Entrepreneurial Skills in Thick and Thin Markets

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Abstract
Firm profitability is affected by location-specific factors such as agglomeration economies, infrastructure, or proximity to consumers or key producers. Location-specific profits are also influenced by the idiosyncratic match between the entrepreneur and the community. Using data on the universe of all new firm entrants in North Carolina and Iowa between 1992–2011, this study shows how observed location-specific factors affect the probability of new firm entry. We then show that the unobserved factors that influence new firm entry increase the probability of firm survival, demonstrating that these unobserved idiosyncratic factors influence firm profitability and are not just unproductive entrepreneurial preferences for the location. These unobserved factors are interpretable as match capital between the entrepreneur and the location. Shift-share analysis demonstrates that the match capital varies systematically across urban locations, meaning that the match capital can be incorporated into property values in densely populated markets. However, the match capital varies disproportionately within and not between rural markets, meaning that match capital in thin markets is primarily due to a unique match between the entrepreneur and the rural location. These results suggest that it will be easier to transfer firm profitability in the case of a firm sale in dense urban markets than in thin rural markets.

Keywords
Firm location, Thick markets, Thin markets, Idiosyncratic match, Survival, Salvage value, Urban, Rural, Asset fixity

Disciplines
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Entrepreneurial Skills in Thick and Thin Markets

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Firm profitability is affected by location-specific factors such as agglomeration economies, infrastructure, or proximity to consumers or key producers. Location-specific profits are also influenced by the idiosyncratic match between the entrepreneur and the community. Using data on the universe of all new firm entrants in North Carolina and Iowa between 1992–2011, this study shows how observed location-specific factors affect the probability of new firm entry. We then show that the unobserved factors that influence new firm entry increase the probability of firm survival, demonstrating that these unobserved idiosyncratic factors influence firm profitability and are not just unproductive entrepreneurial preferences for the location. These unobserved factors are interpretable as match capital between the entrepreneur and the location. Shift-share analysis demonstrates that the match capital varies systematically across urban locations, meaning that the match capital can be incorporated into property values in densely populated markets. However, the match capital varies disproportionately within and not between rural markets, meaning that match capital in thin markets is primarily due to a unique match between the entrepreneur and the rural location. These results suggest that it will be easier to transfer firm profitability in the case of a firm sale in dense urban markets than in thin rural markets.

JEL: L26; M13; R3

Keywords: firm location; thick markets; thin markets; idiosyncratic match; survival; salvage value; urban; rural; asset fixity
**Introduction**

United States governments devote over $250 billion to luring new firms or incentivizing new firm entrants.\(^1\) However, new ventures are fragile. One-third of new start-ups fail within two years of opening and two-thirds exit by their sixth year.\(^2\) As a result, at the time of entry, entrepreneurs must consider the salvage value of the venture were it to fail. Alternatively, exit may result from rising opportunity costs of the location that make sale of the capital more profitable than continuing with a going concern. Whether the government economic development policies succeed or fail depends on what factors influence firm entry decisions, how these factors contribute to the success or failure of new ventures, and how these factors vary across locations.

We investigate the role of location-specific human capital in firm entry decisions and firm survival rates using longitudinal data on all firms born in Iowa and North Carolina between 1990 and 2011. Previous research has focused on identifying market characteristics (agglomeration economics, wages, taxes, and local amenities) that influence firm location. However, the attributes of the firm and the entrepreneur may also have location-specific productivities that raise the firm’s profitability in one location compared to all the rest. This productivity may reflect the entrepreneur’s prior familiarity with the area, as suggested by the large number of entrepreneurs who start a business in their home town.\(^3\) It may also reflect the entrepreneur’s tastes for the home town, in which case the location choice may not be the profit-maximizing location decision.

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1. A 2012 New York Times article estimates that local governments spend $80.4 billion in business incentives each year, while state and federal sources contribute $170 billion.
3. Shane (2008) reports that 48 percent of firms begin in the home or the garage.
This study presumes that entrepreneurs choose the location of their start-ups based not only upon the observed location characteristics typically considered in empirical work on site selection (markets, agglomeration economies, and factor costs) but also the unobservable idiosyncratic profitability of the site and the idiosyncratic complementarity between the entrepreneur’s skills and the location. These idiosyncratic components of the entry choice will be uncorrelated with the observable attributes of the local market, but they will be critical to the location choice relative to all other available location options. We interpret this idiosyncratic component as the match between the entrepreneur and the location. The match may represent the location-specific human capital of the entrepreneur, or it may represent the entrepreneur’s taste for living in a particular location. We will demonstrate that larger endowments of these idiosyncratic match components at the time of entry are systematically tied to the firm’s profitability and probability of survival, consistent with the location-specific human capital interpretation rather than the entrepreneur’s unproductive locational tastes.

The idiosyncratic match affects the value of the firm as long as the entrepreneur remains involved with the venture, but that source of productivity ends if the firm is transferred to a new owner who lacks those same location-specific skills. Therefore, the salvage value of the firm, the value of the firm were it to be sold, depends on the local supply of potential substitute entrepreneurs with like skills.\(^4\) In thin markets, the likelihood that there are similarly skilled entrepreneurs available is small, and so the salvage value of the firm in thin markets will be low relative to the present value of the stream of returns under the original management. As the market density increases, the probability of having like-skilled entrepreneurs in the local area rises, as does the salvage value of the firm relative to its present value under current

\(^4\) See Lazear (2009) for a similar argument.
management. Consistent with this conjecture, we find that the match value of the firm is due primarily to the site-specific component in urban markets, but is due primarily to the idiosyncratic match between the entrepreneur and the site in rural markets. This finding is similar to the asset fixity literature used to explain why it is difficult to sell agricultural firms.\(^5\)

I. Literature review

Firms are attracted by locations that promise streams of higher revenues or lower costs of generating sales. Areas with higher factor costs due to high wages or taxes deter firm entry (Arauzo-Carod et al., 2010). Firm entry rates are higher in urban than in rural areas in part because agglomeration economies in urban areas provide a marginal cost advantage over rural sites. A variety of agglomeration economies have been shown to raise productivity in dense markets—proximity to upstream input suppliers and downstream customers that lower transportation costs and improve information flow through the supply chain; concentrations of an educated workforce that hasten innovation and enhance the diffusion of new technologies; a ready supply of labor that lowers costs of labor turnover; a critical mass of similar firms that can share ideas and a larger specialized labor pool; and a diversity of firms that foster cross-fertilization of ideas (Jofre-Monseny, Marín-López, and Viladecans-Marsal, 2011; Ellison, Glaeser, and Kerr, 2010; Shapiro, 2006; Moretti, 2004; Porter, 2003; Feldman and Audretch, 1999; Glaeser et al., 1992).\(^6\) While the bulk of the research on agglomeration economies focuses on metropolitan areas, recent research by Artz, Kim, and Orazem (2016) finds that the same agglomeration factors matter for rural firm entry.

