Entry Selection into Ambiguous Market Spaces

Elizabeth G. Pontikes
University of Chicago
Booth School of Business

William P. Barnett
Graduate School of Business
Stanford University

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ABSTRACT

Why do ambiguous market spaces persist over time, and even flourish? Previous research assumes that market spaces that lack definition are not useful and so will fade. We note that in many contexts ambiguous market spaces not only persist but also are quite important. We propose that this can be explained by looking at market entry as a selection process. We suggest that decisions to enter markets are based on both product-market fit and the perceived viability of a market space. Ambiguous market spaces are more accepting of many different types of organizations, effectively lowering the entry threshold in terms of product-market fit. At the same time, they offer less credibility than unambiguous spaces. As a result, we expect ambiguous spaces will have high rates of both entry and exit. Further, we suggest that when 1) external agents favor ambiguity and 2) entry decisions are influenced by these agents, that ambiguity persists. We find support for these ideas in a longitudinal analysis of organizational entry into and exit from market spaces in the software industry, between 1990 and 2002. Implications for the persistence of ambiguously defined markets, and explicitly modeling entry selection processes, are discussed.
What prompts organizations to enter markets? Managers considering such a move must think about whether their products will appeal to a new customer base as well as the costs the change will incur. Broadly, we can expect that organizations will enter markets when the risk adjusted gains from doing so merit the entry (Jovanovic, 1982). Both rational choice and normative processes influence this decision. To be successful in a new market organizations must become recognized as legitimate actors, which requires that they conform to the expectations of customers, critics, and other relevant audiences (Zuckerman, 1999). In return, organizations gain credibility and recognition that promotes success.

Yet, in many instances markets have blurry boundaries and do not convey a clear definition that is commonly accepted. Such ambiguous market “spaces” can be so poorly understood that there is not much consensus about what producers in such spaces actually do much beyond the natural language definition of the market’s label. For example, the “mobile telecommunications” space in 2010 includes wireless companies that control transmission technologies, software firms that manage platforms or create the applications that operate on these platforms, hardware manufacturers that produce infrastructure and handsets, networking firms that manufacture routers, and computer manufacturers (and the list goes on). Such market spaces do little to convey to potential customers what they can expect from an organization that claims to be in the space. As a result, the space is less effective at attracting a targeted customer base, and it is hard to evaluate what an organization would gain access to upon entering the market. Despite all of this, ambiguous market spaces are common. Why do organizations enter such spaces? How do these ambiguous spaces persist – and even flourish?

Previous research on markets, categories, and organizational forms implicitly assumes that ambiguous market spaces do not become important or relevant because they do not convey a clear shared meaning. These literatures focus on how expectations that arise from clearly defined markets influence the actions of organizations (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Zuckerman, 2000), how producers continue to conform to role structures (White, 1981), and how organizations that violate categorical expectations are punished (Zuckerman, 1999; Hsu, 2006). Research that focuses on market emergence allows for ambiguity at early stages of emergence when activists contest over the definitions of a market or category (Hannan, Pólos, and Carroll, 2007), but finds that such ambiguity reduces the value organizations receive from affiliating with a market (Negro, Hannan, and Rao, 2010). As a result, the presumption is that labels that remain ambiguous do not catch on or become credible.

In contrast, we think that ambiguous market spaces can become large and prominent, and persist over time. Indeed, examples of this abound. For example, the nanotechnology space has not developed specific codes about what one can expect from a “nanotechnology” organization. The definition of nanotechnology, according to the Nanotechnology Initiative, is simply any
technology that is between 1 – 100 nanometers. As a result, many different types of scientific research are now considered “nanotechnology,” much to the chagrin of early nanotechnologists who envisioned a more clearly defined market (Grodal, 2010). But, despite its ambiguous definition, nanotechnology is heavily funded, growing, and well known even outside the scientific community. Total Quality Management (TQM), a method aimed at improving organizational performance, is extremely popular with both researchers and practitioners. But the definition of that market space evolved to be “diffuse and ambiguous” (Zbaracki, 1998). In the software industry, the empirical context for this study, many prominent market spaces are also ambiguously defined, such as “portal” “enterprise application integration,” “customer relationship management,” and “enterprise software.”

We propose that ambiguous market spaces can grow because they present a lower entry threshold for organizations. We think that there is much to gain by understanding the entry of organizations into markets as a selection process – one that embodies choices made by organizations. Previous research focuses on how markets affect producers once they are members. It concludes that ambiguous spaces are less useful, which will lead organizations to exit. Indeed, if we only consider how helpful a space is in establishing credibility for an organization, then it makes no sense that ambiguous market spaces can thrive. However, once we consider an organization’s decision to enter a market space, the picture changes. Potential entrants are drawn to market spaces when they perceive such an entry as being worthwhile, but they must make this decision in the face of two kinds of uncertainty – (1) about the characteristics that an organization must have to operate in the space, and (2) about the potential benefits of being in the space. For ambiguous spaces, there are fewer clear constraints on organizations that claim to operate in the market. Precisely because ambiguous spaces lack specific criteria that organizations must meet to claim membership, such spaces will attract many different types of organizations. As a result, we expect that ambiguous market spaces will yield high rates of both entry and exit.

We also suggest that ambiguous market spaces will be more likely to flourish in settings where there are external influences that favor ambiguity. In the setting we study, the software industry, venture capitalists are an important resource who, in their quest for novelty, prefer ambiguous spaces (Pontikes, 2010). This can give them credibility despite their broad meanings. We think that this preference will affect organizational entry, and propose that organizations that have recently received venture capital funding are even more likely to enter an ambiguous market space. More generally, we propose that potential entrants will refer to social cues regarding the market, such as visible and public events, that provide evidence that other important actors believe the space is worthwhile. When there is a wave of venture capital fundings in a space, that space can become “blessed,” with managers viewing the space as being
a resource-rich area. Therefore, venture capitalist preferences for ambiguity can directly and indirectly fuel the growth of ambiguous market spaces.

**Ambiguous Market Spaces**

Market spaces help observers make sense of a diverse organizational domain. By classifying organizations into different spaces, market labels help potential customers, partners, investors, and employees find a producer that suits their needs. In general, categorization is a cognitive process that helps people access and understand large amounts of information (Rosch, 1978). Categories are socially constructed by actors, but at the same time are perceived as an objective reality (Berger and Luckman, 1967). Once categories are in place, they influence expectations and evaluations. As a result, organizations tend to replicate accepted structures, a concept that has been studied from multiple perspectives. The literature on new institutionalism shows that organizations are isomorphic, adopting accepted procedures in order to be viewed as legitimate (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Edelman, Uggen, and Erlanger, 2000). Managers closely monitor competitors and position themselves with respect to them, creating self-reproducing cliques that become markets (White, 1981; Porac et al., 1995). The “categorical imperative” (Zuckerman, 1999) describes how organizations that do not conform to recognized types are likely to be ignored or devalued (Zuckerman, 1999; Hsu, 2006; Hsu, Hannan, and Koçak, 2009). The theme that runs through these literatures is that the same thing that makes categories useful – namely that they structure a complex domain so that it is easier to understand and process – also make categories constraining. As a result, an implicit assumption in much previous research is that categories that are prominent or relevant in a domain will be clearly defined, with specific, agreed upon “codes,” strong boundaries, and clear constraints.

