions that had been awarded to the company.10

As with product innovation, which allows firms to unlock hidden demand, business model innovation allows firms to tap into hidden sources of value. In order to assess the effect of increasingly novel business model design on the performance of the focal firm, we need to understand the impact of novel design attributes on the bargaining power of the firm relative to its partners and customers. To structure the discussion, assume that a novel business model either creates a new market, or innovates transactions in existing markets. We refer to the former case as radical business model innovation, and to the latter case as incremental business model innovation.

Radical business model innovation. A business model can create an entirely new market space (Kim and Mauborgne, 1999) by mobilizing customers for a new type of product or service. A prominent example of this is eBay. Flea markets have existed for centuries, but they have historically been a highly localized business. As such, they did not readily allow for widespread trading all kinds of low and high-ticket items among peers. Their scope and liquidity were limited by time, space and logistical constraints. As a result, supply and demand were often unmatched. By creating an on-line flea market, eBay essentially succeeded in vastly enhancing the number of potential sellers and buyers, thereby increasing not only the number of potential customers, but also the chance that buyers and sellers would find each other.

Business model innovation that results in the creation of new markets can give rise to Schumpeterian rents (see, for example, Collis and Montgomery, 1997). Successful innovators earn these monopoly-type rents between the time an innovation is introduced and the time it is diffused. Schumpeterian rents are relatively short-lived, unless the innovation can be protected, for example through a tight appropriability regime (Teece, 1986), or through network effects

10 Since their IPO, InfoSpace has developed many innovations such as a “single-click-instant-buying” technology that allows mobile users to press a single key to make purchases from virtually any web site, thus turning wireless devices into e-commerce enabled products.
(Shapiro and Varian, 1999). Schumpeterian rents accrue to the business model stakeholders. In particular, the focal firm as the orchestrator of its business model can be expected to benefit; the focal firm is the innovator, its business model is the locus of innovation. One would therefore not expect the focal firm’s bargaining power relative to other business model stakeholders to decrease with a higher degree of business model novelty. The more unique the business model, the fewer alternatives are there for customers and partners, and hence the higher their switching costs.

**Incremental business model innovation.** Business model innovation need not necessarily lead to the creation of entirely new market segments. It may also involve innovating transactions within existing markets, that is, markets where a similar product or service is already offered. For example, the automobile retailing process was traditionally controlled by car dealerships, until new intermediaries such as Autobytel.com and CarPoint emerged. These organizations promised to change the ways in which car retailing transactions between individual customers, car dealers, car manufacturers, insurance companies and financial institutions were conducted. In the context of incremental innovation, novel business model design may enable the business model stakeholders to unlock new or hidden sources of value in an existing market by leveraging traditional sources of value (and business model design themes) such as efficiency, complementarities and lock-in in new ways. For example, the new intermediaries mentioned above intended to design a new, more efficient car retailing process, and also offered a novel bundle of products and services.

If incremental business model innovation can be understood as finding new ways to emphasize design themes such as efficiency, complementarities and lock-in, then its effect on the ability of the focal firm to capture value must hinge on the combined effects of the induced increases in these design themes on the firm’s bargaining power. As previously discussed, on average, we would not expect the focal firm’s bargaining position to weaken through an increase in efficiency, complementarities or lock-in. Such an effect is even less likely to result if the increased accentuation of design themes is induced by novel design elements: novel business model design makes the business model more distinctive, and this may result in increased switching costs for other business model stakeholders because of fewer comparable alternatives.

**Hypothesis 4:** The more novel the design of a business model, the higher the value appropriated by the focal firm.
DATA AND METHODS

Sample

To test our hypotheses, we studied the business models of emerging growth firms that derive a significant proportion of their revenues from transactions that are fully or partially conducted over the Internet. Our sample includes e-commerce firms, Internet Service Providers, and companies that use the Internet as a sales channel. It excludes providers of Internet-related hardware or software, that is, firms that facilitate Internet-based transactions but that do not engage in the activity themselves.

We created a list of Internet-based firms that went public in Europe and in the U.S. between April 2, 1996 (the date of Lycos’ IPO) and May 19, 2000 (the date of Coolsavings.com’s IPO) using mostly information available on www.hoovers.com. This exhaustive list included 309 firms, from which 190 firms were taken at random as our sample. After sampling, 16 firms (i.e., roughly 8% of our sample) were acquired, merged, were bankrupt, or otherwise changed their business model significantly in 2000, while 57 of our sample companies (representing roughly 30% of our sample) underwent similar changes in 2001. We took these developments properly into account when we conducted our empirical analyses, discarding observations if necessary.

We considered only public companies in order to ensure the availability and accuracy of data. The analyses conducted in this paper therefore hold specifically for adolescent, that is, relatively mature firms. As noted above, however, there is a high failure rate (according to some definition of failure) among the companies we studied. Almost one third of our sample had gone out of business, merged with another firm or were acquired by another firm by 2001, and others were likely to experience the same fate. This mitigates the concern for selection bias, and makes us optimistic that our results apply to a broader population of firms than the population studied.

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11 We chose April 2, 1996 (the date of Lycos’s IPO, which was followed a few days later by Yahoo’s IPO) as a start date for sampling because this date marked the beginning of a period of multiple IPOs of Internet-based emerging growth companies that occurred in quick succession. Using this date enabled us to create a data set of sufficient size and breadth.

