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Who enters, where and why? The influence of capabilities and initial resource endowments on the location choices of *de novo* enterprises

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Abstract

Some geographical locations have characteristics that create opportunities for *de novo* enterprises, but not all new firms can access the benefits presented by a potential location. The ability of new firms to appropriate benefit and avoid risk depends on the resources that entrepreneurs can marshal for their enterprise. This article develops a model of the interplay between the attributes of *de novo* entrants and their founding locations. The model assumes that *de novo* entrants tend to appear in the region where their founders live, but that founders choose among locations within their regions. The test of the model, using data on all *de novo* entrants in the Canadian manufacturing sector during 1984–98, reveals that entrants with greater resource and capability endowments are more likely to locate in areas with an agglomeration of similar firms, but this effect reverses at high endowment levels. Additionally, larger entrants are less likely to locate in areas characterized by intense local competition and potential entry deterrence, while smaller and well-endowed entrants tend to locate in areas where entry barriers are lower and asset turnover higher. These findings suggest that entrants choose locations strategically within their founding regions. They also indicate that the strategic imperatives of *de novo* entrants differ significantly from those of geographically diversifying firms, and thus suggest amendments to theories of location choice when modeling the decisions of new ventures.

Key words • adverse and favorable selection • agglomeration • *de novo* entrants • location choice • resources and capabilities

Where entrepreneurs choose to found new ventures is a question of both enduring and topical interest for scholars from many disciplines (e.g. Rosenthal and Strange, 2003; Sorenson and Audia, 2000). Among these studies, research employing approaches from organizational ecology has had a remarkable influence, most notably by clarifying how the characteristics of locations – particularly organizational density – influence the rate at which new ventures emerge within a given region (Carroll and Khessina, 2005). Yet, the success of this literature has entailed simplifying assumptions. Scholars have tended to emphasize the homogeneity of *de novo* entrants and discount the potential for entrepreneurs to choose among a set of nearby locations.

De novo entrants are not, however, all equal at birth. Founders' wealth, experience, managerial skills, social capital, knowledge and legitimacy can all influence the initial form of new ventures (Kerr and Nanda, 2007; Klepper, 2002). Successful serial entrepreneurs, for example, bring to their enterprises better knowledge of the founding process and superior access to social networks, and confer on their enterprises a higher level of legitimacy compared to an inexperienced founder. Observed heterogeneity among new entrants also reflects the differing endowments of resources and capabilities that their founders have been able to assemble (Helfat and Lieberman, 2002).

Evidence also suggests that while the location decisions of entrepreneurs are strongly influenced by where they live or work (e.g. Cooper, 1984; Klepper, 2002; Sorenson and Audia, 2000; Zucker et al., 1998), they do make choices about where to locate within that geographic region. In Silicon Valley, for example, the majority of new chip makers (Boeker, 1989), law firms (Jaffee, 2003) and biotechnology firms (Haug, 1995) emerged from employees of spatially proximate firms. But, *within* such regions, entrepreneurs make choices among nearby areas to best exploit distinct, favorable socioeconomic attributes (Aharonson et al., 2007). As a result, new enterprises may emerge some distance from older business-and-bedroom communities. In Ontario, Canada, for example, a growing entrepreneurial cluster around Toronto's Pearson International Airport is located nearly 15 miles from the city's residential areas. In the Ottawa–Hull region, the former city of Kanata has emerged as a major area for entrepreneurial activity, to which employees commute 16 miles, on average (Statistics Canada, 2002).

In this study, therefore, we examine how entrepreneurs choose among fine-grained locations to make the most of the heterogeneous resources and capabilities with which their new enterprises begin operation. In doing so, our analysis extends strategy research on location choice, which has focused on decisions made by mature firms when entering new markets through diversification, franchising, spin-offs or joint ventures (e.g. Alcacer, 2006; Alcacer and Chung, 2007; Kalnins and Chung, 2004), as well as on the entry of multinationals into foreign countries or regions (e.g. Chang and Park, 2005; Head et al., 1995; Shaver and Flyer, 2000). Location choices of *de novo* entrants differ in important ways from those of mature firms. First, as noted already, entrepreneurs do not typically consider a broad range of locations, instead tending to establish

ventures proximate to where they live. Second, *de novo* entrants do not normally have access to the wealth of resources on which a diversifying enterprise can draw. Consequently, we pay particular attention to *de novo* entrants' use of agglomeration externalities to aid in the development of resources and capabilities. Third, and relatedly, *de novo* entrants may lack the resources needed to take advantage of available location benefits. Consequently, we attend to the fit between entrant resources and fine-grained location choices.

We employ a novel data set to test our model. Most of the empirical research on *de novo* entrants' location decision has been based on case studies of individual districts (e.g. Porter, 1998, 2000; Saxenian, 1994), or specific industry sectors (e.g. footwear, Sorenson and Audia, 2000; hotels, Chung and Kalnins, 2001; biotechnology, Stuart and Sorenson, 2003). In contrast, we study the population of *de novo* entrants in the Canadian manufacturing sector from 1984 to 1998, which permits us to examine the effects of industry-level factors on location choice.

Our study also makes several methodological contributions. Martin and Sunley (2003) have noted that accurate measures of geographic effects should reflect the appropriate scale of geographical dispersion for any given factor. Porter (2000), for example, suggested that cluster boundaries should be determined on the basis of the geographic extent of spillovers for each factor. In support of Porter's contention, there is strong evidence that knowledge spillovers occur predominantly within relatively short distances, while deterrence behavior and competitive forces can operate at larger ranges (Aharonson et al., 2007; Rosenthal and Strange, 2003). To incorporate such differences, we determine empirically the geographic ranges of location attributes considered in our model.

Theory and hypotheses

Theoretical perspectives on location choices of *de novo* entrants: resources and competitive advantage

Our theoretical focus is on how differing access to resources and capabilities influences where entrepreneurs choose to found *de novo* enterprises within a given region. Given this focus, our theoretical model is informed by two strategy perspectives. The first perspective focuses on the role of resources and capabilities in fostering firm-level competitive advantage (e.g. Barney, 1991; Peteraf, 1993), emphasizing the importance of resource development as a driver of location decisions, and that founders must consider their ability to harness spillover benefits provided by a location. The second perspective focuses on how industry structure affects the nature of competition (Geroski, 1995; McGahan and Porter, 1997), highlighting the extent to which *de novo* entrants are vulnerable to competition or deterrence, and that entrepreneurs must choose locations judiciously to minimize the costs and risks of entry (Audretsch and Mata, 1995). Together, the two perspectives consider key factors shaping entrant success (or failure) and the ways in which entrants leverage location externalities (McGrath et al., 1995).

At founding, *de novo* entrants possess resources and capabilities that their founding teams bring to the new enterprise. These include stocks of assets (Fichman and Levinthal, 1991), social ties (Sorenson and Stuart, 2001) and knowledge, skills and experience (Adner and Helfat, 2003; Levinthal and Myatt, 1994). As Helfat and Lieberman (2002: 727) point out: 'The greater the similarity between pre-entry firm resources and the required resources in an industry, the greater the likelihood that a firm will enter that particular industry and the greater the likelihood that the firm will survive and prosper.' But, as they also note, founding endowments are only the beginning: 'The endowments present at founding set the stage for further capability development by pre-conditioning the emergence of a capability.'

