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Divergent reactions to convergent strategies: The influence of stock categories on analyst reactions to technological change

Mary Benner

University of Minnesota
Strategic Management and Organization
mbenner@umn.edu

Abstract

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ABSTRACT

Technological change can trigger industry ‘convergence,’ as a new technology enables established firms from different industries to compete in each others’ product-markets. We study the reactions of securities analysts, as important sources of institutional pressures for firms, to the similar product/market strategies undertaken by firms from different prior industries responding to industry convergence. We study the wireline telecommunications and cable television industries following the advent of Voice over Internet Protocol (VoIP), a new technology that allowed cable firms to offer telephone services and triggered convergence between the telecom and cable industries. Controlling for firm financial performance and capabilities, we find that analysts were consistently more positive towards the strategies and investments pursued by cable firms than telecom firms. Our findings further show that these different reactions arose from different pre-convergence investor expectations and preferences concerning how firms create value; stocks owned by investors with a preference for growth pre-convergence showed more positive reactions than those owned by investors interested in margins. These findings contribute to research on the challenges of technological change and industry convergence. Reactions from securities analysts may be based on outdated investor expectations and may persist for a time, creating challenges for some firms responding to technological change and convergence, while legitimating and enabling similar responses of other firms.

Research since Schumpeter (1942) has focused on the importance of technological change for industry and firm evolution (e.g. Abernathy & Utterback, 1978; Tushman & Anderson, 1986; Henderson & Clark, 1990). One important outcome of radical technological change for firms is industry ‘convergence,’ as a new technology allows established firms from different industries to compete in each others’ product-markets (Greenstein and Khanna, 1997). Over the past few decades, firms in many industries have experienced convergence following technological advances in areas like semiconductors, optics, and the Internet (Yoffie, 1997; cf. Srinivasan, Haunschild & Grewal, 2007; Lee, 2007). For example, with the advent of digital technology in photography as a substitute for silver-halide film, a new market emerged for digital cameras. In addition to established firms like Kodak and Polaroid entering from the traditional photography industry, consumer electronics firms like Sony and Samsung, and personal computer firms like Hewlett Packard also entered the new digital camera industry, marking an instance of convergence (Benner & Tripsas, forthcoming).

A common focus in previous research has been that the challenges and outcomes associated with settings of technological change and industry convergence arise from factors internal to firms. Research has highlighted the importance of firms’ resources and capabilities in driving differences in firms’ tendencies to enter and succeed in new domains during a period of convergence (e.g. Klepper & Simons, 2000; Helfat & Lieberman, 2002; Mitchell, 1991). For example, Klepper & Simons (2000) found that radio producers, firms with capabilities close to those required to produce televisions, were more likely to enter the TV industry, to enter early, and to survive. The large body of research on the challenges of technological change has similarly focused on internal factors, showing for example, that firms are constrained in their responses to new technologies by rigid organizational routines or structures (e.g. Leonard-Barton, 1992; Henderson & Clark, 1990), the fear of cannibalizing the profits from the existing business (Reinganum, 1983; Henderson, 1993), organizational tendencies to exploit existing capabilities (e.g. March, 1991; Levinthal & March, 1993; Benner & Tushman, 2002), or managers’ outdated mindsets (Tripsas & Gavetti, 2000).

But there has been little attention to the influences of external pressures as firms from different prior industries respond to industry convergence. Prior research does not explain whether and how firms with

apparently similar capabilities and strategies experience different external pressures and outcomes in a setting of convergence. In this paper, we take a first step to fill that empirical gap. Specifically, we follow a growing body of research that has considered analysts and investors as important sources of external pressures on firms (e.g. Zuckerman, 2000; Rao & Sivakumar, 1999; Useem, 1996; Davis, 2005). We ask how analysts – as intermediaries between firms and investors – react to firms’ strategies during a period of industry convergence. We study whether the pressures on firms from these important external stakeholders systematically differ for firms from different prior industries, potentially constraining some firms responding to industry convergence, while enabling others pursuing similar strategies in the same domain.

Our empirical setting is convergence between the wireline telecommunications (telecom) and the cable television (cable) industries triggered by a major technological change: the advent of voice over Internet protocol (VoIP) technology. VoIP technology allowed cable companies to offer telephone services and introduce a bundle of services that included internet, telephone, and television or video. The telecom firms similarly introduced bundles of the same three services. Thus, the advent of VoIP triggered convergence in these industries as firms began to compete in the same product-market. We conduct a longitudinal panel data study on nine firms, assessing analysts’ reactions to the strategies and investments undertaken by these firms from 2001 to 2008, as industry convergence unfolded. Our statistical study design allows us to further control for observed and unobserved firm-specific and industry factors, including prior industry, financial performance, and firm capabilities. In addition to our quantitative study, we also read hundreds of pages of texts of the analysts’ reports covering these nine firms to gain more insight into the dynamics of our setting.

We draw on cross-disciplinary research, including work in technological change, institutional theory, and finance and accounting to develop hypotheses about analysts’ reactions to firms responding to industry convergence. We hypothesize and find that analysts’ reactions toward firms systematically diverge, and this divergence is associated with prior industry. We show further that the divergent reactions arise from pre-convergence differences in investor beliefs, expectations, and preferences about how firms create value. To the extent a firm’s stock is owned by investors with a preference for ‘growth’ stocks, analysts’ reactions are

more positive toward the firms' strategies and increased strategic investments during convergence, controlling for financial performance, capabilities, and other industry and firm factors. Conversely, analysts' reactions are more negative toward stocks that are held by investors with preferences for 'margin' stocks.

These findings suggest important implications. We document systematic divergence in analysts' reactions that is highly correlated with a firm's prior industry, and is explained, not by differences in firms' capabilities or financial performance, but by differences in – and inertia in – the expectations of investors holding a firm's stock. Given evidence from research showing that pressures from analysts and investors affect firms' strategies (e.g. Zuckerman, 2000; Benner and Ranganathan, 2011; Bushee, 1998), divergence in analysts' reactions to strategies in settings of convergence may further affect the subsequent strategies of these firms. As differential pressures on firms translate into differences in levels of investment, speeds of adoption, degree of management attention (Ocasio, 1997), or commitment (Sull, Tedlow & Rosenbloom, 1997), they may reinforce firm heterogeneity and further set apart 'winners' from 'losers' during periods of convergence (Collis et al, 1997).