12 We chose May 19, 2000 as an end date for sampling primarily because of the paucity of IPOs after this date following the precipitous decline of the NASDAQ index and other stock market indices worldwide that began in April 2000.
Data Collection

For each business model design theme (i.e., efficiency, complementarities, lock-in and novelty), several relevant dimensions were identified and measured as indicators in a survey. The survey process proceeded in five stages: (1) development of survey instrument, (2) development of measurement scales, (3) pre-testing of the survey, (4) development of online web interface and of a central database, and (5) data collection. We did not ask managers of sample companies to fill in the survey because we had concerns about response bias, and because we need a high response rate given the relatively small size of our sample space. Instead, we hired and trained eleven part- or full-time expert raters who filled in the survey instrument for their assigned sample companies. This method of data collection builds on the use of expert panels in prior research (e.g., MacCormack, Verganti and Iansiti, 2001). The surveys were submitted online, and the data were consolidated in a central database.

Our raters were carefully selected from a pool of applicants based on their sound understanding of Internet-based business models. They were interviewed, and had to submit an abbreviated test survey on a randomly chosen sample company. Upon selection, raters were trained and supervised by two project managers, who had been hired according to similar strict criteria. Project managers worked with raters on specific surveys, and they frequently interacted with each other in order to share insights and resolve problems, which reduced the potential for bias. The project managers, in turn, received their instructions and guidance from the authors.

Project managers controlled the quality of the submitted surveys. In order to promote common quality standards, we developed written guidelines on how to interpret survey questions. We also asked our expert raters to provide supplementary written explanations for each submitted response. Using these data, project managers examined each survey for internal consistency, and ensured that questions were correctly interpreted across raters. This procedure sometimes resulted in several iterations between the expert rater and the supervisor until a survey was finally accepted for submission into the database. On average, it took raters about two days to complete a survey, which necessitated a sampling period of about a year (from May 2000 to June 2001).

We validated inter-rater reliability by assigning a randomly chosen business model to two different rater-supervisor pairs and conducting a pair-wise comparison of responses. We calculated a Cronbach alpha of 0.82, a Pearson correlation coefficient of 0.72, and raters were in broad agreement with each other for 82% of the individual items. These measures indicate high inter-rater reliability.
In order to reply to the survey questions, raters collected detailed data on the assigned business models, mainly from publicly available sources: IPO prospectuses, annual reports, investment analysts’ reports, and web sites. Much of our high-quality data on U.S. firms’ business models was obtained from the SEC’s EDGAR database, which is available to the public online. Data on firms included in the database adheres to a single, US standard set by the SEC. In Europe, however, there is no central data depository. In addition, reporting requirements vary across European countries, ranging from strict (e.g., the UK) to relatively lax (e.g., Italy). European firms also vary widely in their accounting and disclosure practices, making comparisons across firms difficult. This made the use of multiple sources of information particularly important.

Econometric Modelling and Estimation Approach

After confirming that none of the conventional assumptions underlying OLS regression analysis were violated by our data, we chose to analyze the data using hierarchical OLS regression techniques. The adopted estimation approach allowed us to test Hypotheses 1-4, and was consistent with the exploratory nature of this study, in which we introduced and measured new concepts. We first formed a baseline model with control variables (see Model 1 in Tables 3 and 4), and regressed the dependent variable (which in our case was the logarithm of the market value of the focal firm’s equity) on these variables. Then we successively introduced all possible combinations of independent variables, performing further regressions (four of which are reported as Models 2-5 in Tables 3 and 4). This procedure ensured that any discovered effects would be robust to the order in which independent variables were introduced. The full model consisted of the set of control variables and the full set of independent variables (see Model 5 in Tables 3 and 4).

We tested the robustness and validity of our model specification in four distinct ways. First, we tested for multicollinearity using variance inflation factors. Second, we performed analyses with different dependent variables (e.g., using market-to-book value of the equity instead of the logarithm of the equity). Third, we discarded influential observations from our data set to see whether they distorted results. For example, we discarded eBay, which had both a relatively high market capitalization and a highly novel business model, on the grounds that, unlike other novel models, it might yield a positive effect of business model novelty on a firm’s

14 Using White’s general test for homoskedasticity, we found no evidence of a heteroskedasticity problem.
stock-market value. We also discarded several observations based on established criteria for identifying influential points (e.g., leverage, studentized residual, or change in the determinant of the covariance matrix). Fourth, we tested for over-fitting the data. Over-fitting occurs when the fit of the model with the data is due to the idiosyncrasy of a specific data set, not the fundamental relations among the variables. To see whether this was the case in our study, we first took a random subsample of 150 firms, with the remaining firms constituting the holdout sample. We calibrated the model based on the subsample, and then applied the resulting parameter estimates to the holdout sample, calculating various measures such as goodness-of-fit, pseudo F-value, and Theil U statistic. Details on all of these tests of model robustness and validity are available from the authors upon request. All tests were satisfactory and supported our model specification.

