



Don't rest on your laurels: Reputational change and young technology-based ventures

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Abstract

We combine resource-based theory and social cognition theory to investigate the factors both limiting and related to between-period reputational change of young firms in a dynamic technology-based industry. An analysis of computer graphics chipmakers during the period 1992–2003 provides evidence that operational signals are related to reputational change. Specifically, receiving a product award in the current period is associated with positive change and gaps in product announcements are associated with negative change. We find little support for our hypothesis that the reputations of older firms are less likely to change.

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1. Executive summary

Establishing and sustaining a good reputation is a key task in founding and growing an organization. Existing studies suggest that organizational reputations are self-reinforcing and relatively stable. For example, five companies have been on every one of *Fortune's* top 10 America's Most Admired Companies lists, from 2000 to 2004, and over this 5-year time period, only 16 companies were named to the list.

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Such stability is not surprising for large and established firms in mature industries, but it does beg the question of whether the reputations of young firms exhibit such stability. New, inexperienced firms are likely to make mistakes. Prior research indicates that a firm's reputation is based, at least in part, on its track record, particularly a consistent track record, but we have no theory regarding the probable reputational consequences when a track record is short and mixed.

Our paper focuses attention on this gap. We augment resource-based theory with social cognition theory to investigate the factors associated with both positive and negative reputational change. Rather than looking at the value of firms' reputation at a particular point in time, we look at changes in reputations over time. In doing so, we focus on signals that are (a) dynamic, in that they can change between time periods; (b) relevant to stakeholders in reducing their uncertainty about a firm; and (c) diagnostic in differentiating strong and weak performers.

We hypothesize that positive product quality signals (product awards, product benchmarks) will be reputation-enhancing, and that signals of lapses in product innovation (gaps in product announcements, being late-to-market) will be reputation-threatening. We also hypothesize that the reputations of younger firms are more likely to change than those of older firms. In testing the hypotheses, we control for prior period reputation.

To investigate these hypotheses, we studied computer graphics chip firms during the period 1992–2003. This industry is an ideal setting for investigating reputational change among young technology-based firms for two reasons. First, high capital requirements render start-up assets important. This implies that it should be more difficult to find evidence of between-period reputational change than in industries where start-up assets are less critical. Second, while the industry had some established firms during this period, it is also characterized by entry and exit. Accordingly, there is the mix of relatively established and new firms which enables us to look at the effects of firm age on reputational change.

We collected data on firms in the industry from archival sources. We measure a firm's reputation each year on the basis of their market share of design wins from one of the top 14 computer vendors in that year. A design win occurs when a particular chip is selected by a computer vendor to be used in a particular computer model: this decision involves assessing a graphics chipmaker's past track record, as well as its ability to deliver in the future.

An examination of our data indicates that there is volatility in firms' reputations over this time period: 33% of firm/year cases exhibited a positive reputational change, 30% exhibited a negative reputational change, while 37% exhibited no change. Most of the firms experienced both positive and negative reputational change. In analyzing the factors related to positive reputational change, we found, contrary to our hypothesis, that the reputations of older firms are more apt to improve than the reputations of younger firms. We also found that receiving a product award (but not a benchmark test) increases the odds of having a positive change in reputation. In analyzing the factors related to negative reputational change, we found that firms with a better reputation had a greater likelihood of a negative reputational change, and that firm age was not significant. These latter two results suggest that longevity and a favorable prior period reputation do not buffer a firm from a loss of reputation in this industry. We also found that the odds of having a negative

change in reputation increase as the time since the last product announcement increases, but that being late-to-market does not have a significant effect.

There are a number of implications of this research for entrepreneurship. In showing that reputations change after taking prior period reputation into account, we provide evidence that firm-specific intangible resources must be conceptualized as dynamic for young firms in technologically dynamic markets. This is important because previous research emphasized start-up assets, such as an experienced team, as reputational signals, but these might yield diminishing returns once an operational track record has been established. Second, examining how firms' reputations change on the basis of operational signals shifts the focus from stakeholders who make reputational judgments at start-up (e.g., investors) to stakeholders who make reputational judgments on an ongoing basis (e.g., customers). Finally, it is surprising that reputations do not stabilize as firms become older and more reputable, perhaps because of two inter-related reasons. The first is that the graphics chip industry is fast-paced and so chipmakers have to prove themselves continually. The second is that the firms we studied were simply not old enough to have stabilized reputations, with the two oldest being 14 years and 8 years in 1992. Both explanations emphasize the importance of industry context when studying resource development in young firms.

2. Introduction

Establishing and sustaining a good reputation is a key task in founding and growing an organization. An organization's reputation is widely considered to be a valuable resource (Amit and Shoemaker, 1993; Barnett, 1997; Hall, 1992) associated with substantial benefits (Dollinger et al., 1997; Fombrun and Shanley, 1990; Heil and Robertson, 1991; Weigelt and Camerer, 1988). Firms with good reputations are more attractive to investors, customers, suppliers, and employees, and this attractiveness can yield price, cost and selection advantages.

Existing studies suggest that organizational reputations are path-dependent and relatively stable. Sociological research on status orderings holds that reputations are self-reinforcing, with greater returns accruing to those organizations perceived as more reputable (Podolny, 1993; Rao, 1994). The standing of firms in published reputational rankings, such as the *Fortune* rankings, tend to be sticky, and persist even when ranking criteria and methods change (Schultz et al., 2001). For example, five companies have been on every one of *Fortune*'s top ten America's Most Admired Companies lists from 2000 to 2004,² five companies have been on every one of the Consumer Food Products top ten lists over the same period,³ and over this 5-year time period, only 16 companies were represented on each of these top ten lists. These are large and established firms in mature industries, possessing superior operating routines and renown in a collective consciousness (cf. Lang and Lang, 1988), and so such stability is not surprising. From a resource-based

² Berkshire Hathaway, General Electric, Microsoft, Southwest Airlines, Wal-Mart.

³ Campbell Soup, ConAgra, H.J. Heinz, Nestlé USA, Sara Lee.

view, however, an important question is whether the reputational positions of young firms are also stable, particularly for firms operating in technologically dynamic environments.

Previous research on new firms has emphasized early reputation-enhancing signals such as start-up endowments (Shane and Cable, 2002; Stuart et al., 1999) and early product performance (Christensen, 1997; Rao, 1994), suggesting that good reputations can be established quickly. A seemingly pervasive implicit assumption is that reputations accumulate in a steady upward trajectory. However, liabilities of newness arguments suggest that there are likely to be reputation-threatening signals about young firms (Aldrich, 1999; Stinchcombe, 1965). The reputations of young firms are likely to be undermined by uneven production quality stemming from a lack of production experience (cf. Sorensen and Stuart, 2000) and by tactical and strategic errors stemming from their lack of environmental knowledge (cf. Stinchcombe, 1965). While we know that a firm's reputation is based, at least in part, on its track record (Weigelt and Camerer, 1988), particularly a consistent track record (Heil and Robertson, 1991), we have no theory regarding the probable reputational consequences when a track record is short and mixed.