This study makes several contributions to research. First, we fill an empirical gap in research by exploring the important but understudied influences of analysts and investors in firms' responses to technological change and convergence. Finding that pressures from key stakeholders in firms' environments diverge systematically for specific groups of firms, independent of individual firm capabilities, resources, and financial performance, provides additional insights into the important constraints firms may face as they respond to industry change. In doing so, we also extend research on the challenge of technological change and strategic renewal (Agarwal and Helfat, 2009) more broadly, suggesting that it is important to study the influence of external stakeholders in firms' strategic changes or development of dynamic capabilities. Researchers studying technological change have questioned why established firms have difficulty responding to new technologies, and have largely attributed these challenges to internal organizational factors. Our study provides important insights into external factors that may reinforce these documented challenges. In addition, we introduce a novel measure of stakeholders' categorization of firms, based on the stated

objectives of the mutual funds holding shares of a firm's stock. Using this measure, we are able to track the source of divergence in reactions.

THEORY DEVELOPMENT

Investor beliefs and expectations about appropriate firm activities are likely to differ depending on how they categorize firms' stocks (e.g. Zuckerman, 1999), and in particular the extent to which they consider firms to be 'growth' stocks versus 'margins' stocks (Aghion and Stein, 2008). Categorization of stocks as 'growth' or 'margins'¹ is common both in academic research and in practice (e.g. Barberis and Shleifer, 2003; Jegadeesh et al, 2004; Benner, 2007; Aghion & Stein, 2008). Investors expect different behaviors from firms categorized as growth stocks and margins stocks and focus on different metrics to assess performance. Growth stocks are expected to adopt strategies that generate higher but more unpredictable future revenue growth relative to the stock market, while firms categorized as margins stocks are expected to adopt strategies focused on a stream of predictable earnings and dividends (Aghion and Stein, 2008). This categorization extends to the institutional investors such as mutual fund money managers that invest in the stocks – not only are the stocks classified as 'growth' or 'margins', but the funds that invest in these stocks are themselves classified as growth or value 'style' investment funds (e.g. Barberis and Shleifer, 2003). Thus, 'growth'-oriented investment funds are generally those that invest in the stocks of firms expected to generate high future revenue growth whereas 'margin'-oriented investment funds generally invest in the stocks of firms expected to generate predictable current earnings and cash flows.

Recent research in finance further proposes that investors categorize a firm's stock by observing the kinds of strategies and investments it has undertaken historically (Aghion and Stein, 2008). These beliefs drive how investors value the stock and the performance measures they focus on when evaluating a firm's performance (Aghion and Stein, 2008). For instance, if a firm's activities have historically focused on cost-cutting and improving profit margins, its investors will tend to focus on current earnings and profitability metrics when evaluating the firm's performance while de-emphasizing other performance metrics such as

¹ 'Margins' stocks are also interchangeably referred to as 'value' stocks both in academic research and in practice

revenue growth. In contrast, if a firm's activities are exploratory in nature - such as investing in new technologies - its investors will tend to focus on growth-related metrics and may even ignore profitability and cost metrics when evaluating firm performance (e.g. Aghion and Stein, 2008). This research further suggests that the extent to which investors believe a firm to be a 'growth' or 'margins' stock affects investors' sentiments and analyst reactions, *independent* of the firm's capabilities.

We focus on analysts recommendations as a reflection of the expectations and beliefs of investors holding shares in a firm's stock. "Sell-side" securities analysts are important stock market intermediaries who issue periodic assessments and reports of firms' current performance as well as their future prospects (Schipper, 1991; Zuckerman, 1999; Rao & Sivakumar, 1999; Benner, 2010). Prior research suggests that analysts' recommendations both influence and are influenced by the beliefs of investors. In particular, analysts are influenced by large institutional investors, such as mutual fund managers. Analysts' reports generated by the research department are used as marketing tools by the brokerage houses, raising the possibility that analysts cater to institutional investors to help brokerage houses obtain business. Analysts also routinely communicate with institutional investors in less formal ways which provides them insights into investors' expectations and requirements (cf. De Franco et al, 2007). Moreover, analysts are annually ranked in several prominent financial publications based on input from institutional investors (Boni and Womack, 2002; Institutional Investor Magazine, 2011) and their compensation and career opportunities are tied to these rankings. Recent empirical evidence in finance shows that analyst optimism rises as investor sentiments climb and wanes as these sentiments fall and is closely related to institutional investors (Qian, 2009). Thus, analysts' reactions are likely to reflect investor beliefs about stock value.

An emerging stream of research in finance and accounting has begun to argue that securities analysts generally evaluate stocks that are categorized as 'growth' more favorably, even after accounting for the stock's performance and other observable fundamentals. This research has focused on the role of analysts' and brokerage firms' incentives (e.g. Das, Levine and Sivaramakrishnan, 1998; Jegadeesh et al, 2004; Baik, Farber and Petroni, 2009; Barniv et al, 2009; Mola and Guidolin, 2009; Ertimur et al, 2010; cf. Westphal and Clement, 2008), and suggests that analysts tend to publicly endorse growth stocks by tilting attention and

recommendations in their favor. Moreover, these preferences may cause analysts to not fully take into account the characteristics of these growth stocks to predict returns (e.g. Baik, Farber and Petroni, 2009).