Agglomeration measures and other observable location characteristics such as tax rates,

\(^5\) See Barry and Robison (2001) for an early review of this literature.
\(^6\) See Arauzo-Carod, Liviano-Solis, and Manjón-Antolín (2010) for a comprehensive review of firm location empirical studies.
government expenditures, and natural amenities explain only a small fraction of the location choices of new firms. Proximity to home explains much more of the variation in firm location. For example, Figueiredo, Guimarães, and Woodward (2002) explain roughly 20 percent of variation in location choices of manufacturing firms in Portugal when they include only agglomeration measures. Adding an indicator of whether the location choice of the entrepreneur is the investor’s “home base” explains an additional 42 percent of the variation. They estimate that an entrepreneur is willing to pay more than three times the labor costs to remain in his home area. Similarly, Michelacci and Silva (2007) document that a significantly higher fraction of entrepreneurs work in the region where they were born relative to the corresponding fraction of workers.

The tendency to locate ventures in their place of birth may be merely a reflection of the entrepreneur’s tastes. However, locating the venture in familiar territory may be a reflection of location-specific factors that raise the firm’s productivity. These factors may be unobserved location attributes that affect all firms at that location equally, or they may reflect location-specific knowledge embodied in the entrepreneur that uniquely raise the productivity only of that entrepreneur’s venture. For example, strong social ties may facilitate financing a start-up venture locally, help an entrepreneur attract and retain skilled labor, and may lead to increased community support for the business once opened (Onyx and Bullen, 2000; Besser and Miller, 2013). Michelacci and Silva (2007) conclude that their advantage in accessing financing explains why local entrepreneurs are bigger, more capital-intensive, and better funded than firms created by non-local entrepreneurs. An entrepreneur’s location-specific capital may include knowledge

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7 This concept of specific local knowledge is akin to a concept from the migration literature that some returns to human capital are location specific. People make investments in their place of residence that increase the costs of migration. The accumulation of location-specific capital at a prior residence is positively associated with the probability of return migration (DaVanzo, 1983; Dierx, 1998).
of niche demands or resources that can be exploited in an area (Kirzner, 1997). Locational advantages could reflect an entrepreneur’s investments in skills pertinent to the industries in the place in which they reside (Krupka, 2009).

If the location-specific productivity is due to the match between the entrepreneur and the location, it will be difficult to transfer that productive advantage to a successor. That suggests that when an entrepreneur who has significant location-specific capital attempts to pass the operation to another, the sale value will be substantially below the value if the entrepreneur were still involved. This is a variation on the asset fixity problem discussed most commonly in agricultural settings (Johnson, 1956; Edwards, 1959) or the spatial fixity problem analyzed by regional economists (Ward and Hite, 1999; Hite, 1997).

Asset fixity has been used to explain why farmers faced with economic losses are slow to cut back on production (Johnson, 1956; Boetel, Hoffman, and Liu, 2007), or slow to exit the industry altogether (Foltz, 2004). The asset fixity trap arises when the salvage value of the farm deviates significantly from its use value under the current farmer and the asset becomes “trapped” in its current usage. The asset fixity problem has implications for entry. Thin salvage markets for fixed capital are an example of a sunk investment cost, which, in the presence of uncertain product demand, makes it less likely for farmers or other entrepreneurs to exit a market they are currently operating in, but also makes it less likely for firms to enter thin markets in the first place (Chavas, 1994; Abel and Eberly, 1994). Since the salvage value will be lower in less densely populated markets, asset fixity will be more severe in rural than urban areas. This is consistent with the empirical evidence that rural firms live as long, or longer, than urban firms.

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8 A broader notion allows development of human capital that is specific to a type of place, as opposed to any one particular place (Herzog and Schlottmann, 1982; Artz, 2003; Krupka, 2009).
The decision to exit is a function of the difference between the expected present value of profit from operating the business and the potential sell-off value of the firm (Huiban, 2011). A higher salvage value increases the likelihood of a “successful closure,” exit to take advantage of another more profitable business or employment opportunity (Wennberg and DiTienne, 2014; DiTienne, 2010). In urban markets, there is a higher probability of the existence of one or more potential successors with the same location-specific knowledge as the current owner. Hence, successful urban firms may have many suitors seeking to purchase them, and a higher probability of a successful exit. In contrast, successful rural firms will face a thin supply of both potential opportunities and potential successors. Thus, as with Lazear’s (2009) skill-weights approach to human capital in which thicker markets make all skills general, the greater supply of potential successors in urban markets renders the firms’ assets more general and increases their sell-off value. In rural areas, there are fewer potential entrepreneurs, making the firm’s productive assets more specific.\(^9\)

This paper proceeds as follows. Section II lays out a model of firm location choice that incorporates idiosyncratic components that affect expected firm profitability across locations. We also incorporate the notion of salvage value as a function of market density. Section III describes empirical specifications. Section IV describes our data and results. Section V concludes with a brief discussion of policy implications and future research.

**II. Model**

We require a model that will: (a) enable us to measure the relative importance of market factors

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\(^9\) Even productive assets that are tradable can become more or less specific if the market is very thin. Foltz (2004) provides the example of dairy cows in Connecticut: because there are so few other dairies in the region, a farmer who wanted to exit might be forced to sell his dairy herd as cull cows rather than productive assets.
versus firm idiosyncratic factors in explaining where firms locate; (b) enable us to assess whether these idiosyncratic factors raise the entrepreneur’s profits or just the entrepreneur’s utility; (c) allow us to assess whether the idiosyncratic factor can be captured in the sale or salvage value of the firm; and, (d) identify how these factors differ between densely and sparsely populated markets. While these questions are ultimately empirical, our answers will only be as convincing as the tie between the theoretical measures and our empirical constructs.

Consider one of \( I \) entrepreneurs who has decided to open a business in year \( t \) in one of \( K \) sectors, but is deciding where the business will be located among \( J \) possible locations. We assume that the entrepreneur will make the decision based on the location that offers the highest present value of expected profit \( \pi_{ijkt}, i=1,2,\ldots, I; j = 1,2,\ldots, J; k=1,2,\ldots, K \). Alternatively, we could define the problem as choosing the location that maximizes the entrepreneur’s expected discounted utility, \( U_{ijkt} \). The reduced form of the firm location decision will be the same under both assumptions regarding the entrepreneur’s motivation, and so the focus on the profit motivation at this stage is for ease of presentation.