But to the extent that categories and markets are socially constructed, they change over time. The “objective reality” that categories create is under continuous transformation. As a result, category emergence has also been well studied. Researchers tend to agree that in early stages of category formation, meanings are ambiguous while activists battle to construct their social meaning (DiMaggio, 1991; Rao, 1998; Rosa et al., 1999). The formation of organizational categories can be thought of as occurring in stages, where first people cluster organizations based on similarity, next a label is applied that might catch on, and later people come to an agreement that the label is infused with meaning, so that shared expectations develop about what a category member will be or do (Hannan, Pólos, and Carroll, 2007). Labels that have ambiguous meaning are assumed to exist only as they are emerging; those that do not progress to have a commonly accepted meaning are expected to fade away.
On the contrary, we note that in many domains ambiguous market spaces – labels that classify organizations but that are not infused with shared meaning – persist and even flourish. In the software industry during 1990-2002, some of the most important spaces had ambiguous meanings. These include “e-business applications,” “customer relationship management,” “enterprise software,” “enterprise application integration,” and “data mining.” For example, the “enterprise software” space is defined by Capterra as software that targets “any/all types of organizations... any/all industries .. any/all sizes of organizations...[and] include[s] function-specific ... and industry-specific ... solutions.” Wikipedia’s definition begins with “there is no single, widely accepted list of enterprise software characteristics,” and Perlmonks.org dedicates an entire article to trying to define the space, eventually claiming that enterprise software is “software whose failure everyone notices quickly” (Foy, 2005). There is clearly no agreed-upon definition of what it means to be in the space, and Capterra’s serious attempt at defining this market drives more inclusion than exclusion. Compare this to a less ambiguous space, “electronic data interchange (EDI).” This market was defined by the National Institute of Standards and Technology in 1996 as:

EDI is the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments. EDI implies a sequence of messages between two parties, either of whom may serve as originator or recipient... the usual processing of received messages is by computer only. Human intervention...is typically intended only for error conditions... For example, the transmission of binary or textual data is not EDI as defined here. This definition includes technology, sequence, and who may interact with the software. It also explicitly states what would not be considered part of this space, resulting in a much clearer meaning attached to this market. In the software industry, many market spaces evolved to be unambiguous, including “entertainment software,” “digital imaging,” “biometrics,” and “anti-virus software.”

Figure 1 shows category maps of the software industry, where the market spaces are nodes and are linked depending on their overlap with other spaces. The size of the node indicates ambiguity, and as we would expect, highly ambiguous spaces are in the center, overlapping with many other spaces, while less ambiguous spaces are in the periphery. Examination of these plots reveals that many of the best-known market spaces in the software industry during this time period were also highly ambiguous. In addition, some of the largest market spaces were also the most ambiguous, as shown in figure 2. Note, however, that not all ambiguous spaces are large.

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1 http://www.capterra.com/enterprise_software_definition
2 http://en.wikipedia.org/wiki/Enterprise_software

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It seems that market spaces can grow large and be relevant without becoming infused with a clear, specific, and unambiguous meaning. Further, both organizational action and how organizations are perceived can depend on the ambiguity of their market spaces. For instance, organizations that innovate are more likely to pioneer a new market – but only when they are in a clearly defined, constraining market space (Pontikes, 2008). End-users prefer organizations in well defined categories that can be easily understood, while venture capitalists, interested in creating the next “new thing,” gravitate toward ambiguous spaces (Pontikes, 2010). Together, these findings indicate that whether an organization is in an ambiguous versus an unambiguous space has significant consequences. As a result, we think it is important to understand how ambiguous market spaces can grow and flourish.

**Organizational “Fit”**

*Organizational Entry*

In any domain, a manager’s decision to enter a market space is based not only on technical characteristics of its products, but also on more fungible elements such as how its product can be used, its target customers, and of course, the markets that are already established. In many industries – and especially in the software industry – for a given organization there are a number of market spaces that it clearly does not fit into, and a number of spaces in which it could credibly position itself. For example, Coremetrics, a company born in the late 1990s that sold a product that tracked and reported on web-site traffic, initially identified itself as a member of the “e-marketing” space, which implied that it was focused on online marketing. This space could also have included companies that provided email or search marketing, or less technical consulting. It then joined the “business intelligence” space, an older and more established market space that indicated that a company provided in-depth reports on data from across many divisions in an organization. Later, it tried to pioneer a “marketing analytics” space, intended to bring back the focus on marketing but also keep out producers that did not have technical reporting. This space was not especially distinct from the emerging “web analytics” space, which conveyed general reporting metrics for a company’s online site, for any division in a company including information technology. It was a good fit for Coremetrics’ product but did not have the panache of a marketing focus. However, because “marketing analytics” did not take off, Coremetrics entered the “web analytics” space.\(^4\)

\(^4\) From one of the author’s personal experience working in the software industry. Specific examples taken from market space claims in press releases issued between 1998 and 2002.
As this example illustrates, an organization’s decision to enter a market space depends on how well its offerings fit with what potential customers of that space are looking for, and on whether the space is promising. In any domain, at a specific point in time, there will be some market spaces that are emerging, ones that are established, and ones that are in decline. Some spaces will have generated “buzz” while others will be solid but staid; some will have clear boundaries and others will be more ambiguous. How audiences think of these market spaces depends on media and analyst coverage, investment patterns, and which organizations are currently members. Therefore managers make decisions to enter and exit spaces depending on the current notions of the market, but these decisions in turn affect the commonly accepted meaning that defines the space.

The entry decision is partly a framing process, influenced by managers’ cognitive beliefs about particular market spaces (Porac and Thomas, 1990). Given the penalties that arise if an organization is misclassified in a market (Zuckerman, 1999), managers are likely to pay special attention to product-market fit before entering a new market space. For ambiguous spaces, there are a number of different definitions of what an organization must provide to satisfy the demands of the market. Although there is not consensus on any one of them, there is also no disagreement on any one; ambiguity allows organizations to see what they want to see in a market. Managers of many different types of organizations will be able to comfortably frame their offerings as consistent with the space without being readily challenged by competitors or analysts. A rival might allege that the organization is inauthentic – “Coremetrics is not a real e-marketing company” – but without a consensual definition of the space, this claim is difficult to verify. If we think about the constraints market spaces present as barriers to entry, then ambiguous spaces present a lower entry threshold. As a result, we expect that more ambiguous spaces will be more likely to attract organizational entry:

H1: Organizations are more (less) likely to enter more (less) ambiguous market spaces.

Organizational Exit

The purpose of a market is to help clarify what the organization does to relevant audiences such as customers and investors. Because they lack a commonly agreed upon definition, ambiguous market spaces do not provide as much clarity and guidance as do constraining markets. Once an organization enters an ambiguous market, managers may find that the label is not especially useful for attracting customers who want a particular product. For example, an “enterprise software” organization may provide a human resources product that will be of little use to a customer looking for “enterprise software” that helps streamline the supply chain. As previous research suggests, when a label evokes shared meaning, organizations that
match accepted standards will be seen as more credible than those that do not conform, and will benefit (Zuckerman, 1999). When the boundaries of a label are ambiguously defined, conformity is of little value (Ruef and Patterson, 2009; Kovács and Hannan, 2010) and members do not benefit as much from identifying with the label (Negro, Hannan, and Rao, 2010). Because an ambiguous label is a weak signal, it is less valuable at attracting the right types of customers, as compared to a label that is associated with clear and shared definitions. As a result, members of an ambiguous market space will be more likely to exit.

We can also think of this as a selection process, where entry into market spaces “screens” potential entrants. The more stringent the criteria for entry, the more selective the entry process is. At the extreme, a particularly selective entry process allows only those organizations to enter that conform to a small range of well-defined criteria. At the other extreme, more ambiguous market spaces can be entered by a very wide variety of organizations. As such, the entry process into ambiguous market spaces is inherently more exploratory, allowing for greater variability in the qualities of the organizations that end up in the market (March, 1991). Some of these entrants will ultimately find themselves well served by having entered, but the permissive entry-selection process will also let in organizations that ultimately will find no support in the market space. Consequently, the permissive entry-selection process in ambiguous spaces also leads to higher exit rates.

H2: Organizations are more (less) likely to exit a more (less) ambiguous market space.

Together, hypothesis 1 and hypothesis 2 indicate that there is more flow through ambiguous market spaces as compared to well-defined markets. Because permissive boundaries are more inclusive, organizations are more likely to enter ambiguous spaces. But since they do not provide clear guidelines of what people can expect from a member, ambiguous spaces also do not confer the same type of legitimacy. As a result, organizations are also more likely to exit from these spaces. But if the rate of entry is greater than the rate of exit, ambiguous market spaces can grow large and become prominent.