At the start of convergence, as firms from different industries respond to the same radical technological change with similar strategies, there is likely to be heterogeneity in the current investors' beliefs and associated analyst recommendations regarding these firms. Prior to the onset of convergence, some firms would have been more valued for 'growth' whereas others would have been more valued as 'margins' stocks, for their ability to deliver predictable earnings. Once convergence is underway, and firms that were previously in different industries now compete with each other, these pre-existing categories may give rise to different reactions to the same strategies. For instance, electronic book retailing, consumer electronics and brick-and-mortar book retailing industries are converging as firms offer similar products. Electronic retailing companies such as Amazon have traditionally been valued for revenue growth by investors whereas brick-and-mortar retailers such as Barnes and Noble have been valued for their margins. Their prior composition of investors with different expectations and preferences is likely to elicit different reactions as they participate in the same market.

Moreover, prior research further suggests that such beliefs persist despite changes in firms' strategies and industries. For instance, Beunza and Garud (2007) show that evaluative heuristics for Internet stocks remained static even as the underlying stock category underwent radical transformation. Similarly, Tripsas (2009) notes that despite the transformative efforts a firm undertook, analysts covering the firm were slow to change how they categorized the firm. This underscores the possibility of inertia in investor beliefs and expectation, and further, suggests that despite underlying technological change and convergence in industry and strategies, investor expectations and analysts' reactions will likely continue to reflect investors' pre-convergence beliefs and expectations. Therefore, analysts are likely to continue to be more positive toward the 'growth' stocks – i.e. toward firms that are generally owned by a higher proportion of institutional investors with preferences for 'growth' stocks than for 'margin' stocks. Thus, a firm's pre-convergence stock category will persist for a time despite the underlying convergence in industries and strategies, and these will give rise to divergent reactions, controlling for firm specific factors.

In general, analysts' recommendations about whether to buy or sell a stock will reflect investor beliefs about how a firm's current actions and strategies influence these metrics and drivers of value. Analysts' reactions to firms' strategies will be more positive to the extent that a firm's strategies are aligned with the investors' beliefs and expectations about drivers of value for the stock, and more negative to the extent a firm's strategies are misaligned with investor beliefs and expectations (cf. Zuckerman, 1999; Benner, 2007). In particular, the technological change that enables convergence is characterized by high uncertainty as competing technological designs progressing at different rates create an 'era of ferment' (Tushman and Anderson, 1986). This uncertainty makes firms' performance less predictable and makes it difficult to predict which firms will succeed (Collis et al, 1997). For example, developments in internet and electronic paper technologies have facilitated convergence between electronic book retailing (e.g. Amazon.com's Kindle), consumer electronics (e.g. Sony's e-Reader) and brick-and-mortar book retailing industries (e.g. Barnes and Noble's Nook), making it difficult ex-ante to predict which firm(s) will emerge successful. These characteristics are more consonant with expectations for firms valued as growth stocks, where investors focus on revenue growth with the expectation of increasing value in the future, than with margin stocks, where the focus is on predictable earnings in the short term. Thus, in a setting of convergence triggered by a technological change, there will be divergence in reactions to firms entering the new domain that arise from two sources. First, firms that are previously categorized as growth stocks will have more positive reactions than those categorized as margin stocks pre-convergence. Second, the increased uncertainty associated with technological change that enables convergence makes the activities and strategies to enter the converged industry more aligned with investors' expectations for a growth stock than a margin stock.

Hypothesis 1: During a period of convergence triggered by a major technological change, the more (less) growth-oriented the investors that own a firm's stock, the more positive (negative) securities analysts' reactions to the firm.

Excerpts from analysts' reports illustrate these differences. Analysts' statements from the telecom versus cable reports highlight that analysts were generally pessimistic about the telecom firms' triple-play bundled offerings as the response to industry convergence than to similar strategies pursued by cable firms.

For example, in reports on the telecom firms, analysts are negative, and their comments also highlight their focus on ‘margins,’ or predictable cash flows and earnings:

Three areas continue to concern us: ... Impact of building BLS’ controlled video business, both from an operating, margin and capex perspective (Deutsche Bank report on BLS, April 2005)

...we are concerned about the economics of the FiOS initiative, but a pull-back on this could make us more constructive on the stock... Curtailment of FiOS plans, more focus on cash generation, and potential divestitures could make us more positive (Morgan Stanley, multiple reports on Verizon between Oct 05 and Jan 06)

There is also evidence that analysts’ reactions incorporate and reflect investor sentiments. Throughout the period Verizon’s stock price was dampened as investors questioned the FiOS strategy (e.g. Mohammed, 2006):

Investors have been concerned over Verizon’s FTTH [FiOS] strategy to accommodate high definition video delivery as well as extensive data bandwidth... (Deutsche Bank, report on Verizon, August 2006).

The investor and analyst negativity toward Verizon’s efforts to respond to convergence is illustrated by the excerpt below, echoed several times in the analysts’ reports, which suggests that analysts and investors would prefer to have Verizon curtail its investments in responding to the technological change and instead focus on short term cash flow (again, consistent with a ‘margins’ strategy):

We believe that if the FiOS project fails to achieve meaningful penetration rates, the rate of erosion of both revenue and EBITDA could be even steeper, and will confirm skeptics’ claims that the company and its shareholders would have been better-off adopting a CZN-type structure (i.e. severely cutting back investments, maximizing short-to-medium term FCF and...returning cash to shareholders) (Deutsche Bank, Verizon, Oct 2005)

In contrast, analyst reactions to cable firms’ similar strategies during convergence contrasted markedly with those of the telecom firms. Analysts are much more attentive and consistently more positive about cable firms’ VoIP efforts. Even before these efforts are launched full scale, analysts discuss the underlying potential for future revenue growth that is in line with growth-oriented investors’ beliefs.