**II. A The firm entry decision**

The firm’s expected discounted stream of profits conditional on success were it to open in year \( t \) in location \( j \) is given by

\[
\pi_{ijkt} = \Pi(Z_{jt}, W_{kjt}, p, w, r, \epsilon_{ijkt})
\]

(1)

where \( Z_{jt} \) are location-specific attributes that have been shown to influence firm entry in location \( j \), \( W_{kjt} \) are sector-specific attributes in location \( j \) that have been shown to influence entry, and \( \epsilon_{ijkt} \) is a mixture of location-specific and firm-specific idiosyncratic profits from locating in city \( j \) that are unobservable to the econometrician but known to the entrepreneur. We assume that the firm is a price taker in the competitive output, labor, and land markets, and so
there is a common wage rate $w$ and rental rate $r$ across all markets that reflect the labor and capital types required for the firm’s production process.

Building on past studies, we define the vector of local agglomeration measures ($Z_{jt}$) to include city size, industrial diversity, and the skill level of the population. City size has been commonly associated with agglomeration economies that raise productivity across sectors (Glaeser and Gottlieb, 2009). Jane Jacobs (1969) argued that local areas with a broad mix of business were more attractive to new businesses. More educated populations improve firm productivity by enhancing the spillover of innovations and ideas across firms (Lucas, 1988; Romer, 1986; Moretti, 2004). Consumers also benefit from local concentrations of customers with ability to pay, and so we include measures of median income per capita and of the county population. The counties in our sample are of roughly equal size, and so our population measure is interpretable as population density.

Past studies have also identified key sector-specific factors ($W_{kjt}$) that induce firm entry. Marshall (1920) and Porter (1990) have argued that firms are attracted to areas that have clusters of incumbent firms in the same sector, whether because proximity among similar firms aids in sharing customers or innovations or because firm clusters attract a better pool of workers with requisite sector-specific skills. Ellison, Glaeser, and Kerr (2010) and Moretti (2004) demonstrated the importance of nearby upstream input suppliers or downstream customers as aiding firm productivity and growth.

We specify the idiosyncratic component as

$$
\varepsilon_{ijkt} = \varepsilon_i + \varepsilon_j + \varepsilon_{jk} + \varepsilon_{ij} + \omega_{ijkt}
$$

These unobservables include the productive attributes of the entrepreneur, $\varepsilon_i$, which are common across all areas, the productive potential of the location, $\varepsilon_j$, which are common across all
ventures, the sector-specific location productivity, which are common across all firms in the sector, \( \varepsilon_{jk} \), and a transitory random component, \( \omega_{ijkt} \). There is also an unobservable match component between the entrepreneur and the location, \( \varepsilon_{ij} \). This match component could represent the entrepreneur’s taste for living in location \( j \), in which case it will have no direct impact on the venture’s profitability, but will increase the likelihood that the firm opens in \( j \). On the other hand, there may be an unobservable productive match between the entrepreneur and the location attributable to location-specific human capital that would raise the venture’s profitability in city \( j \). We will not be able to distinguish whether \( \varepsilon_{ij} \) is unobserved taste versus unobserved productivity at the time of entry, but we will be able to distinguish between the two hypotheses depending on how they are correlated with firm success.

Suppose that there are \( N_j \) potential users of location \( j \). The probability that entrepreneur \( i \) has the highest valued use of the location across all \( N_j \) options at time \( t \) is \( G(\pi_{ijkt})^{N_j} \). That means that there is a probability \( 1 - G(\pi_{ijkt})^{N_j} \) that there is another entrepreneur who would value the site more highly. Over time, firm \( i \) will be getting random draws on \( \omega_{ijkt} \) that will raise or lower its value. Bad draws on \( \omega_{ijkt} \) will lower \( \pi_{ijkt} \), which will cause \( G(\pi_{ijkt})^{N_j} \) to fall and \( 1 - G(\pi_{ijkt})^{N_j} \) to rise.

Suppose that there is another entrepreneur \( \ell \) who represents the best alternate operator of a firm at that same site. If that entrepreneur were to take over, the present value of profits \( \pi_{\ell jkt} \) would reflect the location-specific value of firm \( \ell \). That value represents the highest amount that entrepreneur \( \ell \) would be willing to pay for the business assets and still make normal economic profit.\(^\text{10}\)

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\(^{10}\) For simplicity, we do not consider transaction costs of the transfer of ownership. Transaction costs would add a fixed cost of entry, \( C \), so that the expected present value of profits for firm \( \ell \) would be \( \pi'_{\ell jkt} = \pi_{\ell jkt} - C \).
Combining these two possibilities that the firm survives or dies, firm \( i \)'s expected value at time \( t \) is

\[
V_{ijkt} = G(\pi_{ijkt}^N) \cdot \pi_{ijkt} + \left(1 - G(\pi_{ijkt}^N)\right) \cdot \pi_{\ell jkt}
\]  

Equation (3) demonstrates that as market density increases, the idiosyncratic source of the firm’s value \( G(\pi_{ijkt}^N) \cdot \pi_{ijkt} \) gets smaller and the location-specific value \( (1 - G(\pi_{ijkt}^N)) \cdot \pi_{\ell jkt} \) rises. In thick markets, the new entrant can expect to capture much of its value even if it closes by selling its assets to a successor. The reason is that as \( N_j \) rises, the number of potential successors that could match or exceed the value of the firm as managed by entrepreneur \( i \) increases and the assets of the business become more general. In thin markets, there may be no successor that could generate the same value as \( i \), even if entrepreneur \( i \) faces some bad draws on \( \omega_{ijkt} \).

**II.B Location-specific matches will be most important in thin markets**

At the time of entry, it must be true that

\[
V_{ijk0} = G(\pi_{ijk0}^N) \cdot \pi_{ijk} + \left(1 - G(\pi_{ijk0}^N)\right) \cdot \pi_{\ell jk0} \geq V_{ij'k0} \forall j' \neq j \]  
\[
V_{ijk0} = G(\pi_{ijk0}^N) \cdot \pi_{ijk} + \left(1 - G(\pi_{ijk0}^N)\right) \cdot \pi_{\ell jk0} \geq V_{\ell jk0} \forall \ell \neq i
\]  

which means that individual \( i \) expects at least as much value at location \( j \) at time 0 as at any other location and that no other potential entrant values location \( j \) more highly at time 0 than does individual \( i \). The location-specific attributes \( Z_{j0} \) and \( W_{k0} \) will be common across all potential entrants. In addition, the expected contribution from the location-specific value that can be captured through resale of the venture, \( (1 - G(\pi_{ijk0}^N)) \cdot \pi_{\ell jk0} \), will also be common across all potential entrants. As a result, condition (4B) implies that in any area \( j \), the successful entrant
will have the largest idiosyncratic component, $G(\pi_{ijk0})^{N_j} \cdot \pi_{ijkt}$. However, for (4A) to hold, this idiosyncratic component has to be larger in thin markets than in thick markets to overcome the relatively large location-specific values in thicker markets. As a result, at the margin, idiosyncratic components will be largest in the thinnest markets.