Location choices can influence the difficulty of developing resources and capabilities. Some entrants may be able to appropriate resource spillovers if they locate in resource-rich environments, whereas others may lose hard-won resources. Location choices can also influence entrants' exposure to competition. Geographical proximity plays an important role in shaping the nature and intensity of competition (e.g. Alcacer and Chung, 2007; Baum and Mezias, 1992; Hannan and Carroll, 1992; Hotelling, 1929). Location attributes can also influence the cost of failed entry attempts. The existence of vibrant local markets for used assets (e.g. equipment, plants) allows higher recoverability of their investment in case of failure.

Agglomeration externalities

Agglomeration generates positive localization externalities that can help entrants to mobilize resources, develop capabilities and mitigate the liability of smallness. Localization externalities can be categorized into production enhancements and heightened demand. Production enhancements include: (1) labor market pooling (Marshall, 1920); (2) advantages of backward and forward linkages associated with large local markets (Dumais et al., 2002; Krugman, 1991); (3) shared infrastructure available to co-located firms (Helsley and Strange, 2002); (4) technological and knowledge spillovers (Almeida and Kogut, 1997; Audretsch and Feldman, 1996; Jaffe et al., 1993); (5) information externalities about demand or the feasibility of production at a particular location (Baum and Haveman, 1997); and (6) lower exit barriers, which may, in turn, lower entry costs (Pe'er and Vertinsky, forthcoming). Demand enhancement results from lower consumer search costs and risk: consumers prefer to patronize a location where they can inspect multiple goods or access a second-best option if necessary (Baum and Haveman, 1997; Chung and Kalnins, 2001; Kalnins and Chung, 2004).

The various types of localization externalities, however, operate at different spatial ranges or limits. As asserted by Porter (2000: 16): 'the geographic scope of a cluster relates to the distance over which informational, transactional, incentive, and other efficiencies occur'. Those externalities with benefits that attenuate

slowly in distance have less of an impact on location choices within the region. Localization externalities that attenuate rapidly in distance weigh more in the fine-grained calibration of location choices within the region (Rosenthal and Strange, 2003). Findings support slow attenuation (at least city-wide geographic boundaries) of labor market pooling, industry-specific suppliers and shared infrastructure (Costa and Kahn, 2001; Rosenthal and Strange, 2001). On the other hand, the impacts of knowledge spillovers and demand enhancement attenuate very rapidly (within city geographic boundaries). Facilitation of collaborations, partnerships and spillovers of (tacit) knowledge is improved by immediate physical adjacency and frequent social interactions between parties (Aharonson et al., 2007; Audretsch and Feldman, 1996; Rosenthal and Strange, 2003). Spatial tightness is required in industries where purchasers are less willing (or able) to travel (Baum and Haveman, 1997; Kalnins and Chung, 2004), products have a high degree of heterogeneity (Fischer and Harrington, 1997), or in industries sensitive to transportation costs (e.g. perishability of output).

Whatever the scale, the value of agglomeration externalities to an entrant depends on its ability to develop, search and exploit opportunities generated by agglomeration. To utilize production enhancements offered by a location, a *de novo* entrant must possess the internal capabilities required to access and integrate these enhancements into its operations (Acs et al., 1994). For example, a lack of skilled personnel can lower an entrant's absorptive capacity, limiting its ability to take advantage of information and knowledge spillovers (Cohen and Levinthal, 1989; Shane and Stuart, 2002; Zhara and George, 2002).

Although entrants require resources and capabilities to benefit from agglomeration externalities, additional capabilities provide access to decreasingly valuable enhancements. In other words, the productivity of their resources and capabilities for absorbing value from the agglomeration exhibit diminishing returns. As a result, the absorptive value of resources and capabilities is a concave function ($f'(x) > 0$, $f''(x) < 0$). The foregoing 'spill-in' benefits of agglomeration are offset by 'spill-outs' from the entrant to its agglomeration (Shaver and Flyer, 2000). For example, for an entrant that possesses unique knowledge that allows it to produce goods more efficiently, operating in an agglomeration increases the possibility that other firms will access this knowledge. This spill-out effect of operating in a cluster is a function of an entrant's capabilities and the agglomeration's density: the more capabilities the entrant possesses, and the more potential beneficiaries, the greater the potential for loss.

As shown in Figure 1, the result of these two effects is a combined relationship that first rises and then falls with a marginal increase in resources. When an entrant has very few resources, a marginal increase enhances the degree to which it can benefit from agglomeration economies (Figure 1, section 1). Eventually, however, for entrants with higher endowments, the outward flow of capabilities outweighs this effect. In this region (Figure 1, section 2), additional resources actually reduce the net value of agglomeration. Ultimately (Figure 1, section 3), agglomerated locations become undesirable for the entrant.

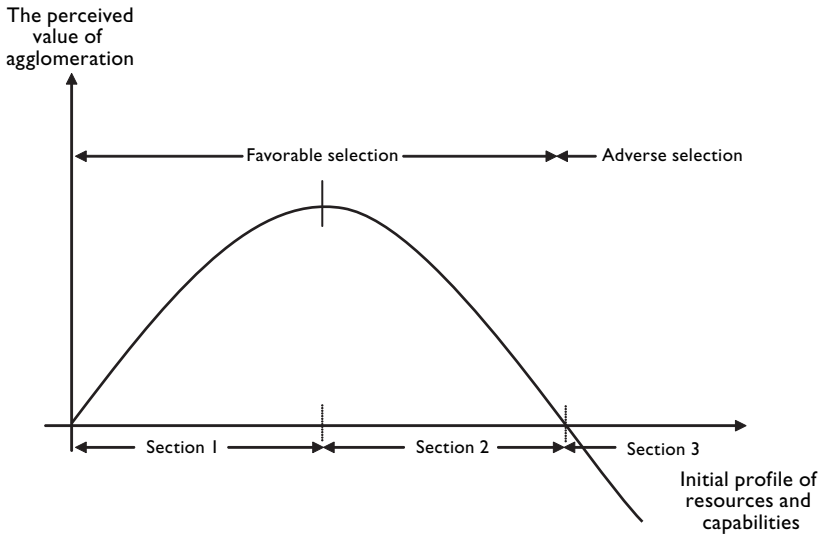

Figure 1 The perceived value of agglomeration as a function of initial profile of resources and capabilities

Evidence concerning the location choices of strong, geographically diversifying firms is consistent with the prediction of section 3 of Figure 1. Among these resource-rich firms, it is the strongest ones that are more likely to avoid agglomeration (Chung and Kalnins, 2001; Knott et al., 2005; Shaver and Flyer, 2000). Yet, whereas these strong firms operate in section 3 of Figure 1, and thus make location decisions that emphasize the avoidance of resource loss, most *de novo* entrants operate in section 1. *De novo* entry tends to be characterized by low resources and underdeveloped capabilities (relative to diversifying firms or foreign entrants) and thus for most *de novo* entrants, we expect resources and capabilities will increase their ability to benefit from agglomeration externalities (Figure 1, section 1). Of course, a small number of *de novo* entrants may possess such large resource and capability endowments that agglomeration is no longer beneficial, and these entrants will locate in less concentrated areas (Figure 1, section 3).

> **HYPOTHESIS 1** The likelihood of *de novo* entrants choosing locations with strong agglomeration externalities increases at a decreasing rate with initial increases in their resources and capabilities, but declines when their resources and capabilities reach high levels.