...On balance, we believe the returns from the VoIP telephony launches could be healthy (Morgan Stanley, Nov 2003, Cablevision)

We believe a rollout of VoIP (voice over IP) telephony to the entire footprint could be completed in the next two years ...we recognize that VoIP could drive telephony penetration higher and expand the footprint even more than originally expected. (Morgan Stanley, July 2003, Comcast)]

The changes in strategy required to respond to technological change and compete in a converging industry can require increased strategic investments to develop new knowledge and capabilities in the new technology (cf. Lavie, 2006; Agarwal and Helfat, 2009). Given the persistent expectations and beliefs of the different types of investors, analysts' reactions to these increased investments are likely to systematically diverge for firms in different categories. Since the extent to which a firm's stock is held by investors preferring 'growth' versus 'margins' influences the relevant metrics and heuristics investors attend to when evaluating the firm's strategic investments (e.g. Aghion and Stein, 2008; Bradshaw, 2004; Beunza and Garud, 2007), increases in strategic investments will be particularly misaligned for firms that are valued as 'margins' stocks, with expectations for stable, predictable earnings. As these firms increase investments, analysts will persist in emphasizing the 'margins' dimension, which makes the increased investment, and its negative effects on earnings, particularly salient in the short term. As a result, investors and analysts will view increases in investments unfavorably when evaluating 'margin' stocks, and analysts may downgrade stock recommendations or drop coverage (Barber et al, 2001; Womack, 1996; Bjerring et al, 1983). In contrast, increases in investments for an established firm that investors value more for *growth* prior to the onset of technological change will be *more* favorably evaluated, as these investments are more aligned with the investors' pre-existing beliefs about sources of value creation for those firms. Investors, focused on future revenue growth rather than current margins when evaluating such firms, already anticipate that a higher proportion of firm value will be derived from uncertain investments. Taken together, this suggests analysts' reactions to established firms' strategic investments in an uncertain technological domain will be more positive to the extent that these firms are considered ex-ante to be 'growth' stocks by investors. The divergence in reactions corresponds to divergence in investors' beliefs about different firms at the start of convergence.

Hypothesis 2: During a period of convergence triggered by a major technological change, the more (less) growth-oriented the investors that own a firm's stock, the more (less) positive securities analysts' reactions to increases in that firm's strategic investments

These divergent reactions are also illustrated in excerpts from the analysts' reports in our setting. Analysts question Verizon's FiOS rollout *even as they recognize its superior capabilities* and recommend pulling back, while encouraging Comcast, while noting that *both firms' strategies require higher capital investments in the short term.*

we are concerned about the economics of the FiOS initiative, but a pull-back on this could make us more constructive on the stock...Despite announcing its video packages for Keller...we believe it will be increasingly difficult for Verizon to continue with its fiber to the premises rollout. The architecture and capabilities are second to none, but the costs are high... (Morgan Stanley, Verizon, Sept. 2005)

An accelerated all-digital and VoIP rollout should increase capital expenditures in the near-term, but they should also generate stronger long-term growth. (Morgan Stanley, Comcast, October 2005)

EMPIRICAL SETTING

Convergence in the wireline telecommunications and cable television industries

Our setting is convergence between the wireline telecommunications and cable television industries (cf. Lee, 2007) enabled by Voice-Over-Internet-Protocol (VoIP) technology.² VoIP is a radical technological change that allows phone calls to be transmitted digitally over any transmission network using the Internet. VoIP technology provided a way for cable television firms to offer telephone services. Cable firms subsequently offered bundles of services (sometimes called a 'triple play'), that included telephone, video, and high-speed Internet. The telecommunications firms responded, both by offering standalone VoIP telephony products on existing copper-based wireline networks, as well as offering similar bundles of internet, video and telephone services, often on upgraded fiber-optic networks. Thus, while cable firms entered the telecommunications industry with telephone services, telecommunications firms entered the cable industry with video services, marking convergence between the two. Table 1 and Table 2 provide a summary of product launch events³ during the convergence time frame.

² Vonage, a startup established in 2001 is widely regarded as the commercial pioneer of VoIP

³ Data obtained from Lexis/Nexis and technology specific websites (e.g. dsreports.com telephonyonline.com, informationweek.com)

Our study includes nine firms: Verizon Communications, Qwest, Bellsouth⁴, SBC Communications, AT&T⁵, Comcast Corporation, Cablevision Systems, Charter Communications and Time Warner Cable.⁶ Our study period is from the first quarter of 2001 to the second quarter of 2008.

DATA, MEASURES AND METHODS

Data and Measures

Dependent and explanatory variables

In Hypotheses 1 and 2, we predict analysts' reactions toward converging strategies will diverge as a result of differences in the pre-convergence expectations of investors for different categories of stocks. We measure analysts' reactions using the *Mean analyst recommendation* value from the I/B/E/S summary file which averages recommendations across all analysts that track a firm, every quarter. The variable is coded as: 1=Strong Buy, 2=Buy, 3=Hold, 4=Underperform, 5=Sell. Thus, higher values of this variable indicate more *negative* reactions.

Our explanatory variable for Hypothesis 1 is a measure of expectations of the investors holding a firm's stock, and specifically the extent to which they are growth- versus margins-oriented. We create a novel measure of investors' preferences and expectations calculated from the stated investment objectives of mutual funds that own stock in these firms. To create our *Investor profile* measure, we first calculate a mutual fund profile for every mutual fund that invests in firms in our sample using the Lipper classification code field in the CRSP data (Thomson-Reuters, 2008). Lipper, recognized as one of the industry standards in mutual fund classification (cf. Lounsbury and Rao, 2004), categorizes mutual funds according to their investment objective, with "growth" "core" and "value" constituting three distinct categories amongst equity funds. "Value" (i.e. "margin," or "income") funds are those that emphasize steady current income flow (margins-orientation) and "growth" funds are those that have a future capital appreciation objective (growth-orientation), with "core" constituting an intermediate style. In addition to equity mutual funds, mixed funds

⁴ AT&T acquired Bellsouth on March 5th, 2006. Analyst reports covering Bellsouth are discontinued after 2005.

⁵ SBC Communications acquired AT&T in late 2005, creating a new company called AT&T Inc.

