The impact of media on the legitimacy of new market categories: The case of broadband internet

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ABSTRACT

Building on research in institutional theory and market categories, we argue that media coverage, through the effects of cognitive and sociopolitical legitimacy, influence the creation of new market categories. Using data on the broadband access industry, we develop and test a media coverage model of market category entries, demonstrating the legitimacy effects of media-based information exchange on the emergence of new market categories. We include two post hoc analyses on mediation effects to test the relationship between population density and media coverage. These results indicate a possible mediation relationship, which we discuss in the implications of our study.

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"And it ought to be remembered that there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things." —Machiavelli's *The Prince*

1. Executive summary

Building on research in institutional theory and market categories, we argue that media coverage influences the creation of new market categories. This study follows a growing research stream in entrepreneurship that focuses on examining the collective process in which new industries and forms of business are created. A key concern within this research stream is how the legitimacy of such collective activity emerges, where new products and services, business practices, and organizational forms become seen as appropriate and valuable. We argue that the legitimacy of new market categories develops through information exchange among market participants, evident through media coverage of those market categories. As information is shared among various market participants, they become aware of new ways of conducting business, types of organizations and business opportunities involved in the new market category, and governmental and regulatory interests at stake. Our findings indicate that media-based legitimacy

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effects exert a stronger influence on the creation of new market categories compared to the effects suggested by prior theorizing following a population ecology approach. Moreover, this study also provides an opportunity to examine a wider variety of effects on the process of new market emergence.

2. Introduction

In the past, entrepreneurship research has traditionally focused on the attributes of individual entrepreneurs (e.g., Baum and Locke, 2004; Carland et al., 1988; Gartner, 1988; Woo et al., 1991) and their propensity to found new companies (e.g., Baum et al., 2001; Bhave, 1994; Birley and Westhead, 1994; Gartner, 1985). Later research has turned to look at the cognitive and information processing capabilities that entrepreneurs show when making decisions (e.g., Ardichvili et al., 2003; Baron, 1998; Busenitz and Lau, 1996; Hmieleski and Baron, 2009; Mitchell et al., 2002). In addition, there has been considerable research done on the environmental conditions that influence both venture creation and venture failure (e.g., Freeman et al., 1983; Hunt and Aldrich, 1998; Stinchcombe, 1965; Thornton, 1999). Within this research stream, many studies have examined the influence of contextual variables on venture creation. An implicit assumption within these studies is that entrepreneurial activity will arise whenever conditions are "right" (c.f., Schoonhoven and Romanelli, 2001). Therefore, several scholars have taken the perspective that entrepreneurial activity lies at the "nexus of opportunity and individual differences" (Alvarez and Busenitz, 2001; Eckhardt and Shane, 2003; Shane, 2000, 2003; Venkataraman, 1997:123).

In contrast, a less common research stream has a broader conception of collective activity as the principal driving force in processes of venture creation and especially industry creation (e.g., Forbes and Kirsch, 2011; Kennedy, 2008; Mezias and Kuperman, 2000; Rao, 2004; Van de Ven, 1993; Van de Ven and Garud, 1989). Scholars within this research tradition recognize that entrepreneurship can be seen as a collective process that requires effort and coordination of several actors. Researchers are focusing on understanding these market-creating activities of collectivities (e.g., Schoonhoven and Romanelli, 2001). Examples of this research stream include the study of community dynamics in the birth of a new industry (Mezias and Kuperman, 2000), collective claim making in order to gain legitimacy in the early periods of the automobile industry (Rao, 2004), personal networks on the acceptance of a revolutionary new product (Granovetter and McGuire, 1998), and media coverage on impressions of key stakeholders (Kennedy, 2008; Pollock and Rindova, 2003), among other studies. In this study, we contribute to this line of research by examining the effects of industry discourse evident through media coverage in the creation of the broadband internet industry.

These studies concentrate on entrepreneurial opportunities that are located at the collective level (i.e., new industries). As Forbes and Kirsch (2011: 590) recently argued, "the emergence of new industry is an important phenomenon that remains relatively neglected by researchers". Van de Ven (1993) observed that seldom can an industry be developed by single firms alone in a vacuum of a community or social context (Van de Ven, 1993). Emerging industries then present a variety of challenges to participants (i.e., sellers, regulatory agencies, suppliers, customers, media organizations, etc.) that do not appear in more mature ones—new forms of organizational activity do not fit neatly into existing categories of acceptable business practices, patterns of seemingly appropriate behavior have yet to appear, and regulatory structures have not developed (Aldrich and Fiol, 1994; Kennedy, 2008). Consequently, the achievement of legitimacy can be particularly challenging for new ventures operating in new market categories—at the creation of an industry, when there are few firms and strategies and practices are still developing (e.g., Navis and Glynn, 2010).

In order to better understand the creation of new market categories, a clearer understanding of how legitimacy arises during the earliest moments of industry formation must be achieved. In this regard, recent studies have started to examine the role that field level processes such as social movements (Rao et al., 2000), demonstration events and performance measures (Rao, 1994, 2004), and ceremony rituals (Anand and Watson, 2004) play in the legitimation processes of new organizational forms and/or field formation. In this tradition, scholars are also looking at the role of media in market formation (Kennedy, 2008; Pollock et al., 2008). Scholars recognize that for newly emergent categories, legitimacy might require structural means that reach different audiences and in this way creates and recreates levels of appropriateness of these new organizational forms.

The purpose of this study is thus to examine how different dimensions of legitimacy are created by the use of media and how these different dimensions will influence the creation of new market categories. Moreover, in our analysis, we find that level of density and media coverage types interact in ways not shown by previous research. This study therefore contributes to a better understanding of industry emergence and the role of media in market creation. To do so, we use the broadband access internet companies, as an example of a new market category for a number of reasons. First, the rise of the personal computer industry in the late 1970s and early 1980s, and the subsequent emergence from the 1990s onward of related technologies involving the Internet fueled waves of new types of business centered on telecommunications and information systems. The industry then arose at the intersection of a number of different actors and interests. Second, financial markets and governmental regulators struggled in evaluating these new industries. Third, the legitimacy of the industry would be influenced by a competition over the utility of broadband in a variety of different applications (e.g., high-speed access to Internet, enhanced video services, new telephone functions, or other yet-to-be developed applications). The legitimacy of the new industry would ultimately be shaped by the interaction of this diverse set of influences. Operating over all these interactions, mass media act as an important industry-structuring mechanism that conveys information that builds awareness of and affects the acceptance of the new industry while also shaping its future development.

3. Theory and hypotheses

3.1. Market categories

Categories exist whenever two or more apparent events or objects are treated equally (Mervis and Rosch, 1981). In this research we particularly focus on market categories, which have been defined in more than one way. For instance, Rosa et al. (1999) define product markets as socially constructed knowledge structures (i.e., product conceptual systems). On the other hand, based on White's (2002) work, Kennedy (2008) defines market categories as those cognitive structures that people use in a market to guide social comparison of different products and services. In this article we follow a more recent definition provided by Navis and Glynn (2010: 440): "A new market category exists when two or more products or services are perceived to be of the same type or close substitutes for each other in satisfying market demand; the organizations producing or supplying these related products or services are grouped together as members of the same market category". We believe that this is a concise and clear definition that includes different pieces of the big puzzle such as products or services, substitutes, and producers.

Scholars have researched the importance of categories in a wide spectrum of disciplines: art (DiMaggio, 1987), mutual funds (Lounsbury and Rao, 2004), automobile industries (Rosa et al., 1999), and wine (Zhao, 2005). Researchers in organizational theory acknowledged the importance of sociocognitive categories when shaping human and organizational behaviors at industry level phenomena (e.g., Fligstein, 2001; White, 2002). The main arguments are as follows: market categories define social and symbolic boundaries among different types of products or services in an industry (Lamont and Molnar, 2002), which helps establish collective identities for products within the category and inclusion or exclusion rules of its constituent members (Mervis and Rosch, 1981). Market categories then allow actors to interpret complex relationships and interactions about products and services more easily (Khaire and Wadhwani, 2010). They are decisive in the process of comparison among different products or services within a category because they shape expectations about what should be included and what should not. Research on market categories evolved from a focus on their effects on the market and on market actors (i.e., consumers' perceptions) and to a better understanding of the emergence and construction of new categories (Kennedy, 2008; Khaire and Wadhwani, 2010; Navis and Glynn, 2010), which is a relevant yet rather unknown entrepreneurial phenomenon (c.f., Forbes and Kirsch, 2011). Much of the recent interest in the study of categories stems from dissatisfaction with traditional sociological approaches to the notion of form (Hannan et al., 2007), dissatisfaction that comes partially from the belief that forms can be assessed in purely objective terms with well-defined boundary conditions (Hsu et al., 2011).

The study of new market categories posits theoretical puzzles for researchers in entrepreneurship in the following sense. At the core of traditional research on entrepreneurship is the idea that this field is related to the study of novelty (e.g., Davidsson and Wiklund, 2001; Drucker, 1985; Jennings et al., 2009; Schumpeter, 1934; Shane and Venkataraman, 2000). However, for market categories to count, a certain number of organizations need to be grouped under the umbrella of a common category, which suggests that the new aspects of these organizations need to be accepted and embraced by a certain portion of the population (Kennedy, 2008). This complex relationship has been exposed in some of the current research on the creation of market categories. For instance, scholars are witnessing an increasing body of literature that indicates that these categories are the outcome of control struggles of different actors in a market over meanings and value criteria (c.f., Khaire and Wadhwani, 2010). Organizations engage in struggles over controlling the category because an organization that succeeds will gain recognition among consumers, competitors, and suppliers as well as gain power over the market (King and Pearce, 2010; Lounsbury and Rao, 2004; Santos and Eisenhardt, 2009).