**EXTERNAL INFLUENCE**

Entry decisions are not determined in a vacuum. External actors also influence organizations, especially if they control important resources. For example, government funding set aside for nanotechnology provides scientists incentives to reframe their work as being part of that space (Grodal, 2010). The perception that nanotechnology is resource rich, coupled with its loosely defined boundaries, fuels its growth. In the software industry, venture capitalists prefer
organizations in ambiguous market spaces as investment targets (Pontikes, 2010). Venture capitalists tend to invest in stages and are frequently on the boards of their investments, giving them much influence over the organization (Norton and Tenenbaum, 1993). They have also become increasingly important within this industry; in the United States, the annual amount of venture capital investment tripled between 1991 and 1996, and the software industry is consistently the largest or second largest recipient of this investment (Onorato, 1997). We think their strong influence, coupled with their preference for ambiguous spaces, will push recently funded organizations toward entering ambiguous market spaces.

H3: Organizations that have recently received venture capital funding are more (less) likely to enter a more (less) ambiguous market space, as compared to organizations that have not recently received venture capital funding.

External actors who favor ambiguity can also indirectly propel the growth of ambiguous market spaces. Potential entrants consider the viability of a space, in addition to product-market fit, in their entry decisions. In software, there is a great deal of uncertainty around which market spaces will be viable. As a result, managers will look to the successes of others as a factor in their market entry decisions. For individuals, social comparisons are particularly relevant under conditions of uncertainty (Festinger, 1954). In the context of a changing market space, limited information is available (Levinthal and March, 1993) and decisions must therefore be made on the basis of the few experiences or events. Further, salient events will have a disproportionate effect on a manager’s assessment, so even a few can be powerful – a notorious problem in limited, sequential sampling (Denrell and March, 2001). Under these circumstances, we think that salient successes are powerful symbols of the promise of a market space. Consequently, we think salient positive events in market spaces will influence organizational entry.

Our idea implies that the popularity of market spaces may change quite rapidly. If positive events were simply indicators of the underlying quality of a space – which presumably does not change rapidly – then one might expect the evolution of market spaces to slowly converge on a “correct” level of organizational activity. But salient events trigger a process of social comparison among managers and potential entrepreneurs that can result in an exaggerated assessment of a market. Individuals and organizations imitate high-status others (Burt, 1987; Davis, 1991). Such imitation fuels the diffusion of practices or innovations within an industry (Strang and Soule, 1998) and can lead to the perception of munificence, in turn promoting further market entry (Strang and Macy, 2001). Therefore, when organizations in a space experience positive events, onlookers may attribute their successes to the space and reposition their organization to identify with that space.
H4: The greater (lower) number of positive events in a space, the greater (lower) the ensuing rate of organizational entry into that space.

In the software industry, venture capital fundings are an example of positive events that will influence managers to enter a market space. Venture capitalists have sought-after resources, and are seen as having a keen sense of the direction of the industry. They not only invest in an organization, but also in the potential of a new type of product or market (Tyebjee and Bruno, 1984). As a result, we expect that venture capital investment in an organization is a salient positive event for the organization’s market space. Because venture capitalists are more likely to fund organizations in ambiguous market spaces (Pontikes, 2010), then the tendency for managers to track on positive events will also lead to the growth of ambiguous market spaces. Venture capital investment gives ambiguous spaces credibility that makes them seem promising and viable, while their ambiguous definition accommodates entry for many different types of organizations. A preference for ambiguity by resource-rich actors coupled with the permissive boundaries of ambiguous spaces can set the stage for such markets to persist and flourish.

What happens to organizations that follow common wisdom and enter hyped markets? In order to answer this question, we again look at organizational entry as a selection process. Assuming that organizations are more likely to clear the entry threshold if they are better fit with that market space, then when the entry-selection threshold is high only especially fit organizations will enter. By contrast, when the entry-selection threshold is low, organizations with lower product-market fit also will enter. By shaping perceptions of market spaces, salient positive events shift the entry selection threshold down – at least temporarily. The surge of organizations that enter a market space after such an event is a consequence of this. This indicates that entrants will, on average, be less fit for that particular space, than would have been the case without the positive event (Barnett, Swanson, and Sorenson, 2003). As time passes and the effects of the positive events fade, organizations that entered after a positive event will be less fit on average than others in that market space:

H5: Organizations that enter a space following more (fewer) positive events are more (less) likely to exit that space over time.

Ironically, rather than finding a safe haven in a popular space, organizations that enter market spaces because of venture capitalist attention find themselves ill suited to the space. Again, the same process that lowers the selection threshold for market entry also increases the likelihood of market exit. But if the rate of entry is greater than the rate of exit, positive events can propel the growth of a market space.
**Empirical Test: The Software Industry**

We study these ideas in the context of the software industry between the years 1990 and 2002. This industry is segmented by a large number of market spaces that organizations identify with in order to attract the “right” type of attention from the media, potential investors, customers and employees. It also is populated with entrepreneurial start-up companies, a number of which became markedly and unexpectedly successful, which has created incentives for speculators. Microsoft, Oracle, and Siebel are examples of exceptional successes that enticed entrepreneurs and financiers alike to become the next “new thing.” Venture capitalists, whose funding was essential to this industry, looked to fund companies that were in promising market spaces (among other things). In fact, the tendency of venture capitalists to become “sector speculators” and to invest in companies that were in “hot markets [with] hyped business models” has been cited as a factor that led to the internet bubble and its subsequent collapse (Valliere and Peterson, 2004). Thus, market spaces – and their reputations – are important to the dynamics within this industry.

Software has been around since computers were commercialized in the 1950s, but initially software was not considered a distinct product. In 1957 FORTRAN, the first higher-level programming language, was created. This allowed programmers to code software to run on many different machines and set the stage for software began to be thought of as a distinct product. The software industry began to be referred to as such in the mid to late 1960s around IBM’s 1968 decision to unbundle hardware and software. This provided an opportunity for independent vendors to thrive (Steinmueller, 1995; Campbell-Kelly, 2003).

In the 1970s market spaces emerged that segmented the industry. The main division was between “system” and “application” software, which was subdivided into industry classifications. The invention of the personal computer in the 1980s provided opportunities for organizations to pioneer new market spaces. In 1982 the “productivity application” space emerged, which included spreadsheets, word processing, and personal databases. Later in the decade, growing hardware markets for printers, modems, and hard disks gave rise to the market space for “utility software,” (Steinmueller, 1995). In the 1990’s a number of new spaces came about including “network management tools”, “ERP”, “security software”, “object management software”, “middleware”, “financial applications”, “human resource management”, “CAD”, and “integrated voice response systems,” (Frye and Melewski, 1995).

In 1991, Tim Berners-Lee and Robert Calliau, researchers at CERN in Switzerland, released the HTML document format and the HTTP protocol that ran on the existing TCP/IP

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5 The ENIAC, the first fully functional digital computer, was completed in 1946 for the U.S. government. Computers were sold for commercial use beginning in the 1950s.
network infrastructure on the Internet at large, which they dubbed as the World Wide Web. These advances created the internet as we know it today and brought another opportunity for software vendors (Fabrizio and Mowery, 2007). Existing companies shifted focus to creating client/server products that could be used over the World Wide Web (Geppert, 1998). The Internet provided a scalable answer to client/server computing that software companies scrambled to provide, and the boom of the late 1990’s fueled the growth of software companies. They began to focus on “data mining,” “OLAP (On-Line Analytical Processing),” “object-oriented programming,” and “Customer Relationship Management (CRM)” (Comerford, 1998; Hayes, 2000).

The software industry has historically been segmented by many different market spaces. Although it is a technical domain, these markets are also socially constructed around technologies, resulting in a number of market spaces that are quite vaguely defined. In fact, ambiguous market spaces often became the largest and best known in this industry. Further, venture capitalists are a prominent external influence that favor ambiguity and play an active role in market creation. As a result, this context provides a good setting to investigate how ambiguous market spaces can grow and flourish.