⁶ Two other cable firms could not be included in the study: Adelphia filed for bankruptcy in 2002, and Cox Communications is privately owned and therefore not covered by analysts.

that invest in both debt (bonds) and equity also owned stock in our firms – these funds have a greater current income orientation (higher margin orientation) compared to equity funds. We transform these mutual fund investment styles to mutual fund profile scores as follows: we first assigned a value of 1 for ‘mixed’ funds that have a greater focus on bonds (fixed income) than equity and a value of 2 for ‘mixed’ funds that have a greater focus on equity than bonds (greater growth-orientation).⁷ Amongst equity funds, we assign values of 3, 4, and 5 to value funds, core funds and growth funds respectively. Thus, our mutual fund profile scale runs from 1 (least oriented towards growth) to 5 (most oriented towards growth).⁸ Finally, we compute a weighted-average value for the *Investor profile* of every firm in our sample as follows:

$$\text{Investor_Profile}_{i,j} = \sum_k \{ \text{Mutual_Fund_Profile}_k * (\text{Shares_Owned}_{i,j,k} / (\sum_k \text{Shares_Owned}_{i,j,k})) \}$$

Where: i =Firm, j =Period, k =Mutual Fund, and,

$\text{Mutual_Fund_Profile}_k$: Is measured on a scale from 1 (focus on income) versus 5 (focus on growth) for fund ‘ k ’. This remains constant for a fund across periods and firms.

$\text{Shares_Owned}_{i,j,k}$: Is the number of shares owned by fund ‘ k ’ of firm ‘ i ’ in period ‘ j ’.

The weight used for a mutual fund ‘ k ’ is the proportion of firm ‘ i ’ equity held by the fund divided by the total equity of that firm held by all mutual funds in a period ‘ j ’. The resulting *Investor profile* variable takes on values between 1 and 5 with higher values indicating greater growth-orientation of the investors that own the firm’s stock. Given the scaling of *Mean analyst recommendations* (lower values indicate more positive reactions), Hypothesis 1 predicts a negative coefficient for *Investor profile*.

Our explanatory variable for Hypothesis 2 is the interaction between *Investor profile* and the firm’s strategic investments during convergence to test whether analysts’ reactions are more negative toward increasing investments by margin-oriented firms than for growth-oriented firms. Following prior research, we measure a firm’s strategic investments using the logged value of *Capital expenditure* (e.g. Maritan, 2001; Kotha and Nair, 1995; Litov, Moreton, and Zenger, 2009; Benner and Ranganathan, 2011). Although it is not possible to obtain data to break out firms’ capital investments to assess specifically what the investments are in, our reading of hundreds of pages of analysts’ reports shows that firms from both of the industries in this study were increasing capital investments in order to participate in the new “triple-play” market, and VoIP

⁷ This was determined from both the description of the Lipper classification for the mutual fund and the more detailed fund objective field from CRSP/Reuters.

⁸ For the small proportion of funds that did not fit into this coding scheme (e.g. Global Science and Technology funds, specialty funds etc.), we assigned a value based on our assessment of the fund objective.

was an area of new investment that analysts were aware of for all the firms. Specifically, it is likely that any increases in capital expenditures, beyond the ongoing run rate, is undertaken to address the new technology. In addition, the firms' capital investments occur during technological convergence, so it is reasonable to consider these expenditures, at least in part, constituting firms' responses to the new technology. We predict a negative coefficient on the interaction term.

Control variables

We control for inter-industry differences that might influence our dependent variables beyond the mechanisms we hypothesize, by including an *Industry dummy* variable, which we set equal to 1 for all firms in the cable industry and equal to 0 for all firms in the wireline telecom industry (in our models with fixed effects controls, discussed below, this variable drops out since a firm's industry is a stable firm characteristic and not time-varying). We control for both a firm's stock market performance and its accounting performance in the previous period using *Return on assets* and *Share price*. We also control for a firm's financial resources (leverage) using a measure of *Debt ratio* (cf. Miller and Bromiley, 1990). We use the log of the firm's *Assets* to control for firm size. A firm's asset base is a measure of its diversification which may be an indicator of future firm performance and thus correlated with our dependent variables (Berger and Ofek, 1995). We use measures of *Cumulative patent count* and *Cumulative patent forward citation count* as measures of a firm's technological capabilities and technological knowledge (e.g. Ahuja and Katila, 2001; Stuart and Podolny, 1996). By controlling explicitly for firms' technological capabilities, we address a concern that our dependent variables may reflect differences in the technological potential of firm, as firms often "know more than they make" (Brusoni, Prencipe, & Pavitt, 2001).⁹

Method

Our research design is at the level of firm-quarter. We have an unbalanced panel as one firm (Time Warner) enters the panel only in 2002 (this is the year when analysts start covering it), and two other firms (Bell South and SBS) merge with AT&T in 2006-2007. To alleviate simultaneity and reverse causality concerns, we lag all explanatory and control variables by one time period in each of our regression models.

⁹ We used the two relevant technological categories – Computers and Communications, Electrical and Electronics to filter the patents. We use HJT(2005)'s approach to depreciate the forward citation flows and the patent counts.

We estimate the coefficients in STATA using Generalized Least Squares (the *xtreg* command). For each hypothesis, we obtain the estimates by first assuming that the unobserved firm effects are randomly distributed (random-effects models) and then test the robustness of our results to within-firm changes by changing to a firm fixed effects assumption. As we discuss below, our results are robust to both specifications.

RESULTS

We first conduct a t-test comparing *Mean analyst recommendation* and *Investor profile* between cable and telecom firms. As shown in Table 4, we find a significant difference between the analyst recommendations for telecom firms and cable firms, with the cable firms receiving more positive (lower in value) analyst recommendations by 0.34 (a difference of about 9%). There is also a significant difference in the investor profile of the telecom firms and cable firms at the beginning of the convergence period – by this measure, the cable firms are owned by more growth-oriented investors than the telecom firms by 0.77 (a difference of about 20%). This initial test provides preliminary support for Hypothesis 1 and for our insights from the analyst report texts about the divergence in analysts' reactions for firms in the two different industries.