Independent Variables

We used four latent variables characterizing the design of a business model as independent variables in our study: efficiency, complementarities, lock-in and novelty. We also identified several indicators for each of these variables. In particular, we used 13 indicators for efficiency (i.e., indicators pertaining to transaction speed, degree of automation, depth and breadth of information provided, and ease of access to potential transaction participants); 9 indicators for complementarities (i.e., indicators pertaining to bundling of resources and capabilities, and bundling of products and services); 15 indicators for lock-in (i.e., indicators pertaining to direct incentives, trust and reliability, network effects, and sunk investments); and 13 indicators for novelty, hence 50 indicators altogether. (See the appendix for the relevant parts of our survey.) We measured the strength of each of these indicators in a given business model using Likert-type scales. (For details, see the appendix.) Given the difficulty of obtaining objective measures for our indicators, we deemed the use of perceptual measures obtained from expert raters as appropriate (Dess and Robinson, 1984).

The coding rules that we used to translate measurements into standardized scores (i.e., score values between 0 and 1) are reported in the appendix. After coding, we aggregated the indicators for each design theme into an overall score for the design theme, using equal weights (for a similar aggregation procedure to quantify firm-level “value drivers” see Baum, Ittner et al., 2000). The use of equal weights is appropriate when there is no prior theory suggesting

\[15\] The intuition behind these tests is as follows. If the model specification is correct, one should be able to uncover the underlying true relations between the independent and dependent variables, regardless of the specific sample data. In particular, the model fit on the holdout sample should be comparable to that on the calibration sample.
differential weights (Barki et al., 2001). This process yielded distinct quantitative measures for the extent to which each business model in the sample leveraged efficiency, complementarities, lock-in, and novelty as design themes. (See Table 1 for summary statistics on our sample companies.)

We validated the internal consistency of our measures using standard econometric techniques. The standardized Cronbach alpha coefficient was 0.69 for the efficiency measure, 0.70 for the complementarities measure, 0.74 for the lock-in measure, and 0.72 for the novelty measure. Hence, all our measures sufficiently satisfy Nunnally’s (1978) guidelines, which suggest 0.7 as a benchmark for internal consistency.16

**Dependent Variable**

We used the logarithm of a firm’s stock market value as our main dependent variable. Many adolescent firms, even after an IPO, incur losses for a number of years before becoming profitable. This makes the use of historic performance indicators such as net income, return on sales, or return on assets problematic. For example, investments in productive assets and knowledge capital through R&D count as expenses in a profit and loss statement, even though they enhance the firm’s ability to earn future revenues. Similarly, the effect of business model design may be spread over many years. Since a firm’s stock-market value reflects the market’s expectation of future cash flows to shareholders, it is an immediate indication of the value appropriated by shareholders. Most firms in our sample have relatively low levels of debt; the market value of a firm’s equity is therefore a good approximation of the market value of the whole firm. Hence, it can be considered a suitable measure for examining a firm’s ability to capture rents from the adoption of a particular business model design.

We measured the market value of the equity as the number of shares outstanding multiplied by the stock price at two dates: the last day of the fourth quarter in 1999 (“pre-crash”), and the last day of the fourth quarter in 2000 (“post-crash”). We chose these two dates primarily to take into account the correction of the stock markets that followed the March 10, 2000 peak in the NASDAQ stock market index. In particular, we wanted to see whether results differed markedly in pre- and post-correction periods and identify any “bubble” effects. For most firms, we took the

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16 We also found support for the discriminant and convergent validity of the design theme variables. On average, items within a design theme category correlated higher with items in the same design theme category (convergent validity) than with items in other design theme categories (discriminant validity). Forty-seven out of the 50 items we measured followed this pattern.
relevant data from Compustat’s Global Vantage Database. For companies that were not found on Compustat (i.e., some European companies), we applied the same rule as the one used by Compustat (namely, multiplying the number of shares outstanding by the stock price from the last day of the quarter), taking the stock price either from Yahoo’s finance archives or from the online archives of the respective stock exchange. For companies that had their stock prices quoted in currencies other than US dollars, we converted the data into US dollars using the intra-bank rate of the corresponding date. Finally, we took the logarithm of the market value of the equity to comply with the normality assumption of OLS.\\(^{17}\)

While our reported results use the logarithm of the market value of the equity as the dependent variable, we also performed analyses using the market-to-book value of the equity as the dependent variable in order to validate the robustness of our results.\\(^{18}\) The book value of the equity was either taken from Compustat or from quarterly results reports filed with the respective stock exchange. The market-to-book ratio can be interpreted as a return figure, and it is a proxy for Tobin’s q (Tobin, 1969), an established performance metric in management research.\\(^{19}\) The analyses run with market-to-book as dependent variable were consistent with our primary results.

**Control Variables**

Other factors that might influence the market value of a firm’s equity can be broadly classified as industry and firm-level variables. We included these variables as control variables in the analysis because their omission might confound the analysis.

**Industry controls.** Firm performance varies by industry (McGahan and Porter, 1997; Porter, 1980). Earlier studies control for industry effects by including fixed industry variables (see Schmalensee, 1985; Rumelt, 1991). Due to the specific requirements of our study and the limited size of our dataset, we adopted a different approach and included the level of competitive threat as well as the estimated market size to be our industry controls.

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17 Using a Shapiro-Wilk test on our sample we found that the null hypothesis of normality could not be rejected at the 5% level of significance.