DATA AND METHODS

To test the hypotheses in this paper, we must have data on organizational membership in market spaces, within an industry that is segmented by many different spaces. As described above, the software industry is a good context for this type of analysis. It is important to include both market spaces that became large and important as well as those that never caught on. In the software industry, organizations often attempted to “try on” new market spaces, or even pioneer new labels, to test out whether that identity resonated with the market. Some organizations would enter new spaces quite frequently, while others maintained a more consistent identity. As described above, organizations used market spaces as a first stage in describing what their products were and what they could be used for. Sometimes organizations entered new market spaces with a new product; other times they would enter a new space by reframing the same product based on its use or target customer base. When organizations would enter new market spaces, they would broadcast the changed identity to employees at quarterly meetings (or more regular meetings, especially for externally focused sales and marketing departments), and update their Web sites and brochures. The market space provided the starting point for sales people in

6 The project began in 1989 and was released internally at CERN in 1990. It was made generally available in 1991.
their introductory calls and was the standard tag line on presentations. In this way, it provided the foundation for an organization’s identity.

Organizations would use these tag lines in press releases. Software organizations issued press releases to announce all types of news: a new vice president, a new product, a new partnership, having received venture capital funding, or any other notable event. Press releases are featured prominently on the organization’s Web site, usually as “news,” and managers hoped that they would be picked up by the media or by analysts. Within each press release, software organizations identified themselves through market space claims. For example, in a press release from February 2000, Citrix systems states, “Citrix Systems, Inc. is a global leader in application server software and services,” (figure 3 lists other examples of identity statements from press releases in these data). It is likely that most press releases were never read by anyone outside the organization, and so the press release itself is not especially consequential. What press releases provide is a written record of the market space identities organizations claimed over time. There is a low barrier to issuing a press release, so they contain many small and otherwise difficult to track organizations. In addition, they contain any market space that an organization tried to claim; there is no gatekeeper that prevented organizations from identifying with different labels. Unlike compiled lists that force organizations to choose their market from a list created by an outsider, press releases provide the many different market spaces that were both well established and those that organizations were attempting to pioneer. As a result, they provide rich data on market spaces and organizational membership in these spaces.

We use press releases to assemble data on the market spaces organizations claimed to be in at a specific point in time. Our initial source is all press releases issued through Businesswire, PR Newswire, and Computerwire from 1990 until 2002 that contained at least three mentions of the word “software.” There are 268,963 of these. A combination of custom coded text-matching programs and manual examination of these programs’ output resulted in 4,573 software organizations that issued press releases during this period. The identity statements made by these organizations indicate category membership. An extensive list of software categories was assembled from articles in Software Magazine and Computerworld, and from the business sectors listed in Software Magazine’s Software 500. Text matching programs searched all identity statements for these categories. This provided the organizations’ category membership for each year between 1990 and 2002. The final data contain 455 categories and 4,573 organizations.

Figure 1 shows maps of market spaces in the software industry for selected years. These are network plots where the number of overlapping members link spaces. The size of each node

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7 We include press releases from 1989 to construct variables to estimate outcomes in the year 1990.
is based on category leniency, defined in detail below, which measures ambiguity. These plots show that very ambiguous (high-leniency) market spaces are more central and overlap with many other categories. This is expected, since ambiguous categories present fewer constraints on members within identity space. These plots show the extensive category structure of the software industry, and how it changes over time.

With these data, we are able to investigate our hypotheses at the dyadic level for organizations and market spaces. A dyadic analysis allows us to use both organizational and market space covariates to predict organizational entry and exit. For our entry analysis data include dyads of organizations paired with market spaces in which they are not already members, for the years in which the organization is issuing press releases.\(^8\) We only include a dyad if the organization has never previously claimed membership in the space. Our data contain 1,894,598 potential organization-market space pairs, 23,693 market space entries, and 6,512,579 organization-space-years. For our exit analysis, data include dyads for each organization and the spaces in which it claims membership in the current year. Our data include 21,651 organization-market space pairs and 13,930 market space exits over 39,517 organization-space-years.

**Dependent Variables**

We use market space entry as the dependent variable to test hypothesis 1, hypothesis 3, and hypothesis 4. This is a binary variable that equals 1 if the organization enters the space from the dyad in the current year, and 0 if the organization does not enter that space. We code market entry as 1 only if the organization has never previously claimed to be a member of that market space.

We use market space exit as the dependent variable to test hypothesis 2 and hypothesis 5. This is a binary variable that equals 1 if the organization exits the space from the dyad in the current year, and 0 if the organization does not exit the space. We code exit as 1 in the last year that the organization from the dyad claims membership in the market space from the dyad. Therefore, if an organization exits and re-enters a space, only the final exit is coded as a 1. Our data include the years 1990 through 2002, so we cannot define market exit for the year 2002. As a result, we run our exit analysis for the years 1990 through 2001.

**Independent Variables**

\(^8\) For organizations that “skip” years in terms of claiming market spaces in press releases, we attribute the previous year’s market space claims to the skipped year.
We test hypotheses 1 and 2 using market space ambiguity. We test hypothesis 3 by interacting the ambiguity of the space from the dyad with a dummy variable that indicates whether the organization received venture capital funding: (market space ambiguity) x (recently received venture capital funding). We test hypotheses 4-5 using the number of venture capital funding events for members of a market space. All variables are measured as of the beginning of each time period.

Category Ambiguity

Category ambiguity is measured using leniency, which captures the extent to which a market space overlaps with many others in its domain. Previous research shows that when members of an organizational form or product market identify elsewhere, the market is less likely to develop an agreed-upon social meaning (McKendrick and Carroll, 2001; McKendrick et al., 2003), and a previously well-defined market space can become blurry (Phillips and Kim, 2009). For example “nanotechnology,” a vaguely defined discipline, overlaps with many other disciplines such as molecular physics, materials science, chemistry, biology, computer science, electrical engineering, and mechanical engineering. In the software industry, the ambiguous market space “enterprise software” overlaps with almost 150 other categories in the late 1990s and early 2000s (see figure 1 for other examples). Market spaces that have such broad overlap do not impose strong constraints in identity space, as members are not restricted from identifying with almost any other market. In this way, these spaces are lenient; they have porous boundaries and are unlikely to convey a well-defined social meaning. Therefore, high leniency indicates that a category is vague and ambiguous.

Mathematically, leniency is calculated by multiplying the proportion of members that identify with at least one other market space, by the number of distinct other spaces with which they identify.9 We conceive of categories as fuzzy sets, so that an organization can have partial membership in a market space. Thus, an organization can be “sort of” a “database” company, but primarily in “security software.” Research in cognitive psychology indicates that this is the way that people conceive of categories (Rosch and Mervis, 1975). Allowing organizations to have partial membership can provide a more realistic picture of how “folk categories” operate in markets (Hannan, 2010). Thus, we allow organizations to have degrees, or grades, of membership in a market space. We suggest that the more frequently an organization claims membership in a space, the stronger its tie to that market. Therefore, we calculate an

9 Multiplying by the proportion of members that identify with at least one other category ensures that if only one member is in many categories, it does not overly influence the measure. Multiplying by the number of distinct categories distinguishes a category that overlaps with many categories from a category that has a strong degree of overlap with one or two others. The number of distinct categories is counted across all organizational members, so that a category can be very lenient even if every member only identifies with only one other category. In this way leniency is category-level construct, and does simply capture the generalism of its members.
organization’s grade of membership in a market space by dividing (the number of times an organization mentions the market space in press releases), by (the number of times it mentions any market space), for each year. Grade of membership takes values between 0 and 1. Weighting organizations by grade of membership ensures that one generalist organization does not contribute too heavily to market-space-level measures.