Although resource-based theorists have posited that resources accumulate at varying rates and decay gradually (Dierickx and Cool, 1989), they have not explicitly considered how reputational resources may be increased or diminished. Our paper focuses attention on this gap by augmenting resource-based theory with social cognition theory to investigate the factors associated with both positive and negative reputational change. In doing so, we explicitly recognize that reputation is a resource that lies in the cognitions of stakeholders. While resource-based theory provides an understanding of what types of resources and capabilities are likely to be valuable, rare and difficult to imitate, social cognition theory provides an understanding of how signals are likely to be processed cognitively by stakeholders.

Much of the research on organizational reputation has focused on determining which signals lead to a good reputation; that is, on predicting reputational valence based on specific signals. Signals that have been positively associated with the reputational valence of new firms in particular include the status of affiliates (e.g., Stuart et al., 1999), the track record of founders (e.g., Shane and Cable, 2002), product contest wins (e.g., Rao, 1994), and directors (Deutsch and Ross, 2003). The question of what causes reputational resources to increase or diminish is complementary to, but distinct from, the question of what predicts the valence of a reputation at a point in time.

In order to understand improvements or deterioration in the reputation of young firms—particularly those operating in dynamic technological environments—we posit that it is necessary to examine factors that may stabilize and destabilize them. Specifically, through linking resource-based theory and social cognition theory, we predict that (1) reputations of older firms are less apt to change than those of younger firms; (2) positive product quality signals are associated with positive reputational change; and (3) negative product innovation signals are associated with negative reputational change. We test our predictions through panel data analysis of 14 computer graphics chipmakers through the period 1992–2003, which is a fast-paced industry context, characterized by continuous technological change and short product cycles. Our results indicate that relevant and diagnostic operational signals are related to reputational change, but there is little evidence that firm age is related to reputational stability.

Since prior research has considered the evolution of capabilities but not the evolution of resources (Helfat and Peteraf, 2003: 999), one contribution of the present study is that it examines the dynamics of reputational resources. While resource-based theory has emphasized resource accumulation, this paper provides evidence that, at least in technology-based industries, reputation accumulation is unlikely to be a linear process. The paper points out the importance of going beyond the resources and stakeholders (investors) that are important at start-up, to consider the operational signals of ongoing capabilities and their assessment by customers. Further, the paper contributes to the reputation literature by focusing on reputational change rather than reputational valence. It enhances our understanding of which types of signals are likely to be associated with reputational change, by recognizing the importance of signal relevance to key uncertainties and signal diagnosticity. These are signal characteristics that can be used to predict reputational change across different industry contexts.

The remainder of the paper is organized as follows. Next, we review past research on reputations and link resource-based theory and social cognition to develop three hypotheses. The methods used to obtain the data and test the hypotheses are then described. Results are reported, and the implications of the findings for practice and future research are discussed.

3. Literature review and hypotheses development

3.1. Firms' reputation

A firm's reputation is "a perceptual representation of a company's past actions and future prospects that describe the firm's overall appeal to all its key constituents when compared to other leading rivals" (Fombrun, 1996: 72). Four elements of this definition are important to elaborate.

First, unlike other resources held by firms, a reputation is a construct of social cognition. It is a firm-level resource that is a cognitive evaluation of the firm. It is socially constructed but objectively held by external audiences: audience beliefs, however aligned with or decoupled from signals sent by firms, constitute the reality of reputations (Fischer and Reuber, 2003, *in press*). Therefore, to understand how firms' reputations change, we need to consider the cognitive processes leading to attitude change among stakeholders, as is done when studying consumers' beliefs about new brands and products (e.g., Keller, 1993). Accordingly, in this paper we draw on social cognition theory to deepen and reinforce the resource-based explanations provided.

Second, the definition emphasizes that a firm's reputation constitutes an overall, or aggregate, firm-level assessment. A firm's reputation transcends particular dimensions such as its technology, its management team, or its financial performance, although signals about these dimensions are likely to be consequential in determining its reputation. For example, experienced founding teams are valuable resources because they make superior decisions (Eisenhardt and Schoonhoven, 1990), but they are also reputation-enhancing signals for investors (Sacks, 2002). This means that the valence of a firm's reputation is an aggregation of people's evaluations of its other resources and capabilities, and so

reputation as a firm-specific asset is connected to the stocks of other firm-specific assets (cf. Dierickx and Cool, 1989). Moreover, in the same way that attribute salience is fundamental to attitude formation (Fishbein and Ajzen, 1975), it is important to understand which resources and capabilities are most connected to reputation when people make reputational assessments, and to recognize that these might vary by audience. For example, a teenage gamer and an IBM executive will assess the reputations of computer graphics chipmakers differently if they are paying attention to different firm-specific resources and capabilities in making a cognitive evaluation. While investors pay attention to experienced founding teams, consumers might not.

Third, the definition highlights that reputations are comparative, like the sociological concept of organizational status (Podolny, 1993; Shrum and Wuthnow, 1988). That is, reputations are favorability assessments of firms' resources and capabilities as compared with those of other, similar organizations. This comparison is explicit in studies that operationalize reputation as corporate rankings, such as those published by *Fortune* (cf. Brown and Perry, 1994; Fombrun and Shanley, 1990; Fryxell and Wang, 1994; Schultz et al., 2001). It is implicit in studies indicating that more reputable firms are better able to gain access to scarce resources (e.g., Sacks, 2002; Stuart et al., 1999).

Finally, the definition highlights that reputations involve a longitudinal, as well as cross-sectional, evaluation of a firm's resources and capabilities. This longitudinal evaluation is particularly important because the functional role of reputation is to reduce stakeholder uncertainty about the firm: "the idea of reputation only makes sense in an imperfect world" (Shapiro, 1983: 659). The capabilities a firm has demonstrated in the past can lead to a lower variance estimate of its future capabilities (cf. Heil and Robertson, 1991), reducing the perceived uncertainty associated with the firm's future prospects. This implies that reputation is a resource subject to time compression diseconomies (cf. Dierickx and Cool, 1989): it is likely to stick more firmly when it is accumulated over a longer time period.