18 Using the market-to-book value of the equity as a dependent variable in our analyses has certain drawbacks: (1) The book value of the equity depends on accounting profits, and hence is subject to accounting practices and to fluctuations in profits, which may be relatively large for young firms. (2) The end of the fiscal year at which book value is reported varies across firms, and is not always identical with the date at which we measured stock market value. (3) The book value of the equity for firms in our sample was sometimes negative, which makes results hard to interpret. For these reasons we focused on the market value of the equity as our performance measure.

19 For example, Core, Guay and Van Buskirk (2001) report that the market-to-book equity ratio for their sample of firms has a 0.98 rank order correlation with the market-to-book assets ratio, which is often used as a proxy for Tobin’s q.
All our hypotheses are formulated for a given level of competition. To see why this is important, consider the efficiency design theme. Under high competitive pressure, a company might be forced to adopt efficiency measures for its business model just to maintain or achieve competitive parity with rivals. These measures might benefit the firm’s customers more than its shareholders. For example, a company may have to offer valuable information to its customers (e.g., car retailing sites release information on manufacturers’ sales prices) because this is part of competitors’ offerings; this may strengthen customers’ bargaining power. Furthermore, the more fierce the competition, the lower may be customers’ switching costs because the latter have increasingly attractive outside alternatives. Again, this weakens the focal firm’s bargaining power. Increased competition also reduces the total value created by a business model because for a given market size more business will go to competing business models. Hence, given a fixed level to which a business model leverages a particular source of value, the focal firm may appropriate less value when the level of competition is higher. We therefore needed to control for the level of competitive threat; we thus expected the sign of the respective coefficient to be negative.

Our expert raters measured competitive threat using a four-point Likert scale on an item that was referred to in the questionnaire as follows: “the company faces a high degree of competitive threat.” The raters used information on competitors provided by the focal firms in their annual reports and prospectuses. These data were cross-checked and complemented with information from primary sources (i.e., competitors’ SEC documents and web sites) and from other secondary sources, such as Forrester benchmark studies or Hoovers’ database (which lists each focal firm’s main competitors), as well as investment analyst’s assessments of competition.

In addition, we controlled for the estimated size of the market that the respective business model addressed. This information was obtained from Forrester research reports and from US Department of Commerce publications. Ceteris paribus, a larger market offers a higher potential for value appropriation. Hence, we expected the sign of the market size coefficient in the multiple regression analysis to be positive.

**Firm controls.** There is a large body of literature that presents arguments in support of firm-specific effects on firm performance (e.g., Amit and Shoemaker, 1993; Barney, 1991; Rumelt, 1991). We specifically included characteristics of the focal firm such as age, size, country of origin, R&D expenditures, capital investments, and advertising expenditures in our
analysis in order to control for firm-specific effects. This allowed us to better capture the boundary-spanning nature of the business model configuration through our independent variables.

We included age as a control variable in order to ensure that age effects did not confound the effects of our independent variables (especially, the novelty construct). All else equal, we expected older firms to have a higher performance in terms of market capitalization, due, for example, to more established brand and reputation, and a larger customer base. We therefore expected a positive sign on the age coefficient in our analysis.

Furthermore, we expected that firm size might be related to market value. We did not want any of our main effects related to the configuration of a business model to be confounded by effects related to firm size. For example, we wanted to distinguish the transaction efficiency enabled by a business model configuration from efficiency that results from economies of scale and scope due to the size of the focal firm. We therefore controlled for firm size, as measured by the logarithm of the number of employees of the focal firm, expecting a positive sign on the coefficient.

We also controlled for the firm’s country of origin using a dummy variable ("1" for firms headquartered in North America, "0" for European firms) to take into account possible cultural differences between European and North American firms, as well as differences in investors’ evaluations, given that European firms in our sample were mostly listed on European stock exchanges and US firms were mostly listed on US stock exchanges. If investors in different geographic markets viewed the same business model configuration differently, then the omission of this control variable would have confounded the effects associated with our independent variables. There is some anecdotal evidence that firms listed on European stock exchanges were valued higher than their North American counterparts during 1999-2000 due to tech-hungry investors and a limited supply of IPOs in Europe (e.g., Racanelli, 2001), hence the expected sign of the country of origin coefficient was negative.

Finally, we took into account classic firm-level measures such as R&D expenses, advertising and capital expenditures, which could be considered proxies for growth prospects based on firm-specific resources and capabilities such as knowledge capital (R&D expenses), brand (advertising), and physical capital (capital expenditures). These data were obtained from the Compustat Global Vantage database and from company financial reports. Consistent with prior
research, we set missing values equal to zero, and we expected a positive coefficient on all three variables in our analysis (Core et al., 2001).

RESULTS

Descriptive Statistics

Table 1 provides an overview of the data set we assembled. It shows that the companies in our sample are, on average, 7 years old, had average sales of $77 million in Q4 1999 and grew to $102 million by Q4 2000. Over the same period, average losses almost doubled from $19.2 million to $37.4 million, while the average market capitalization declined from almost $1.6 billion to $385 million, a 75% decline in one year. Also notable in the data set is the increase in the mean of the market-to-book ratio in a period of a sharp decline in the market capitalization of the sample firms. This could mean that during these 12 months, the sample firms, whose losses increased sharply, rapidly consumed their cash reserves, which caused the sharp decline in book value. However, the witnessed increase is probably mostly explained by the very large minimum market-to-book value in Q4 1999, which largely disappeared in Q4 2000. Such large negative market-to-book values can be produced by very small negative book values; this points to the dangers of using market-to-book as a performance variable in samples of emerging growth firms that may have negative book values.