Industrial organization and competition

Because *de novo* entrants are, by definition, new and the most are small, they may be adversely affected by economic shocks and competition from incumbents (Dunne et al., 1988; Stinchcombe, 1965). An initial bundle of resources

and capabilities obtained before founding can help entrants survive by affording a 'honeymoon' period during which they rely on these endowments while they learn and grow (Fichman and Levinthal, 1991). To avoid exhausting these initial resource endowments too quickly, *de novo* entrants must seek locations where threats from competitors are low and the environment is welcoming.

The industrial organization of a market can make a significant difference to the survival prospects of *de novo* entrants and therefore influence their location choices. In a dense market with a large number of firms selling homogeneous goods, competition is usually stiff, margins low, and only the most productive entrants survive (i.e. entrants that have the capability of organizing their production efficiently such that with the same bundle of resource inputs they produce a comparatively similar or higher level of outputs). As a result, entrepreneurs who believe their new ventures will have productivity advantages will be more likely to enter such locations, where the market structure implies long-term pressure on prices and profits. For example, founders who have the experience and knowledge to organize production efficiently, or the reputation needed to acquire substantial resources, will be willing to enter into such difficult competitive environments. In contrast, less efficient entrants must shield themselves from local rivalry (Baum and Mezias, 1992).

HYPOTHESIS 2A The likelihood of a *de novo* entrant choosing a location with a highly competitive market structure increases with the productivity of the entrant.

Entrants must also consider possible threats of aggressive actions by incumbents to deter their entry or exploit their vulnerability should they choose to enter. Prior research suggests that incumbent responses to entry vary within an industry (e.g. Yamawacki, 2002). The majority of previous 'findings indicate that incumbents only respond aggressively to entry under certain conditions' (Simon, 2005: 1230). The conditions for an aggressive response include: (1) a serious threat to rents collected by incumbents and (2) the ability of incumbents to undertake effective deterrence. Concentrated markets with few large firms facilitate coordination of deterrence by incumbents, and markets where rents are high provide a motive for defense. Simon (2005) found, for example, that incumbents in more competitive markets cut prices less following entry.

The tendency for an incumbent to respond to a new entrant also depends on the nature of the entrant. For small entrants, the threat to the incumbent may be so low that the cost of deterrence exceeds the benefit. Entrants with a small stock of resources may pose less of a threat than larger entrants and therefore are less likely to be targets of aggressive deterrence strategies. As a result, founders of smaller enterprises should be less concerned about locating in areas where deterrence is likely. Thus, we should expect to see a disproportionate number of small enterprises founded in areas where deterrence is likely.

Whereas size is an observable element of entrants, their productivity is much less so. As a result, the degree of deterrence is less likely to vary with the *de novo* entrant's initial productivity. In environments where deterrence is possible, more

productive entrants have a better chance of survival. Entrepreneurs who believe their new ventures will have productivity advantages will therefore be more likely to co-locate with incumbents that might engage in deterrence. Thus, we should expect to see a disproportionate number of more productive entrants in areas where deterrence is likely.

HYPOTHESIS 2B The likelihood of a *de novo* entrant choosing a location with a high propensity for incumbents to adopt an aggressive deterrence strategy is higher for smaller and more productive entrants.

Welcoming environments and risk mitigation

Rosenthal and Strange (2003) argued that industrial organization has an influence on localization economies. Specifically, they found that markets in the manufacturing sector with a high concentration of small incumbents seemed to disproportionately encourage agglomeration. Echoing Saxenian (1994) and Porter (2000), they attributed these agglomeration effects to the notion that small firms are more likely to be entrepreneurial and open to interaction with their neighbors. Such interaction enhances knowledge and information spillovers and makes these environments more 'welcoming' to smaller entrants. Easier access to knowledge spillovers, to partnerships and to collaborative opportunities with neighbors allows smaller entrants to obtain agglomeration economies. Similarities of attributes and 'deeper insight into each other's situations and behavior [enable small entrants] to engage in activities demanding high-trust kinds of cooperation' (Aharonson et al., 2007: 95). Thus, despite the pressure of competition, smaller entrants that rely on external resource augmentation and that may benefit more from knowledge spillovers may be more attracted to locations with competitive market structures than larger entrants.

Although the agglomeration benefits that accrue from a competitive market structure are likely higher for smaller entrants, the risks accruing from competitive pressures are greater as well. Entrants with larger resource endowments can endure sharper losses from competition as they learn and become more efficient. Thus, two opposing agglomeration effects – one positive and one negative – may influence smaller entrants. Given the scale of *de novo* location choice, however, the effect of agglomeration externalities should predominate. Agglomeration benefits operate in small areas and their impact is focused locally (Rosenthal and Strange, 2003). Competitive pressures attenuate more slowly in distance and thus cover larger areas within the region. As a result, the negative effects of competition are relatively constant among locations within a region, permitting entrepreneurs to choose locations that maximize benefits created by a 'welcoming' locale.

HYPOTHESIS 3A The likelihood of a *de novo* entrant choosing a location with a highly fragmented market decreases with the entrant's stock of assets.

The degree of risk associated with entering a particular environment depends on the probability of failure and the scale of the assets at risk. A critical determinant of this second element is the extent to which investments in assets can be recovered (Baumol and Willig, 1981; Dixit, 1980; Kessides, 1990; Sutton, 1991). Regions where assets can be resold reduce the risk of entry and allow entrepreneurs to enter and experiment through 'learning by doing' (Jovanovic, 1982). The extent to which initial investments can be recovered upon exit (i.e. exit barriers) depends on the mobility of tangible resources employed by the entrant and on entry rates to that location. Some resources devalue little on use and can be resold with little loss. For example, in the Bowery section of Manhattan, numerous stores resell the equipment of restaurants that have gone out of business. These stores make it easier for an entrant to exit (or enter) the local market. High entry rates can increase the demand for second-hand assets, increasing their salvage value. In sum, the risk of founding a new venture with high resource endowments decreases with the extent to which these assets can be sold. As a result, we should expect to see relatively more asset-rich entrants founded in regions where assets can be resold.

HYPOTHESIS 3B The likelihood of *de novo* entry into locations where a greater percentage of assets can be resold increases with the entrant's stock of assets.

Research methods

Data sources

Two sources were used to construct our data set. The Canadian Census of Population (1981, 1986, 1991, 1996 and 2001) was used to derive information on local unemployment, geographic area, value of homes and human population density. The second, T2-LEAP, is a merger of two different databases. We used the first database, the Longitudinal Employment Analysis Program (LEAP), to identify new entrants, their three-digit SIC (Standard Industrial Classification) codes, number of employees and location. We used the second database, the Corporate Tax Statistical Universe File (T2SUF), to assess initial firm-specific financial variables including equity, assets, sales and closing inventories (converted into 1986 constant Canadian dollars).

T2-LEAP is a unique longitudinal data set that provides information on *all* incorporated Canadian establishments that legally hire employees (and hence file payroll information with the Canadian Revenue Agency) and file a 'T2' corporate income tax return.[1] T2-LEAP covers the period 1984–98. The data set contains almost the entire Canadian private sector as measured by either output or employment. Components of the economy that are omitted include non-incorporated enterprises and corporations that hired no employees. The database may underrepresent the 15 percent of employed Canadians who identify themselves as self-employed. A substantial proportion of these self-employed are

not creating production entities of any substance – either in terms of sales, employment or capital formation.[2]

The data sets provide annual firm-level data on employment, assets, wages, sales, inventories, location and industry affiliation at the three-digit Standard Industrial Classification-Establishment (SIC-E) level. The data sets also report the exact longitude and latitude of each firm's location, enabling us to use a very compact geographic unit and to utilize continuous distances over political boundaries. All of these characteristics make this data set an excellent source for studying the characteristics of *de novo* entrants and their location choices. The measures of employment allow us to identify the time of firm founding and the characteristics of the firm on founding. The measures of precise physical location allow us to evaluate choices among locations within a region.