The components of (2) that will prove most important for satisfying (4A) and (4B) are $\epsilon_i$, $\epsilon_{ij}$, and $\omega_{ijk0}$. The first component is the entrepreneur’s skill that raises value across all markets. Individuals for whom $\epsilon_i \geq \epsilon_{i'} \forall i' \neq i$ will be able to locate in areas with the largest location-specific values, and so the best entrepreneurs will congregate atypically in thick markets.¹¹

To locate in a thin market, an entrepreneur has to make up for the low location-specific value compared to a thick market. That requires a large draw on the location-specific match, which is made up of $\epsilon_{ij} + \omega_{ijk0}$, and so thin market entrepreneurs will atypically have large transitory or permanent values of the location-specific match.

**III. Empirical specification**

Our empirical work uses data on a firm’s choice of location $j$ from all $J$ possible locations, and so we work from equation 4A). Equation 4B) would require that we have information on all possible firms that could have selected location $j$, information that is not plausibly available as it would include possible ventures that never opened. We begin by noting that in equation 4A),

$$V_{ij,k0} = G(\pi_{ijrk0})^{N_j} \cdot \pi_{ijr,k0} + \left(1 - G(\pi_{ijrk0})^{N_j}\right) \cdot \pi_{ijr,k0} = \pi_{ijrk0} \text{ because location } j' \text{ is defined as the best alternative location to } j. \text{ As a result, } 4A) \text{ can be rewritten as}$$

$$V_{ij,k0} = G(\pi_{ijk0})^{N_j} \cdot (\pi_{ijkt} - \pi_{ijr,k0}) + \pi_{ijr,k0} \geq \pi_{ijrk0}$$

so that

$$V_{ij,k0} \geq 0 \text{ iff } G(\pi_{ijk0})^{N_j} \cdot (\pi_{ijkt} - \pi_{ijr,k0}) \geq 0$$

¹¹ This point was emphasized in Behrens, Duranton, and Robert-Nicoud (2014).
\[ V_{ijk0} \geq 0 \text{ if } (\pi_{ijk} - \pi_{ijk0}) \geq 0 \]

so that at the time of firm i's entry into market j, the present value of firm profit at that time and location dominates the present value of that firm's profit at that time and any other location. The linear approximation to the reduced-form present value of firm i in industry k, location j and year t given by:

\[ \pi_{ijk} = Z'_j \gamma_Z + W'_k \gamma_W + \alpha_{pi}p + \alpha_{wi}w + \alpha_{ri}r + \varepsilon_i + \varepsilon_j + \varepsilon_{jk} + \varepsilon_{ij} + \omega_{ijk} \tag{5} \]

where \( \gamma_Z \) and \( \gamma_W \) are vectors of coefficients. The parameters \( \alpha_{pi} \), \( \alpha_{wi} \) and \( \alpha_{ri} \) translate prices, wages, and capital rental rates into profit equivalents in a manner common across all locations, given firm i's production process. The firm will choose location j so that it maximizes expected value compared to all other possible locations, \( j' \). We can characterize that decision using a dichotomous variable \( E_{ikjt} = 1 \) if the firm opts to enter area j in year \( t \) and \( E_{ikjt} = 0 \) otherwise, implying that \( E_{ikjt} = 1 \) if \( \pi_{ijk} - \pi_{ijk'} \geq 0 \forall j' \neq j \).

Using the linearized profit (5), we have

\[ E_{ikjt} = 1 \text{ if } (Z'_j - Z'_{j'})\gamma_Z + (W'_k - W'_{k'})\gamma_W > \phi_{ijk} + \zeta_{ikjt} \forall j' \neq j \tag{6} \]

where \( \phi_{ijk} = (\varepsilon_i + \varepsilon_{jk} + \varepsilon_{ij}) - (\varepsilon_j + \varepsilon_{jk} + \varepsilon_{ij}) \) and \( \zeta_{ikjt} = \omega_{ikjt} - \omega_{ikjt} \). Note that the common firm effects \( \alpha_{pi}p + \alpha_{wi}w + \alpha_{ri}r + \varepsilon_i \) are differenced away because they represent a common level of firm profits across markets and so do not affect relative profitability across locations. If we assume that the composite error term \( \phi_{ijk} + \zeta_{ikjt} \) follows the type-1 extreme distribution, we can estimate (6) using the conditional logit estimator.

III.A. Identifying whether the idiosyncratic location match component is unobserved taste or profit
The parameters will allow us to estimate the probability of firm entry in all J possible locations. In particular, the predicted probability of firm entry into location $J^*$, the location actually chosen, conditional on the observable factors is $F[Z'_{j*t} \hat{Y}_Z + W'_{k_{j*t}} \hat{Y}_W]$, where $F[·]$ is the cumulative distribution and $\hat{Y}_Z$ and $\hat{Y}_W$ are the parameters from estimating (6). The predicted probability will not equal 1 because of the unobserved factors that influence the firm location decision. By construction, the observed outcome is $F[Z'_{j*t} \hat{Y}_Z + W'_{k_{j*t}} \hat{Y}_W + \varphi_{ij*}] = 1$, where the difference between the ex ante predicted probability of the location $J^*$ and the realized outcome ex post is due to the unobservable $\varphi_{ij*} = (\epsilon_{j*} + \epsilon_{j+k*} + \epsilon_{ij*} + \omega_{ikj*})$. The idiosyncratic match between the entrepreneur and the location can be measured by the monotonic transformation of the error terms,

$$h(\varphi_{ij*}) = 1 - F[Z'_{j*t} \hat{Y}_Z + W'_{k_{j*t}} \hat{Y}_W].$$ (7)