Following a social construction approach, the role of language and processes of legitimation of the new categories are particularly salient (Kennedy, 2008; Khaire and Wadhwani, 2010; Lounsbury and Rao, 2004; Navis and Glynn, 2010). For instance, these studies have shown the relevance of industry media in the legitimation of these categories emphasizing that processes of legitimation are complex social process involving individual and collective interests (Navis and Glynn, 2010). It has been shown that organizations in a new category benefit from inviting coverage that makes moderate (i.e., not too few, not too many) links to other firms in the category (Kennedy, 2008). Moreover, in a study on mutual funds, Lounsbury and Rao (2004) showed how product categories get reconstituted and how they are shaped by relationships between industry media and producers.

Yet researchers have neither fully examined how industry media influences different types of legitimacy nor the process by which media and density (i.e., number of producers within a category) are related to the establishment of a new market category. Some researchers (c.f., Lounsbury and Rao, 2004) have explored how incumbent firms in a product category replicate it by lobbying field level organizations such as media to preserve the boundaries that benefit these already established firms. Moreover, although scholars have shown that media might trigger shared understandings of categorical identity (e.g., Kennedy, 2008; Navis and Glynn, 2010), much less is known about different messages in the information and their effects on category legitimacy. In this article, we address the lack of understanding of the relationships between media, legitimacy, and new market category with an examination of the relationship of industry and regulatory media coverage, and early entry in the new market category of broadband internet access.

3.2. Cognitive and sociopolitical legitimacy effects of media coverage of new market categories

It is common in organizational research to distinguish between legitimacy stemming from taken-for-grantedness versus legitimacy arising from normative approval, relational support, and regulatory or political evaluation (Scott, 1995: 35–47). The impact of legitimacy has been described as coming from a basic recognition or acceptance of an organizational form or behavior (Berger and Luckmann, 1966; Meyer and Rowan, 1977; Zucker, 1989), the perceived value of the form to organizational members and the community (Selznick, 1949, 1957; Zald and Denton, 1963), and the approval and sanction of other social entities (DiMaggio and

Powell, 1983; Meyer and Scott, 1983). Recognizing the multitudinous ways in which legitimacy has been conceptualized, Suchman offered an inclusive definition of legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (1995: 574).

These images of legitimacy illustrate both *cognitive* and *sociopolitical* dimensions of the legitimation process (Aldrich, 1999; Aldrich and Fiol, 1994). The quality of "taken-for-grantedness" is the key description of cognitive legitimacy, and Aldrich noted that at its highest level "a new product, process, or service is accepted as part of the sociocultural and organizational landscape" (1999: 230). Sociopolitical legitimacy reflects the attainment of acceptance by critical environmental entities or conformity to socially constructed standards of behavior or legally established codes of conduct. The cognitive dimension of legitimacy achieves its authority by its unquestioned character in the minds of individuals, while the sociopolitical dimension depends largely on the influence of shared values and norms in creating and sustaining stable patterns of organizational activity.

3.2.1. Media coverage model of legitimacy effects

Aldrich and Fiol (1994: 648) noted that legitimacy could be assessed "by measuring the level of public knowledge about a new activity" or "by assessing public acceptance of an industry". Baum and Powell called attention to the analysis of information exchange and communication content as an established method which achieves the need for a historical scope and a means for measuring legitimacy separately from density (1995: 530–531). They note that detailed media coverage exists on a wide range of industries, and cite a number of references where content analysis has been used to study the context of social action. In Abrahamson's (1991, 1996) work on the dissemination of "management fashions", he observed that the mass media served as a point of diffusion for managerial ideas between both "fashion setters" and "fashion users", and thus played a role in promoting actual managerial practices. For many individuals and organizations, the mass media serves as an important source of information about events and issues going on about them in the environment, a process which then goes beyond being informative to affecting long-term changes in beliefs and attitudes (Alper and Leidy, 1969).

In general terms, scholars in mass media communication study the content of mass media, its production and delivery to audiences by media organizations, and the effects on audiences (Ball-Rokeach and Cantor, 1986; Gans, 1979; Shoemaker and Reese, 1991; Smith, 1995). It is suggested that media organizations act not only as mechanisms to advertise and mirror reality but also as active agents shaping reality through feature articles and editorials (Fombrun and Shanley, 1990). The mass media is in effect an arena through which various actors express their interests (Hilgartner and Bosk, 1988; McCombs and Shaw, 1972). Actors use the mass media as a tool to advance their own agendas, direct attention to issues, and present and define situations in ways that suit them best. For instance, various groups can use the mass media to generate awareness of and promote their own vision of the best organizational forms and practices (Abrahamson, 1991); the media serves as means by which groups can stake out their own claims to legitimacy (Coombs, 1992). Moreover, it has been shown that mass media not only provide information about important aspects of the environment, but it also influences individuals' beliefs, attitudes, and behaviors towards a particular content (e.g., Ball-Rokeach et al., 1984). One of the explanations for this influence is that media outlets broadcast information from mainstream politicians, academics, artists, and journalists; that is, actors with recognized experience and authority (McCombs, 1992). In Pollock's and Rindova's study of the effect of mass media-based information exchange on IPO performance, they explained that "in performing its functions of informing, highlighting, and framing, the media presents market participants with information that affects impression formation and the legitimation of firms" (2003: 632).

Among content analysis researchers, the mass media and the business press are routinely seen as means in which organizational communities create, share, and perpetuate shared conceptions of facts and meanings regarding social action (Gerbner, 1979: 123), social processes clearly tied to the generation of cognitive and sociopolitical legitimacy. The analysis of public media coverage of an industry should also be an effective way of measuring the legitimacy of different market categories and strategies since it is central in both disseminating knowledge about new organizational practices and in influencing the behaviors of individual actors like potential investors or entrepreneurs, and should therefore be critical in the establishment of taken-for-grantedness (Deephouse and Suchman, 2008).

3.2.2. General media coverage

As participants increase their exposure to developments in the industry through an increasing volume of media coverage, they become aware of the opportunities available and the industry becomes increasingly taken-for-granted and legitimate in their minds. This motivates the founding of new organizations or the expansion of existing ones to take advantage of those opportunities; these activities contribute further to the process as they are reported upon and discussed in the news media (Kennedy, 2008). The argument here is that as the overall level of public discourse increases about particular companies that offer similar services, through the arena of the mass media, a market category will gradually become seen as a natural part of the environment and the strategies and organizational forms associated with that market category will become increasingly taken-for-granted, and as a consequence the number of entrants into the category should also increase:

Hypothesis 1. The volume of general media coverage of an industry positively affects entry rates of companies within a new market category.

3.2.3. Positive and negative evaluations in media coverage

Sociopolitical legitimacy depends on acceptance and approval of an organization or its activities from elements in the environment. The organization gains legitimacy when it makes a contribution to stakeholders based on criteria rooted in the system

of values and beliefs operating in the environment (DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Rowan, 1982; Scott and Meyer, 1983). Those endorsing judgments can center on a number of organizational factors. Organizations are evaluated on the social and economic merit of their domain of activity, the consequences of their actions, as well as the methods and procedures used in producing those outcomes (Bitektine, 2011; Dowling and Pfeffer, 1975; Suchman, 1995). For instance, organizational activities are legitimate to the extent that they produce results that are consistent with socially constructed notions of worthiness (e.g., high economic or ethical value), and by the degree to which the processes used are considered useful (e.g., scientific or rational). Acceptance can stem from the degree in which practices conform to widely held expectations regarding organizational activity, ethical standards, or legal regulations. It is also necessary in many instances for industries to be seen as having new and untapped opportunities for growth from emerging markets or from the application of a technological breakthrough in its products, services, or operations.

Pollock and Rindova noted that "the information the media provide about a firm may affect the processes of impression formation and legitimation not only through the volume of the information, but also through its tenor, or its framing as positive or negative" (2003: 634). Indications in the media of public interest in investing in the area, corporate interest in developing new products or in building relationships with other firms that are already in the market, and the availability of venture capital should have a positive impact on founding and entry rates into the population. On the other hand, media coverage of the possibility or actuality of bankruptcy or other modes of failure in the market, or of an overall downturn in the prospects of the industry, should negatively affect entry rates.

Hypothesis 2a. The volume of positive industry evaluations in media coverage of an industry positively affects entry rates of companies within a new market category.

Hypothesis 2b. The volume of negative industry evaluations in media coverage of an industry negatively affects the entry rates of companies within a new market category.