The T2-LEAP database tracks employment and payroll characteristics of individual entrants from their year of entry to their year of exit and allows determination of the time of entry and exit with precision. We identify entrants (foundings) in any given year as entrants that have current payroll data, but that did not have payroll data in the previous year. Similarly, deaths (exits) in any given year are identified by the absence of current payroll data, where such data had existed in the previous year. A special labor tracking mechanism allows us to exclude mergers, changes in control and changes of name or location as (false) entries and exits. (An appendix describing this mechanism is available upon request.) Depending on the sector, *de novo* entry accounts for 85 percent to 94 percent of all newly created establishments in the database. In our empirical estimation, we include only location choices made by *de novo* entrants; we do not include births of diversifying entrants or parent-company ventures (Helfat and Lieberman, 2002).[3]

The geographic units used in our analysis are Census Subdivisions (CSDs), small geographic units representing urban or rural neighborhood communities. CSDs are defined to be as homogeneous as possible in terms of socioeconomic characteristics (Statistics Canada, 2002). Canada is divided into 5984 CSDs. Ontario, for example, is divided into 947 CSDs, and Quebec into 1599. CSDs aggregate into Economic Regions (ERs). An ER is created as a standard geographic unit based on regional economic activity, population density and commuting patterns – individuals living and working within an ER travel on average 13.7 miles to their workplace (Statistics Canada, 2002). Canada is divided into 76 ERs. Ontario is comprised of 11 ERs; Quebec of 17.

Use of CSDs has several advantages. First, it allows us to examine agglomeration externalities within compact geographic areas since these effects tend to attenuate sharply with distance (e.g. Aharonson et al., 2007; Rosenthal and Strange, 2003; Stuart and Sorenson, 2003). Second, it allows us to overcome potential problems of arbitrary spatial boundaries that may bisect clusters. Third, continuous distances allowed us to determine empirically the distance beyond which a given theorized effect attenuates substantially.

Variables and measures

Dependent variable

For each *de novo* entrant, the chosen location – CSD – was coded 1 and all other feasible CSDs in the ER where entry is observed were coded 0. As with all studies of location choices, it was important to include only feasible locations in our sample. Since regulations and zoning restrictions prohibit industrial activity from some CSDs, we excluded all CSDs that exhibited neither existing manufacturing activity nor entry during the observation period. The mean area of a feasible CSD is 79.6 square miles (SD = 185.3 square miles). However, the most entry takes place in densely populated areas comprised of smaller CSDs.

Independent variables: location characteristics

Agglomeration: We calculated the potential for agglomeration externalities as the number of employees within a given CSD and focal three-digit SIC industry divided by the total number of employees in that three-digit industry nationally. This measure of localization concentration is widely used in the literature on regional economics (Porter, 2000; Shaver and Flyer, 2000).

Competitive market structure: As an indicator of market structure, we used an inverse employment-based Herfindahl–Hirschman Index (HHI) defined as the sum of squared shares of employees by firms in a three-digit SIC industry within a given CSD. Higher values correspond to less concentrated (more competitive) CSDs. A CSD composed of small firms is likely to be more open and entrepreneurial and make local social and professional networks easier to penetrate (Aharonson et al., 2007; Rosenthal and Strange, 2003).

Deterrence propensity: As an indicator of incumbents' propensity to deter entry, we used the product of (three-digit) industries' average profit margins and sales-based HHI within a given CSD.[4] Local coordination costs are lower when there are a small number of large incumbents in a CSD. Concentration may also indicate the presence of economies to scale that facilitate preemption. High profits suggest a strong motive to deter entry as well as resources to fund deterrence. The industry profit margin was measured as the average ratio of profits to sales of all incumbents for a given three-digit SIC industry and CSD. Location concentration was defined as the sum of squared shares of sales by firms for a given three-digit SIC industry and CSD.

Asset turnover: As an indicator of the magnitude of sunk costs, we calculated the product of the entry and exit rates of the industry in a CSD in the year prior to entry. Nascent entrepreneurs may infer from high entry and exit rates that they can sell their tangible assets in case of failure and recover a significant proportion of their initial investment. High turnover (reflected in high past entry and exit rates and thus their product) suggest the presence of an active ('churning') marketplace characterized by a continual reorganization of firms. Low

local turnover indicates a thin and relatively inactive market for second-hand equipment and space and thus high sunk costs.

Independent variables: entrant resources and capabilities

The resources used to operationalize our empirical model are employees and assets (Amit and Schoemaker, 1993). The capabilities we used are productivity and quality of human capital (Dutta et al., 2005). We calculated each measure relative to the averages of *de novo* entrants to the same three-digit SIC industry, and as a robustness check, relative to three-digit SIC industry averages. A ratio greater than 1 indicates relative advantage in that resource or capability, while a ratio less than 1 indicates relative weakness. Resources and capabilities were measured at the end of the first calendar year, thus representing on average the position of a firm after six months of operation (Geroski et al., 2002). Since our measures are defined relative to the cohort of *de novo* entrants, they provide accurate measurement of the initial endowments of resources and capabilities (i.e. the endowments brought to the enterprise by the founding team). Specific definitions follow.

Employment: Relative Employment is defined as the number of employees of the entrant divided by the sector (same three-digit SIC) average level of employment for all other *de novo* entrants in the same year. Not surprisingly, the population of *de novo* entrants in Canada consists primarily of small enterprises (59 percent of all new entrants have fewer than 10 employees while only 3 percent have more than 100 employees).

Assets: Relative Assets is defined as the assets of the entrant divided by the sector (same three-digit SIC) average assets of all other *de novo* entrants in the same year.

Quality of human capital: Higher wages tend to reflect a greater investment in certain labor-related enhancements, such as training and firm-specific human capital (Mincer, 1958). Firms tend to pay a wage rate above the market-clearing wage to attract and retain high-quality labor and to provide incentives for workers to exert more effort (Lemieux, 2005). Therefore, we measure the initial Quality of Human Capital available to an entrant as the average wage paid by the entrant divided by the sector (same three-digit SIC) average wages paid by all other *de novo* entrants in the same CSD and year to ensure that our measures are compared across similar external conditions (Dutta et al., 2005).

Productivity: Our database does not contain information required to compute classical measures of Total Factor Productivity (TFP); however, it is possible to calculate Approximate Total Factor Productivity (ATFP). This measure, originally suggested by Griliches and Mairesse (1990) and more recently by Hall and Jones (1999), is derived from a simple Cobb–Douglas production function. Suppose that entrant i has productivity level A_i and produces output Y_i using capital K_i and labour L_i. The entrant's production function is then:

$$Y_i = A_i K_i^{\alpha} L_i^{1-a}. \quad (1)$$

If we solve for productivity, A_i, and take the natural log of both sides, the equation can be rewritten as:

$$\ln(A_i) = \ln\left(\frac{Y_i}{L_i}\right) - \alpha \ln\left(\frac{K_i}{L_i}\right) \quad (2)$$

Equation (2) describes the efficiency of entrant *i* at turning inputs into outputs. This is comprised of the entrant's labor productivity and the amount of capital each worker has at his/her disposal. To operationalize ATFP, we measure labor productivity as total sales divided by the number of employees. To approximate capital per worker, we divided total assets minus closing inventory by the number of employees. The optimal capital share FA varies significantly from industry to industry in the manufacturing sector. The Annual Survey of Manufacturing was used to derive this share.[5] The natural log of ATFP for a given entrant *i* is thus defined as:

$$\ln(ATFP_i) = \ln\left(\frac{sales_i}{alu_i}\right) - \alpha \ln\left(\frac{assets_i - inventories_i}{alu_i}\right) \quad (3)$$

where alu_i is the average labor units (i.e. total employees) of the firm, $sales_i$ is its total sales, $assets_i$ is its total assets, and $inventories_i$ is the closing inventories of the entrant (all measured by the end of the first year of operation). Relative Productivity is defined as the entrant's ATFP divided by the three-digit SIC sector average ATFP of all other *de novo* entrants at the same year.