Table 5 shows the results of our regression models to test Hypothesis 1 and Hypothesis 2. Models 1-4 are random effects models and Models 5-8 are firm fixed effects models. Models 1 and 5 are controls-only models and in Models 2 and 6, we add the *Investor profile* variable. The coefficient for this variable is negative and highly significant in both random and fixed effects models, thus supporting our argument in hypothesis 1 that firms that were owned by more growth-oriented investors received more favorable ratings from analysts during convergence. An increase of one unit in the investor profile is associated with approximately a one standard deviation improvement in analyst ratings. In Models 3 and 7 we add the interaction term *Investor profile X (log) Capital expenditure*. The coefficient for this term is also negative and highly significant in both random and fixed effects models providing strong support for hypothesis 2 that firms owned by more growth-oriented investors received higher analyst ratings when they increased their strategic investments during convergence. Models 4 and 8 are identical to Models 3 and 7 except that we

exclude the patent variables to increase the number of observations. Hypotheses 1 and 2 continue to be strongly supported in these models.

DISCUSSION

We study the nature of the pressures firms face from external stakeholders during a period of industry convergence. We assess security analysts' divergent reactions to established firms entering a new technological domain from different categories that closely align with prior industry. Our study explores these dynamics during the period of convergence between the wireline telecom and cable industries, as firms from both industries offered similar product bundles facilitated by VoIP technology. In our analyses of analysts' recommendations, we use a novel measure of investors' beliefs - the investment objectives of mutual funds investing in a firm, i.e. whether a firm's large institutional investors are more interested in 'growth' stocks or in 'margin' stocks, reflecting differences in how they assess firm value. By controlling for firm- and period-specific factors, we are able to attribute the persistent differences in reactions that we observe, at least in part, to the influences of these categories. We achieve consistent and robust results in spite of a small dataset that is restricted by our empirical context. At the beginning of the convergence period, investors in cable firms' stocks clearly had a greater 'growth' orientation and investors in telecom firms had a greater 'margins' orientation, as indicated by the objectives of the mutual funds investing in each stock. The divergence in reactions and high correlation of these reactions with prior industry, suggests that as incumbents responding to radical technological change, firms from the margins category (telecom) are disadvantaged compared to firms from the growth category (cable), although both firms follow similar strategies. These findings are further illustrated by text excerpts directly from the analysts' reports.

These findings have important implications. As the convergence unfolds, these reactions from analysts are likely to further differentially enable strategies of the growth category firms compared to margin category firms by influencing investor behavior as well as management attention and commitment, thus shaping and reinforcing path-dependent firm heterogeneity within the converged industry setting. The study results are also interesting in light of technological change research that focuses mainly on managerial awareness or changes in capabilities as the primary challenges for incumbent firms faced with technological

change. In our setting, both groups of firms have undertaken strategies and increased investments to respond to technological convergence, yet the reactions to these strategies are often negative to only one group of firms, and encourage that group to retreat and curtail efforts in the new technology. At the same time, there is greater attention and a more positive reaction from analysts toward the similar strategies pursued by the other group of established firms. It appears that one category of firms faced an additional layer of challenge. In our setting, by responding to the threats of competition facilitated by technological convergence, this set of firms triggers negative analyst and investor reactions, even though they face more negative financial consequences in the longer term if they fail to adapt.

Our study design and findings further suggest that the differences in analysts' levels of attention and reactions to the same bundled strategies arise from differences in investor audiences. The analysts covering cable firms' stocks, speaking to investors interested in long-term revenue growth, appear to focus more on the upside revenue potential associated with offering phone services in bundled strategies, despite the investments. In contrast, the analysts covering the telecom stocks, speaking to investor audiences focused on margins, attend more to the downside of current investments rather than the prospect of market opportunities. This explanation is consistent with prior research that has focused both on the role of analysts as mediators in equity markets (Zuckerman, 1999), and on the idea that analysts rationally focus on different strategies and actions depending on their prior beliefs about what firms and markets are attending to (Aghion and Stein, 2008).

We control for the risk of alternative explanations for our findings in several ways. First, we study two groups of firms entering the same market with similar strategies, thus controlling for the potential that different reactions arise from differences in perceptions of the overall potential of the new market or the wisdom of a bundled strategy generally. We also address the alternative explanation that divergent reactions arise from actual differences in firm capabilities or financial performance by controlling for these factors. We demonstrate that even after controlling for heterogeneity in capabilities and performance, differences in reactions persist and are significantly influenced by a firm's stock category and the associated expectations about how value is created. Further, our significant results with fixed effects specifications show that,

controlling for unobserved heterogeneity, these effects arise within-firm, with changes in that particular firm's investor profile. This provides stronger evidence that it is specifically the expectations associated with the particular stock category that influences analysts' reactions.

Evidence from the texts of the analysts' reports, and separately, texts of earnings conference calls (not shown here) suggest further that neither the cable firms' nor the telecom firms' VoIP-based offerings or bundles were profitable at the outset. Similarly, increased investments were required for both groups of firms to provide the bundled offerings that marked industry convergence. It is apparent in the texts, however, that analysts were focused on growth prospects for cable firms like Comcast and so were enthusiastic about the role of VoIP products in spurring additional revenue growth, despite these increased investments and the absence of profits. At the same time, Verizon's analysts were focused mainly on the magnitude of investments and the shorter-term effects on margins. This suggests, supporting the idea that categories play an important role (e.g. Zuckerman & Rao, 2004; Benner, 2007; Aghion & Stein, 2008), that it is the focus on different metrics and valuation models associated with different categories that makes the same strategies more legitimate for some firms than others.