For market spaces that contain dedicated members, the average grade of membership will be close to 1. For those where members primarily identify somewhere else, average grade of membership will approach zero. The contrast of a market space, or the average grade of membership, \( \frac{N_{GOM}}{N} \) captures this distinction (Hannan, Pólos, and Carroll, 2007). Here, \( N_{GOM} \) is the number of members in a market space weighted grade of membership. N is the number of organizations with non-zero membership. The opposite of contrast is fuzziness, \( fuzzi_{MS} = 1 - \text{contrast}_{MS} \). Fuzziness can be thought of as the proportion of non-dedicated members in a market space. Note that a market space can have high fuzziness if it shares members with only one other space. To capture whether a space broadly overlaps with many others, leniency multiplies fuzziness by the (natural log of the) number of distinct other market spaces with which members identify. Leniency is measured every year as the ambiguity of a market space can change over time.

\[
\text{leniency}_{MS} = fuzzi_{MS} \cdot \ln(N_{ocal})
\]  

(1)

The distribution of leniency for software market spaces is illustrated in figure 4.

--- Insert figure 4 here ---

Venture capital funding events

We use the number of organizational members in a market space that receive venture capital funding as a measure of positive events. We sum the number of organizations that receive venture capital funding, weighted by their grade of membership in the space. We use a three year window, and because the measure is skewed, we use the natural log of this measure in our models.

Control Variables

We include a number of market-space-level and organizational-level variables in our model to control for the propensity of certain types of markets to attract many entries and for certain types of organizations to enter markets. For space characteristics, we include market space density, or the number of organizations who claim to be in a market space (weighted by grade of membership), to account for the possibility that populated spaces might attract more entries. We
also include the number of organizations that entered and exited the space (also weighted by grade of membership) to account for whether the space is growing or declining in popularity. Finally, we included the age of the market space measured since 1990 (the inception of our data).

Organizational-level controls include whether the organization was in *Software Magazine’s Software 500*, an annual ranking of software organizations by revenue, to account for heterogeneity in size and quality. Organizations may be more likely to enter new spaces after receiving new investments, so we also include whether the organization has received venture capital funding. We also include the time since an organization has last entered any category, and the age of the organization, measured since 1990 (the inception of our data). All independent and control variables are measured as of the beginning of each time period.

**Model**

To test our hypotheses we estimate, in separate models, the instantaneous hazard rate of an organization’s entry into and exit from the market space of the organization-space dyad. This estimates the instantaneous likelihood that the organization enters or exits a particular market space during time period $\Delta t$ in the limit where $t \to 0$, and can be operationalized in terms of two random variables: $Y(t)$, which indicates whether an organization enters or exits a market space at time $t$, and $t_n$, the time of its entry or exit:

$$r(t) = \lim_{\Delta t \to 0} \frac{\Pr(Y(t - t_n + \Delta t) | Y(t - t_n) = 0)}{\Delta t}$$

This rate is estimated as a function of the independent and control variables listed above:

$$r(t - t_n) = r_0(t - t_n) \cdot \exp(\beta_{\text{ind}} \cdot x_{\text{ind}} + \alpha_{\text{control}} \cdot x_{\text{control}}) + \epsilon$$

We use piecewise continuous hazard rate models to estimate our model using the stpiece routine in Stata 11 written by Jesper Sørensen. Robust standard errors are used, clustered by market space.

**Results**

Table 1 provides descriptive statistics for the organization-market-space dyads in our entry data. These data contain all “potential” pairings of organizations with market spaces. Table 2 provides
descriptive statistics for the organization-market-space dyads in our exit data, which contain all actual pairings of organizations and market spaces.

---- Insert tables 1 and 2 about here ----

Table 3 contains entry models, and model 1 includes controls only. It shows market spaces that are large and that have a lot of recent entries are more likely to attract entries, while spaces with recent exits are less likely to have entries, significant at p<0.05. This indicates that organizations look to the choices of others when entering markets. Older spaces are also more likely to attract entrants, significant at p<0.05 in this model, although the effect is not robust to the inclusion of ambiguity. Organizations that are in the Software 500 are more likely to enter a new space (p<0.05), suggesting that resources may affect an organizations ability (or perceived ability) to expand or change. Receiving venture capital funding also promotes entry, significant at p<0.05, which supports the idea that venture capitalists influence the market direction of target investments. As we would expect, an organization has recently entered a new space it is less likely to do so again (significant at p<0.05). The effect of organization age is not significant in model 1, although it becomes positive and significant at p<0.05 when market space ambiguity is included.

----- Insert table 3 about here -----

Model 2 tests hypothesis 1. It includes the ambiguity of the market space from the organization-space dyad (measured by leniency). Results show that the more ambiguous the space, the more likely an organization will enter it, significant at p<0.05. Model 2 is also an improvement in fit over model 1 at p<0.05, providing strong support for hypothesis 1. Ambiguous market spaces are much more likely to attract entry as compared to unambiguous spaces. These results show that an organization is more than twice as likely to enter a market space with mean ambiguity, and six times more likely to enter a space one standard deviation above mean ambiguity, as compared to an unambiguous space.10 Figure 5 plots these effects.

------ Insert figure 5 about here ------

Table 4 reports exit models, and model 5 contains controls only. Results show that organizations are less likely to exit large market spaces, significant at p<0.05. Note that large spaces both increase entry and decrease exit. This may be because the size of a space indicates that there is stable customer demand, or other types of resources. Recent entries do not affect exit, but recent exits have a positive effect, significant at p<0.05. This may pick up on changing external conditions that make a space less desirable. The age of a market space does not show a

10 From table 1, the mean level of market space ambiguity is 1.4, and one standard deviation above the mean is 2.4 in the entry data.
significant effect. Organizations that are in software magazine and older organizations are more likely to exit spaces, significant at p<0.05. Together with the entry finding, this may indicate that organizations rich in resources are more willing or able to change their identities. Those that receive venture capital funding are also more likely to exit (p<0.05), again indicating that these types of investors influence the market identities of their investments.

----- Insert table 4 about here ------

Model 6 tests hypothesis 2 by including the ambiguity of the market space. Results show that organizations are more likely to exit ambiguous market spaces, significant at p<0.05. Model 6 is an improvement over model 5 at p<0.05, providing strong support for hypothesis 2. Organizations are 15% more likely to exit a space of average ambiguity, and 19% more likely to exit spaces one standard deviation above average ambiguity, as compared to an unambiguous space.11 Thus organizations are more likely to both enter and exit ambiguous market spaces. The rate of entry is much higher than the rate of exit, helping to explain the prominence of ambiguous market spaces in this domain.

It may be useful to compare this effect to the results for market space density. Entry and exit rates are symmetric for this variable; as density increases, entry increases and exit decreases. Large market spaces are more attractive than small spaces to both potential entrants and to existing members. In the case of ambiguity, more ambiguous spaces yield higher entry and higher exit rates. Thus ambiguous spaces are more attractive to potential entrants, but less attractive to existing members. These results are consistent with previous literature that suggests that ambiguously defined markets do not provide as much advantage to organizations as those with a clearer definition; once an organization is in an ambiguous space, it is more likely to leave. But they also indicate that considerations of product-market fit can fuel entry and hence the growth of ambiguous spaces.

Model 3 (table 3) tests hypothesis 3, which states that organizations that recently received venture capital funding are more likely to enter ambiguous market spaces. Results show the interaction between an organization receiving venture capital funding and market space ambiguity is positive and significant at p<0.05. An organization that receives venture capital funding is 9% more likely to enter an ambiguous space, compared to an organization that did not receive venture capital funding. Also note that when the interaction is included the positive effect of an organization that received venture capital funding loses its significance due to a reduction in the coefficient (note that model 3 is an improvement in fit over model 2 at p<0.05). This indicates that organizations that receive venture capital funding are not simply more likely to

11 From table 2, the mean level of market space ambiguity is 2.1, and one standard deviation above the mean is 3.0, for the exit data.
enter any market space; rather they are more likely to enter ambiguous market spaces. For comparison purposes, model 7 in table 4 includes the interaction in exit models. The effect is insignificant due to a small coefficient. Organizations that receive venture capital funding are more likely to enter ambiguous categories, but not exit them. Together, this provides further support for the venture capitalist preference for ambiguity, and indicates that this preference may fuel the growth of ambiguous spaces.