Table 1 also shows that firms in our sample made most use of efficiency as a business model design theme, and least use of novelty, with complementarities and lock-in scoring in-between, both in terms of mean and median index values. The low number for novelty is somewhat surprising, given the widely held post-correction view that the innovativeness of many business models of Internet-based emerging growth firms that went public between 1996 and 2000 was partly responsible for the boom and bust of the dot-com bubble. Our data show that many business models were “me-too” rather than novel. Lastly, the variation among business models was greatest in terms of the complementarities design theme, as evidenced by the large spread between minimum and maximum values, as well as by the high standard deviation of the complementarities index.

Table 2 depicts the Pearson correlation among the variables used in the regression analysis.

[INSERT TABLE 1 ABOUT HERE]

[INSERT TABLE 2 ABOUT HERE]
Hypotheses Tested

Tables 3 and 4 show the results of the OLS regressions for measurements of the dependent variable in 2000 (“post-crash”) and 1999 (“pre-crash”), respectively.

The results in Table 3 (the “post-crash” scenario) show that Hypothesis 1 (the more efficient the design of a business model, the higher the value appropriated by the focal firm) is strongly supported by the Q4 2000 results (Models 2-5 in Table 3). Capital markets reward firms whose value proposition to their customers include efficiency enhancements that reduce their operating costs, simplify transactions, speed up processes, enhance the utilizations of capital equipment, enable companies to capture economies of scale and scope, and more. Model 5 in Table 4 (the “pre-crash” scenario) shows that while the coefficient of efficiency is positive, it is not significant. That is, during the heydays of the dot-com boom in 1999, the market discounted efficiency enhancements, perhaps because in the euphoria of the stock market boom there was less focus on the fundamentals of a business. Indeed, there is emerging empirical evidence that in the boom period of 1999 firms were rewarded by capital markets based on their ability to bring consumers to their websites (the “eyeball rush”) and thereby generate traffic (browsers). Summarizing the results for Hypothesis 1, we find that the data confirm the hypothesis, once the “noise” created by the bubble in the capital market is removed, as evidenced by the Q4 2000 results.

Hypothesis 2 (enhanced complementarities in the design of a business model will not increase the value appropriated by the focal firm) is confirmed by the results of the regression analyses. We note that in both 2000 (see Table 3) and 1999 (see Table 4) the coefficients are not significant. While insignificant, and hence difficult to interpret, the negative sign of the complementarity coefficient suggests that, on average, a focal firm is able to capture less value as business model complementarities are enhanced. Although overall value created may, indeed, have increased, the focal firm is unable to capture a fraction of this value enhancement, due to a loss of bargaining power relative to other stakeholders in the business model.

Hypothesis 3 (enhanced lock-in in the design of a business model will on average not decrease the value appropriated by the focal firm) is not clearly rejected by the regression analysis for the year 2000 (Table 3). We note the negative but insignificant sign of the coefficient for lock-in in Table 3. For the 1999 data (Table 4) the sign is positive and insignificant (Model
5), hence the 1999 data provide stronger support of the hypothesis than the 2000 data. These inconclusive signs of the coefficient provide some support for the trade-off between the ex-post benefit of lock-in through repeat transactions and the ex-ante costs of lock-in through a reduction in bargaining power of the focal firm. Although insignificant from a statistical standpoint, the observed sign reversal of the lock-in coefficient from Q4 1999 to Q4 2000 – a persistent feature also in many other models we ran but do not report in this paper – might indicate that before the spring 2000 NASDAQ stock market crash investors attributed high importance to locking-in customers’ “eyeballs” as a virtue in and of itself. In the post-crash era, it was the profitability of the firm (per customer) that apparently mattered more than the mere number of customers that were locked-in. Another possible interpretation is that the effectiveness of design measures to create lock-in (e.g., network effects) was overestimated before the stock market correction.

Finally, Hypothesis 4 (the more novel the design of a business model, the higher the value appropriated by the focal firm) receives strong support from our data. In all regressions that we ran, the coefficient on the novelty variable was positive and highly significant, both before (see Table 4) and after the stock market correction (see Table 3). The observed effect was thus very robust to changes in the market environment and investors’ expectations. While the results for Q4 1999 could be interpreted as “hype” about novel business models, the results for Q4 2000 do not allow us to draw this conclusion and may therefore be surprising. In fact, our results show that in an era in which the focus of many firms is on efficiency, cost-cutting and profitability, and in which managers are reluctant to take risks on novel ways to do business and rather focus on short-term results, the market still rewards innovative business model designs. This is consistent with the theoretical arguments presented in this paper.