3.2.4. Coverage of governmental and regulatory interests

Governmental or other regulatory interests influence organizations by constraining or releasing resource flows to them, monitoring and licensing their activities, and altering competitive relationships in organizational populations (Baum, 1996: 95-96). Because of their powerful influence on organizational forms and practices, these factors are frequently included in research studies. For instance, Hannan and Freeman's (1987, 1988) work on labor unions examined the effect certain laws had during different historical periods on founding and failure rates. Edelman (1990, 1992) studied the influence the legal environment had on the diffusion of due process practices and equal employment opportunity structures in organizations. Singh et al. (1991) looked at the influence of different laws on the founding and failure of nonprofit charitable organizations in the city of Toronto. Beyond the effects of laws during particular time periods, researchers have examined other sociopolitical influences on organizational populations. In the study conducted by Singh et al. (1991), the further effects of organizational certification by regulatory entities were also analyzed. Baum and Oliver (1992) found that the relationships between licensed day care facilities and government and community agencies influenced founding rates.

Although the approach in many studies is to look at time period effects stemming from regulatory entities, the interest here is on how knowledge of governmental involvement and current (or potential) regulation influences legitimacy, and subsequently the entry rate into new market categories. For instance, in addition to the passage of laws, governmental interest alone might influence founding rates of companies within an emergent market category by drawing attention to or pressure on organizations. In the case of the online music sharing service Napster in the late 1990s, at the height of the controversy about the legality of the service and how it should be regulated it continued to attract large numbers of members. Furthermore, looking at time periods when laws take effect may not capture all the legal and regulatory factors at work in the sociopolitical environment; much of the impact on online music services such as Napster seemed to come not from new laws but from the reinterpretation of old ones and legal actions taken in the court system (Electronic Advertising and Marketplace Report, 2000; Schlesinger, 2000).

Government and regulatory interests can support a new market category as well as limit or restrain it. For instance, the research cited earlier on Toronto nonprofit organizations reported that during the early 1970s regulatory activities fostered the emergence of new organizations, but regulatory actions later that decade reversed those effects (Singh et al., 1991; Tucker et al., 1988). In situations where a new industry or market category is emerging, governmental attention can positively influence legitimacy and organizational density, since such actions give approval and stature to the emergent industry as well as signal the government's willingness to support it (Aldrich, 1999: 230). For instance, Budros (1994) found that the passage of a crucial piece of legislation provided legitimacy to the fledgling New York state life insurance industry and positively affected organizational entries. In the field of Internet commerce, governmental agencies and legislative activity in the United States predominately served to facilitate online commercial activity, and thus have been positive influences on the development of broadband access. Laws such as the National Communications Competition and Information Infrastructure Act and the Internet Tax Freedom Act serve to promote business on and access to the Internet. The Telecommunications Act of 1996 was designed largely to spur the provision of broadband access (and other telecommunications services) by allowing new entrants to come into local markets dominated by incumbent monopolies. Government can also generate legitimacy of a new market category by simply focusing public attention on it. This happened with the Clinton Administration's National Information Infrastructure initiative, popularized by Vice President Al Gore as the "information superhighway", which brought attention to the potential of information systems and widespread Internet access (Broad, 1992; Moschovitis et al., 1999). Despite this, it must be recognized that in other contexts,

political and regulatory interests might serve to restrict or slow down the development of emergent market categories. With this restriction in mind, the expectation is that in the broadband access industry:

Hypothesis 2c. The volume of media coverage of governmental interest positively affects entry rates of companies within a new market category.

4. Data and method

The rise of e-commerce and Internet business provides a historically convenient and interesting case in which to study the process of industry emergence and legitimation. While the Internet access industry itself consists of many different elements, some of which are clearly still emerging in the marketplace, the focus of this study is the introduction and legitimacy of organizations providing services associated with high speed, broadband Internet access between 1993 and the first quarter of 2000.

4.1. Cable and DSL broadband technologies

A preliminary examination of accounts of the industry in the business and trade press, a review of public utility commission publications on the broadband industry, and informal discussions with trade association and public utility commission staff members revealed that two technologies were the dominant forms of broadband access to consumers: *cable* and *digital subscriber line* (*DSL*) access. Both cable access and DSL were frequently considered together in discussions of broadband, both had similar technological roots, both appealed to the same customer groups by providing essentially identical services, and broadband access providers often saw each other as competitors regardless of any technological differences. Broadband cable access is a technology that produces a very high-speed Internet connection over the coaxial and fiber optic cable infrastructure used to deliver cable television. Digital subscriber line is a high-speed access method that extends the technology in traditional telephone lines and hardware. DSL allows the simultaneous use of both Internet access and normal telephone services while additionally providing up to fifty times faster data transfer rates.

This research setting is appropriate for a study on the emergence of legitimacy and the creation of new market categories for a number of reasons. The industry represented a convergence of a number of competing interests concerned with defining the appropriate forms of organization and business, types of services, and codes of conduct among participants. It had significant support from large, well-funded corporations, such as AOL Time Warner, AT&T, SBC Communications, and Verizon, with significant interests in building telecommunications infrastructure and establishing their dominance in the industry. Moving into broadband significantly redefined their traditional character by allowing expansion into totally new domains of activity, but also exposed them to new competition in areas where they had little experience. In addition to these companies, a variety of new forms of organization emerged – typified by examples such as Covad Communications and Rhythms NetConnections – dedicated solely to developing and taking advantage of new broadband technologies. Moreover, the industry received a tremendous amount of attention from regulatory entities interested in controlling the deployment of new broadband services, and who felt empowered by their authority over older telecommunications forms. Added to this situation was the relative newness of broadband and lack of awareness by businesses and consumers; industry participants promoted broadband in a number of ways, and intended the technology to provide a variety of new applications, such as high-speed access to the Internet, enhanced video services, and new telephone functionality, the value of which was often not obvious or even available in a mature form to end users.

4.2. Sample selection

The provision of broadband services is based on the development of an organization and infrastructure at the local level; even for firms that are national or global in scope, broadband activities are operated at the city, or even the neighborhood, level (Dempsey et al., 1998). Likewise, broadband competition is also localized; because of the need for close proximity between broadband operations and customers, service providers in one metropolitan area do not compete with service providers in another. Furthermore, the localized nature of broadband access creates a situation where economies of scale accrue to firms that can access the most number of customers within the geographic reach of their network facilities. Any research sample chosen must account for effects on founding and entry rates produced by the diffusion of broadband into different residential population levels. Therefore, this study covered the population of broadband providers in the six largest cities in Texas – Austin, El Paso, Dallas, Fort Worth, Houston, and San Antonio – allowing for the observation of industry activities in a typical set of large metropolitan areas, and avoiding extreme differences in urban population density as an important factor. Restricting the choice of cities to one state also has the benefit of controlling for potential differences between state-level regulatory regimes.

With respect to the time frame for the study, the assumption used was that the beginning of the residential-level Internet access industry began in 1993 when the graphical Internet browser Mosaic was developed by the National Center for Supercomputing Applications (Moschovitis et al., 1999). This application resulted in popular interest in the Internet and its information interface known as the World Wide Web, and motivated firms to provide access to those information services. The resulting sample for this study covered all the high-speed broadband provider entries, measured in monthly time intervals between January 1993 and April

2000, in the six largest cities in the state of Texas, yielding a total of 528 observations (88 monthly periods×6 cities). To control for dependency issues among years, lagged independent variables were used resulting in the loss of one time period of data.

4.3. Entry rates of companies within a new market category

The *entry rate* for each city is defined here by the number of new broadband provider entrants (offering either broadband cable or DSL access) that occurred in each city in a particular month. Since no single source exists documenting the number of broadband competitors in the population, a number of sources were used to determine the history of entries and exits in the industry. The first task in this data collection effort involved generating a list of broadband service providers in the state of Texas, drawing on various regulatory (e.g., National Telecommunications and Information Administration and the Rural Utilities Service, 2000; Public Utility Commission of Texas, 2001), trade (CED Magazine, 2001), and online and print news sources. After creating this list, a comprehensive search of news sources and company information on each provider produced a record of the times and locations of entries and exits in each of the six Texas cities studied.[3]

The procedure employed in this study identified a total of 55 entries across the six cities, by 17 companies providing broadband cable or DSL service during the period between January 1993 and April 2000. During the period of this study, no firms ceased operations in any of the cities studied; subsequent analysis found market exits began in late 2000. Right-censoring in the data set was evident; organizational exits and failures had simply not occurred within the historical period of the study. However, this poses few problems for this study since left-censoring is typically viewed as the most critical concern, and studies are often designed to gather data on the earliest historical periods possible in organizational populations (Carroll and Hannan, 2000). The focus on the earliest period in the history of the industry is actually beneficial to the study, since the objective is to examine the impact of legitimacy on the creation of new market categories. While the data is right-censored, it does not exhibit left-censoring because the time period studied begins years before the first entry activity. The first entrant began service in May 1996 in Houston. However, much of the entry activity started in late 1998 and continued through early 2000.

4.4. Media coverage variables

4.4.1. Data sources for media coverage variables

The media coverage variables were generated using well established content analysis techniques (Krippendorff, 1980; Riffe et al., 1998; Weber, 1990). In measuring legitimacy, the concern in identifying the appropriate content to analyze is dependent on the ability to access information about the taken-for-granted character of organizational activities and the evaluation and approval of those activities by interested social actors (e.g., entrepreneurs, investors, regulators, etc.). The content used should thus be a form of media that extensively reports on industry issues and that interested participants access for important information on the industry as well as attempt to influence. The *ABI/Inform* database provided a good source of content for analysis in this study, since it contained an extensive index to articles in all areas of business and management as well as access to their full citations and abstracts. The *ABI/Inform* database covered over 1,800 professional journals and trade publications allowing collection of data from many different sources over the history of the industry as well as providing easy to use search tools which facilitated access to the information. The disadvantage of using *ABI/Inform* was that it only provided comprehensive access to article abstracts rather than the full text of the articles, although the presence of most of an article's key points in an abstract lessened this problem.