Control variables

We measured Industrial Diversity (an indicator for urbanization economies) as the HHI of employment specialization, defined as the sum of squared shares of total employment in two-digit SIC industries at the economic region (Glaeser et al., 1992; Henderson, 1994; Rosenthal and Strange, 2003). Urbanization externalities reflect the attractiveness of a location to entrants due to industrial cross-fertilization through information spillovers, social networks and other sources of diversity of the economic activity (Henderson, 2000; Jacobs, 1969). An increase in this index reflects less diversity in the ER. We used the natural logarithm of the population in the census subdivision at time *t-1* measured during census years 1981, 1986, 1991, 1996 and 2001 and interpolate linearly between census years to measure population. We measured the unemployment rates of CSDs using census data and interpolating between census years. Land area was measured by computing the natural logarithm of the area of the CSD to account for differences in land supply and therefore land prices.

We calculated three-year average exit rates (closures, excluding divestitures) at the three-digit SIC level for each CSD as an indicator for hazards facing new ventures in a given local. We calculated three-year average entry rates (all types of entrants) analogously, to a control for imitation, contagion and increase in competition.

We used a set of fixed effects for the year to control for the effects of macroeconomic conditions, as well as two-digit SIC industry fixed effects to account for the role of industry characteristics on the likelihood and location of entry.[6] Industry characteristics were found to account for about 75 percent of the variation in industry average profitability (Schmalensee, 1985). Thus, we expect that the likelihood of entry is higher in more profitable, innovative and growing industries.

Table 1 reports descriptive statistics and bivariate correlations for the study variables.

Geographic scope of independent variables

The first step in our empirical analysis was to determine the geographic scope of agglomeration, competition, deterrence and asset turnover effects. To do this, we computed these variables based on the same three-digit sector incumbents operating within concentric rings with various radiuses around the geographic centroid of each CSD that experienced an entry in a given year. After experimentation with more fine-grained rings, for parsimony, we aggregated the rings into five distances: 1 mile, 1–5 miles, 5–20 miles, 20–50 miles and over 50 miles (e.g. Aharonson et al., 2007; Arzaghi and Henderson, 2004; Rosenthal and Strange, 2003).

The dependent variable for the boundary determination analysis is the yearly number of foundings in each three-digit SIC at the CSD level. While our empirical specification includes controls found in previous studies, it is likely that some remaining unobserved heterogeneity has an impact (King and Zeng, 2001). We therefore employed a negative binomial model, appropriate for the founding count dependent variable, and that accounts for unobserved heterogeneity using 75 ER fixed effects estimated by the maximum likelihood method (e.g. Baum and Singh, 1994; Stuart and Sorenson, 2003). To avoid simultaneity problems, all covariates were lagged one year.

Table 2 presents the model estimates. Given the fine-grained geographic level at which our analysis was conducted, it is important to note that the degree of systematic variation in factors contributing to founding rates is much higher for the *within*-Economic Region (ER) location characteristics than those attributed to ER fixed effects (the standard deviations of within-economic region location characteristics covariates are at least two times larger than those of the ER fixed effects). This suggests that *within*-ER location characteristics drive a greater share of the systematic variation in founding rates than do the ER-wide effects (although both are important).

We calculated the percentage change in expected entry counts for a unit increase in the characteristic, while holding other variables constant. A substantial drop in the percentage change indicates that the effect has a substantially lower impact on founding at the location than the effect measured in a ring with smaller radius. Wald tests of equality were used to compare the effects between rings (Greve, 2002). Results of the empirical analysis suggest that the extent to

Table 1 Descriptive statistics and correlation matrix

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Relative Employment	.922	2.16													
(2) Relative Assets	.953	2.45	.416												
(3) Relative Quality of Human Capital	.914	.361	.302	.229											
(4) Relative Productivity	.961	2.05	−.056	−.010	−.004										
(5) Agglomeration	.124	.147	.024	.007	−.002	−.001									
(6) Competitive Market Structure	17.01	12.68	−.022	−.023	.145	.0007	−.036								
(7) Deterrence Propensity	2.47	3.25	.028	.014	.063	−.004	−.007	.146							
(8) Asset Turnover	.005	.003	−.003	−.004	.024	−.0004	−.002	.043	.047						
(9) Industrial diversity	8.63	7.04	.085	.074	.077	.008	−.135	−.097	.036	.025					
(10) Population	8.46	12.83	.071	.063	.067	.013	−.104	−.128	.014	−.003	.461				
(11) Land area	4.38	4.62	−.025	−.022	.008	−.004	.043	.034	.009	.005	−.326	−.227			
(12) Unemployment rate	6.64	4.02	−.041	−.043	−.058	−.006	.147	.023	−.018	−.022	−.309	−.332	.182		
(13) Average exit rate	.072	.048	.153	.205	−.174	−.096	.203	−.124	.205	.324	−.155	.173	.084	.177	
(14) Average entry rate	.065	.037	.137	.187	.204	.154	.217	.108	−.079	.358	.108	.205	.184	−.105	.497

Table 2 Negative binomial model of new venture founding rates in a CSD 3-digit SIC industry, 1984–1998

Independent variables		Coefficient	Z-score	Percentage change in expected count for unit increase in X (holding other variables constant)
Agglomeration	0–1 mile ring	.0453***	8.07	4.634
	1–5 mile ring	.0394***	7.69	4.019
	5–20 mile ring	.0171**	2.53	1.725
	20–50 mile ring	.0008*	2.04	0.080
	Over 50 miles	−.0013	1.75	−.130
Competitive Market Structure	0–1 mile ring	−.0107***	4.11	1.076
	1–5mile ring	−.0089***	3.98	.894
	5–20 mile ring	−.0065**	2.33	.652
	20–50 mile ring	−.0035**	2.27	.351
	Over 50 miles	−.0028*	1.98	.280
Deterrence Propensity	0–1 mile ring	−.0376***	3.55	−3.690
	1–5 mile ring	−.0355***	3.58	−3.488
	5–20 mile ring	−.0319**	2.31	−3.140
	20–50 mile ring	−.0205*	1.87	−2.029
	Over 50 miles	.0187	1.31	1.888
Asset Turnover	0–1 mile ring	.0271***	4.62	2.742
	1–5 mile ring	.0199***	4.37	2.010
	5–20 mile ring	.0184**	2.17	1.857
	20–50 mile ring	.0168**	2.09	1.697
	Over 50 miles	.0102*	1.88	1.028
Controls:				
Industrial diversity		.0037**	2.13	
Population		.0550**	2.04	
Land area		.0135***	2.66	
Unemployment rate		−.0532**	2.11	
Average exit rate		−.0056*	1.88	
Average entry rate		.0035	1.54	
Fixed effects		ER		
Number of observations		43.324		

Note: *** significant at 1% level; ** significant at 5% level; *significant at 10% level.
The geographic boundaries beyond which effects attenuate sharply are set in bold type.

which the location characteristics discussed earlier impact founding rates in a CSD varies by sector. However, in all sectors the effects of sector-specific location characteristics on sectoral founding events attenuate with distance.