These four aspects of the definition of organizational reputation are relevant to the development of our hypotheses. Before proceeding to that discussion, though, it should be noted that reputation can be compared with at least three other socially constructed organizational resources: organizational identity, organizational image, and organizational status. A firm's reputation is an assessment made by outsiders, and it is this external assessment that primarily differentiates reputation from organizational identity, which is usually defined as what insiders think about their organization (Gioia and Thomas, 1996), and organizational image, which is usually defined as what insiders believe that outsiders think about it (Dutton et al., 1994). These terms, however, have been used in multiple and partly overlapping ways in previous research: conceptualizations of both identity (e.g., Gioia et al., 2000) and image (e.g., Gatewood et al., 1993) have included the mental models that outsiders have of organizations. This overlap is true of reputation and status as well. Although Washington and Zajac (2005) differentiate the economists' notion of reputation (the perception of quality achievements) and sociologists' notion of status (the unearned ascription of social rank), other theorists tend to use the two terms indistinguishably and, indeed, develop hypotheses about reputation from theory on status orderings (cf. Rao, 1994). Accordingly, the ways in which these other constructs have been used may partly overlap with the reputation construct as used here.

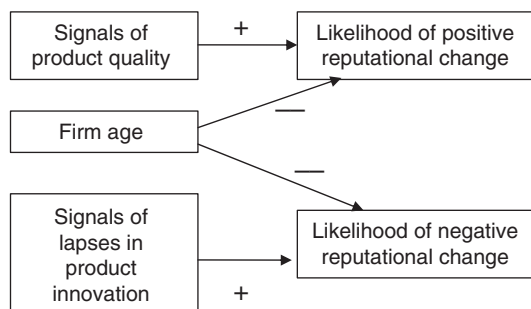


Fig. 1. The factors associated with between-period reputational change.

Following on from this analysis of the reputation construct, we augment resource-based theory with social cognition theory to develop our hypotheses related to the factors limiting and influencing between-period reputational change. The hypotheses are outlined below and illustrated in Fig. 1.

3.2. Firm age limiting between-period reputational change

We expect firm age to limit inter-period reputational change. Resource-based theory and social cognition theory both suggest that the reputations of older firms will be more stable than those of younger firms, and this is consistent with empirical findings that both positive signals (Rao, 1994) and negative signals (Flanagan and O'Shaughnessy, 2005) have a greater effect on reputations of newer vs. older firms.

From a resource-based perspective, a firm's reputation is likely to be subject to time compression diseconomies, leading to greater stability (Dierickx and Cool, 1989). This is because a firm's longevity implies to stakeholders that the firm has had the resources and capabilities necessary to survive until that point in its life. Older firms have leveraged their resources and capabilities to achieve competitive advantage over a longer time period than younger firms, and so their age is evidence to external audiences that they have been able to evolve their capabilities (cf. Helfat and Peteraf, 2003) and develop resource configurations (cf. Eisenhardt and Martin, 2000) to sustain a competitive advantage over a longer period of time. Such evidence of greater stability in evolutionary capability reduces the likelihood of a one-period change in stakeholders' assessments of firm-specific resources and capabilities. Moreover, new inter-period information is likely to have less of an impact on stakeholders' reputational assessments of older firms compared to newer firms simply because it represents one data point among a larger set of historical data points in a longitudinal calibration. In general, there should be less uncertainty with longer track records.

Examining firm age from a social cognition perspective leads to the same conclusion. Research has demonstrated repeatedly that early impressions persevere and color how subsequent information is processed (Asch, 1946; Ybarra, 2001). Through an "anchoring and insufficient adjustment" mechanism (e.g., Cervone and Peake, 1986), people use early information as a judgmental anchor and fail to adjust it sufficiently in light of newer information. Early inferences are not binding, but they shape the path of learning because people underestimate the chances that something they have not hypothesized is true of the

entity. This means that there should be less change in the reputations of older firms than younger firms because people are less apt to modify their attitudes towards firms with which they have been familiar for a longer time.

Thus, from both a resource-based and a social cognition perspective, we expect reputational change to be less likely for older firms than for younger firms, leading to the following hypothesis:

H1. Firm age at time $t=0$ has a negative relationship with the likelihood of reputational change over the period $t=0$ to $t=1$.

3.3. Factors associated with between period reputational change

Unlike firm age, which is expected to limit between-period reputational change and whose value is known at time $t=0$, the factors associated with between-period reputational change are signals received between periods $t=0$ and $t=1$. Social cognition theory suggests that these signals must be both relevant and diagnostic in order to impact a firm's reputation. Relevant signals provide information about those firm-specific characteristics that are salient to stakeholder objectives (cf. Fishbein and Ajzen, 1975). Moreover, given that the functional role of organizational reputation is to reduce uncertainty about the organization (Prabhu and Stewart, 2001; Shapiro, 1983; Weigelt and Camerer, 1988), the quality rendering them relevant for reputational assessments is that their information content corresponds with the key uncertainties of the industry for a particular group of stakeholders. In other words, between-period reputational change is likely to be influenced by signals providing information on those attributes about which stakeholders are most uncertain.

Diagnosticity is a construct studied by social cognition scholars interested in how new information affects people's judgments of other people and products (e.g., Ahluwalia, 2002; Folkes and Patrick, 2003; Skowronski and Carlston, 1987; Skowronski, 2002; Ybarra, 2001). Diagnostic signals are those which enable stakeholders to distinguish between good and poor performers on relevant attributes. This emphasis on differentiation is consistent with the emphasis on the heterogeneity of resources and capabilities in resource-based theory (cf. Barney, 1991). Negative information has more frequently been found to be diagnostic (Baumeister et al., 2001), because good performers rarely perform poorly, whereas weak performers are expected to perform at a satisfactory level at least some of the time. In a resource-based view, negatively diagnostic information would correspond to having a heterogeneous lack of resources or capabilities; that is, being unusual for not possessing capabilities that most industry players have, such as those representing best practices (cf. Eisenhardt and Martin, 2000). However, there is ample evidence that positive information can also be diagnostic in circumstances when strong performance is unusual (e.g., Skowronski and Carlston, 1987; Ahluwalia and Gurhan-Canli, 2000). This would correspond to the more studied situation of possessing heterogeneous valuable, rare resources or capabilities.

Thus, to identify the operational signals mostly likely to be associated with between-period reputational change, we need to identify the firm-specific characteristics about

which new signals will be both relevant and diagnostic to the customer stakeholders we are interested in. Resource-based theory suggests two such attributes.

Signals of product quality are expected to be relevant to stakeholders, in general, because product-level quality is an important indicator of firm-level quality (Barney, 1997; Milgrom and Roberts, 1986; Weigelt and Camerer, 1988). They are even more relevant to customers in fast-paced technological environments because there is greater uncertainty about what constitutes “high quality” due to changing demand and technologies (Brown and Eisenhardt, 1998; Christensen, 1997). Therefore, product quality signals in successive periods are likely to be relevant to the updating of customers’ reputational beliefs.