If these unobserved factors affecting new firm location are productive assets that raise firm profitability, they should affect the probability of firm survival. If they are just reflective of the entrepreneur’s taste for the location, they will not affect firm productivity. To investigate this question, we embed our measure of these unobserved factors into the firm’s realized value of profit as of time $\tau$

$$\pi_{ij*,kt}^R = Z'_{j*0} \beta_Z + W'_{k_{j*0}} \beta_W + \beta_\varphi h(\varphi_{ij*}) + \theta_{ij*,kt}$$ (8)

where the first three terms on the right-hand side represent the profit expected at the time of start-up and $\theta_{ij*,kt}$ denotes a random negative or positive shock to the expected stream of returns to entrepreneurship that is realized as of time $\tau$. The firm will remain in business provided

$$\pi_{ij*,kt}^R > \pi_{\ell_{j*},kt}$$

where $\ell$ is the most profitable potential successor at location $j$. Let $T_i > 0$ denote the duration of the firm’s existence. If an entrepreneur $i$ exits business $\tau_i$ years after start-up, then $T_i = \tau_i$. $T_i$ has a cumulative distribution, $H(\tau_i)$, which is the probability of firm failure.
by time $\tau_i$. The associated probability density function is $h(\tau_i)$.

The probability of failure at time $t + \tau$ is:

$$H(\tau_i) = \Pr(T_i \leq \tau_i)$$

$$= \Pr(Z'_{j*0}(\beta^i_Z - \beta^i_{Z*}) + W'_{kJ*0}(\beta^i_W - \beta^i_{W*}) + \beta_{\varphi}h(\varphi_{ij*}) + (\theta_{ij*,\tau} - \varepsilon_{ij*,\tau}) \leq 0)$$

$$= \Pr((\theta_{ij*,\tau} - \varepsilon_{ij*,\tau}) \leq -(Z'_{j*0}(\beta^i_Z - \beta^i_{Z*}) + W'_{kJ*0}(\beta^i_W - \beta^i_{W*}) + \beta_{\varphi}h(\varphi_{ij*})))$$

$$= H[-(Z'_{j*0}(\beta^i_Z - \beta^i_{Z*}) + W'_{kJ*0}(\beta^i_W - \beta^i_{W*}) + \beta_{\varphi}h(\varphi_{ij*}))] \quad (9)$$

The coefficient $\beta_{\varphi}$ relates the unobserved component to firm profit. If it is positive, then large values of $\varphi_{ij*}$ will increase firm profits and lower the probability of firm exit. However, if $\varphi_{ij*}$ is just the entrepreneur’s taste for location $J^*$, then it will increase the likelihood of entry, but it will have no implications for firm profit or survival, and we will find that $\beta_{\varphi}=0$. In addition, an atypically productive draw that makes local market attributes more profitable for a potential successor than the incumbent ($\beta^i_Z < \beta^i_{Z*}$ or $\beta^i_W < \beta^i_{W*}$); or if a successor entrepreneur has an atypically large draw on ability, $\varepsilon_{\ell}$; or if the location match, $\varepsilon_{j*,}$ is unusually large.

Consequently, the existence of a more profitable potential successor will also increase the probability of exit, even if the incumbent entrepreneur is making money.

**III.B Can the idiosyncratic location match component be incorporated into the sale value or salvage value of the firm?**

If the unobserved component is large due to location-specific factors $\varepsilon_{j*} + \varepsilon_{J*,k}$, then it will be a common unobserved effect across all ventures rather than being tied to this particular venture.

These unobserved attributes are common across venture $i$ and its potential successors. As a result, its productivity can be transferred from the present entrepreneur to the successor, and so
the value of $\varepsilon_{j*} + \varepsilon_{j*k}$ will be included in the resale price. However, if the unobserved component is mainly due to the idiosyncratic match between the entrepreneur and the location, $\varepsilon_{j*} + \omega_{ljk*}$, the firm’s value depends on the participation of entrepreneur $i$ and so the value of the venture to a successor will be much lower. As demonstrated by equation (3), the unobserved source of value for firm $i$ will depend increasingly on common location-specific factors as $N_j$ increases.

We can immediately assess the fraction of $\varphi_{lj*k}$ that is location-specific by regressing $\varphi_{lj*k}$ on a complete set of location-specific dummy variables,

$$\varphi_{lj*k} = \sum_{j=1}^{J} \alpha_j D_{lj} + \varepsilon_{lj*} ,$$

(10)

where the first term is a series of dummy variables where $D_{lj} = 1$ when $j=J*$ and 0 otherwise. Equation (10) is equivalent to an analysis of variance of the idiosyncratic component. The first term is the ‘between’ component that will give us the share of the variance of the idiosyncratic component due to location-specific factors. The between component will capture all of the variation in $\varphi_{lj*k}$ that varies systematically across markets and can therefore be priced at time of sale or salvage of the firm. The second term, the ‘within’ component, will reflect the match-specific capital reflecting the unique profitability of the union of the entrepreneur with the location. Because this profit is lost when the current entrepreneur is no longer involved with the firm, it cannot be priced upon sale or salvage. Because $N_j$ is larger in dense urban areas, we would expect that the first term would dominate in urban markets and the second term would be more important in thin rural markets. As demonstrated by conditions (4A) and (4B), the large idiosyncratic value in thin markets will be driven by a large draw on the match between the
entrepreneur and the location, $\epsilon_{ij} + \omega_{ijk0}$.\(^{12}\)

IV. Data

Our data include the universe of all firms that opened for business between 1991–2011 in North Carolina and Iowa. The states were selected because they both have a broad continuum of county populations from remote rural small towns to metropolitan areas. The data come from the National Establishment Time Series (NETS) Dataset. Our sample consists of 283,721 new firm entrants in Iowa and 889,533 new firms in North Carolina. To fit the spirit of the model, we restrict our sample to for-profit firms. We exclude non-profit organizations, government agencies, and public service firms such as museums or historical sites. We also exclude agricultural and mining firms because they are not free to choose any location but must pick sites with requisite land, mineral, and water resources.

Each new entrant chooses one of the 99 counties in Iowa or one of the 100 counties in North Carolina. We use the 1993 Rural-Urban Continuum Codes (RUCC) to divide the counties into urban and rural designations at the start of our sample period. Urban counties have an RUCC between 0 and 5 and rural counties have an RUCC between 6 and 9. The sample is large enough to insure we will have adequate representation in all markets. In Iowa, 170,548 (60 percent) of the start-ups entered urban markets and 113,173 (40 percent) entered rural markets. In North Carolina, 724,912 (81 percent) are urban and 164,621 (19 percent) are rural.

To estimate equation (6), we need measures of location-specific attributes $Z_{jt}$ and location-sector-specific attributes $W_{kjt}$. Our location-specific factors include the rural-urban designator plus measures of the industrial diversity and labor force skill in each county.