Control Variables

A comparison of the coefficients on the control variables in Tables 3 and 4 merits a brief discussion. As predicted, competition is negatively related to market capitalization, but only significantly so in the post-crash context. One possible (but certainly not an exclusive) interpretation of this effect would be that investors were worried less about competition in 1999 than in 2000. The coefficient on our second industry control variable, market size, is negative for 1999, although barely significant, and becomes positive in 2000, with some significance. This pattern is also consistent with an explanation related to the alleged bubble in equity markets: smaller markets might have been associated with extraordinarily high growth rates. After the
crash, growth expectations were marked significantly, and, perhaps disproportionately, down (i.e., the highest expectations were corrected the most). Investors might also have thought initially that firms would easily be able to penetrate and dominate these emerging high growth markets profitably (e.g., based on “winner-takes-it-all” arguments). Post-crash, the idea of market dominance might have been less convincing.

Age, our first firm-level control variable, is negatively related to firm market value in both sets of regressions, but highly significant only in 1999. Again, an interpretation based on investors’ “irrational exuberance” is possible. Pre-crash, the market may have assigned a premium on younger firms because of the expected high growth potential of these firms, which were perceived as a threat to incumbents, and were even expected to revolutionize whole industries. The coefficient on the country of origin is negative throughout, as expected, but highly significant only for the 2000 data. In other words, in the post-crash era companies listed in the US were valued significantly lower than companies listed in Europe, all else equal. Finally, the firm-size control variable we used showed the expected positive association with market capitalization, as well as R&D, advertising, and capital expenditures. The observed lack of significance of some of these firm-level control variables (e.g., advertising expenditures) is consistent with prior research findings (e.g., Core et al, 2001).

**DISCUSSION AND CONCLUSION**

In this study, we were able to corroborate our basic premise that in a highly interconnected world enabled by advances in information technologies, one must look beyond firm and industry boundaries to understand value creation by and for the firms’ shareholders. We have provided empirical support for the suggestions that a firm’s business model, and more generally, the strategic network of firms in which it is embedded, is an important determinant of firm performance. These effects are in addition to, not in place of, firm-specific and industry specific effects, which have already been shown to affect firm performance (Schmalensee, 1985; Rumelt; 1991; McGahan and Porter, 1997; Hawawini et al., 2001).

One of the key contributions that this paper makes lies in measuring and quantifying the extent to which the boundary-spanning nature of a firm’s business model emphasizes certain design themes, and the implications this has for firm performance. For example, regarding the efficiency design theme, many of the factors that we measured might benefit third parties more than they do the focal firm in terms of value creation (e.g., customers benefit from increase
transaction speed, simplicity, transparency, etc.). Our results suggest that firms benefit from the value they create for their customers. In our analysis of complementary business model design, we took into account resources, capabilities, products and services made available by other firms, and even by customers. Here we find that, on average, firms do not receive advantages in terms of a higher market value, and that they may even face disadvantages. In our analysis of the novelty of a business model design crossed firm boundaries by focusing on the ways in which firms’ exchanges with partners and customers are structured and governed. In fact, it may be the partners and customers who introduce and drive business model innovation. Controlling for firm-specific as well as industry-specific factors, we found that novel business model design clearly matters, both in the pre- as well as post-correction period. Thus, the empirical evidence that we produced points toward the business model as an important emerging unit of analysis for strategy and management research. It complements other important units of analysis, such as the firm and industry, which remain central to our understanding of the determinants of the economic performance of firms.

Moreover, our analysis suggests that the configuration of a firm’s business model matters, thus highlighting the potential of adopting a configuration approach to studying organizations. In particular, we have shown that capturing configuration as a set of variables, as suggested by Miller (1996), helps us better understand the variation in the performance of firms, which is an important objective of management research. This study thus suggests that extending the notion of configuration from the organization to the business model is a promising approach.

Another important contribution of this study was to theoretically, as well as empirically, relate value creation at the business-model level to value appropriation at the firm level. Theoretical approaches to linking the network/business model and firm levels of analysis have so far been rudimentary. By drawing on arguments from bargaining theory to link the business model design themes with the performance of the focal firm, we have provided some insights that might be useful for management and organization scholars in developing a more complete understanding of how firms can benefit from membership in strategic networks.

We find that in the context of business model configuration, what matters most are designs for efficiency and novelty. These two design themes best promote value creation at the level of the business model, and at the level of the shareholders of the focal firm. Our study offers the perhaps surprising finding that business model innovation remains important even in a rough
economic climate in which managers tend to want to focus first and foremost on efficiency enhancements. One possible explanation for this may be that efficiency and novelty can be interrelated: novel business model design can lead to increased transaction efficiency (see Amit and Zott, 2001). Another interpretation of our results is that business model innovation might lead to first-mover advantages (Lieberman and Montgomery, 1988). The creators of new market spaces using highly innovative business model designs are first movers. Being the first to market with a novel business model can make it easier to create switching costs, and to develop brand awareness and reputation. As well, business model innovators can gain by learning and accumulating proprietary knowledge, and by pre-empting scarce resources. These advantages strengthen the bargaining power of the focal firm, for example by raising the switching costs of partners and customers.20

We acknowledge the limitations of this study. Some empirical results could be affected by measurement problems. For example, our measurement of business model design themes may not have captured all lines of a firm’s business that have revenue potential; hence, it might not explain all the variation in the dependent variable. A related problem could be that bad management corrupts inherently good designs. Unfortunately, our data did not allow us to control for the quality of management. As well, due to multicollinearity problems, we could not measure interaction effects between the independent variables. Finally, we were not able to observe the focal firm’s bargaining power directly.