As a starting point in the content analysis, a combination of search terms was chosen to identify published articles on the subject of broadband cable and DSL access technologies. A separate search was then conducted using the chosen keywords for each month in the period from January 1993 to April 2000, generating a list of articles appearing in the database each month on broadband access topics. Finally, in each month every fourth article abstract was selected from the list of articles starting from a randomly chosen point, producing a 25% sample of article abstracts for subsequent analysis. This procedure compensates for variation in the number of articles published in each month, while producing a random sample from the total population of content (Budd et al., 1967; Krippendorff, 1980; Riffe et al., 1998). This procedure produced a total of 1407 article abstracts for further analysis.

Following the guidelines set out by Riffe et al. (1998), a content analysis procedure was formalized in a content coding protocol. The protocol listed all the categories used in the analysis and specified how the coder was to assess the content in each article abstract. The protocol required the coder to assess each article abstract in each month and classify them into different content categories identifying the types of technologies described in the article (broadband cable, DSL, some other technology, or not about broadband), whether the article described the industry and the opportunities for expansion or growth positively or negatively, and if the article described regulatory interest in broadband. A test of inter-rater reliability produced no less than 88% agreement between coders on each coding category, demonstrating a high level of reliability.

4.4.2. General media coverage variables

The volume of *general media coverage* in a particular month is the total number of articles published each month, identified in the content analysis of the *ABI/Inform* database as pertaining to the broadband industry or to broadband cable or DSL

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[3] News and information sources included the *Lexis-Nexis* news database, service provider web sites, and the *Internet Archive*, a project of the Library of Congress and the Smithsonian Institution to produce a historical archive of Internet information (located at http://web.archive.org/).

technologies. If the article described any form of broadband access technology or the firms developing and selling the technology it was viewed as contributing to the taken-for-grantedness of the market category and counted as increasing its cognitive legitimacy.

4.4.3. Positive and negative industry and governmental interest coverage variables

Again guided by the coding protocol, each article abstract was also examined for descriptions of growth and expansion of the industry or decline and firm failure, as well as any type of regulatory or governmental activity. *Positive industry coverage* represents the current volume of positive evaluations of the broadband industry in the news media and business press, and encompassed a generally positive evaluation of the business opportunity, investment activity, public offerings of equity, industry growth, increasing levels of consumer demand, and venture capital interest in the broadband market category. An article abstract was counted if the article described the presence of broad business opportunities in the developing broadband market, such as overall growth in the market, expansion of customer demand, general investor interest in the market, etc. An article abstract would also be counted if positive business indicators were discussed about specific firms, such as expansion and growth in particular firms operating in the market, or acquisitions, public offerings, or general investor interest in individual firms. The total number of articles describing the development of the industry positively in each time period, covering both DSL and broadband cable technologies, was used as the measure of positive industry evaluations in that month.

The volume of *negative industry coverage* measured current negative evaluations of the industry, and is suggestive of the level of threat to the market, perceived potential for a downturn in the industry, poor prospects for business growth, and of potential or actual firm failures. Like positive industry coverage, article abstracts were counted in this measure when describing the market broadly or if specific firms were the subject. As in the case of positive industry coverage, the total number of articles describing the broadband market negatively was used to identify the value of negative industry coverage for each month.

Sometimes an article described broadband in mixed terms; that is, an article might provide an overview of the broadband market that highlighted both opportunities and threats, described both high and low performing companies, or asserted that either DSL or cable technology had more opportunity than the other. In such cases, the article was counted as contributing to both positive and negative industry coverage. In this regard, this study diverges somewhat from previous research by approaching positive and negative evaluation of the market as separate dimensions rather than as one continuous dimension (c.f., Deephouse, 1996; Deephouse and Carter, 2005; Janis and Fadner, 1965).

Governmental interest coverage is measured by the current level of media coverage of real or potential governmental regulation of the Internet access market; examples might include reporting on new laws, congressional hearings, and agency activities. This measure should indicate the level of governmental interest in the industry, and thus is representative of the regulatory approval of the behaviors of firms in the market. The number of articles identified using the protocol describing any form of governmental activity or regulatory interest in the broadband business was totaled for each month and used as the measure of the level of governmental interest in the industry.

4.5. Control variables[4]

The *residential population* at the city level (in hundreds of thousands of people) was included to account for demographic factors that might impact the entry rate. Higher resident population levels allow for greater use of the communications infrastructure investment, and could potentially influence the pattern of entry rates in ways unrelated to legitimacy and competition processes. Annual population data was gathered from the U.S. Bureau of the Census.

Economic variables are frequently used in founding and entry rate studies as control variables; entry rates patterns could result from changes in economic conditions rather than from legitimacy or competition effects. The *GDP growth rate* was used to represent national economic conditions while the city-level *unemployment rate* was used to control for local economic factors. GDP measures were available from the U.S. Bureau of Economic Analysis on a quarterly basis, while the unemployment measures were obtained from the U.S. Bureau of Labor Statistics on a monthly basis.

Finally, to account for the growing size of the Internet as a factor in the emergence of the broadband access industry, a measure was included as a control which represented the increase in the number of Internet users and the amount of information available on the Internet. The *Internet growth rate* is the rate of increase in the number of hosts connected to the worldwide information network. While not representing the number of users of the Internet, it does represent in a reliable way the number of systems on the network, and thus is a proxy for demand for access to and the amount of information available on the Internet. The data was collected by the Internet Software Consortium, and is available online at http://www.isc.org/.

5. Results

Table 1 shows the correlation matrix for the variables used in this study, while Table 2 reports the negative binomial regression estimates for models of the entry rate across all six cities between January 1993 and April 2000. Since the likelihood tests of the estimated overdispersion parameter α demonstrated mixed results, it was decided to model the heterogeneity in the data by using negative binomial regression instead of the Poisson regression model. Negative binomial regression relaxes the

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[4] When particular control variables were not available on a consistent monthly basis, well established linear methods were employed to transform the available data into a format suitable for subsequent statistical analysis.

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Table 1
Correlation matrix.

		Mean	Std dev	1	2	3	4	5	6	7	8	9	10	11
1	Entry rate	0.104	0.378	1.0000										
2	Volume of general media coverage	9.598	7.709	0.3657*	1.0000									
	Sig levels			0.0000										
3	Volume of positive industry evaluations	5.896	4.920	0.2656*	0.8517*	1.0000								
	Sig levels			0.0000	0.0000									
4	Volume of negative industry evaluations	1.241	1.447	0.1596*	0.6857*	0.5824*	1.0000							
	Sig levels			0.0003	0.0000	0.0000								
5	Volume of political and regulatory interest coverage	1.368	1.684	0.3533*	0.4204*	0.3215*	0.3793*	1.0000						
	Sig levels			0.0000	0.0000	0.0000	0.0000							
6	City population, in hundreds of thousands	9.531	4.786	0.0838	0.0542	0.0494	0.0354	0.0242	1.0000					
	Sig levels			0.0557	0.2163	0.2597	0.4196	0.5806						
7	GDP growth rate	3.763	1.597	0.0764	0.2090*	0.2482*	0.1099*	−0.0051	0.0242	1.0000				
	Sig levels			0.0812	0.0000	0.0000	0.0120	0.9076	0.5808					
8	City unemployment rate	5.278	2.614	−0.1644*	−0.2380*	−0.2139*	−0.1566*	−0.1054*	−0.1580*	−0.0979*	1.0000			
	Sig levels			0.0002	0.0000	0.0000	0.0003	0.0160	0.0003	0.0253				
9	Worldwide Internet host growth rate	4.909	2.680	−0.0779	−0.3463*	−0.3170*	−0.1789*	−0.0541	−0.0242	−0.2105*	0.0816	1.0000		
	Sig levels			0.0752	0.0000	0.0000	0.0000	0.2171	0.5809	0.0000	0.0625			
10	Industry population density	1.011	2.327	0.3980*	0.5303*	0.5440*	0.2789*	0.3677*	0.1839*	0.2210*	−0.2400*	−0.1275*	1.0000	
	Sig levels			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0035		
11	(Industry population density)2	6.429	20.557	0.3179*	0.3823*	0.4350*	0.1654*	0.2706*	0.1723*	0.1979*	−0.2039*	−0.0749	0.9518*	1.0000
	Sig levels			0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0872	0.0000	

Table 2
Negative binomial regression coefficients for the relationship between entry rate and independent variables, January 1993 to April 2000.