Signals of product quality are also expected to be positively diagnostic to stakeholders. Since products represent both the existing core knowledge of a firm and its potential to learn and evolve (Helfat and Raubitschek, 2000), signals of product quality provide both the backward-looking and forward-looking dimensions of a reputational assessment. While all firms might produce some low-quality products, perhaps aimed at a low price point, the production of high-quality products indicates superior resources and capabilities. From a resource-based perspective, high-quality products indicate that a firm has had the resources and capabilities to successfully evolve in a fast-paced environment and suggest that they constitute a platform for continued success (cf. Helfat and Raubitschek, 2000). Therefore, product quality signal periods are likely to be positively diagnostic to the updating of reputational beliefs, leading to the following hypothesis:

H2. Positive product quality signals over the period $t=0$ to $t=1$ are related to a greater likelihood of positive reputational change between t_0 and t_1 .

Signals of product innovation are expected to be relevant to customers of firms in technology-based industries because a key uncertainty in industries experiencing rapid technological change is whether a firm can sustain continuous product innovativeness (Filson, 2001; Stavins, 1995; Storper and Salais, 1997). Specifically, there is expected to be considerable uncertainty with respect to whether the firm can design new product models quickly and consistently (Brown and Eisenhardt, 1998; Stavins, 1995), and whether the firm is able to deliver the designs of new product models to the market as promised (Eliashberg and Robertson, 1988; Heil and Robertson, 1991). Therefore, signals related to both dimensions of product innovation are likely to be relevant to the updating of reputational beliefs.

Unlike product quality signals, signals of product innovation per se are not likely to be positively diagnostic in industries of rapid technological change. Market players in these industries are expected to be able to design new product models and to deliver those designs to the market, and so these outcomes do not necessarily reflect heterogeneous capabilities (Eisenhardt and Martin, 2000). Even weak performers will exhibit some innovation, which means that signals of these capabilities are insufficient to identify strong performers and so are not positively diagnostic. Instead, signals of lapses in product innovation are expected to be negatively diagnostic because they indicate a lack of commonly held capabilities (cf. Eisenhardt and Martin, 2000). Therefore, we expect signals that reflect lapses in a firm’s product innovation

capabilities to result in a negative change to the firm's reputation, as reflected in the following hypothesis:

H3. Signals of lapses in product innovation over the period $t=0$ to $t=1$ are related to a greater likelihood of negative reputational change between t_0 and t_1 .

4. Research methods

4.1. Industry setting, sample and data collection

Because of the comparative calibration inherent in reputational assessments, an intraindustry level of analysis is preferable and so we examined a single industry longitudinally; specifically, the computer graphics chip industry over the period 1992–2003. This industry is an ideal setting for investigating reputational change among young technology-based firms for two reasons. First, high capital requirements render start-up endowments important. This implies that we should expect path dependencies in reputation formation, and it should be more difficult to find evidence of between-period reputational volatility than in industries where start-up endowments are less critical. Second, while the industry had some established firms during this period, it is also characterized by entry and exit. Accordingly, there is the mix of relatively established and new firms which enables us to look at the effects of firm age on reputational change.

The computer graphics chip industry over the period 1992–2003 was characterized by rapid advances in speed, capacity, functionality and miniaturization, accompanied by more sophisticated software applications.⁴ While increasingly sophisticated graphics capabilities were used in business and home applications, their development was driven by computer gamers. Gaming software was, and remains, particularly important to the industry not only because it is a lucrative market, but also because it pushes the limits of existing hardware. Chipmakers continually develop more powerful and faster components, which in turn spur software developers to write more demanding games.

Throughout the studied period there was continuous technological change and several technological shifts, due to changing software standards (e.g., switch to Windows Direct X) and hardware standards (e.g., switch to the AGP bus standard). The most profound technological shift was from 2D graphics chips to 3D graphics chips in the mid-1990s. This shift was prompted by the release of the Sony Play Station (1995) which included a dedicated 3D graphics accelerator chip in addition to the CPU, and was escalated by the release of ID Software's "Quake" game (1996) and 3Dfx's "Voodoo" 3D accelerator (1997).

We identified industry players through archival sources because there are no industry directories for this period. We searched web sites related to computer graphics and databases such as Proquest, Lexus Nexus and Factiva. There has been extensive coverage of the industry in several periodicals (for example, *PC Magazine*, *PC World*, *Game*

⁴ This industry description was compiled from many sources, including interviews with industry experts and the roughly 10,000 pages of media articles that were a source of firm-specific data.

Developer, Computer Gaming World, PC Gamer Magazine, PC Net, Maximum PC, OC Workbench, Hardinfo) and on web sites such as Tom's Hardware Guide, www.extremetech.com and www.accelenation.com. In addition, research firms such as John Peddie Research and Frost and Sullivan Information Technology Research have covered the industry continuously during this period of time, and numerous references to specific firms and the industry as a whole have been published in the business media.

Our unit of analysis in this study is “firm/year,” as we explain below. To create our data set, we first needed to identify the relevant firms operating in the time period of interest. We defined a relevant firm as an organization that produced computer graphics chips sometime during the time period 1992–2003, excluding firms that produced only boards. We identified 27 firms that met the criteria. Other sources confirm that this is a small industry. For example, a retrospective account of the industry's history 1995–2002 lists only 17 firms by name and pays most attention to only 7 of these (Monk, 1993), while industry market share reports tend to identify 4–5 firms by name, with “Others” having less than 1% market share.

Once we had a list of industry players, we used the same sources to collect data on our measures. There were three stages of data collection for each firm. First we collected general firm-level data, such as age, entry mode and exit mode. Many of the companies were not public and so financial information was generally not available. Second, we identified and collected data on all the chip families (i.e., product lines) introduced each year. Third, we identified and collected data on all adoptions of each chip family by 14 top computer vendors. These adoptions are called “design wins.”

We were able to collect meaningful data on 14 chipmakers, yielding 92 firm/year observations. Most of the chipmakers with a large amount of missing data had been in business only a few years, early in our time period, and archival references to them are extremely scarce. This does not mean that the sample is limited to recent firms or firms that were in existence for a long period of time, however. Seven firms in the sample were operating in 1993, and three firms existed for only 3 years. However, in terms of representativeness, it would be fair to say that our sample includes only firms that were interesting enough at the time to the business and technological communities that their products and sales to major customers would be reported in the press.