Despite these limitations, we believe that this study makes important contributions to scholarly research on the performance of emerging growth public firms. The received management, strategy and organization literatures have clearly documented the role of industry and firm effects in explaining the performance of firms, in particular with respect to the variation of performance across firms. But the advent of the Internet has significantly changed the landscape in which firms do business and studies of firm performance must take these changes into account. The business model, that is, the design of economic exchanges between a firm, its suppliers and partners, is a unit of analysis that allows us to do this. We hope that this article inspires further work on the theoretical and empirical linkage between the multiple levels of

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20 We note that the theoretical and empirical findings about first mover advantages are increasingly ambiguous (see Lieberman and Montgomery, 1998: 1116). In fact, there is a growing literature on late mover advantages. As the study by Shankar, Carpenter and Krishnamurthi (1998) shows, late mover advantage can be explained by the degree of novelty the late mover brings to bear: highly innovative late entrants may outperform pioneers. Our results are therefore consistent with the assumption of late mover advantages.
analysis that the business model as the unit of analysis and the firm as the unit of accrual represent.

REFERENCES


APPENDIX

Survey Items

BUSINESS MODEL DESIGN FOR EFFICIENCY

- **Transaction speed**
  - The business model enables fast transactions

- **Degree of automation**
  - Inventory costs for participants in the business model are reduced
  - The transaction is simple from the user’s point of view
  - The business model enables a low number of errors in the execution of transactions
  - Costs other than those already mentioned for participants in the business model are reduced (i.e., marketing and sales costs, transaction processing costs, communication costs, etc.)
  - The business model is scalable (in the sense that the same business model is suitable for handling a small as well as large number of transactions)

- **Breadth and depth of information provided**
  - The business model enables participants to make informed decisions
  - Transactions are transparent, that is, participants can easily verify flows and use of information, services, and goods
  - As part of the transaction, information is provided to participants that reduces the asymmetric degree of knowledge amongst them regarding the quality and nature of the goods being exchanged
  - As part of the transaction, information is provided to participants that increases the knowledge amongst them about each other (i.e., buyers learn more about trustworthiness of sellers, vendors learn about consumers, etc.)

- **Ease of access to potential transaction participants**
  - Access to a large range of products, services and information, or to a large number of other participants is provided
  - The business model enables demand aggregation (bringing together large number of buyers who may benefit from volume discounts)

- **The business model, overall, offers high transaction efficiency**
BUSINESS MODEL DESIGN FOR COMPLEMENTARITIES

- **Bundling of resources and capabilities**
  - There are complementarities between online and off-line elements of the transactions in the business model
  - The business model enables complementarities among activities of participants (i.e., supply chain integration)
  - The Business Model enables complementarities between the company’s technologies and technologies provided by others

- **Bundling of products and services**
  - The business model offers customers a wide range of complementary services and products from various participants to the business model
  - The business model offers customers a wide range of complementary services and products from the firm whose business model is discussed itself
  - Cross selling of products/services is important to the business model
  - There are strong vertical complementarities in terms of product/service offerings (i.e., after sales service)
  - There are strong horizontal complementarities in terms of product/service offerings (i.e., hardware and software, one stop shopping)

- **Overall, the bundling of complementary products/services are important to the business model**

BUSINESS MODEL DESIGN FOR LOCK-IN

- **Direct incentives**
  - The incentives offered to participants by loyalty programs to engage in repeat transactions are strong
  - Business model participants can customize products, services, or information to their needs
  - State the methods used by the e-commerce company to personalize goods (check box)
  - This personalization is effective in attracting and maintaining participants

- **Trust and reliability**
  - The business model promotes transaction safety and reliability
Methods adopted that promote trust by giving customers control over the use of personal information (check box)

Other methods adopted that promote trust (check box)

- **Network effects**
  - The focal firm has a dominant design (i.e., a proprietary standard that it developed for its business model)
  - The concept of "virtual community" plays an important role in the business model
  - Affiliate Programs, which are designed to enable transactions originating from the company’s partners, play an important role in the business model
  - The business model exhibits important direct network externalities; participants benefit from increasing numbers of similar participants
  - The business model exhibits important indirect network externalities: participants from one group benefit from increasing numbers of participants from another group (i.e., participant groups can be buyers and sellers)

- **Irreversible up-front investments**
  - Site users must make considerable site-specific investments of time and effort in order to learn how to use the site
  - Site users must have specialized assets (like customized software) in place in order to use the site

- **Overall, the business model succeeds in creating lock-in**

**BUSINESS MODEL DESIGN FOR NOVELTY**

  - The business model offers new combinations of products, services and information
  - The business model brings together new participants
  - The incentives (beyond the good offered) offered to participants to take part in transactions are novel
  - The business model allows stakeholders to access an unprecedented variety and number of participants and/or goods
  - The business model links participants to transactions in novel ways (these refer to who is linked to whom and in which direction)
  - The richness (quality and depth) of some of the links between participants is novel
- Number of patents that the focal firm has been awarded for aspects of its business model (i.e., number of business method patents)
- To what extent does the business model rely on trade secrets and/or copyrights to enable transactions? (radically – substantially – a bit – not at all)
- Does the company claim to be a pioneer with the commercial introduction of its business model? (yes – no)
- Since the issuing of the prospectus, the company has continuously introduced innovations in its business model
- There are competing business models in sight that have a potential to leapfrog the company’s business model
- There are other important aspects of the business model that make it novel