	Testing main hypotheses				Post hoc analysis			
	Demographic control model	General media + demographic controls	Sociopolitical media + demographic controls	Combined model + demographic controls	Demographic and density control model	General media + demographic and density controls	Sociopolitical media + demographic and density controls	Combined model + demographic and density controls
Independent Variables	1	2	3	4	5	6	7	8
Volume of general media coverage	—	0.1654**	—	0.1872**	—	0.1098**	—	0.1712**
Volume of positive industry evaluations	—	—	0.1554**	0.0042	—	—	0.0836*	0.0331
Volume of negative industry evaluations	—	—	-0.2784*	-0.4776**	—	—	-0.3056*	-0.4439**
Volume of political and regulatory interest coverage	—	—	0.3929**	0.2548**	—	—	0.2996**	0.1916*
City population, in hundreds of thousands	0.0837*	0.0467	0.0562+	0.0445	0.0273	0.0276	0.0389	0.0287
GDP growth rate	0.0643	0.2174*	0.0202	0.1056	-0.0183	0.1100	-0.0226	0.0505
City unemployment rate	−0.5220**	−0.2080*	−0.2867*	−0.1913*	−0.1642	−0.1434	−0.1695	−0.1446
Worldwide Internet host growth rate	−0.0868	0.0329	−0.0342	0.0005	−0.1279	−0.0529	−0.1076	−0.0517
Industry population density	—	—	—	—	0.8872**	0.4355*	0.6229**	0.2960
(Industry population density)^2	—	—	—	—	−0.0668**	−0.0309+	−0.0500**	−0.0198
Constant	−0.7846	−5.3642**	−3.2853**	−4.8788**	−2.2875*	−4.3632**	−2.9775**	−4.3088**
α	1.5379	0.4960	0.2600	0.0000	0.4213	0.4171	0.0000	0.0000
Likelihood test of α=0	0.007	0.100	0.269	1.000	0.139	0.133	0.500	0.500
Pseudo R-square	0.0843	0.2405	0.2302	0.3052	0.2269	0.2657	0.2718	0.3183
AIC	339.006	285.22	292.922	268.133	292.082	280.234	282.041	267.455
Log Likelihood	−163.503	−135.610	−137.461	−124.066	−138.041	−131.117	−130.021	−121.728
Degrees of freedom	4	5	7	8	6	7	9	10

+p<0.10, *p<0.05, **p<0.01. Note: Sample consisted of 522 observations (87 months in 6 cities); one month of data was lost in the statistical analysis through the use of lagged variables. Note: The parameter α is an estimate of the overdispersion parameter characteristic of the negative binomial regression model. When α=0, the data exhibits no overdispersion and can be modeled using Poisson regression. The likelihood test is a significance test of overdispersion in the data.

Table 3
Likelihood ratio tests and model AICs comparing selected statistical models.

Model comparisons:	Description of comparison	Likelihood ratio test of full versus constrained models[a]:				Comparison of full versus constrained model AICs[b]:		
		Degrees of freedom	Likelihood ratio	P-value	Preferred model	AIC of the full model	AIC of the constrained model	Preferred model
Comparing density and demographic/economic control variable models								
Full model 5 and constrained model 1	Adding density control variables to demographic/economic control variable model	2	54.924	0.0000	Full model	292.082	339.006	Full model
Building the general media coverage model								
Full model 6 and constrained model 2	Adding density variables to general media coverage and demographic/economic control variable model	2	8.987	0.011	Full model	280.234	285.220	Full model
Full model 6 and Constrained Model 5	Adding general media coverage variables to density/demographic/economic control variable model	1	13.849	0.000	Full model	280.234	292.082	Full model
Building the sociopolitical media coverage model								
Full Model 7 and Constrained Model 3	Adding density variables to sociopolitical media coverage and demographic/economic control variable model	2	14.881	0.0006	Full model	282.041	292.922	Full model
Full Model 7 and Constrained Model 5	Adding sociopolitical media coverage variables to density/demographic/economic control variable model	3	16.041	0.0011	Full model	282.041	292.082	Full model
Combining general and sociopolitical media coverage variables								
Full Model 8 and constrained Model 4	Adding density variables to general and sociopolitical media coverage and demographic/economic control variable model	2	4.677	0.0965	Constrained model	267.455	268.133	Full model
Full Model 8 and constrained Model 5	Adding general and sociopolitical media coverage variables to density/demographic/economic control variable model	4	32.627	0.0000	Full model	267.455	292.082	Full model

[a] A significant p-value in the likelihood ratio test indicates that the full model provides a better fit to the data.
[b] All things being equal, the model with the lower AIC is the preferred model.

assumption in Poisson regression models that the mean and the variance are the same (Cameron and Trivedi, 1998; for an application see Guler et al., 2002). Doing so produced a more conservative test of the significance of the parameters, avoiding the tendency of the Poisson model to overestimate significance levels in the case of overdispersion. The pseudo R-squared and the AIC of each model are also provided in Table 2 as indicators of fit with the data.[5] Table 3 shows a summary of likelihood ratio tests and model AIC statistics for the comparing the fit of different models.

As Table 1 indicates, there is a high correlation among the different variables that capture the media coverage, with the highest correlation among general media coverage, positive, and negative industry evaluations. As discussed below, this can cause multicollinearity problems in the models that include all the media coverage variables. An interesting correlation is the one found between the variables Worldwide Internet host growth rate and the volume of the general media coverage and the volume of positive industry evaluation. The corresponding correlations are negative indicating that while the usage of the Internet grew the relative level of media coverage of this industry decreases, suggesting that industry growth may serve as a surrogate for the taken-for-grantedness aspect of legitimacy.

The parameter estimates listed under model 1 in Table 2 depict all the control variables used in the study that account for demographic, economic, and technological factors that might influence market category entry rates, and provide a baseline for the

[5] Any one measure of fit only provides a "rough" guide to the fit of the model (Long, 1997; Long and Freese, 2006). Focusing on a single measure optimizes only one criterion, potentially masking other considerations. Therefore, the statistical results reported in this study give both the pseudo R-squared measure as well as an information-based measure, Akaike's information criterion, or AIC, suggested by Long (1997) and Cameron and Trivedi (1998). The AIC penalizes models with larger numbers of parameters for the degrees of freedom that are lost. The AIC has the added benefit of being useful even when comparing non-nested models, situations where models cannot be compared using the likelihood ratio test.

rest of the statistical models. Among the control variables, only the local residential population and economic environment variables produced significant results, while growth rate of the size of the Internet was never significant in any model. When significant, the signs of the parameter estimates were in the expected directions.

5.1. Testing hypothesis 1—a general media coverage model of entry rates

The second model in Table 2 reports the estimates for the model used to test Hypothesis 1; Hypothesis 1 stated that the cognitive legitimacy evident from the level of general media coverage of an industry positively affects the entry rate of companies within a new market category. The parameter estimate for the general media coverage variable was positive and significant in its influence on entry rates ($p<0.01$), demonstrating the legitimating effect the volume of communication and information transmission within the industry has on entry rates in a new market category.

5.2. Testing hypothesis 2—a positive/negative and regulatory media coverage models

Hypotheses 2a, 2b, and 2c stated that the sociopolitical effects of positive and negative industry evaluations and regulatory influences evident through industry discourse affected the entry rate into the new market category. The third regression model reported in Table 2 reports the significance of both positive and negative evaluations in the news media as well as coverage of governmental and regulatory interest in the industry on the entry rates. The parameter estimates of the model showed both positive industry coverage and the reporting on political and regulatory issues positively affected the entry of broadband providers, supporting hypotheses 2a and 2c ($p<0.01$), demonstrating the importance of the emergence of these sociopolitical legitimacy dimensions in the creation of a new market category. Also found significant, negative industry evaluations were negatively related to the entry rate, supporting hypothesis 2b ($p<0.05$) and providing strong evidence for the de-legitimating influence of certain forms of industry discourse.

5.3. Combining news media-based legitimacy effects in a single model of entry rates

Model 4 integrates both general media coverage with the current volume of news reports of industry evaluations and regulatory attention into a single model. General industry coverage and regulatory interest variables were shown to have positive and significant effects ($p<0.01$). Negative industry evaluations again affect entry rates negatively ($p<0.01$). However, positive industry coverage is no longer significant when combined with general industry coverage. This may be the result of multicollinearity between these two measures (as reported in Table 1, the correlation between the two was 0.8517), a problem which could result in the insignificance of one measure of legitimacy even though both are separately highly significant. The AIC is useful here because it can be used to assess the improvement in the model combining two sets of variables over models that consider each on their own. The pseudo R-squared of model 4 is higher than that of either model 2 (using only general media coverage) or model 3 (using positive/negative and regulatory media coverage). However, a higher R-squared alone is not evidence that the combined model is the better one, and the R-square criterion is not as useful in Poisson and negative binomial regression as it is in linear regression analysis (Cameron and Trivedi, 1998; Long and Freese, 2006). Comparing the AICs of each model gives additional insight into which is more appropriate because it penalizes against a reduction in parsimony in the model. The AIC of model 4 (AIC = 268.133) is lower than either model 2 or 3, indicating that positive industry coverage should be included in the model. Since the statistical fit of the model improves even though this single variable becomes insignificant suggests that perhaps it plays an important but indirect role in influencing the population entry rate.

5.4. Post hoc analysis

Using insights from the population ecology literature, we also examined the influence of the number of total active industry participants in each city. Population ecologists argue that entry rates into an organizational population are governed by the population's density, a relationship that is labeled "density dependence" (Carroll and Hannan, 1989, 2000). In contrast to institutional perspectives, the density dependence model views organizational density as driving the dynamics of both legitimacy and competition (Haveman and David, 2008), where density growth at low density levels increases the legitimacy of the population. In this situation, increases in density lead to increases in entry rates. Conversely, when density is at a high level further growth increases the competition in the population. When density is high, further increases will decrease the entry rate.