4.2. Analysis approach

To investigate the factors associated with reputational change, we need a modeling approach that highlights change in reputation as the focal outcome. We view an improvement in a firm's reputation and a deterioration in a firm's reputation as two distinct events and model each type of change with a dichotomous dependent variable (positive change or not; negative change or not). Using two separate logistic analyses, we investigate the likelihood of a positive reputational change and the likelihood of a negative reputational change.

The focus on discontinuous change makes it necessary to move away from a cross-sectional approach toward a method that captures inter-temporal variability in reputations. While an autoregressive approach at the firm level can be appropriate when attempting to predict the valence of variables of interest based on a firm's prior performance (e.g., Mueller, 1986), such an approach is less appropriate when period-to-period changes in

variables are of interest (Roberts and Dowling, 2002). To model events within given periods of time, we created observations for each firm in our sample for each year between 1992 and 2003 (inclusive) in which that firm operated.⁵ Our unit of analysis for purposes of this study is, therefore, “firm/year” rather than firms per se. To handle the potential lack of independence between observations, we use panel data techniques, which take into account both cross-sectional and time series effects.

4.3. Measures

4.3.1. Dependent variables

Our measure of reputation is based on the number of design wins from one of the top 14 computer vendors obtained by each chipmaker in each year. A design win occurs when a particular chip is selected by a computer vendor to be used in a particular computer model. This decision typically takes place after the chip has been designed and tested by the chipmaker, just prior to a 2–4-month production process.

Although some graphics chips are sold separately, the vast majority of chipmakers' sales come from design wins. That said, the volume of sales generated by a design win varies significantly, and so design wins cannot be considered the equivalent of market share. Rather, design wins reflect the reputation of the chipmaker among the audience of customers who purchase chips to include in their own products. In granting a design win, computer vendors need to assess a graphics chipmaker's past track record, as well as its ability to deliver in the future, and so a firm's design wins reflect both the backward-looking and forward-looking aspects of the definition of reputation (Fombrun, 1996: 72). For each chipmaker we recorded, per year, how many design wins had been garnered from the top 14 computer vendors that year. There were a total of 518 design wins, from 1992 to 2003, across the 14 chipmakers in the database.

We looked only at design wins granted by the top computer vendors over this period to ensure that we measured reputation and not financial performance (e.g., sales). We wanted to capture endorsements by large and prestigious firms who are savvy in due diligence and making quality assessments (cf. Stuart et al., 1999), and exclude buyers who may be less apt to consider chipmaker reputation in making purchase decisions. Compiling a list of the top 14 computer vendors involved some subjectivity because the major players change somewhat during this time and serve different segments (desktops, laptops, servers). On the basis of industry reports and interviews with industry experts we focused on design wins granted by the following 14 computer vendors: Acer, Apple, AST Research, Compaq, Dell, Gateway, Hewlett-Packard, IBM, Micron, NEC, Packard Bell, Panasonic, Sony and Toshiba. We recorded every announcement of a design win granted by one of these computer vendors to one of the chipmakers in our database.

Customer loyalty, or habitual buying practices, would reduce the likelihood of finding evidence of between-period reputational change, by reducing the extent to which decision makers consider between-period signals when granting design wins. While we cannot rule

⁵ Given the nature of the industry, the time interval examined was that of a year. While this may be a short time period during which to expect reputational change in some industries (cf. Schultz et al., 2001), a year in the computer graphics chips industry would encompass at least one product cycle and often more.

this out, an examination of the design wins over this period shows that computer vendors grant design wins to multiple firms and the set of these firms change over time. For example, one of the 14 computer vendors granted design wins in 1997 to 7 chipmakers in our database, in 1998 to 5 chipmakers (4 from the 1997 set), and in 1999 to 5 chipmakers (3 from the 1997 set). This suggests that computer vendors are making period-to-period decisions on the basis of between-period reputational signals, which is not surprising since technological expectations in the industry are continually evolving.

Counting the number of design wins a chipmaker garners from the top computer vendor each year is insufficient as an annual measure of reputation, however, because it does not reflect a comparative assessment. Our dependent variable needed to reflect how favorably a firm was perceived relative to its rivals (cf. Fombrun, 1996). Furthermore, the industry was growing rapidly throughout this period, and so it would be expected that, all else being equal, the design wins of each player would increase independently of any reputational effect. We therefore measured a chipmaker's reputation in year y as the proportion it obtained of all design wins in year y it obtained. We divided the number of design wins a chipmaker obtained in year y by the total number of design wins obtained by all chipmakers in the sample in year y . This proportion measures the valence of the chipmaker's reputation in year y , and is calculated by the following equation:

$$\text{proportion of design wins for chipmaker } i \text{ in year } y = dw_{iy} / \sum_{i=1}^n dw_{iy}$$

where dw_{iy} is the number of design wins received by chipmaker i in year y .

Finally, we used these proportions to construct the two dependent variables indicating positive reputational change and negative reputational change, respectively. A chipmaker was characterized as having a positive (negative) change in reputation in year y if the proportion of design wins in year y is greater (lower) than the proportion in the preceding year $y - 1$, and no change in reputation if the proportion of design wins was unchanged. One binary dependent variable indicated whether there had been a positive change from the previous year or not (yes=1; no=0) and the other indicated whether there had been a negative change from the previous year or not (yes=1; no=0).

4.3.2. Independent variables

We measured firm age by the number of years since the chipmaker was founded. It should be noted that firms normally considered new in entrepreneurship research (6 years old or less) were well represented in the sample. In 1992, the first year of the time period over which data were collected, only 3 of the 14 chipmakers were over 6 years old. Eight firms were founded during the period, and 5 firms were still new at their exit date.

We based our measures of product quality on third-party performance signals because credibility is important in signals of reputation (Herr et al., 1991) and third-party sources are expected to send less self-serving, and therefore, more credible, signals than those from the chipmakers themselves. Further, third-party performance signals have previously been found to be reputation-related quality indicators during a period of technological change (cf. Rao, 1994). In the graphics industry the most important third-party signals are product awards and benchmark testing. Product awards are given to particular chip models

periodically by a wide array of magazines and web sites. Although the most common basis for an award is the speed of the chip, awards can also have a composite basis, taking into account other product attributes such as price, reliability and compatibility. Receiving a product award is not unusual, but is not the norm either, and so is likely to be diagnostic: a product award was received in 30% of the firm/year observations.

Benchmark tests evaluate hardware performance: game tests indicate how a chip performs in an extremely demanding gaming application and inspection tests measure some particular aspect of a video card's capabilities. The features evaluated are determined by a panel of benchmark developers and the benchmark tests are updated with each new major generation of graphics chips. Being associated with a reported benchmark test was rarer than receiving a product award and so is expected to be diagnostic as well: 21% of the firm/year observations were associated with a benchmark test.