The effect of Agglomeration is positive and attenuates sharply after 5 miles. Beyond 20 miles, the effect is significant only at the 10 percent level and becomes negative and insignificant over a 50-miles radius. The sharp decay of

localization economies is consistent with the findings of Jaffe et al. (1993), Audretsch and Feldman (1996), Rosenthal and Strange (2003) and Aharonson et al. (2007), among others. They argued that the strong preference of startups to locate in proximity to clusters of their sectors stems from the mechanisms by which information spills over. Notably, our findings are comparable to those reported in Rosenthal and Strange's (2003: 385) analysis of the US manufacturing sectors.

The effects of Competitive Market Structure are negative and significant at all geographic levels. However, the magnitude of the effect drops significantly beyond 20 miles. The effects of Deterrence Propensity are negative and significant up to a 50-mile radius and positive and insignificant over 50 miles. The magnitude of the effect drops after 20 miles. Lastly, the effects of Asset Turnover are positive and significant within the region but the magnitude of the effect attenuates sharply beyond 50 miles.

We used these empirically derived geographic scope conditions to specify our model of entrants' location choice. In discussing the robustness of our findings, we consider the sensitivity of the results to expanding the geographic scope of effects by an additional ring.

Location choice econometric framework

We can model entrepreneurs' selection of CSDs within a given ER using a discrete choice approach, which has been modeled extensively in the economics literature using conditional logit estimation (e.g. Carlton, 1983; Head et al., 1995). This approach assumes the Independence of Irrelevant Alternatives (IIA), i.e. that the error terms are independent across entrepreneurs and choices. Specifically, the relative probabilities of various alternatives depend only on the observed characteristics of these alternatives, regardless of the choice set. If this assumption is violated due to unobserved location characteristics, it can lead to biased coefficient estimates. It is likely that the random terms in our specification are correlated across CSDs within a given ER, i.e. alternatives located within the same 'nest'. Therefore, we adopted a nested logit model, which is a generalization of the multinomial logit to solve this problem since it permits proportional substitution within a nest such that the IIA assumption is valid (Head and Mayer, 2004; McFadden, 1974; Train, 2003). Maximum likelihood techniques were used to estimate the parameters.

Results

Table 3 presents the coefficients generated by the maximum-likelihood estimation of the nested logit model. In this specification, the choice sets are defined as all relevant alternative CSDs in the ER where entry is observed.

The first column of Table 3 provides benchmark estimates assessing the impact of location characteristics and the controls on location choices of *de novo*

entrants. The estimated coefficients confirm findings of prior studies indicating that *de novo* entrants value densely populated areas, strong industrial agglomeration (localization) and diversity, and locations where turnover is high (controlling for three-year averages of entry and exit rates that have the expected positive and negative impacts of foundings respectively). CSDs with larger land area are more likely to attract entrants. Estimates also indicate that, on average, *de novo* entrants are not attracted to CSDs with more competitive market structures, greater potential aggressive entry deterrence or higher unemployment rates.

Columns 2–13 of Table 3 present estimates for models that include interactions of location and entrant-specific attributes.

To examine hypothesis 1, Columns 2–4 add the interactions of Agglomeration with the linear and squared covariates of the initial relative resource and capability positions of entrants. Column 5 estimates all interaction effects simultaneously. A log-likelihood test confirms the superiority of this model to the baseline specification in column 1 ($p < .001$). In column 5, the linear interaction effects of Relative Employment, Relative Assets and Relative Quality of Human Capital with Agglomeration are all significant and positive; positive values are added to the positive overall main effect of Agglomeration (except for model 4), reflecting larger positive effects for better endowed entrants. We suspect that the coefficient for assets loses its significance in column 5 due to the .416 correlation between Relative Employment and Relative Assets.

These estimates suggest that at the low range of resources and capabilities observed in our population, *de novo* entrants with larger initial resource endowments (employees, assets) and greater capabilities (quality of human capital) perceive more benefits from agglomeration externalities than those with lower endowments. This result confirms that in the low range of resources and capabilities, a favorable selection is present in entry to locations with high-agglomeration economies, rather than the adverse selection found in more mature diversifying (or multinational) entrants where 'Firms possessing superior technologies, human capital, training programs, suppliers, and distributors have the incentive to locate distant from other firms' (Shaver and Flyer, 2000: 1191). The negative and significant signs on all squared interaction terms, however, suggest that agglomeration benefits are perceived to have diminishing marginal effects, supporting hypothesis 1.[7]

Quantitatively, the estimates in Table 3 suggest that *de novo* entrants whose quality of human capital (as reflected in relative wage rates) is 26.8 percent higher than the sectoral cohort average in their CSD were most attracted to concentrated agglomerations, and, by implication, perceived the greatest agglomeration benefit. Beyond this level, however, the tendency to locate in a concentrated agglomeration and the perceived advantage of agglomeration declines. For Relative Assets, the comparable value is 30.2 percent. For Relative Employment, the attraction to concentrated agglomerations increases at a decreasing rate across the observed range of Relative Employment, but does not decline.

Table 3 Nested logit model of CSD location choices

Specification	1	2	3	4	5	6	7	8	9	10	11	12	13
Agglomeration	.013***	.008***	.007***	−.027***	−.122***	.013***	.013***	.013***	.013***	.013***	.013***	.013***	−.116***
	4.E–04	4.E–04	4.E–04	.016	.021	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	.025
Competitive Market Structure	−.005***	−.003***	−.004***	−.004***	−.006***	−.014***	−.005***	−.006***	−.005***	−.008***	−.013***	−.005***	−.011***
	.001	.001	.001	.001	.001	.002	.001	.001	.001	.002	.002	.001	.002
Deterrence Propensity	−.007***	−.007***	−.007***	−.009**	−.007***	−.006***	−.009***	−.011***	−.009***	−.006***	−.007***	−.007***	−.011***
	6.E–04	6.E–04	6.E–04	6.E–04	7.E–04	6.E–04	6.E–04	6.E–04	6.E–04	6.E–04	6.E–04	6.E–04	6.E–04
Asset Turnover	.086***	.088***	.093***	.096***	.114***	.077***	.085***	.091***	.089***	.076***	.070***	.135***	.151***
	.009	.009	.008	.009	.007	.009	.009	.009	.007	.009	.008	.008	.008
H1													
Relative Employment ×	.004***				.006***								.005***
Agglomeration	2.0E–04				5.E–04								5.E–04
{Relative Employment}^2 ×		−2.E–04***			−1.E–05***								−1.E–05***
Agglomeration		4.E–05			5.E–06								5.E–06
Relative Assets ×			.003**		2.E–04								6.E–04*
Agglomeration			1.E–03		3.E–04								3.E–04
{Relative Assets}^2 ×			−2.E–04*		−2.E–06								−5.E–06**
Agglomeration			3.E–05		−2.E–06								1.E–06
Relative Quality of Human				.092***	.107***								.102***
Capital × Agglomeration				.018	.022								.021
{Relative Quality of Human				−.043***	−.096***								−.088***
Capital} ^2 × Agglomeration				.014	.018								.016