Baum and Powell claimed that researchers "need to measure *other* aspects of legitimation and examine how diverse social processes combine with organizational density to contribute to the legitimacy of organizational forms" (1995: 530). Motivated by their suggestion, the post hoc analysis sought to capture the impact of density-based legitimacy and competition effects and compare them to the hypothesized media-based effects by adding population density variables to the original models. The *industry population density* of each city is the total number of active industry participants or market entrants in each city in each month (not to be confused with the residential population discussed earlier, referring to the number of people in each city). Following past practices in the literature, first- and second-order forms of population density are used to reflect indirect measures of legitimacy and competition (e.g., Carroll and Hannan, 1989; Hannan and Carroll, 1992; Hannan and Freeman, 1987, 1988). We therefore include both these measures in our post hoc analysis to control for density dependent legitimacy and competition effects.

Table 1 also presents the correlations among these variables and the rest of the variables in the models. This table shows a high level of correlation between first and second order forms of population density and media coverage. Moreover, as shown in Table 2, model 5 adds density-dependent legitimacy and competition to the demographic, economic, and technological control variables from model 1. The results show that density-dependent legitimacy and competition are significant predictors of entry rates (both at $p < 0.01$). The results of the likelihood ratio test and comparison of AICs reported in Table 3 support the addition of first and second-order forms of density in model 5 over model 1. Interestingly, even in the earliest phases of industry creation, density-dependent legitimacy effects are strongly evident, and competition effects are still observed at a significant level, both in an environment with few firms yet in operation. Model 5 thus provides support for the inverted U-shaped relationship between density and entry rates among broadband access providers, as predicted by the population ecology model, even in the formative stages of a population's history.

5.4.1. Combining density-dependent and media-based variables in a model of entry rates

The negative binomial regression models 6 through 8 combine both the density-dependent and the media-based effects tested in models 2 through 4. In model 6, first-order density is significant at the $p < 0.05$ level, while general media coverage is also significant at the $p < 0.01$ level. Competition effects from second-order density are only significant at the $p < 0.10$ level. As expected from theory, the parameter estimates for both density-dependent and media-based effects are positive for first-order density and general media coverage and negative for second-order density. The significance of density-based legitimacy and competition as well as cognitive legitimacy effects of general news coverage of the industry provide support for their combined effect on entry rates and the development of new market categories.

Table 3 shows the result of the tests comparing the models combining density-dependent and media-based legitimacy effects with the models which treat their influence separately. The comparison between model 6 and model 2 tests the significance of adding density-dependent effects to a model with general media coverage. Both the likelihood ratio test and the comparison of AICs show that the density variables significantly add to the explanatory power of the model (likelihood ratio test is significant at the 0.05 level; AIC of 280.234 for the full model compared to 285.220 of the model without density variables). Comparing model 6 to model 5 tests the significance of adding the general media coverage variable to a density-dependence model. As before, the results indicate that the full model, with both the media-based measure of the cognitive legitimacy and density-based legitimacy, should be included in the model (likelihood ratio test is significant at the 0.01 level; AIC of 280.234 for the full model compared to 292.082 of the model without general media variables).

5.4.2. Combined density, and positive/negative and regulatory coverage model

Model 7 in Table 2 includes both density-based measures and the three media-based measures of sociopolitical legitimacy as independent variables. The result of the test of model 7 shows that density-based legitimacy, positive and negative industry evaluation, and political interest are all significant. Density-based legitimacy and competition are both significant at the $p < 0.01$ level. Positive industry evaluations and regulatory coverage are positive and significant ($p < 0.05$; $p < 0.01$), indicating that both are critical in the creation of the broadband population, while the parameter estimates of negative media coverage are also significant but negative in direction ($p < 0.05$), indicating that it remains as a de-legitimating influence.

The results from Table 3 comparing models 7 and 5 shows that adding media coverage measures to the density-dependence model produces a more favorable model than using a density-based model alone. Similarly, comparing models 7 and 3 shows that adding density-based legitimacy produces a significantly better model of the entry rate into the broadband population then the use of media-based measures alone. Interestingly, the effect sizes of negative industry evaluations increase while positive and regulatory media coverage slightly decrease. This may suggest that the addition of density variables clarifies a strong and direct influence from negative information on the development of emerging organizational populations, and that some of the effects of the density variables may also represent the influence of regulatory factors and positive industry evaluations.

5.4.3. Combined density and all media coverage effects model

Model 8 combines the influence of density-based legitimacy and competition with all media coverage variables. Density-dependent legitimacy and competition are insignificant. General media coverage is highly significant ($p < 0.01$), and the direction of the parameter estimate is positive. As seen in previous models, negative media coverage of the industry is negatively associated with entry into the population ($p < 0.01$). The volume of regulatory coverage was also significant ($p < 0.05$) with a positive effect on entry rates. As in model 4, the effects of collinearity between general industry coverage and the volume of positive evaluations are seen in model 8, where the combination of the two variables results in the insignificance of the positive industry evaluation as an explanatory factor.

The results in Table 3 comparing model 8 to model 4 shows mixed results on which is the better fitting model. While the full model has a lower AIC and a higher pseudo R-squared than the constrained model (AICs of 267.455 versus 268.133; pseudo R-squareds of 0.3183 versus 0.3052), suggesting that the model containing both density-dependence and media coverage variables is appropriate, the likelihood ratio test indicates that first- and second-order density do not add significantly to the explanatory power of the model with media coverage variables alone. Comparing model 8 to model 5 shows the significance of adding media coverage variables to a model based solely on density-dependent effects. In this case the comparison supports the more complete model; both the comparison of AICs and the likelihood ratio test point to the value of adding media coverage variables to a model with only density variables (likelihood ratio test is significant at the 0.01 level; AIC of 267.455 for the full model compared to 292.082 of the model without media variables).

Table 4
Factor and Percentage changes for the relationship between entry rate and independent variables, January 1993 to April 2000.

	Testing main hypotheses									
	Demographic control model			General media + demographic controls			Sociopolitical media + demographic controls			Combined model + demographic controls		
	Factor change	Percentage change		Factor change	Percentage change		Factor change	Percentage change		Factor change	Percentage change	
Models	1			2			3			4		
Volume of general media coverage	—	—		1.180	18.0%	**	—	—	—	1.206	20.6%	**
Volume of positive industry evaluations	—	—		—	—		1.168	16.8%	**	0.996	−0.4%	
Volume of negative industry evaluations	—	—		—	—		0.757	−24.3%	*	0.620	−38.0%	**
Volume of political and regulatory interest coverage	—	—		—	—		1.481	48.1%	**	1.290	29.0%	**
City population, in hundreds of thousands	1.087	8.7%	*	1.048	4.8%		1.058	5.8%	+	1.045	4.5%	
GDP growth rate	1.066	6.6%		1.243	24.3%	*	1.020	2.0%		1.111	11.1%	
City unemployment rate	0.593	−40.7%	**	0.812	−18.8%	*	0.751	−24.9%	*	0.826	−17.4%	*
Worldwide Internet host growth rate	0.917	−8.3%		1.033	3.3%		0.966	−3.4%		1.000	0.0%	
Population density	—	—		—	—		—	—		—	—	
(Population density)^2	—	—		—	—		—	—		—	—	

	Post hoc analysis									
	Demographic and density control model			General media + demographic and density controls			Sociopolitical media + demographic and density controls			Combined model + demographic and density controls		
	Factor change	Percentage change		Factor change	Percentage change		Factor change	Percentage change		Factor change	Percentage change	
Models	5			6			7			8		
Volume of general media coverage	—	—		1.116	11.6%	**	—	—		1.187	18.7%	**
Volume of positive industry evaluations	—	—		—	—		1.087	8.7%	*	0.967	−3.3%	
Volume of negative industry evaluations	—	—		—	—		0.737	−26.3%	*	0.641	−35.9%	**
Volume of political and regulatory interest coverage	—	—		—	—		1.349	34.9%	**	1.244	24.4%	*
City population, in hundreds of thousands	1.028	2.8%		1.028	2.8%		1.040	4.0%		1.029	2.9%	
GDP growth rate	0.982	−1.8%		1.116	11.6%		0.978	−2.2%		1.052	5.2%	
City unemployment rate	0.849	−15.1%		0.866	−13.4%		0.844	−15.6%		0.865	−13.5%	
Worldwide Internet host growth rate	0.880	−12.0%		0.948	−5.2%		0.898	−10.2%		0.950	−5.0%	
Population density	2.428	142.8%	**	1.546	54.6%	*	1.864	86.4%	**	1.344	34.4%	
(Population density)^2	0.935	−6.5%	**	0.969	−3.1%	+	0.951	−4.9%	**	0.980	−2.0%	

5.4.4. Marginal effects

Table 4 shows factor and percentage changes in each model tested as an alternate way to interpret the negative binomial regression coefficients and marginal changes in effects. The factor changes indicate the degree to which the expected number of new market entrants changes with a unit change in the independent variables (c.f. Long, 1997; Long and Freese, 2006). This effect on the dependent variable can also be expressed as percentage change. These factor and percentage changes help illustrate the relative impact of each variable on the dependent variable in a more easily interpreted way than viewing the coefficients alone. For instance, the post-hoc analysis models show the expected change in the number of new market entrants with the inclusion of population density variables. In model 5, where media coverage variables are absent, the addition of one more market entrant in the previous period (a unit increase in density) increases the expected number of new market entrants by a factor of 2.428, or +142.8%. Contrast this result with model 8, where a unit increase in density only increases the expected market entry rate by a factor of 1.344, or +34.4%, a result that was noted earlier as statistically insignificant. More important is the influence of general media coverage, where a unit increase in number of sampled article abstracts increased the expected number of market entrants by a factor of 1.187, or +18.7%. Negative media coverage influenced the dependent variable by a factor of 0.641, or -35.9%, and political and regulatory interest coverage had an impact of 1.244, or +24.4%. In this combined model, the impact of media coverage accounted for much of the increase in new ventures that was earlier attributed to population density.