We recorded, for each firm/year observation, whether the firm had received any product awards (yes = 1; no = 0) and whether any of the firm's chips had been favorably reviewed in a benchmark test (yes = 1; no = 0). These two variables, awards and benchmarks, are the two independent variables measuring product quality.

In constructing measures of product innovation, we needed to capture both aspects of product innovation: the extent to which a chipmaker can sustain innovation, and the extent to which a chipmaker can deliver the new designs to the market as promised. We based our two measures of product innovation on new product announcements. In this industry, new models are announced by chipmakers prior to their date of availability. Such announcements are common in many industries and are typically regarded as signals designed both to attract customers and pre-empt competitors (Eliashberg and Robertson, 1988). Announcements are particularly important in this industry because of the speed of technological change: most chips are less than 1 year old when adopted by customers. We recorded the announcement date for each chip family and so could calculate for each firm and each year how long it had been since the firm had made a previous product announcement. Thus, an independent variable measuring the extent to which chipmakers can sustain innovation over time is the number of years since the most recent announcement. Having even a 1-year gap in product announcements is rare: there was no gap for 78% of the firm/year observations, and the longest gap was 2 years. Therefore, gaps in announcements are expected to be diagnostic.

To measure the second aspect of product innovation, the ability to deliver as promised, we recorded whether the chip was late-to-market or not (yes = 1; no = 0). Product announcements specify when a chip is supposed to be available, and we compared this date with the actual date of availability on the market. If a chipmaker introduced multiple chip families to the market in the same year, we recorded the chipmaker as being late if one of these models was late. Being late to market is not unusual, but is not the norm and so is expected to be diagnostic: 29% of the firm/year observations involved a model being late to market.

Finally, we measured each of these variables (awards, benchmarks, gaps in announcements and late-to-market) as of the date of availability of the associated chip family. Since these variables measure signals received, and lapses in signals expected to be received, prior to assessments of reputations being made (i.e., design wins granted), they should be measured before design wins are measured. Chips need to be available before design win

decisions are made, and so measuring these variables as of the date of availability allows us to be reasonably certain that these signals would be known before decision wins are granted.

4.3.3. Control variable

We included prior period reputation as a control variable. In the parlance of resource-based theory, this is the firm's reputational resource position at time $t=0$. Although we expect firm age and prior period reputation to be significantly correlated, they are different constructs. Longevity is not necessarily associated with a positive reputation, nor do young firms necessarily have a poor reputation. Indeed, in fast-paced industries new firms can become reputable very quickly, as companies like eBay and nVidia show.

We expect a firm's reputational position at time $t=0$ to influence the likelihood of reputational change between $t=0$ and $t=1$, although there are two competing theories of the nature of the relationship. Research on status and reputation that emphasizes the stability of status orderings (e.g., Podolny, 1993; Rao, 1994) indicates that there is a "Matthew effect" consistent with the colloquialism that the rich get richer and the poor get poorer. In our context, a Matthew effect means that highly reputable firms are more likely to gain reputation than firms with a less positive reputation, and firms with a poor reputation are more likely to lose reputation than firms with a more positive reputation; in other words, the likelihood of positive reputational change is positively related to prior period reputation and the likelihood of negative reputational change is negatively related to prior period reputation.

An alternative resource-based logic is that there is an inverted-U relationship between prior period reputation and reputational change, with less change at both higher and lower levels of reputational valence. We expect a firm's reputation to be a resource position that is difficult to imitate (cf. Makadok, 1998; Wernerfelt, 1984) because of its idiosyncrasy: it is interconnected with other resource stocks and subject to causal ambiguity due to calibrations with peer firms and the firm's unique history over time (cf. Dierickx and Cool, 1989). More extreme reputations, positive or negative, are more idiosyncratic than less extreme reputations. In the case of extremely good reputations, this constitutes a barrier for improvement in peer firms' reputations in a ceiling effect and so highly favorable reputations are less apt to change. In the case of extremely poor reputations, the firm's history is difficult to detach from. Thus, we expect extreme reputations to be less apt to change than moderate reputations.

A similar expectation can be derived from social cognition theory. An extreme reputation can be conceptualized as an extreme attitude. Extreme attitudes tend to be stronger attitudes (Abelson, 1995), with greater temporal stability and more resistance to change (Ajzen, 2001). Thus, both highly favorable and highly unfavorable reputations are expected to be cognitively sticky.

We measure a chipmaker's prior period reputation in year y as the firm's reputational valence in year $y - 1$. As outlined in the previous section, we measured reputational valence in year y as the number of design wins a chipmaker obtained in year y divided by the total number of design wins obtained by all chipmakers in the sample in year y . We expected firm age and reputational valence to be significantly correlated, with older firms being more reputable, and they were ($p = .000$). Since we had a theoretical explanation for both a linear

and a curvilinear relationship between prior period reputation and the two dependent variables, prior period reputation and its square were both included in the models.

5. Findings

There are 92 firm/year observations, for the 14 firms over the 11 periods from 1993 to 2003, with 1992 data used only as “previous year” data. When a firm is founded after 1992, the first observation year is the year after start-up, and start-up year data constitutes “previous year” data. If a firm exited the industry before 2003, we included data from the exit year.

There was considerable reputational volatility among the firms over this time period. Of the 92 observations, there was no change in reputation from the previous year for 34 (37%), a positive change for 30 (33%) and a negative change for 28 (30%). The mean number of positive changes per firm was 2.14, with a range from 0 to 6, and the mean number of negative changes per firm was 2, with a range from 0 to 7. As can be seen in Fig. 2, most of the firms experienced both positive and negative reputational change. A sample of 14 firms is too small for a firm-level statistical analysis, but examination of the data provides no evidence of a Matthew effect for an upward trend. Indeed, of the 30 positive reputational changes, only 10 were directly followed by another positive change and 18 were directly followed by a negative change. Negative reputational change was more apt to be followed by a subsequent negative change, but even so, of the 28 negative changes, only 12 were directly followed by another negative change, while 7 were followed by a positive change.