(Continued)

Table 3 (Continued)

Specification	1	2	3	4	5	6	7	8	9	10	11	12	13
H2a													
Relative Productivity ×						.007***					.006***		.005***
Competitive Market						3.E–03					3.E–03		3.E–03
Structure													
H2b													
Relative Employment ×							−.0002		−.0002				−2.E–04*
Deterrence Propensity							8.E–04		8.E–04				9.E–05
Relative Assets ×							−.003***		−.004***				−.003***
Deterrence Propensity							7.E–04		7.E–04				2.E–03
Relative Productivity ×								.006***	.005***				.005***
Deterrence Propensity								5.E–04	5.E–04				4.E–04
H3a													
Relative Assets ×										−.005***	−.004***		−.005***
Competitive Market										2.E–03	2.E–03		2.E–03
Structure													
H3b													
Relative Assets × Asset												.074**	.062**
Turnover												.036	.030
Controls													
Industrial Diversity	.002***	.002***	.002***	.003***	.003***	.003***	.003***	.003***	.003***	.003***	.003***	.003***	.003***
	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
Population	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.002***	.003***
	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04	4.E–04
Land Area	.005**	.005**	.006**	.006**	.006**	.005**	.006**	.006**	.005**	.005**	.005**	.006**	.005**
	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03	2.E–03
Unemployment Rate	−.032***	−.031***	−.032***	−.033***	−.032***	−.032***	−.033***	−.033***	−.033***	−.033***	−.033***	−.032***	−.033***
	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003

Table 3 (Continued)

Specification	1	2	3	4	5	6	7	8	9	10	11	12	13
Average Exit Rate	−.036**	−.036**	−.036**	−.038**	−.036**	−.037**	−.033**	−.036**	−.034**	−.036**	−.036**	−.042**	−.039**
	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	2.E–02	3.E–02	2.E–02
Average Entry Rate	.017	.017	.017	.017	.015	.017	.016	.017	.018	.017	.017	.024*	.027*
	.011	.012	.011	.012	.013	.011	.011	.013	.013	.011	.011	.012	.014
Log-likelihood	−47,335	−46,904	−47,133	−46,658	−46,088	−46,611	−45,894	−45,607	−44,977	−46,589	−45,101	−45,439	−41,443
Likelihood Ratio Index	.227	.235	.231	.239	.248	.239	.251	.256	.266	.240	.264	.258	.324
Number of choosers	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324	43,324

Note: Standard errors below estimates.

*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

ER, SIC and year fixed effects are included in all models.

The likelihood ratio test is computed as 1–L1/L0, where L0 is the constant only log-likelihood and L1 is the full model log-likelihood.

Combined with the negative main effect for Competitive Market Structure, the positive coefficient of the interaction term between Relative Productivity and Competitive Market Structure introduced in column 6 indicates that more productive entrants are less strongly deterred from entering competitive markets. Thus, supporting hypothesis 2a, the likelihood of a *de novo* entrant locating within a highly competitive CSD increases with the productivity of the entrant.

Hypothesis 2b also receives support. Columns 7–8 add the interactions of Deterrence Propensity with the initial relative resource and capability positions of entrants. Column 9 estimates the interactions simultaneously. A log-likelihood test confirms the superiority of this model to the baseline specification in column 1 ($p < .005$). The significant negative coefficient for the Relative Assets × Deterrence Propensity interaction term indicates that larger than average *de novo* entrants are less attracted to CSDs where incumbents are likely to react aggressively toward entry. Although having the expected sign, the coefficient for Relative Employment × Deterrence Propensity is not significant, however. The positive and significant coefficient of the interaction between Relative Productivity and Deterrence Propensity, combined with the negative main effect for Deterrence Propensity, indicates that less productive entrants tend to avoid expected entry deterrence more than more productive entrants.

Models 10–12 add interactions to test hypotheses 3a and 3b. The negative coefficient for the Relative Assets × Competitive Market Structure interaction implies that *de novo* entrants with below average initial asset levels value more highly an industrial environment characterized by many small firms – more welcoming – rather than a few large ones. The positive and significant sign of the coefficient implies that higher turnovers in a location (controlling for three-year average entry and exit rates) are valued more by entrants with higher relative assets. Thus, supporting hypothesis 3a, we find that the likelihood of *de novo* entry to locations with highly competitive market structure decreases with increases in the stock of the initial assets of entrants. Additionally, supporting hypothesis 3b, the likelihood of *de novo* entry in CSDs with high asset turnover increases with entrants' initial asset stock.

The final column of Table 3 estimates all interaction terms simultaneously. The qualitative interpretation of results remains unchanged, and the full model provides a significant improvement in explanatory power over the baseline model ($p < .001$).

Robustness checks and study limitations

To check our findings' robustness to different measures and specifications, we conducted a series of additional estimations. First, we checked whether restricting the choice of CSDs to those within a particular ER biased our results. Relaxing this assumption so that entrepreneurs choose among all CSDs in a province did not materially alter the findings in sign or significance. Restricting the set of CSDs within a given ER did not affect the results either.[8]

We also used several alternative operationalizations for our main covariates. For Agglomeration, we considered location quotients (Rosenthal and Strange, 2001, 2003) and density (e.g. Audia et al., 2006; Greve, 2002; Lomi, 1995).[9] For Competitive Market Structure, we considered the ratio of the number of establishments per worker in the same three-digit SIC in the area (Glaeser et al., 1992; Rosenthal and Strange, 2003). For Deterrence Propensity, we considered employment of the four largest firms over the total industry employment in the area. For Asset Turnover, we considered an alternative measure based on the ratio of entry rates to exit rates to capture the balance of demand and supply for the entrant's assets. We also considered specifications of the original and these alternative measures that expanded their scope an additional ring beyond the ones based on the analysis in Table 2. Our results were robust to these different measurement specifications, which are available from the authors on request.

We conducted additional analysis using alternative model specifications as well. In addition to the year and industry fixed effects included in Table 3, we experimented with the following interactions: ER × year effects to absorb ER-specific time-varying shocks shared by all firms operating in the ER (such as the construction of a rail link or the opening of an airport); sector × year effects to capture sector-specific time-varying shocks (such as the introduction of a new industry-specific technology); and ER × year × industry effects. The qualitative and quantitative pattern of the results was similar regardless of the specification. The likelihood ratio index increases by roughly 8 percent (vs column 13) when 73 ER fixed effects are included, providing evidence that locations vary systematically in their average attractiveness. An *F*-test of the joint significance of the ER fixed effects was highly significant.

Although we have conducted extensive robustness checks, it must be noted that the use of proxy indicators does not necessarily capture fully the theoretical constructs they represent. For example, we followed the convention in economic modeling and interpreted higher wage rates as indicators of higher human capital quality. Clearly, a variety of other factors may explain why entrants pay more for employees (e.g. local wage differences). We have reduced the likelihood of potential misinterpretations by using relative wage rates within locations and industries. Given that we used secondary data, we could not capture more detailed entrant-level capabilities or attempt to uncover the underlying reasons for differences in those capabilities (McGrath et al., 1995). We also used accounting data to estimate resources (Dutta et al., 2005; Grant, 1991). Since our data relate to a time close to entry, the bias in using accounting data may not be serious: since only a short time elapsed from the time assets have been purchased and the time of the accounting report, the differences between market values and reported values should not be significant (Geroski et al., 2002). Another limitation is the estimation of initial resources using data that on average represent resources and capability six months on from entry, and thus may reflect some impact of the location on resource and capability levels.