\(^{12}\) We might expect that only the permanent locational match component $\epsilon_{ij}$ would predict firm survival; however, a large, positive, but transitory, profit shock at time of entry could affect the likelihood that the firm survives the first few years.
Industrial diversity is characterized by $Concentration_{jt}$, measured as $\sum_{k=1}^{120} S_{kjt}^2$, the sum of the squared employment shares across 120 four-digit NAICS industries. We base our employment shares on sectoral wage bills from the Quarterly Census of Employment published by the Bureau of Labor Statistics over the 1990–2010 period. This variant of the Herfindahl- Hirschman Concentration Index will range from 0 to 1 and will be inversely related to sectoral diversity in each county.

Our measure of local skill is $College\%_{jt}$, the percentage of county residents over age 25 with at least some college education. The data were culled from the 1990 and 2000 U.S. Census of Population and the 2005–2009 American Community Survey. The same source provided information on county $Population_{jt}$ and median per capita $Income_{jt}$.

Our elements of the vector of sectoral market factors include $Cluster_{jkt}$, the proportion of all establishments in industry $k$ in the state that are located in county $j$. This measure, known as a location quotient, was computed by aggregating across all incumbent firms in the NETS data using:

$$Cluster_{jkt} = \left( \frac{N_{jkt}}{N_{jt}} \right) / \left( \frac{N_{kt}}{N_t} \right)$$

where $N_{jkt}$ denotes the number of incumbent establishments in county $j$, industry $k$, and year $t$; $N_{jt}$ denotes the number of total incumbent establishments in county $j$; $N_{kt}$ denotes the number of incumbents in industry $k$ in the state; and $N_t$ denotes the number of all establishments in the state. This measure will indicate whether county $j$ has an atypical concentration in sector $k$.

The access to upstream suppliers ($Upstream_{jkt}$) and downstream customers ($Downstream_{jkt}$) for sector $k$ was constructed using input-output tables. Using the 1997 and 2002 Standard Use Tables form the Bureau of Economic Analysis, we measure the share-weighted
concentration of sector $k$ suppliers and customers in county $j$. The access to upstream firms is measured by:

$$Upstream_{jkt} = \sum_s \frac{N_{sjt}}{N_{st}} \cdot \frac{Input_{s-k}}{Input_k} \cdot 100 \quad \forall s \neq k$$

where $N_{sjt}$ denotes the number of incumbent establishments in industry $s$ and county $j$; $N_{st}$ denotes the number of establishments in industry $s$ in the state, and $\frac{Input_{s-k}}{Input_k}$ is the proportion of all input purchases made by firms in industry $k$ from industry $s$ from the input-output matrix. Similarly, local access to downstream firms is:

$$Downstream_{jkt} = \sum_s \frac{N_{sjt}}{N_{st}} \cdot \frac{Output_{k-s}}{Output_k} \cdot 100 \quad \forall s \neq k$$

where $N_{sjt}$ and $N_{st}$ are defined as before and $\frac{Output_{k-s}}{Output_k}$ is the portion of all sales made by firms in industry $k$ to industry $s$ from the input-output matrix.

Table 1 summarizes the data used to test the model. We report the sample statistics separately for the two states and by urban and rural areas. The values are quite consistent across states, however, they illustrate large differences in market attributes between rural and urban areas. Urban areas have larger clusters of incumbent firms in each sector, have much better access to upstream suppliers and downstream customers, have higher concentrations of educated workers, and have more diverse mix of firms across sectors.

The firm-specific attributes are also reported in Table 1. New entrants are disproportionately small with about 90 percent having fewer than six employees at birth. Less than 10 percent are branch expansions of parent firms. The size and stand-alone attributes of start-ups are comparable across states and across urban and rural markets, and so any differences
in firm entry patterns or success across urban and rural markets will not be driven by firm size at entry or firm access to deep pocketed parent companies.

V. Results

We report the results of estimating equation (6) in Table 2. We estimate two versions of the model, with and without Population_{jt} and the Rural_{jt} indicator.\textsuperscript{13} The estimation shows how location-specific attributes alter the probability that each new entrant chooses that location compared to all other locations in the state. All attributes of the entrepreneur such as age, education, marital status, and prior entrepreneurial experience are common across locations and do not affect the location choice except as they are correlated with unobserved firm attributes. These will be captured in the error terms as we will discuss below. All firm attributes such as initial firm size, sector, financing, and status as a branch or stand-alone entrant are also common across all locations and are therefore held constant across locations. We therefore focus on the location-specific factors, Z_{jt}, and location-sector-specific attributes, W_{kjt}, which vary across markets.

The results show that market attributes have significant effects on locational choice. The results are very consistent across states. Having a presence of incumbent firms in the same four-digit industry in the county attracts new entrants. Having more upstream suppliers to and downstream customers of the sector in close proximity adds to the attractiveness of a local market, although these effects are much smaller when we include population in the estimation. Locations with higher concentrations of college-educated workers and a more diversified (i.e.,

\textsuperscript{13} We estimated equation (4) including a dummy variable indicating that the county was rural and excluding the population measure. It turned out that the rural designation and the measure of local employment concentration are highly correlated. As a result, the concentration measure changes sign when the rural dummy is included, although no other coefficients are affected. The model performed similarly when we include either the rural dummy variable or the employment concentration measure.
less concentrated) economy are more promising hosts for start-ups. However, even when we control for these other measures, firms are less likely to enter rural counties, consistent with the presumed smaller location-specific value in (3) in thinner markets.

We convert these coefficients into elasticities in Tables 3A and 3B and report the implied values separately for urban and rural markets. As a rule, locational attributes have comparably sized elasticities across urban and rural markets, but the sectoral elasticities are larger in urban markets. Firms locating in rural markets are virtually unaffected by the presence of upstream or downstream firms, presumably because they already have a business plan that does not depend on nearby suppliers or customers. Rural entrants are also less influenced than urban entrants by local clusters of firms in the same sector in Iowa, although the urban-rural differences in the magnitude of the cluster elasticity are more modest.

We generate a monotonically increasing measure of the idiosyncratic match error term, \( \phi_{ij+k} \), using equation (7). We illustrate the distribution of these idiosyncratic components in Figures 1A and 1B. Recall that \( 0 \leq \phi_{ij+k} \leq 1 \). The patterns in Iowa and North Carolina are very similar. It is immediately apparent that the idiosyncratic match component represents the disproportionate share of the reason firms choose a location. Over 90 percent of new market entrants have match components exceeding 0.9. Because the rural cumulative distribution lies to the right of the urban CDF, we can conclude that the idiosyncratic locational match component is more important in rural than in urban markets.