Descriptive statistics and correlations among the variables are shown in Table 1. There is a positive significant correlation between the two product quality signal variables predicting positive reputation change, and a negative significant correlation between the two product innovation signal variables predicting negative reputation change. We tested the seriousness of this multicollinearity using Menard’s (1995: 66) method: running a linear regression with the identical variables and examining the Tolerance statistics generated. Menard states that a Tolerance statistic of less than .20 is cause for concern, and

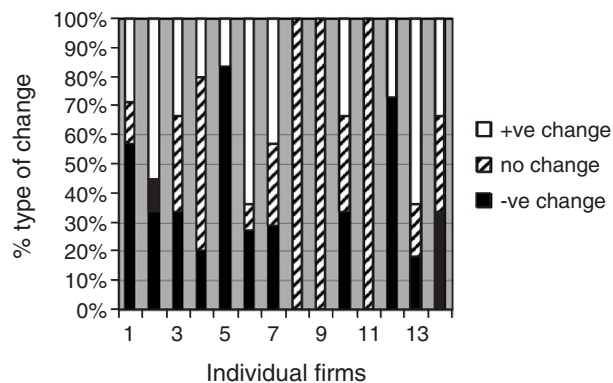


Fig. 2. Relative frequency of types of reputational change for the 14 chipmakers.

Table 1
Descriptive statistics and zero-order correlations

Variable	Mean	S.D.	1	2	3	4	5	6	7
1. Positive change	.326	.47							
2. Negative change	.304	.46	−0.46***						
3. Prior period reputation	.108	.14	−0.05	0.53***					
4. Firm age	8.50	5.9	0.06	0.29**	0.44***				
5. Award	.304	.46	0.24*	0.08	−0.02	−0.003			
6. Benchmark	.206	.41	0.16	0.01	−0.03	−0.12	0.54***		
7. Years since last announcement	.228	.45	−0.25 ⁺	0.08	−0.03	−0.04	−0.23*	−0.20	
8. Late availability	.300	.46	0.12	−0.13	0.06	−0.04	0.08	0.02	−0.29**

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

the lowest Tolerance statistic generated was .715 (for positive change) and .690 (for negative change). We therefore concluded that we could include the two independent variables in each logistic model.

The hypotheses were tested with random effects logistic panel data analyses. The results are shown in Table 2. Model 1 contains the control variable, prior period reputation, Model 2 contains firm age which is expected to stabilize reputation, and Model 3 adds the factors expected to be associated with reputational change.

5.1. Positive change in reputation

In Model 1, the relevant coefficient is that for the quadratic term (Cohen and Cohen, 1983: 229) and it is significant and negative, suggesting that prior period reputation has an inverted-U relationship with the likelihood of a positive change in reputation. However, the model's chi-square is not significant. In Model 2, the coefficient for firm age is significant, but in the opposite direction from what was expected. Contrary to H1, firm age is positively related to the likelihood of positive reputational change, suggesting that the reputations of older firms are more apt to improve than the reputations of younger firms.

Model 3, incorporating the factors expected to be associated with positive reputational change, also has a significant chi-square. The coefficient for having an award in the current year is positive and significant, indicating that receiving a product award increases the odds of having a positive change in reputation. The coefficient for garnering a benchmark in the current year, however, is not significant. Overall, these results support H2: after taking the age of the firm and its prior period reputation into account, updated signals of product quality have a positive impact on firms' reputation.

5.2. Negative change in reputation

Model 1 has a significant chi-square. The coefficient for prior period reputation, but not the quadratic term, is significant and positive. Contrary to both the Matthew effect

Table 2
Results of the cross-sectional time series logistic regression analyses

Variable	Positive change in design wins			Negative change in design wins		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Prior period reputation	14.63* (7.46)	11.47 (7.34)	9.02 (7.59)	17.28** (6.65)	20.68** (6.80)	26.00** (8.37)
Prior period reputation ²	−51.26* (24.61)	−48.09* (24.26)	−43.29 ⁺	−14.61 (14.56)	−20.19 (14.19)	−29.46 ⁺ (17.30)
Firm age		0.10* (0.05)	0.12* (0.05)		−0.09 (0.07)	−0.10 ⁺ (0.08)
Award			1.77** (0.65)			
Benchmark			−0.41 (0.73)			
Years since last announcement						1.64* (0.75)
Late availability						0.47 (0.68)
<i>N</i>	92	92	92	92	92	90
Model chi-square	4.34	8.19*	14.27**	15.44**	17.97**	18.61**

Positive coefficients indicate an increase in the odds of a change and negative coefficients indicate a decrease in the odds of a change. Standard errors are in parentheses.

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

explanation and the resource-based explanation, firms with a better reputation had a greater likelihood of a negative reputational change. Model 2 indicates that H1 is not supported: the coefficient for firm age is not significant. Collectively, these results suggest that longevity and a favorable prior period reputation do not buffer a chipmaker from a loss of reputation.

Model 3, incorporating the factors expected to be associated with negative reputational change, also has a significant chi-square. The coefficient for the number of years since the last new chip announcement is significant and positive, indicating that the odds of having a negative change in reputation increase as the time since the last product announcement increases. The coefficient for being late-to-market, however, is not significant. Overall, these results support H3: after taking the age of the firm and its prior period reputation into account, lapses in product innovation have a negative impact on firms' reputation.

6. Discussion

In contrast to studies that have found evidence of reputational stickiness (MacMillan et al., 2002; Schultz et al., 2001), this study of the reputations of players in the computer graphics chip industry has found evidence of reputational volatility. While this is not unexpected, given the dynamic, technology-intensive nature of the industry, it is, to our knowledge, the first time that such volatility has been documented. Moreover, this study is a first attempt to understand the reasons that a firm's reputational position may change from one period to the next. Our results show that diagnostic signals of product quality and product innovation can have an immediate impact on chipmakers' reputations.

6.1. Implications for theories of entrepreneurship

A general question yet to be fully answered within the entrepreneurship literature is how young firms can create the resources and capabilities needed to implement strategies that are the basis of a sustainable competitive advantage. While the evolution of capabilities has been examined, the evolution of resources such as reputation has not (Helfat and Peteraf, 2003: 999). We know that a favorable reputation is a valuable, rare, difficult to imitate, and non-substitutable resource which is critical for firm survival, but we have little understanding of how it develops over the early life of a firm when missteps are common.

The approach adopted here is instrumental in this regard because it goes beyond start-up resources. Previous research on the reputation of new firms has emphasized the signals that exist at founding, such human resources (e.g., Burton et al., 2002; Deutsch and Ross, 2003; Shane and Cable, 2002). Although we expect these signals to make a difference in the short-term, we have little understanding of their shelf-life. Certainly, one would expect diminishing reputational returns to signals of founding resources per se once a firm is able to provide an operational track record. Our measure of prior period reputation reflects the stock of the reputational asset (cf. Dierickx and Cool, 1989), encompassing perceptions of the firm's operational track record up to that point in time, as well as any remaining perceived value of start-up resources at that point in time. In showing that recent product

quality and product innovation signals are associated with a greater likelihood of reputational change, even after taking prior period reputation into account, we provide evidence that firm-specific intangible resources must be conceptualized as dynamic for young firms in technologically dynamic markets.