5.4.5. Models with media coverage or density as the dependent variable

Given the significance of both media and density variables in the entry rate models, the issue emerges about how both types of variables are related to each other. Examining how these variables are related to each other will create a more complete understanding of the operation of new market categories. To further discern the relationships between the various measures of legitimacy and the control variables, the post hoc analysis also included testing of additional models with media coverage and density variables as the dependent variable. The results from this analysis are reported in Tables 5 and 6.

Table 5 shows models 9 through 10, which feature each of the media coverage variables as the dependent variable along with the demographic, economic, and technological controls and density measures of legitimacy and competition. It is evident from the table that in all models, density-based legitimacy and competition are highly significant predictors of each of the media-based measures ($p < 0.01$). City population is significant in none of the models. GDP growth rate city unemployment rate, and internet host growth rate are significant in models 9 and 10 (general media coverage and positive industry evaluations as dependent variables, respectively). In model 11 (negative industry evaluations as dependent variable) only internet growth rate was significant, while in model 12 (political/regulatory coverage as dependent variable) only GDP growth rate was significant. Table 6 shows models 13 through 20, where models 13 to 16 use density as the dependent variable and models 17 to 20 use density-squared as the dependent variable. In all models, media coverage was highly significant (all at $p < 0.01$, except in model 15 where negative industry evaluation was significant at the $p < 0.05$ level). Demographic, economic, and technology controls were also often highly significant, with the exception of internet host growth rate which was insignificant in models 14 and 18, and only mildly significant in model 20 ($p < 0.10$).

From both sets of models in Tables 5 and 6, it is clear that media coverage and density variables are related to one another. This is not surprising given the high correlation between density- and media-based variables seen in the correlation matrix in Table 1. The primary difference between the two sets is the strength of the influence of the demographic, economic, and technology control variables, where it appears that they have a stronger direct influence in models with density as the dependent variable. Since media coverage of the market occurs and relates to events prior to the time periods were density is measured, one interpretation of the results of this study is that media-based legitimacy processes precede density-dependent processes, and density-based legitimacy and competition reflect a variety of underlying social processes.

Table 5
Negative binomial regression coefficients for the relationship between media coverage and independent variables, January 1993 to April 2000.

Independent variables	Dependent variables							
	Model 9 — volume of general media coverage		Model 10 — volume of positive industry evaluations		Model 11 — volume of negative industry evaluations		Model 12 — volume of political and regulatory interest coverage	
City population, in hundreds of thousands	−.0102413		−.0090965		−.0049154		−.0080148	
GDP growth rate	.0544029	*	.0693737	**	−.0042754		−.1105747	**
City unemployment rate	−.0325362	**	−.0289069	*	−.029609		−.0007357	
Worldwide Internet host growth rate	−.112808	**	−.1025803	**	−.0890064	**	.0010393	
Industry population density	.4083948	**	.3586728	**	.4914716	**	.5001057	**
(Industry population density)^2	−.0334451	**	−.0281728	**	−.0515695	**	−.0432788	**
Constant	2.55004	**	1.943708	**	.5892128	*	.4766093	*
α	.3735775		.3714986		.293305		.2967185	
Likelihood test of α = 0	0.000		0.000		0.000		0.000	
Pseudo R-square	0.0700		0.0664		0.0611		0.0627	
AIC	3226.110		2785.285		1517.939		1588.072	
Log likelihood	−1605.0549		−1384.6424		−750.96937		−786.03619	
Degrees of freedom	6		6		6		6	

$+p < 0.10$, $*p < 0.05$, $**p < 0.01$

Table 6
Negative Binomial regression coefficients for the relationship between density and independent variables, January 1993 to April 2000.

Independent Variables	Industry Population Density as Dependent Variable								Density-Squared as Dependent Variable							
	Model 13		Model 14		Model 15		Model 16		Model 17		Model 18		Model 19		Model 20	
Volume of general media coverage	—		.1965933	**	—		.1513325	**	—		.3273751	**	—		.1856985	**
Volume of positive industry evaluations	—		—		.2496264	**	.1118198	**	—		—		.4683077	**	.2864301	**
Volume of negative industry evaluations	—		—		-.1469522	*	-.3098054	**	—		—		-.3766398	**	-.5828463	**
Volume of political and regulatory interest coverage	—		—		.3145612	**	.1828324	**	—		—		.5425441	**	.3821684	**
City population, in hundreds of thousands	.0588304	**	.068351	**	.0703962	**	.0718338	**	.0926827	**	.0850199	**	.0931846	**	.09342	**
GDP growth rate	.1795035	**	.3079956	**	.2092944	**	.2481594	**	.2070484	*	.3183877	**	.4126769	**	.4132725	**
City unemployment rate	-.2828112	**	-.1576361	**	-.1622229	**	-.1425743	**	-.5013079	**	-.3260819	**	-.2881228	**	-.2660885	**
Worldwide Internet host growth rate	-.3488665	**	-.0658328		-.1348639	*	-.0920622		-.6901827	**	-.1088543		-.1962375	*	-.146939	+
Constant	1.510883	*	-3.894314	**	-2.890097	**	-3.833108	**	5.176239	**	-3.498165	**	-3.839698	**	-4.6759	**
α	3.87375		1.302822		1.341478		.9611488		9.550051		4.946226		3.997689		3.479243	
Likelihood test of α = 0	0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Pseudo R-square	0.0666		0.2272		0.2234		0.2615		0.0530		0.1486		0.1737		0.1918	
AIC	1217.378		1012.021		1020.911		973.637		1674.514		1508.624		1468.558		1438.781	
Log Likelihood	-602.68918		-499.01039		-501.45561		-476.81862		-831.2572		-747.31178		-725.27891		-709.39044	
Degrees of freedom	4		5		7		8		4		5		7		8	

+ $p<0.10$, * $p<0.05$, ** $p<0.01$

In the market entry rate models in Table 2, demographic and economic control variables were significant only in the absence of density-based variables. Demographic and economic variables were intended to account for changes in market conditions, such as the industry's potential size and growth rate, which could influence entry beyond the effects of legitimacy and competition. The fact that these control variables lose their significance in models with density-based control variables suggests that density mediates the relationship between market conditions and entry rates. Also, supporting this interpretation are the results from models 13 to 20 from Table 5, where the controls are consistently significant with respect to density as the dependent variable (with the exception of the technology control, internet host growth rate). The significance of the controls are much more inconsistent when media-based measures are the dependent variables in models 9 to 12 from Table 4 and in the percentage changes from Table 6.

5. Discussion

5.1. Implications for theory development in entrepreneurship and organization science

The results have several implications for the field of entrepreneurship and organizations, particularly in the study of legitimacy and market category formation. First, the study adds to the literature on industry emergence (e.g., Forbes and Kirsch, 2011; Mezias and Kuperman, 2000; Van De Ven, 1993). Within this research tradition, scholars argue that little is known about key processes that unfold in this context. We state that a way of studying industry emergence is through an understanding of market category creation. In particular, this study shows that media information (i.e., general press, trade publications) is an alternative way to collect data on the emergence of a new market category. In this way, this study answers the recent call made by Forbes and Kirsch (2011) on the necessity of using alternative means to explore and exploit more fully the breadth and depth of industry records. Second, the study advances the field by extending the measurement of legitimacy through the use of media-based measures of taken-for-grantedness and sociopolitical influence in the industry. Finally, the study also highlighted the importance of industry discourse and information exchange as a factor in the development of legitimacy of market categories. The sharing of information among category participants and observers builds awareness and understanding of the population, exposes a greater number of people to the opportunities being presented, and underlies the process which establishes or weakens support from critical stakeholders.

5.2. The legitimating effect of media coverage on entry rates on new market categories

Before the broadband market category could be established the technology itself had to be developed, industry standards created, and its usefulness determined; basic facts like who might provide broadband services needed to be resolved (e.g., cable companies, regional Bell companies, competitive telecommunications companies, or some other type of company, just to name a few). Indeed, the very meaning of the term "broadband" had to be settled before new entrants could be started to provide services based on it. The establishment of a routine understanding and identity of a new category through the ongoing conversation among industry participants was a necessary step before new entrants could be founded.