It is possible that the idiosyncratic match is based on tastes. For example, entrepreneurs may choose locations based on where they want to live and not where the firm is likely to succeed. To investigate that question, we embed our measure of the idiosyncratic match into the
survivor function (9). The outcomes are reported in Tables 4 and 5. The match component is significantly tied to firm survival, consistent with the presumption that it represents an unobserved productive match between the entrepreneur and the location. This is true even after we control for firm size and whether the firm is part of a multi-establishment firm. The effect remains strong although it shrinks in size when we add a control for rural county.

We can further illustrate the importance of the idiosyncratic match by plotting the implied hazard of firm exit by length of time since firm birth. The higher match value for rural firms means that rural firms live longer holding observed profit factors constant, a finding consistent with results reported by Yu et al. (2011). In both North Carolina and Iowa, the hazard function for urban start-ups lies to the left of the rural start-ups, indicating a shorter expected length of life for urban firms at the time of firm birth.

This idiosyncratic match could be due to location-specific profitability or to attributes of the entrepreneur that are complementary with location. If the match profitability is due to location, then the entrepreneur can add that component to the sale price of the firm. If the idiosyncratic component is tied to the presence of the current entrepreneur, then it cannot be priced upon resale. We investigate this question using equation (10). The results are reported in Table 6. In both Iowa and North Carolina, the match capital for rural ventures is atypically tied to the match between the current entrepreneur and the location. The location-specific component represents 32 percent of the urban match variation but only 17 percent of the rural match variation in Iowa. In North Carolina, the location-specific component represents 60 percent of the urban match variation but just 36 percent of the rural match variation. Once we control for population, over 90 percent of the variation in the urban match is explained by the county-fixed factors in urban markets, but in rural areas, over 90 percent is tied to the match between the
location and the entrepreneur. The greater capitalization of the idiosyncratic match in urban markets could be due to a larger number of potential successor entrepreneurs with the same location-specific match or it may be unobserved location-specific profitability common across all firms in the sector.

VI. Conclusion

A large data set of new firm entrants over the 1991–2011 period demonstrates that location-specific and location-sector-specific factors consistently attract start-ups to locations with a larger number of incumbent firms in the same sector, with larger numbers of firms in sectors that buy from or sell to the same sector, with more educated potential workers, and with a more diverse mix of firms. Nevertheless, the entry decision is driven more by idiosyncratic factors than by observable market factors. These idiosyncratic factors are productive and not just the entrepreneur’s taste for the location, and so start-ups with large idiosyncratic match components live longer. At least some of this match is due to unique complementary relationships between the entrepreneur and the location, a source of profitability that cannot be transferred to successors. As a result, some elements of the firm cannot be priced at the time the firm is sold and cannot be included in the salvage value of the firm were it to fail. This unique match component between the current entrepreneur and the location is of particular importance in thinly populated markets, and so rural firms will face a lower resale value than urban firms with the same current profit stream.

This result demonstrates the Lazear (2009) proposition that population density changes the specificity of human capital. In his case, workers are searching for firms. In ours, entrepreneurs are searching for locations. Entrepreneurial skills appear to be a location-specific productive factor in dense markets. In thin markets, entrepreneurial skills are idiosyncratic and
tied to the match between the entrepreneur and the location.

Because most ventures fail, forward looking entrepreneurs must factor in the possible salvage value of the venture at exit. In thick, urban markets, there is a high probability of finding someone else in that market who shares the same skill set and so the salvage value of the firm is independent of the current entrepreneur. In thin, rural markets, the firm value is idiosyncratically tied to the current entrepreneur and that value will not be captured by the salvage value of the firm. The data are consistent with the model’s predictions that both entry and exit rates are higher in thicker markets.
References


<table>
<thead>
<tr>
<th>Local Attributes:</th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>( Cluster_{jkt} ): Location quotient</td>
<td>0.771 (0.595)</td>
<td>0.565 (0.510)</td>
</tr>
<tr>
<td>( Upstream_{jkt} ): Relative number of upstream suppliers in county ( j ) compared to the state average for the sector</td>
<td>0.629 (0.908)</td>
<td>0.109 (0.097)</td>
</tr>
<tr>
<td>( Downstream_{jkt} ): Relative number of downstream customers in county ( j ) compared to the state average for the sector</td>
<td>0.713 (1.261)</td>
<td>0.104 (0.105)</td>
</tr>
<tr>
<td>( College%_{jt} ): Percentage of the county population aged 25 and over with at least some college education</td>
<td>0.498 (0.202)</td>
<td>0.401 (0.149)</td>
</tr>
<tr>
<td>( Concentration_{jt} ): Sum of squared employment shares across all sectors in the county</td>
<td>0.183 (0.080)</td>
<td>0.214 (0.101)</td>
</tr>
<tr>
<td>( Income_{jt} ): (Median household income in thousands of 1990 dollars)</td>
<td>24.127 (2.865)</td>
<td>21.562 (2.087)</td>
</tr>
<tr>
<td>( Population_{jt} ): (in thousands)</td>
<td>90.431 (81.32)</td>
<td>14.608 (6.24)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm Attributes:</th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>( Small Entrant ): Proportion of all entering firms ( \leq 5 ) employees.</td>
<td>0.852 (0.355)</td>
<td>0.891 (0.311)</td>
</tr>
<tr>
<td>( Medium Entrant ): Proportion of all entering firms ( &gt; 5 ) but ( \leq 50 ) employees.</td>
<td>0.132 (0.338)</td>
<td>0.101 (0.301)</td>
</tr>
<tr>
<td>( Large Entrant ): Proportion of all entering firms ( &gt; 50 ) employees.</td>
<td>0.016 (0.126)</td>
<td>0.008 (0.089)</td>
</tr>
<tr>
<td>( Branch ): Establishment is part of a multi-establishment firm</td>
<td>0.099 (0.299)</td>
<td>0.073 (0.260)</td>
</tr>
<tr>
<td>Number of Firms</td>
<td>170,548</td>
<td>113,173</td>
</tr>
</tbody>
</table>
Table 2. Conditional Logit Estimation for the Firm Entry Location Decision, Iowa and North Carolina, 1991–2011