Model 4 (table 3) tests hypothesis 4, that the more positive events in a space, the more likely organizations will enter. Results support this hypothesis. The number of venture capital fundings a space receives in the past three years has a positive effect on market entry, significant at p<0.05. An organization is 2.9 times more likely to enter a market space where five members have received venture capital funding, as compared to a space that has received none. Figure 6 plots this effect.

--- Insert figure 6 about here -----

Model 8 (table 4) tests hypothesis 5, which suggests that organizations that rush into market spaces following venture capital funding will have a poor product-market fit, and thus be more likely to exit over time. To test this hypothesis, model 8 includes the venture capital funding a space received at the time of the organization’s entry into the space. This variable is included in the time pieces, which allows the magnitude of the effect to change with the organization’s tenure in the market space. Results provide strong support for this hypothesis. Organizations that entered market spaces following venture capital funding are significantly more likely to exit after only one year in the space. An organization that enters a space after five venture capital funding events will be 17% more likely to leave after one year. The longer the organization remains in the space, the larger the effect. The same organization, entering a space after five positive events, is 39% more likely to exit if it remains in the space for four years. These results are illustrated in figure 7.

--- Insert figure 7 about here -----

**DISCUSSION**

Although organizational theorists have maintained that only well-defined markets will become prominent, here we note many instances where ambiguous market “spaces” emerge to become some of the most important in a domain. The software industry provides many examples of this; in fact, a large number of the most important market spaces in this industry were also highly ambiguous. But this phenomenon is by no means restricted to software. From
“nanotechnology” in science to “social entrepreneurship” in business to “leadership” curricula offered at many schools of business, ambiguously defined spaces abound. But why? If the purpose of a market space is to clearly define what an organization does, how can ambiguous spaces flourish?

Attention to entry selection processes can help to explain the persistence of ambiguous market spaces. Although ambiguous spaces do not provide members as much clarity and credibility as well-defined markets, they allow a wide range of organizations to plausibly position their products in that space. If entry decisions are based both on product-market fit and on the viability of a particular market, ambiguous market spaces will be more attractive to more organizations in terms of the first criterion. Ambiguity allows managers to form their own definitions of what the space “really is,” and perhaps even hope to position their organization as central in the new competitive sphere. In this way, ambiguous market spaces provide a lower threshold for entry in terms of product-market fit. Results show organizations are much more likely to enter ambiguous spaces, supporting these ideas. But once an organization enters an ambiguous space, the realities of the market set in. It is easier to spin a tale where an organization will dominate a market space prior to entry. After joining a market space, sales numbers, media coverage, and recruiting indicate how the organization fares with respect to its competitors. If ambiguous spaces do not provide as much value as do well-defined markets, we should expect a higher rate of exit. Indeed, findings also support this idea.

Together, these results indicate that there is more flow through ambiguous spaces, with organizations both entering and exiting at higher rates. This explains how ambiguous spaces can grow large, but does not mean that they will necessarily grow large. In the case studied here, entry rates into ambiguous spaces are much higher than exit rates, which is consistent with the observation that some of the largest markets in the software industry were also the most ambiguous. Entry rates may be higher than exit rates when pressures for organizations to find a satisfactory product-market fit outweigh the challenges that arise when a market is not well defined. In an industry where products tend to be unique and where the focus is on innovation, it is possible that the flexibility ambiguous boundaries can afford outweigh benefits associated with constructing a clear and commonly accepted definition for a market.

Results also indicate that external influences drive the growth of ambiguous market spaces. In this context, venture capitalists are an important resource for software organizations, and they tend to prefer funding organizations that are in ambiguous market spaces (Pontikes, 2010). Findings here are show that recently funded organizations are more likely to join ambiguous spaces, consistent with the notion that venture capitalists influence entry decisions. They may also indirectly fuel the growth of ambiguous spaces. If venture capitalists fund organizations in ambiguous spaces, and if organizations enter market spaces following venture
capital investment, then we should expect ambiguous spaces to grow large. Results provide support for this indirect effect as well. Organizations are significantly more likely to enter market spaces that have received venture capital funding. We suggest that positive events such as venture capital funding lower the threshold for entry, because the space will seem more viable, thus encouraging entry. This sets the stage for a flood of entries, with some organizations forcing the fit between their products and what customers are generally looking for from that market space. As a result, over time, organizations that enter following positive events are also more likely to exit. But again, the rate of entry in this context is much higher than the rate of exit, indicating that the net effect is that venture capital investment leads to market space growth.

These hypotheses have implications regarding boom and bust cycles that characterize market spaces. They suggest that these cycles partly result from managers’ perceptions of the munificence of a space. Indeed, in previous research much discussion about waves of entries into promising new markets highlights psychological factors. Camerer and Lovallo (1999) point to high numbers of foundings followed by high rates of organizational failures as symptoms of “overconfidence” by entrepreneurs making entry decisions. Barbarino and Jovanovic’s (2007) theoretical model depicts how optimism can produce boom and bust cycles of overcapacity and “shake out” over time. In contrast, Moore et al. (2007) claim that both booms and busts follow from myopic self-focus among entrepreneurs, so that they are over-confident in “easy” markets and under-confident in “difficult” ones. Interview data and lab experiments support their claims, and raise a question about the specific psychological processes that underlie observed patterns of founding activity. Results here suggest that managerial perceptions, both about the “ease” of product-market fit and the viability of markets, may also lead to such cycles.

Finally, these results indicate that there may be much to gain from modeling entry as a selection process. Growth can result from either high entry or low exit, but often it is assumed that both will operate when there is explosive growth. On the contrary, here we show that at times the same process that leads to high rates of entry can also lead to high rates of exit. For example, ambiguity both lowers the entry-selection threshold in terms of an organization’s product-market fit, and at the same time reduces the benefit an organization can receive from affiliating with the market. In addition, lowering the entry selection threshold on one dimension can result in a mismatch on another dimension. Here, market spaces that receive venture capital funding create the perception that the space is viable attracting increased organizational entry. But this also means that more organizations will force a product-market fit in order to move into the desirable market. Once there, they will be ill suited to the requirements of the space, leading to increased rates of exit. Overall, we suggest that by modeling entry and exit as separate processes, we can gain a clearer understanding of market evolution.
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Valliere, D. and R. Peterson

White, H.

Zbaracki, M.

Zuckerman, E.
### Tables

**Table 1. Descriptive statistics for market space entry.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization enters market space</td>
<td>0.0036</td>
<td>0.0602</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Market space ambiguity</td>
<td>1.402</td>
<td>0.9914</td>
<td>0</td>
<td>4.063</td>
</tr>
<tr>
<td>Organization received VC funding last year × market space ambiguity</td>
<td>0.1246</td>
<td>0.5076</td>
<td>0</td>
<td>4.063</td>
</tr>
<tr>
<td>Number of venture capital fundings of organizations in space (3-year window, logged)</td>
<td>0.4556</td>
<td>0.6492</td>
<td>0</td>
<td>4.090</td>
</tr>
<tr>
<td>Market space density</td>
<td>4.707</td>
<td>10.39</td>
<td>0</td>
<td>163.6</td>
</tr>
<tr>
<td>Entries into space</td>
<td>2.316</td>
<td>5.490</td>
<td>0</td>
<td>86.7</td>
</tr>
<tr>
<td>Exits from space</td>
<td>2.086</td>
<td>5.247</td>
<td>0</td>
<td>102.7</td>
</tr>
<tr>
<td>Age of market space (since 1990)</td>
<td>5.795</td>
<td>3.666</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Organization was in software magazine last year</td>
<td>0.1356</td>
<td>0.3423</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Organization received vc funding last year</td>
<td>0.0812</td>
<td>0.2731</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Time since organization last entered a category</td>
<td>1.083</td>
<td>1.509</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Organization age (since 1990)</td>
<td>2.820</td>
<td>2.852</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Year</td>
<td>1999</td>
<td>2.602</td>
<td>1990</td>
<td>2002</td>
</tr>
</tbody>
</table>

1 These data contain 1,894,598 potential organization-market space pairs for the years 1990 through 2002. There are 23,693 market space entries over 6,512,579 organization-space-years.
Table 2. Descriptive statistics for market space exit.¹