Another question these findings might raise is whether the institutional investor behavior we hypothesize about and measure are in fact reflective of the broader stock market behavior. In a supplementary analysis, we conducted an event study to estimate abnormal stock market returns to measure aggregate investor reactions to strategy announcements of the two groups of firms during the convergence period. We include events such as announcements of prototypes and commercialization (roll-outs/launches) that are relevant to the firms' convergent strategies (outlined in Tables 1 and 2). We use a standard event study approach as outlined in McWilliams and Siegel (1997) that is based on estimating a market model for each firm-event and then calculating abnormal returns (difference between actual and expected returns) for these events.¹⁰ We estimate the abnormal returns using EVENTUS (see Arthaud-Day, Certo, and Dalton (2006) for an example of prior application of EVENTUS). We calculate abnormal returns for 17 telecom

¹⁰ We do not re-state the details of the mathematical approach used to estimate abnormal returns – this has been adequately discussed in prior research. See McWilliams and Siegel (1997) for an overview and criticisms of the event study technique. Also see Sood and Tellis (2008) for an event study in the context of technological innovation.

firm events and 18 cable firm events that were announced during the convergence period. We estimated these returns for each firm-event over four different time periods-1 day, 2 days, 3 days and 1 week. Table 6 shows the results of our event study. As the results indicate, investors reacted more positively to announcements of cable firms' strategies than to announcements of convergent strategies by telecom firms. The telecom firms experienced (on average) negative abnormal returns while the cable firms experienced positive abnormal returns. It is also important to note the *magnitude* of the difference between these groups of firms. For example, the telecom firms experienced an average abnormal return of -2.25% and the cable firms experienced an average abnormal return of +2.09% in the week following the announcement- a difference of 4.34%. The magnitude of this difference is considerable, considering that prior studies have generally found abnormal returns in the 0.5% range (Woolridge and Snow, 1990).

Finally, it appears that analysts' negative reactions were also not indicative of telecom firms' eventual prospects. Texts from analysts' reports included above show that despite the negative reactions early on, analysts later begin to see promise in Verizon's strategy. Recent developments also indicate that Verizon has presented a serious threat to Comcast through the ability to offer comparable bundles of services (Fernandez, 2007; Fung, 2007). Verizon and AT&T's capabilities in fact allow for a 'quadruple play' offering of phone services, Internet, video and wireless, which has spurred the need for additional responses by cable firms to compete successfully through entry into wireless telephone services (Crockett, 2007).

This study contributes to research at the intersection of strategy, organization theory, and technological change. We contribute to research on the challenge of technological change and the understudied role of external factors that could reinforce – and possibly even trigger – inertial incumbent tendencies documented in prior research. This work also contributes to research in organizational theory, by documenting the nature of pressures that arise in the context of adaptation to technological convergence, and the important role of cognitive categories that give rise to different pressures for firms. In addition, we also add to the growing stream of research on industry convergence and shed light on possible sources of firm heterogeneity. This study uncovers the potential for heterogeneity and path-dependence to be reinforced by stock market categories and analysts. This research also contributes to management practice. Managers'

challenges in responding to new opportunities in technologically convergent settings may extend beyond the already considerable challenge of overcoming inertia and developing new capabilities. These challenges may be exacerbated by the negative reactions of analysts and financial markets to the strategic changes and investments required to enter these markets, as well as by the simultaneous positive reactions that reward and legitimate the entry of competitors.

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TABLE 1 –Timeline of Telecom firms’ new products/services during the period of convergence

<u>Date</u>	<u>Firm</u>	<u>Event Description</u>
May 2003	Bellsouth, SBC, VZ	Announce common technical requirements for Fiber initiatives
Dec 2003	SBC	Announces alliance with Alcatel for Fiber initiative
Apr 2004	AT&T	Launches CallVantage VoIP offering
May 2004	Bellsouth	Rolls out IP Centrex VoIP service to business customers
Jun 2004	Bellsouth	Rolls out residential VoIP in Columbia, SC, FL
Jun 2004	Qwest	Launches OneFlex VoIP product business and consumer markets
Jul 2004	AT&T	CallVantage launch complete – expanded to more than 100 US markets
Jul 2004	Verizon	Launches Voicewing VoIP services to residential customers
Oct 2004	Verizon	Announces rollout plans for FiOS in northeastern US
Nov 2004	SBC	Announces launch of residential VoIP service for its DSL customers
Apr 2005	Verizon	Introduces FiOS broadband in trial markets
Sep 2005	Verizon	Rolls out Fiber Optic TV service as part of FiOS triple-play
Dec 2005	Bellsouth	Announces launch of consumer VoIP service in partnership with 8x8
Feb 2006	Qwest	Announces plans to bundle video with phone and internet products
Feb 2006	AT&T	Trials U-verse (Fiber based bundle) in Nevada

TABLE 2 – Timeline of Cable firms’ new products/services during the period of convergence

<u>Date</u>	<u>Firm</u>	<u>Event Description</u>
Early 2002	Time Warner	Announces Cable VoIP plans in conjunction with partners
May 2003	Cablevision	Trials residential VoIP product
Aug 2003	Time Warner	Tests ‘Digital Phone’ VoIP service
Nov 2003	Cablevision	Launches ‘Optimum Voice’ –residential VoIP product
May 2004	Comcast	Announces ‘Digital Voice’ residential VoIP product rollout for 2005/06
Jun 2004	Cablevision	Announces bundling of Internet and phone product
Aug 2004	Charter	Announces VoIP plans in conjunction with partners
Dec 2004	Cablevision	Announces expansion of VoIP service
Jan 2005	Comcast	First rollouts of Digital Voice
Feb 2005	Time Warner	Launches ‘TW Telecom One Solution’ VoIP service for businesses
Nov 2005	Charter	Announces cable web telephone
Apr 2006	Charter	Introduces VoIP service
Apr 2008	Time Warner	Expands video and phone bundle into California

TABLE 3: Correlation matrix

#	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1	Mean analyst recommendation	2.49	0.57	1								
2	Debt Ratio (t-1)	-0.61	34.37	-0.06	1							
3	(Log) Assets (t-1)	10.89	1.01	-0.29	0.05	1						
4	ROA (t-1)	-0.002	0.038	-0.17	-0.1	0.13	1					
5	Stock Price (t-1)	22.33	13.06	-0.59	0.02	0.44	0.28	1				
6	(Log) Capital Exp. (t-1)	6.74	0.96	-0.33	0.11	0.89	0.19	0.53	1			
7	Investor Profile (t-1)	3.79	0.31	-0.27	0.01	-0.29	-0.08	0.02	-0.34	1		
8	Time period	179.81	9.14	0.24	0.01	0.06	0.08	-0.11	-0.02	-0.34	1	
9	Initial Investor Profile (@t=0)	4.07	0.48	-0.09	-0.03	-0.44	-0.22	-0.38	-0.58	0.44	-0.05	1