<table>
<thead>
<tr>
<th></th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
</tr>
<tr>
<td>Cluster_{jkt}:</td>
<td>0.343*** (0.004)</td>
<td>0.404*** (0.004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.262*** (0.002)</td>
</tr>
<tr>
<td>Upstream_{jkt}:</td>
<td>0.032*** (0.002)</td>
<td>0.251*** (0.002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.001 (0.002)</td>
</tr>
<tr>
<td>Downstream_{jkt}:</td>
<td>0.017*** (0.002)</td>
<td>0.161*** (0.002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.036*** (0.001)</td>
</tr>
<tr>
<td>College%_{jt}:</td>
<td>1.165*** (0.034)</td>
<td>4.225*** (0.028)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.450*** (0.029)</td>
</tr>
<tr>
<td>Concentration_{jt}:</td>
<td>-0.999*** (0.039)</td>
<td>-1.083*** (0.036)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.439*** (0.025)</td>
</tr>
<tr>
<td>MedianHouseholdIncome_{jt}:</td>
<td>0.039*** (0.001)</td>
<td>0.105*** (0.001)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.005*** (0.001)</td>
</tr>
<tr>
<td>Population_{jt}:</td>
<td>5.595*** (0.032)</td>
<td>2.723*** (0.010)</td>
</tr>
<tr>
<td>Rural_{jt}:</td>
<td>-0.813*** (0.006)</td>
<td>-0.851*** (0.003)</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-964457.43</td>
<td>-960998.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2851072.3</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Note: * significant at 10%, ** significant at 5%; *** significant at 1%
Table 3A. Elasticities of Local Attributes in North Carolina and Iowa on Firm Entry

<table>
<thead>
<tr>
<th></th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Cluster_{jkt}:</td>
<td>0.360</td>
<td>0.206</td>
</tr>
<tr>
<td>Upstream_{jkt}:</td>
<td>0.062</td>
<td>0.004</td>
</tr>
<tr>
<td>Downstream_{jkt}:</td>
<td>0.037</td>
<td>0.002</td>
</tr>
<tr>
<td>College%_{j}:</td>
<td>0.666</td>
<td>0.488</td>
</tr>
<tr>
<td>Concentration_{j}:</td>
<td>-0.222</td>
<td>-0.237</td>
</tr>
<tr>
<td>MedianHouseholdIncome_{j}:</td>
<td>1.049</td>
<td>0.851</td>
</tr>
<tr>
<td>Population_{j}:</td>
<td>1.180</td>
<td>0.095</td>
</tr>
</tbody>
</table>

Note: Elasticities correspond to the application of the specification in Table 2 including population but applied separately to urban and rural markets.

Table 3B. Elasticities of Local Attributes in North Carolina and Iowa on Firm Entry

<table>
<thead>
<tr>
<th></th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Cluster_{jkt}:</td>
<td>0.424</td>
<td>0.243</td>
</tr>
<tr>
<td>Upstream_{jkt}:</td>
<td>0.478</td>
<td>0.031</td>
</tr>
<tr>
<td>Downstream_{jkt}:</td>
<td>0.352</td>
<td>0.020</td>
</tr>
<tr>
<td>College%_{j}:</td>
<td>2.642</td>
<td>1.936</td>
</tr>
<tr>
<td>Concentration_{j}:</td>
<td>-0.241</td>
<td>-0.259</td>
</tr>
<tr>
<td>MedianHouseholdIncome_{j}:</td>
<td>2.839</td>
<td>2.303</td>
</tr>
</tbody>
</table>

Note: Elasticities correspond to the application of the specification in Table 2, column B applied separately to urban and rural markets.

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(survival time)</td>
<td>(A)</td>
<td>(B)</td>
</tr>
<tr>
<td>Match: $\varphi_{ij+k}$</td>
<td>0.968*** (0.048)</td>
<td>0.676*** (0.041)</td>
</tr>
<tr>
<td>Medium Entrant</td>
<td>0.237*** (0.012)</td>
<td>0.235*** (0.012)</td>
</tr>
<tr>
<td>Large Entrant</td>
<td>0.096*** (0.035)</td>
<td>0.091*** (0.035)</td>
</tr>
<tr>
<td>Branch</td>
<td>0.338*** (0.011)</td>
<td>0.342*** (0.039)</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-233290.59</td>
<td>-233353.2</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Note: * significant at 10%, ** significant at 5%; *** significant at 1%. Standard errors generated by bootstrapping the data 100 times with replacement and sequentially applying equations (6) and (9). Column A also includes controls for population and rural county designation.
Table 5. Elasticities of the Attributes for the Survival Function for New Market Entrants over the 1992–2010 period as of 2011

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Iowa (A)</th>
<th>Iowa (B)</th>
<th>North Carolina (A)</th>
<th>North Carolina (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(survival time)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Match</td>
<td>0.925</td>
<td>0.650</td>
<td>0.414</td>
<td>0.442</td>
</tr>
<tr>
<td>Medium Entrant</td>
<td>0.021</td>
<td>0.021</td>
<td>0.033</td>
<td>0.033</td>
</tr>
<tr>
<td>Large Entrant</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>Branch</td>
<td>0.032</td>
<td>0.034</td>
<td>0.019</td>
<td>0.019</td>
</tr>
</tbody>
</table>

Note: Elasticities correspond to the estimates reported in Table 4
Table 6A. Variance Decomposition of the Idiosyncratic Match into between (Location-Specific) and within (Entrepreneur-Location Match) Components, without Population included in Estimation

<table>
<thead>
<tr>
<th>Variance due to</th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Between: $\epsilon_{J*}$ + $\epsilon_{J*k}$</td>
<td>0.36</td>
<td>0.18</td>
</tr>
<tr>
<td>Within: $\epsilon_{iJ*}$</td>
<td>0.64</td>
<td>0.82</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 6B. Variance Decomposition of the Idiosyncratic Match into between (Location-Specific) and within (Entrepreneur-Location Match) Components, with Population included in Estimation

<table>
<thead>
<tr>
<th>Variance due to</th>
<th>Iowa</th>
<th>North Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Between: $\epsilon_{J*}$ + $\epsilon_{J*k}$</td>
<td>0.90</td>
<td>0.04</td>
</tr>
<tr>
<td>Within: $\epsilon_{iJ*}$</td>
<td>0.10</td>
<td>0.96</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Figure 1. Cumulative distribution of the idiosyncratic match between entrepreneur and location, $\varphi_{ij+k}$ (based on parameters estimated in column A of Table 4)
Figure 2. Cumulative distribution of the idiosyncratic match between entrepreneur and location, $\varphi_{ij+k}$ (based on parameters estimated in column B of Table 4)
Figure 3. Predicted hazard of firm exit based on parameters estimated in column A of Table 4.
Figure 4. Predicted hazard of firm exit based on parameters estimated in column B of Table 4.