<table>
<thead>
<tr>
<th>Metric</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization exits market space</td>
<td>0.3525</td>
<td>0.4778</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Market space ambiguity</td>
<td>2.102</td>
<td>0.8961</td>
<td>0</td>
<td>4.046</td>
</tr>
<tr>
<td>Organization received VC funding last year x market space ambiguity</td>
<td>0.2046</td>
<td>0.7043</td>
<td>0</td>
<td>4.046</td>
</tr>
<tr>
<td>Number of venture capital fundings of organizations in space (3-year window, logged)</td>
<td>1.231</td>
<td>1.058</td>
<td>0</td>
<td>3.921</td>
</tr>
<tr>
<td>Market space density</td>
<td>23.26</td>
<td>33.23</td>
<td>0</td>
<td>163.6</td>
</tr>
<tr>
<td>Entries into space</td>
<td>12.09</td>
<td>18.16</td>
<td>0</td>
<td>86.70</td>
</tr>
<tr>
<td>Exits from space</td>
<td>9.34</td>
<td>15.24</td>
<td>0</td>
<td>80.21</td>
</tr>
<tr>
<td>Age of market space (since 1990)</td>
<td>6.889</td>
<td>3.232</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Organization was in software magazine last year</td>
<td>0.2185</td>
<td>0.4132</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Organization received vc funding last year</td>
<td>0.0887</td>
<td>0.2844</td>
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<td>1</td>
</tr>
<tr>
<td>Organization age (since 1990)</td>
<td>3.102</td>
<td>2.984</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Year</td>
<td>1998</td>
<td>2.746</td>
<td>1990</td>
<td>2001</td>
</tr>
</tbody>
</table>

¹ These data contain 21,651 organization-market space pairs for the years 1990 through 2001. There are 13,930 market space exits over 39,517 organization-space-years.
Table 3. Piecewise continuous hazard rate models on the rate of organizational entry into a market space.\(^1\)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market space ambiguity</td>
<td>0.7597*</td>
<td>0.7521*</td>
<td>0.5396*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0433)</td>
<td>(0.0434)</td>
<td>(0.0311)</td>
<td></td>
</tr>
<tr>
<td>Organization received VC funding last year x market space ambiguity</td>
<td>0.0934*</td>
<td></td>
<td>0.0801*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0353)</td>
<td></td>
<td>(0.0330)</td>
<td></td>
</tr>
<tr>
<td>Number of venture capital fundings of organizations in space (3-year window, logged)</td>
<td></td>
<td></td>
<td>0.6475*</td>
<td>(0.0438)</td>
</tr>
<tr>
<td>Market space density</td>
<td>0.0230*</td>
<td>0.0280*</td>
<td>0.0282*</td>
<td>0.0155*</td>
</tr>
<tr>
<td></td>
<td>(0.0068)</td>
<td>(0.0039)</td>
<td>(0.0039)</td>
<td>(0.0042)</td>
</tr>
<tr>
<td>Entries into space</td>
<td>0.0466*</td>
<td>0.0236*</td>
<td>0.0235*</td>
<td>0.0200*</td>
</tr>
<tr>
<td></td>
<td>(0.0107)</td>
<td>(0.0084)</td>
<td>(0.0084)</td>
<td>(0.0081)</td>
</tr>
<tr>
<td>Exits from space</td>
<td>-0.0382*</td>
<td>-0.0367*</td>
<td>-0.0369*</td>
<td>-0.0352*</td>
</tr>
<tr>
<td></td>
<td>(0.0091)</td>
<td>(0.0077)</td>
<td>(0.0077)</td>
<td>(0.0088)</td>
</tr>
<tr>
<td>Age of market space (since 1990)</td>
<td>0.0634*</td>
<td>0.0103</td>
<td>0.0103</td>
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<td>(0.0161)</td>
<td>(0.0119)</td>
<td>(0.0119)</td>
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<tr>
<td>Organization was in software magazine last year</td>
<td>0.6279*</td>
<td>0.6734*</td>
<td>0.6743*</td>
<td>0.6740*</td>
</tr>
<tr>
<td></td>
<td>(0.0334)</td>
<td>(0.0353)</td>
<td>(0.0352)</td>
<td>(0.0352)</td>
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<tr>
<td>Organization received vc funding last year</td>
<td>0.2592*</td>
<td>0.3182*</td>
<td>0.1035</td>
<td>0.1275+</td>
</tr>
<tr>
<td></td>
<td>(0.0365)</td>
<td>(0.0369)</td>
<td>(0.0801)</td>
<td>(0.0757)</td>
</tr>
<tr>
<td>Time since organization last entered a category</td>
<td>-0.1077*</td>
<td>-0.0883*</td>
<td>-0.0881*</td>
<td>-0.0905*</td>
</tr>
<tr>
<td></td>
<td>(0.0090)</td>
<td>(0.0081)</td>
<td>(0.0081)</td>
<td>(0.0079)</td>
</tr>
<tr>
<td>Organization age (since 1990)</td>
<td>0.0017</td>
<td>0.0266*</td>
<td>0.0269*</td>
<td>0.0313*</td>
</tr>
<tr>
<td></td>
<td>(0.0078)</td>
<td>(0.0069)</td>
<td>(0.0069)</td>
<td>(0.0066)</td>
</tr>
<tr>
<td>Time piece: 0-1 year</td>
<td>-6.006*</td>
<td>-7.172*</td>
<td>-7.156*</td>
<td>-7.215*</td>
</tr>
<tr>
<td></td>
<td>(0.1492)</td>
<td>(0.1362)</td>
<td>(0.1358)</td>
<td>(0.1040)</td>
</tr>
<tr>
<td>Time piece: 1-2 years</td>
<td>-6.529*</td>
<td>-7.854*</td>
<td>-7.839*</td>
<td>-7.865*</td>
</tr>
<tr>
<td></td>
<td>(0.1628)</td>
<td>(0.1432)</td>
<td>(0.1429)</td>
<td>(0.1079)</td>
</tr>
<tr>
<td>Time piece: 2-4 years</td>
<td>-6.355*</td>
<td>-7.900*</td>
<td>-7.885*</td>
<td>-7.944*</td>
</tr>
<tr>
<td></td>
<td>(0.1768)</td>
<td>(0.1503)</td>
<td>(0.1499)</td>
<td>(0.1117)</td>
</tr>
<tr>
<td>Time piece: 4+ years</td>
<td>-6.485*</td>
<td>-7.923*</td>
<td>-7.908*</td>
<td>-7.999*</td>
</tr>
<tr>
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<td>(0.1893)</td>
<td>(0.1663)</td>
<td>(0.1661)</td>
<td>(0.1261)</td>
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<tr>
<td>Year Dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Log pseudolikelihood</td>
<td>-133,590.22</td>
<td>-129,747.63</td>
<td>-129,740.52</td>
<td>-128,531.55</td>
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</tbody>
</table>

\(^1\) Models are run on 1,894,598 potential organization-market space pairs for the years 1990 through 2002. There are 23,693 market space entries over 6,512,579 organization-space-years. Standard errors are clustered by market space. All independent variables are measured at the start of each time period.
Table 4. Piecewise continuous hazard rate models on the rate of organizational exit from a market space.  