TABLE 4: Difference of Means t-test between Telecom and cable firms for *Mean analyst recommendation* and *Investor profile*

<u>Variable</u>	<u>Telecom firms</u>	<u>Cable firms</u>	<u>Difference</u>	<u>Std Err</u>	<u>T-Test 't'</u>	<u>p-value</u>
Dependent Variable: Mean analyst recommendation	2.65	2.31	0.34	0.074	4.45	<.0001
Independent Variable: Investor profile	3.68	4.45	-0.77	0.062	-12.2	<.00001

Note:

- (1) Lower values of Mean Analyst Recommendation indicate more positive analyst recommendations
(2) Lower values for Investor Profile indicates a greater investor focus on margins vs. growth

TABLE 5: Divergence of analyst reactions. Panel data models (GLS) with random or fixed effects. Dependent variable is Mean Analyst Recommendation for firm 'i' in period 't'. (Note: Lower (higher) values of the dependent variable indicate more positive (negative) reactions)

VARIABLES	Random effects models				Firm fixed effects models			
	(1) Ctrls only	(2) H1	(3) H2	(4) w/o patents	(5) Ctrls only	(6) H1	(7) H2	(8) w/o patents
<i>Predictors</i>								
Investor Profile (t-1)		-0.2730** (0.1381)	-0.4806*** (0.1303)	-0.2927*** (0.1013)		-0.3626** (0.1458)	-0.6235*** (0.1519)	-0.3066*** (0.1103)
Investor Profile X (Log) Capital Exp.(t-1)			-0.6361*** (0.1204)	-0.4239*** (0.1014)			-0.6409*** (0.1616)	-0.4332*** (0.1145)
<i>Controls</i>								
(Log) Capital Exp. (t-1)	-0.0833 (0.0883)	-0.0816 (0.0872)	-0.1246 (0.0788)	-0.1500** (0.0727)	-0.2456** (0.0954)	-0.2454*** (0.0932)	-0.1761* (0.0892)	-0.2297*** (0.0828)
Industry control (1=cable,0=telco)	-0.6790*** (0.0824)	-0.5827*** (0.0949)	-0.5271*** (0.0860)	-0.6610*** (0.0628)	Drops out	Drops out	Drops out	Drops out
Debt Ratio (t-1)	-0.0004 (0.0006)	-0.0004 (0.0006)	0.0005 (0.0006)	0.0001 (0.0006)	-0.0000 (0.0006)	0.0001 (0.0006)	0.0009 (0.0006)	0.0004 (0.0005)
(Log) Assets (t-1)	-0.3676*** (0.0811)	-0.3727*** (0.0802)	-0.3394*** (0.0724)	-0.0922 (0.0562)	-0.1236 (0.1452)	-0.0595 (0.1442)	-0.1804 (0.1388)	-0.1591 (0.1169)
ROA (t-1)	-2.6513 (1.6440)	-2.8423* (1.6264)	-1.1417 (1.4978)	-1.2999 (1.1111)	-0.5107 (1.6592)	-0.2798 (1.6241)	0.6382 (1.5418)	0.0833 (1.1367)
Stock Price (t-1)	-0.0048 (0.0043)	-0.0050 (0.0043)	-0.0087** (0.0039)	-0.0174*** (0.0020)	-0.0215*** (0.0080)	-0.0153* (0.0082)	-0.0082 (0.0079)	-0.0073* (0.0041)
Patent count (t-1)	-0.0005 (0.0003)	-0.0005 (0.0003)	-0.0003 (0.0003)		-0.0010 (0.0012)	-0.0010 (0.0011)	0.0005 (0.0011)	
Patent citation count (t-1)	0.0000** (0.0000)	0.0000** (0.0000)	0.0000 (0.0000)		0.0000 (0.0000)	0.0000 (0.0000)	-0.0000 (0.0000)	
Constant	7.6892*** (0.7169)	8.7455*** (0.8870)	9.4155*** (0.8077)	6.2739*** (0.4768)	6.2631*** (1.3727)	6.7913*** (1.3582)	8.2973*** (1.3300)	7.0896*** (1.0098)
Period effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	147	147	147	203	147	147	147	203
R-Square	0.850	0.855	0.884	0.820	0.802	0.813	0.837	0.768
Chi-square (re) or F-Statistic (fe)	653.7	674.2	861.4	760.9	14.90	15.29	17.31	15.61

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

TABLE 6 – Results of Event study measuring abnormal stock market returns for announcements related to firms’ convergent strategies

Days over which Abnormal returns were calculated	Number of Events	Average market adjusted abnormal returns (equally weighted market index)		Significance tests	
		Mean Cumulative Abnormal Return (CAAR)	Precision weighted CAAR	Patell 'Z' test (Z-Value)	Generalized Sign 'Z' test (Z-value)
<i>Telecom Firms</i>					
1 day (-1,0)	17	-0.56%	-0.63%	-1.595*	-1.004
2 days (-1,+1)	17	-0.48%	-0.57%	-1.174	-1.489*
3 days (-1,+2)	17	-0.80%	-0.88%	-1.572*	-1.975**
1 week (-1,+7)	17	-2.13%	-2.25%	-2.686***	-1.489*
<i>Cable firms</i>					
1 day (-1,0)	18	1.25%	2.12%	2.576***	1.354*
2 days (-1,+1)	18	0.98%	1.72%	1.705**	1.354*
3 days (-1,+2)	18	1.21%	1.76%	1.514*	1.354*
1 week (-1,+7)	18	1.26%	2.09%	1.198	1.828*

The symbols *, **, and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels
 Abnormal market returns and significance tests calculated using EVENTUS