**Overall, the company's business model is novel**

**Coding Rules**

If the possible responses to a question were “strongly disagree - disagree - agree - strongly agree” then the scale was considered an implicit five point Likert scale, with the neutral response between agree and disagree not explicitly offered to the analysts in order to motivate them to collect enough information to make up their minds. The coding scheme was consistent with the assumption of an implicit five point Likert scale: “strongly disagree” received 0, “disagree” was coded 0.25, “agree” was coded 0.75 and “strongly agree” was coded 1. The coding gap between “disagree” and “agree” implied a neutrality point at 0.5.

If the possible responses to a question were “none - few - some - many” then the chosen scale was a four point Likert-type scale. “None” was translated into a standardized code of 0, “few” received 0.333, “some” was coded as 0.667, and “many” as 1. The same coding rule was applied to the scale “not at all - a bit - substantially - radically.” If the possible responses were “no - yes,” then “no” responses were coded as 0 and “yes” responses as 1.

Some questions allowed for multiple responses. In these cases, the online survey presented multiple check boxes to the analysts. The coding rule applied to these cases was as follows. If all boxes were checked, then the assigned code was 1, if none were checked this corresponded to a code of 0, and all other cases translated into a score between 0 and 1 that was
proportional to the number of boxes checked (e.g., if 2 out of 5 boxes were checked, the standardized score was 0.4).

Finally, some questions about novelty were asked in two forms. First, the analyst was asked to assess an indicator of novelty comparing the business model of the focal firm to that of the” best on-line competitor.” Second, the analyst was asked to make a similar assessment, but using the “best off-line competitor” as a benchmark. Information on the identity of competitors was readily available from the Hoovers database. We then coded the responses to both questions using the rules given above, and chose the smaller of the two standardized scores for our analysis. This conservative procedure ensured that we did not only capture the newness of the examined business model with respect to business practices that had been established in the pre-Internet era, but considering the whole landscape of competing business models.
FIGURE 1: Framework for examining the impact of business model design themes on value appropriated by focal firm

Business Model Design Themes
- Efficiency
- Complementarities
- Lock-in
- Novelty

Bargaining Power Of Focal Firm
- Access to information
- Cost of replacing exiting stakeholder
- Switching cost for exiting stakeholder

Value Appropriated By Focal Firm

Indirect effect

Direct effect
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<th>TABLE  1: Descriptive Statistics</th>
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<td>Age in 2000</td>
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<td>Revenues in Q4 2000 (USD MM)</td>
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<td>Market/book in Q4 1999</td>
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</table>

**Sources:**

Employee’s data: Compustat, Hoovers, and companies annual reports (www.sec.gov, European stock exchanges, or annual reports available on company websites).

Revenues: Compustat, Hoovers, financial results (www.sec.gov, European stock exchanges, or financial reports available on company websites).

Net income after tax: Compustat, Hoovers, financial results (www.sec.gov, European stock exchanges, or financial reports available on company websites).

Market cap: Compustat Global Vantage Database. In the absence of Compustat data, market cap was computed using the Compustat method: number of shares outstanding from the most recent quarter (taken from financial results (www.sec.gov, European stock exchanges, or financial reports available on company websites) multiplied by the stock price of the last day of the quarter (stock price was extracted from archival data). For the companies that have their stock prices in different currencies conversion was performed according to intra-bank rate of the same day (as stock price) using www.oanda.com.

Market/book: Shareholders equity was taken from Compustat, Datastream, and financial results (www.sec.gov), European stock exchanges, or financial reports available on company websites.
TABLE 2: Pearson correlation coefficients (in brackets: number of observations)

<table>
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<tr>
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<th>Lock-in</th>
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TABLE 2 (cont’d): Pearson correlation coefficients (in brackets: number of observations)

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21 Levels of significance: † p < .10, * p < .05, ** p < .01, *** p < .001
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TABLE 3: OLS regression results for Q4 2000. Dependent variable: ln (market value of equity Q4 ’00)^22

^22 For levels of significance, see previous footnote.
### TABLE 4: OLS regression results for Q4 1999. Dependent variable: ln (market value of equity Q4 '99)

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<td>2.91**</td>
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<td>Lock-in</td>
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<td>1.57†</td>
<td>.65</td>
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<tr>
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<td>-.62</td>
<td>-.6</td>
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<tr>
<td>Log (market size)</td>
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<td>-.12†</td>
<td>-.12*</td>
<td>-.1</td>
<td>-.12</td>
</tr>
<tr>
<td>Age</td>
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<td>-.06***</td>
<td>-.06***</td>
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<td>-.05***</td>
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<tr>
<td>Log (employees)</td>
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<td>.72***</td>
<td>.72***</td>
<td>.72***</td>
<td>.73***</td>
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<tr>
<td>Country</td>
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<td>-.43</td>
<td>-.43</td>
<td>-.64</td>
<td>-.7†</td>
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<tr>
<td>R&amp;D expenditures</td>
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<td>.09**</td>
<td>.08**</td>
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For levels of significance, see previous footnote.