The media communication studied in this research project showed that general media coverage of the broadband market positively affected market entry rates. General coverage about broadband served to build awareness about the technology among all industry participants, including telecom and related companies, customers, investors, and regulators. This study further contributes to the literature by showing the impact of the pattern of both positive and negative coverage, by treating each as independent dimensions rather than a single continuous variable and examining how each impact the market entry rate in the broadband market category. Increasing amounts of information exchanged describing the industry positively lead to an increase in market entries directed toward capitalizing on those opportunities. As people and organizations involved in the telecommunications and networking industries developed broadband technology, a broader recognition of the growth potential of the market for high speed Internet access occurred. Companies began promoting broadband technologies to consumers and businesses, they developed business models to profit from those technologies, consumers learned about the benefits of broadband services, and investor resources flowed into the industry to capitalize on the technology and satisfy customer demand. Negative evaluation of the industry also strongly affected the emergence of the new category, but in this case it played a de-legitimating role, reducing the rate of entry. Even as capital flowed into the industry, some level of concern or caution regarding the true size of consumer demand and the growth in the market appeared in media coverage. Interestingly, this delegitimating influence occurs even in the earliest moments in the history of the industry, even before there is an established population.

The study also stressed the role that political and regulatory coverage can have on the development and creation of industries. An example of this kind of effect is the role that the Clinton Administration had on the popularization of the Internet broadly by focusing public attention to what it called the "information superhighway" (Broad, 1992). Rather than being reflected by a single law enacted in a particular time, the influence of this effort was seen more generally by a change in the way people talked about computers and information systems over time. This study contributes to the literature by moving beyond using simple period effects to examine the impact of regulatory and governmental interests in the market, and instead models how the media coverage of such interests influences entry rates. Regulatory issues were the subject of much communication in the media, particularly commentary on the meaning and implications of potential and actual legislative actions and regulatory agency rulings, and it should be no surprise that entry rates increased as the meaning of regulatory activities and the role of the government were developed and the scope of their influence became less ambiguous. It would be interesting to analyze whether this effect remains stable across countries with governments and regulatory agencies characterized by different levels of credibility such as might be found in emerging economies. In those cultures in which public institutions are weak, the impact of political and regulatory coverage on new venture creation may be less than in cultures in which public institutions are strong.

The implication for research is that the information exchange between different social actors in and around the industry has to be more fully explored. The basic meaningfulness and acceptability of a new market category to those in the industry, as evidenced by the rise in discourse regarding that category, is a critical factor in supporting entry events in the population. Discussion among industry actors creates a shared identity and builds a common understanding of new category, firm strategies, and products and services; it creates awareness of new organizations to those who might support or imitate them.

5.3. Applying the density-dependence model in emergent categories

The hypothesis tests together with the post hoc analysis shed light on the creation of new market categories. In particular, this study provides some evidence into the complexity of the interrelationships between media, density, and entry rate. By combining multiple media-based measures of legitimacy with entry rate models, it becomes possible to see potential mediating relationships that would not be evident if density-based measures were used alone.

The post hoc analyses show an interesting relationship between media coverage and density-dependence variables on the creation of new market categories. These analyses examine the legitimating influence of both density-dependent processes and information exchange amongst industry participants, producing a richer picture of the processes underlying population entry rates. When used in place of density variables, media-based measures reflecting cognitive and sociopolitical legitimacy effects performed as well as the density-dependent model in predicting entry rates. Even when combined with density variables, media-based variables largely retained their significance and produced a much more detailed picture of the processes occurring in the broadband industry. Moreover, it appears that density variables only marginally add to models containing only media coverage variables. At least in emerging organizational populations, media-based legitimacy effects appear to exert a strong influence on market entry rates compared to density-dependent processes; early communications processes and information diffusion among industry participants are more important than density growth patterns. With the results in the post hoc analyses, the study then responds directly to the call by Baum and Powell (1995: 530) to examine how different aspects of legitimacy beyond density dependence combine to contribute to the legitimacy of organizational populations.

For instance, it appears that there is a mediating relationship between the sociopolitical impact from positive industry coverage and general media coverage. The lack of a significant direct effect when combined with general media coverage suggests that broad coverage of the industry mediates the relationship between positive coverage and entry rates. The implication is that positive interpretations of the potential of the industry lead to more general discourse about the technology, its applications in the market, and organizations created to offer the service; such discussion among industry actors then leads directly to market entry. The complexity of these relationships points out how intertwined cognitive and sociopolitical dimensions of legitimacy are with each other and with growth in a new market category; further research is clearly needed to more fully specify these relationships.

However, most interesting here is not the direct and indirect impact of the media-based measures, but the role density-dependence plays in light of those media coverage effects. From the results, one can conclude that density variables are only highly significant when general and evaluative media coverage variables are considered separately. When general and evaluative media coverage is considered together along with density variables, the legitimacy and competition effects of density disappear entirely. The implication of this finding is that media-based measures of legitimacy may intervene in the relationship between density effects and founding and entry rate patterns. Terreberry (1968) noted that legitimacy is tied to information exchange and communication regarding the value of organizational practices and the willingness to invest resources. The population density provides industry participants with some knowledge about activities occurring within the market category, but changes in density provide information that may be only distantly linked to many critically important issues. Furthermore, in emergent organizational populations where density is extremely low, the legitimating effect of density may not be strong enough to affect entry rate. As a single measure, it may also obscure a number of information exchange processes which have different effects on entry rates.

Work on the formation of new organizational forms has highlighted the importance of developing of a clearly defined and focused identity within a category, which is only partially influenced by patterns of organizational density (McKendrick and Carroll, 2001; McKendrick et al., 2003). Recent work on legitimacy in new market categories also acknowledges the importance in establishing a legitimate identity for a new category by the ongoing dialogue and information exchange occurring in the industry (Navis and Glynn, 2010). Examining information exchange provides a window looking on the social processes in which legitimacy emerges and develops over time. Aldrich and Fiol (1994) noted that legitimacy emerges as an aspect of the social context of industry creation, providing both a constraint on behavior but also an arena in which entrepreneurs work toward establishing the legitimacy of new organizational forms. This study claimed that this social context emerges through information exchange and the sharing of conceptions of what broadband access might provide and who might provide it, and the construction of legitimate status of new organizational categories for the provision of broadband service can be seen in analysis of the business press.

Because of these factors, interpreting the significance of density measures when used alone in predicting entry rates becomes difficult since it may confound legitimacy with the influence of other economic and social factors. From another perspective, economic conditions are important in the development of new industries but perhaps only through their impact on density. Using only density may produce a parsimonious model of entry rates in an organizational population, but it may produce an incomplete picture of the impact of legitimacy on the process. Clearly, more research is required to further untangle the complex relationships between various processes in the formation of industries and new market categories through the passing of time.

5.4. Limitations and directions for future research

Since this study proposed that information exchange provides the social context in which legitimacy is established and maintained, further development of this research could look at the structure of the mass communication process itself on legitimacy. There may be systematic differences in how organizational activities are covered in the media. For instance, it is reasonable to assume that large firms receive the most news coverage; as a consequence, they may also have greater influence on market category legitimacy and entry rates even in new industries. If true, the implication would be that the creation of new market categories may involve the emergence of new firms, but may also require the support of large incumbent firms to ultimately acquire legitimacy. Furthermore, different sets of publications (e.g., weekly news magazines with a wide audience versus industry trade publications with a focused constituency) may reflect the interests and conceptions of different sets of industry actors which may influence the development of new organizational forms. Future studies should examine further the differences between firms and news media sources in their ability to influence the recognition and reputation of the industry.

Another limitation and hence future research opportunity refers to a better understanding of legitimacy effects of changing information into meaning in new market categories or new industries. Some research following a more qualitative and interpretativistic approach provide some guidelines (e.g., Khaire and Wadhwani, 2010; Navis and Glynn, 2010). This research suggests that there is a tension between individual and collective identity and efforts and that the development of assessment criteria that enhanced commensurability and enabled comparisons and valuations are key processes that provide meaning and context to the new categories. Future research therefore could add new insights to this research by identifying different actors and the mechanisms that they use for processes of meaning construction.

Finally, the results of this study may not be generalizable to later periods in the history of industries. The scope of this study was the time period leading up to the first entries into the market and through the early phases of population development. However, the patterns of discourse may change as the industry matures. We believe that given the absence of existing market participants, the development of the market category's legitimacy can be witnessed through the discourse in the industry occurring through the mass media. However, Deephouse and Suchman (2008) argue that this may only be appropriate for emerging organizational groups; mature industries may have quite a bit of taken-for-grantedness but may generate less media

coverage than emergent ones. It will be useful to study how the patterns and content of communication change over time with the maturation of an organizational population.

6. Conclusion

This study set out with the objective of expanding our understanding of the effects of legitimacy on entry and founding rates of companies in new market categories. Content analysis methods were devised to evaluate legitimacy effects using news media-based data sources, which were combined with density-based measures in a model of entry rates into a new market category. By using both density-dependent and media-based measures of legitimacy in our post hoc analyses, a more complex picture of the process of market category creation and development emerged, with both media- and density-based measures significantly related to the rate of founding and entry. Furthermore, it was found that media-based measures of legitimacy produced entry rate models as good as those using density-based legitimacy and competition measures; combining the two types of variables produced substantially better fitting models than those which treated them separately, and in one instance resulted in density becoming insignificant. The use of media-based measures allowed the models to account for pre-population activities, which began to establish the legitimacy of the industry before the first entry appeared and supported the subsequent development of the market category, while the use of multiple measures of legitimacy allowed an examination of the complexity of the relationships between different dimensions of legitimacy and entry and founding rates within the market category.

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