Discussion and conclusion

Baum and Shipilov (2006: 58) have noted that 'Although organizational founding is an important theme in ecological research, in large part, foundings have been treated as identical additions to homogeneous populations: the characteristics of new organizations, which define their domains, have not been of central interest.'[10] In this article, we relax this assumption of homogeneity and attempt to understand what effect heterogeneous resources have on where entrepreneurs choose to found new enterprises.

Employing perspectives from the strategy literature, we develop a model that explicitly accounts for the moderating effects of initial endowments on location choices. We draw on two complementary perspectives to form our model: industrial organization and the resource-based view. Based on these two perspectives, we hypothesize that initial endowments determine both the value of location externalities and the capacity of an entrant to access those externalities. We also hypothesize that exposure to risk and competition in a location is a function of the initial resources and capabilities of an entrant. Thus, we expect that entrepreneurs will take into consideration both the resources and capabilities they can marshal for their enterprise and the competitive and resource environment of potential locations. They will, we argue, try to find a place where a match between their firm and the location provides a good prospect for success.

For theories of strategic agglomeration, our study emphasizes that *de novo* entry is different than *de alio* entry since *de novo* entrants do not enjoy the possibility of continuous transfers of resources and capabilities from their parents. As our analysis shows, for most *de novo* entrants, a marginal increase in resources or capabilities has the opposite effect to that for diversifying entrants. Rather than causing them to flee agglomerated areas, it causes them to seek them out (see also Aharonson et al., 2007). Among weak entrants, our analysis suggests, additional resources and capabilities make agglomerations more attractive because they help the *de novo* entrant access and absorb the economies created by the cluster. For *de novo* entrants with very high endowments of resources and capabilities, the existing theory does seem to be predictive (Shaver and Flyer, 2000). Thus, it appears that our analysis provides new evidence about the location-choice effects of resources and capabilities in a part of the continuum – highly resource-constrained entrants – that has been relatively less studied.

For theories of industrial organization, our study demonstrates that finding a shelter from competitive threats is an important element in strategic choices of location by *de novo* entrants. We hypothesized that the likelihood of entry into markets with highly competitive structures would be higher for entrants that are more productive. We predicted that competitive markets and a higher potential for aggressive reactions from incumbents would deter entry to a location. We confirmed both predictions. More productive entrants may be able to cope more effectively with difficult competitive environments. Being small reduces the perceived threat of aggressive reaction to entry from incumbents, providing

support for the 'judo strategy' articulated by Gelman and Salop (1983) and Scherer and Ross (1990).

Finally, our results suggest that a location that is 'welcoming' or 'forgiving' could influence the tendency for an entrepreneur to choose that location. Several authors have argued that markets with many small firms are more welcoming in the sense that local social and professional networks are more open to new entrants (Aharonson et al., 2007; Porter, 1998, 2000; Rosenthal and Strange, 2003; Stern and Porter, 2001). We find evidence consistent with this contention by showing that comparatively smaller entrants are more likely to enter locations with high concentrations of small firms (i.e. locations with a competitive market structure), despite their greater competitive risks. We find that the degree to which an environment is 'forgiving' matters as well. Larger entrants were more likely to emerge in locations where thick markets for assets allowed them to recoup some of their investment should the enterprise fail.

In sum, our article offers insight on the enduring question of where entrepreneurs found new enterprises. For entrepreneurs, our article clarifies important tradeoffs to be considered when choosing location. It suggests, for example, that in some contexts smallness in conjunction with appropriate location can be used to implement a type of 'judo strategy'. For policy-makers, our findings illuminate which policies will foment the development of entrepreneurial clusters. It provides, for example, evidence that increases in asset recovery could help attract stronger startups (i.e. those with greater initial resources). Finally, for scholars of the literature on *de novo* entry, our analysis draws attention to the importance of heterogeneity among new enterprises. Startups are not all equal at birth and their differing founding endowments cause them to choose differing types of locations. In this study, we have mapped out how these differing endowments can influence location choices.

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Notes

1 Establishment is not necessarily equivalent to a firm as some firms have more than one establishment, but the overwhelming majority of firms are single establishments and, correspondingly, the vast majority of establishments correspond to independent firms. As we

limit our sample to include only *de novo*, single-establishment entrants, it is likely that the locations of operation and headquarters are the same. We use the term 'firm' to represent the units in the data set hereinafter.

2 Because of difficulties in measuring self-employment and the conceptual problems in equating it to the creation of new enterprises (Glaeser, 2007), we follow previous research and identify a new firm when it first hires employees.

3 We excluded from our sample spin-offs that started as subsidiaries or divisions of incumbents and later transformed into independent establishments (also known as parent spin-offs). We cannot, however, differentiate between *de novo* entrants and firms established by executives of an incumbent leaving to start their own firms (also known as entrepreneurial spin-offs). Such spin-offs were found by Klepper (2002) to be an important determinant of geographic concentration in the US automobile and tire industries.

4 While other measures may be used to predict the intensity of incumbents' deterrence activity such as patenting and branding expenditures, or investments in capacity expansion in the pre-entry period, they are likely to be correlated with price–cost margin (Geroski et al., 2002).

5 Aggregating by three-digit SIC industries, the relative contribution of capital inputs to the overall value added of industry j is estimated as follows: $\alpha j = 1 - Wj / VAj$ where W_j is the aggregate level of wages paid in industry j and VA_j is the total value added of that industry.

6 Since some of the covariates vary by three-digit SIC level, we use two-digit SIC level fixed effects. Moreover, industry fixed effects are expected to operate at a higher aggregation level than three-digit.

7 Note that we do not need to include the main effects for entrants' characteristics since our data set covers only entrants with a single establishment at the time of entry. The inclusion of main effects of firm characteristics reflects the tendency of an entrant with given characteristics to enter a location in the region irrespective of its characteristics. The interaction terms represent a full specification of our model of choice of location within a region (for empirical development, see Train, 2003). To ensure robustness, we also conducted analyses using the main effects and obtained findings that are consistent in sign and significance.

8 Specifically, for the choice set of alternative CSDs within the ER, we ran tests for all models by excluding several CSDs from the choice set. For the choice set that contained all alternative CSDs in the province, we excluded ERs that may share some common unobserved characteristics (e.g. Toronto ER in Ontario or Montreal in Quebec have more supporting services for new ventures than do other ERs in the provinces). Additionally, we eliminated several sectors while maintaining the completed location choice set since entrepreneurs in those sectors may be attracted to (or reject) certain locations due to availability of natural resources, clusters of related industries or research institutions. Specifically, we eliminated the wood pulp and sawmill sectors, transportation sectors and pharmaceutical and medicine sector.

9 Location Quotient (LQ) is a technique that compares the local economy to a reference economy. LQ = [(Local employment in industry *i* in year *t)* / (Total local employment in year *t*)] / [(National employment in industry *I* in year *t*) / (Total national employment in year *t*)]. Density is the count of local firms in industry *i* in year *t*.

10 In part, the lack of focus on heterogeneity of entrants by ecologists has stemmed from the assumption that the characteristics of potential entrants cannot be observed for organizations that do not exist. Treating organizational founding at the population level meant that ecologists either ignored heterogeneity, corrected statistically for estimation biases created by it, or dealt with it by specifying more fine-grained population substructures or taking organizational founding as given and examining heterogeneity in entry patterns.

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