<table>
<thead>
<tr>
<th>Model</th>
<th>VC funding events at organization's entry, time in space (0-1 years)</th>
<th>VC funding events at organization's entry, time in space (1-2 years)</th>
<th>VC funding events at organization's entry, time in space (2-4 years)</th>
<th>VC funding events at organization's entry, time in space (4+ years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.0319</td>
<td>0.0953*</td>
<td>0.1279*</td>
<td>0.2044*</td>
</tr>
<tr>
<td></td>
<td>(0.0302)</td>
<td>(0.0333)</td>
<td>(0.0416)</td>
<td>(0.0609)</td>
</tr>
<tr>
<td>6</td>
<td>0.0953*</td>
<td>0.1279*</td>
<td>0.2044*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0333)</td>
<td>(0.0416)</td>
<td>(0.0609)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.1279*</td>
<td>0.2044*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0416)</td>
<td>(0.0609)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.2044*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0609)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
<th>Model 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market space ambiguity</td>
<td>0.0614*</td>
<td>0.0613*</td>
<td>0.0614*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0170)</td>
<td>(0.0173)</td>
<td>(0.0181)</td>
<td></td>
</tr>
<tr>
<td>Organization received VC funding last year x market space ambiguity</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0295)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of venture capital fundings of organizations in space (3-year window, logged)</td>
<td></td>
<td>-0.0426</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0371)</td>
<td></td>
<td></td>
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<tr>
<td>Market space density</td>
<td>-0.0073*</td>
<td>-0.0068*</td>
<td>-0.0068*</td>
<td>-0.0080*</td>
</tr>
<tr>
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<td>(0.0033)</td>
<td>(0.0031)</td>
<td>(0.0031)</td>
<td>(0.0032)</td>
</tr>
<tr>
<td>Entries into space</td>
<td>-0.0058</td>
<td>-0.0084*</td>
<td>-0.0084*</td>
<td>-0.0059</td>
</tr>
<tr>
<td></td>
<td>(0.0034)</td>
<td>(0.0032)</td>
<td>(0.0032)</td>
<td>(0.0032)</td>
</tr>
<tr>
<td>Exits from space</td>
<td>0.0221*</td>
<td>0.0230*</td>
<td>0.0230*</td>
<td>0.0221*</td>
</tr>
<tr>
<td></td>
<td>(0.0044)</td>
<td>(0.0042)</td>
<td>(0.0042)</td>
<td>(0.0040)</td>
</tr>
<tr>
<td>Age of market space (since 1990)</td>
<td>-0.0025</td>
<td>-0.0059</td>
<td>-0.006</td>
<td>-0.0058</td>
</tr>
<tr>
<td></td>
<td>(0.0052)</td>
<td>(0.0055)</td>
<td>(0.0055)</td>
<td>(0.0054)</td>
</tr>
<tr>
<td>Organization was in software magazine last year</td>
<td>0.1616*</td>
<td>0.1502*</td>
<td>0.1502*</td>
<td>0.1492*</td>
</tr>
<tr>
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<td>(0.0268)</td>
<td>(0.0265)</td>
<td>(0.0266)</td>
<td>(0.0265)</td>
</tr>
<tr>
<td>Organization received venture capital funding last year</td>
<td>0.1671*</td>
<td>0.1624*</td>
<td>0.1600*</td>
<td>0.1636*</td>
</tr>
<tr>
<td></td>
<td>(0.0255)</td>
<td>(0.0254)</td>
<td>(0.0777)</td>
<td>(0.0258)</td>
</tr>
<tr>
<td>Organization age (since 1990)</td>
<td>0.0435*</td>
<td>0.0433*</td>
<td>0.0433*</td>
<td>0.0442*</td>
</tr>
<tr>
<td></td>
<td>(0.0037)</td>
<td>(0.0037)</td>
<td>(0.0037)</td>
<td>(0.0036)</td>
</tr>
<tr>
<td>Time in market space: 0-1 year</td>
<td>-1.570*</td>
<td>-1.621*</td>
<td>-1.621*</td>
<td>-1.597*</td>
</tr>
<tr>
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<td>(0.1024)</td>
<td>(0.1063)</td>
<td>(0.1066)</td>
<td>(0.1079)</td>
</tr>
<tr>
<td>Time in market space: 1-2 years</td>
<td>-1.855*</td>
<td>-1.908*</td>
<td>-1.908*</td>
<td>-1.936*</td>
</tr>
<tr>
<td></td>
<td>(0.1037)</td>
<td>(0.1073)</td>
<td>(0.1076)</td>
<td>(0.1074)</td>
</tr>
<tr>
<td>Time in market space: 2-4 years</td>
<td>-2.119*</td>
<td>-2.170*</td>
<td>-2.170*</td>
<td>-2.197*</td>
</tr>
<tr>
<td></td>
<td>(0.1150)</td>
<td>(0.1180)</td>
<td>(0.1182)</td>
<td>(0.1095)</td>
</tr>
<tr>
<td>Time in market space: 4+ years</td>
<td>-2.370*</td>
<td>-2.416*</td>
<td>-2.416*</td>
<td>-2.449*</td>
</tr>
<tr>
<td></td>
<td>(0.1204)</td>
<td>(0.1231)</td>
<td>(0.1233)</td>
<td>(0.1200)</td>
</tr>
<tr>
<td>Year dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Log pseudolikelihood</td>
<td>-24,885.70</td>
<td>-24,873.95</td>
<td>-24,873.95</td>
<td>-24,858.29</td>
</tr>
</tbody>
</table>

1 Models are run on 21,651 organization-market space pairs for the years 1990 through 2001. There are 13,930 market space exits over 39,517 organization-space-years. Standard errors are clustered by market space. All independent variables are measured at the start of each time period.
Figures

Figure 1. Maps of spaces in the software industry, selected years.
Figure 2. Relationship between ambiguity and number of members in market spaces.
Figure 3. Sample Press Release and Statements of Category Affiliations.

Accrue Announces BuyPath Offering Unmatched Merchandising Analysis of the Visitor Path From Entry to Purchase

1,098 words
4 October 1999
13:21 GMT
Business Wire
English
(c) 1999 Business Wire

FREMONT, Calif.--(BUSINESS WIRE)--Oct. 4, 1999--

New Feature of Accrue Insight(TM) eBusiness Analysis

Application Provides Powerful Analysis of Web Site Navigation

by Customer Segment

Accrue Software, Inc. (NASDAQ: ACRU), a leading provider of eBusiness analysis software and services, today announced BuyPath(TM), a new feature of Accrue Insight(TM) that enables eBusiness marketers to analyze and compare site navigation for customer segments and to gain insights into visits that involve transactions or that touch high-value content.

Using BuyPath, the marketer can determine which visitor segments are the most valuable and which referrers and content are most effective in accomplishing eBusiness goals. A key goal of ecommerce is converting visitors into customers. BuyPath enables the comparison of the navigation patterns of precisely-defined customer segments.

For example, comparing new visitors from Yahoo! against returning visitors from Excite.

<table>
<thead>
<tr>
<th>Company</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrix Systems</td>
<td>February 2000</td>
<td>Citrix Systems, Inc. is a global leader in application server software and services</td>
</tr>
<tr>
<td>Plasmon</td>
<td>August 2000</td>
<td>Plasmon, a leading manufacturer of automated data storage solutions, today announced its Diamond® storage management software.</td>
</tr>
<tr>
<td>Watson General</td>
<td>May 1994</td>
<td>Watson General currently provides remote software monitoring systems.</td>
</tr>
<tr>
<td>Comergent Technologies</td>
<td>Sept 2002</td>
<td>Comergent Technologies® Inc., the leading provider of sell-side e-business software solutions</td>
</tr>
<tr>
<td>Accrue Software</td>
<td>October 1999</td>
<td>Accrue Software, a leading provider of e-business analysis software and services</td>
</tr>
<tr>
<td>ACP</td>
<td>July 2001</td>
<td>ACP provides enterprise web publishing and e-business solution</td>
</tr>
<tr>
<td>Alliance</td>
<td>March 2001</td>
<td>Alliance offers the technical and business advantages of the Sybase Enterprise Portal with a wide range of e-business solutions, including content, e-commerce, and business process automation and analysis</td>
</tr>
</tbody>
</table>
Figure 4. Distribution of ambiguity for market spaces, 1990 – 2002.
Figure 5. Predicted effects of organizational entry into ambiguous market spaces.\(^1\)

\(^1\) Plot is based on results from model 2.
Figure 6. Predicted effects of positive events on the entry rate into market spaces.\footnote{Plot is based on results from model 4. Note that the logged number of funding events is used to estimate the model.}
Figure 7. Predicted effects of entry following positive events on an organization’s exit rate from market spaces.\(^1\)

\(^1\) Plot is based on results from model 8. Note that the logged number of funding events is used to estimate the model.