Looking beyond resources present at start-up also points out the importance of customers to the resource acquisition of young firms. Previous research focusing on start-up resources has emphasized the reputational assessments of investors, since this group of stakeholders is pivotal in both evaluating and determining the early resources of a firm. Examining how firms' reputations change on the basis of operational signal shifts the focus from stakeholders who make reputational judgments at start-up to stakeholders who make reputational judgments on an ongoing basis. It suggests that researchers studying the dynamics of firm-specific resources and capabilities need to consider the roles of customers in this process.

In addition, going beyond start-up resources raises the issue of what signals researchers should focus on in studying the capabilities of young firms. This is consistent with a recent call to understand more specifically what activities are likely to generate competitive advantage (Ray et al., 2003). In this paper we argue that the most consequential operational signals for reputation development are both relevant, in terms of conveying information about the firm-specific characteristics stakeholders are most uncertain about, and diagnostic, in terms of distinguishing strong and weak performers. With this in mind, it is interesting to consider the operational signal of being associated with a benchmark test which, given the importance of technological performance in this industry, was surprisingly unrelated to the likelihood of positive reputational change. Sample frequencies and the trade media suggest that benchmarks are likely to be diagnostic in differentiating products on the basis of quality. However, there is widespread suspicion in the industry that many benchmark tests are "fudged" or manipulated (Patrizio, 2001). This would lower the diagnosticity of public benchmarks as a product quality signal and could explain the lack of significance of this variable in the model. This suggests that behavioral research into which operational signals are most relevant and diagnostic is likely to be of benefit to our understanding of reputation development. Further, since key uncertainties vary by industry (Storper and Salais, 1997), it is likely that the consequences of different operational signals do as well.

Finally, from an entrepreneurship perspective, it is surprising that these reputations do not stabilize as firms become older and more reputable. There could be two inter-related explanations for this lack of stability. The first is that the graphics chip industry is fast-paced and so chipmakers have to prove themselves continually. This implies that the nature of asset stock accumulation varies across industries, with asset erosion (cf. Dierickx and Cool, 1989) being higher in certain industries. Second, while the chipmakers in the sample represent a range of ages, the two oldest were 14 years and 8 years in 1992, the first year of the study. In classifying a firm as established vs. new, these ages are an order of magnitude younger than the firms represented in past reputation studies based on the *Fortune* rankings. This implies that reputation may stabilize at a greater age than is represented in many new industries. Both of these explanations emphasize the importance of industry context when studying resource development in young firms.

6.2. *Implications for theories of reputation*

This study suggests that theories of reputation are limited to the extent that they focus only on predicting factors that affect the valence of an organization's reputation. If organizational reputation is subject to improvement or deterioration, then it is necessary to expand the focus of traditional reputation studies beyond identifying the types of signals that are associated with reputational valence. Efforts must be directed at understanding which signals will have enduring impacts on reputations, and which will have relatively transient ones. Audience and industry factors that moderate the volatility of reputations will need to be considered as well.

This study of volatility also highlights the need for greater conceptualization of what makes for "bad" reputations. Existing studies of reputational valence have been uniformly concerned with signals that, if received by audience members, contribute to good reputations. Little, if any, attention has been given to signals that can contribute to bad reputations. The present study points to the fact that reputations can worsen and suggests that this can be due to inactivity rather than activity. Theory-based efforts to identify static, cumulative and dynamic signals that will have negative impacts on reputations are required before a full understanding of the reputation formation processes is possible.

If models predicting good vs. bad reputations, or improvements vs. deterioration in reputations, are developed, it is worth noting (consistent with the approach adopted here) that we should not necessarily anticipate symmetry in the signals or processes that produce good vs. bad reputations. Our findings show that firm age and prior period reputation had different relationships with the likelihood of positive vs. negative reputational change. Reputational gains were more likely for older chipmakers, but longevity was not associated with reputational losses. Reputational gains were less likely for chipmakers with extreme reputations, while reputational losses were less likely for chipmakers with already low reputations. This indicates that there was not a Matthew effect for reputational loss. Overall, the results suggest that there are liabilities of newness with respect to reputational gains and liabilities of adolescence with respect to reputational losses (cf. Bruderl and Schussler, 1990). Further, the absence of favorable signals is not necessarily predictive of a bad reputation, just as the absence of unfavorable signals is not necessarily predictive of a good reputation. Research on the negativity effect (Skowronski and Carlston, 1987; Ybarra, 2001) highlights that negative information is typically more diagnostic than positive information and suggests that the conceptualization of how bad reputations are formed must be particularly sensitive to the diagnosticity of signal content.

6.3. *Limitations of the present study*

This study has a number of limitations. First, we examined only a single industry, one characterized both by its newness and by its technological dynamism. It is likely that reputational beliefs about firms in this industry will be susceptible to variability, simply because of the number of entries and exits (resulting from industry newness) and the higher level of asset erosion (stemming from technological dynamism). Thus, the degree of reputational volatility found here may be different than that found in industries that are more mature and less technology-intensive.

A second limitation of the study is that reputational perceptions were studied within a single type of audience: customers. Audiences can differ in the valence of the reputation they associate with a given firm (e.g., Ravasi, 2002; Wiedmann, 2002). Similarly, it is plausible that audiences will differ in the degree of volatility in their reputational assessments. Audiences that are, in general, more attentive to updated signals are expected to change their reputational ratings more dramatically than those that tend to pay less attention to firms in a category. This possibility represents an avenue for future research.

A third limitation of the study is the limited number of firms available for analysis. Although the graphics chip industry has many desirable characteristics for a study of reputational change, its small and changing population inhibits firm-level statistical analyses. In particular, this means that this investigation is silent on the relationship between reputational volatility and firm-level performance.

Finally, by focusing on the key uncertainties of this industry, we have paid attention to only two types of operational signals expected to be related to reputational change in this industry, product quality and product innovation. We expect that other frameworks will identify other signals that are both relevant and diagnostic and will affect reputational change in this industry.

7. Conclusions

We argue in this paper that reputational volatility is a phenomenon worthy of examination, for young firms in dynamic environments, and provide a preliminary examination of factors that limit and are associated with reputational change.

The analyses presented in this paper raise questions about the manner in which prior research concerning reputational valence should be applied to young firms. We may know what signals are associated with better vs. worse reputation at a point in time, but our findings suggest that we do not yet have a full appreciation of which signals can stabilize or destabilize emerging reputations across varying industrial contexts. Our understanding of entrepreneurial firm performance as well as our understanding of the nature and impact of organizational reputations will be enhanced if further consideration is given to the phenomenon of reputational change.

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