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Asymmetric information and location

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**Asymmetric Information
And Location**

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ABSTRACT

In empirical location research, the probability of opening a new plant depends on the relative level of profit that can be gained based on the site's attributes compared with all other alternatives. Many studies implicitly assume that the decision maker evaluates the potential profit with identical knowledge regarding the impact of each area's attributes on the profit function. Such an approach disregards the problem of asymmetric information concerning the choices. An investor may have a strong incentive to locate the investment in the local environment because there is greater certainty (and lower information costs) regarding business conditions. In this paper, new evidence emerges concerning the connection between uncertainty and the location decision. Adding a variable to account for the investor's local "area of business" significantly improves the regression results. The coefficients for explanatory variables change strikingly in some cases. The evidence suggests that urbanization economies and major (urban) market accessibility may play a discernible role in reducing uncertainty and associated information costs when investors locate outside their local "area of business." Finally, the paper conjectures that the importance of the "local area of business" variable may reflect social capital networks and related informational advantages found in the entrepreneur's home environment.

I. INTRODUCTION

Uncertainty and asymmetric information have been largely neglected in recent urban and regional location studies, despite the substantial attention received in other fields. Yet the information available to a local investor is clearly superior to non-local investors. This paper's intent is to explore the distinction between local and non-local investment decisions as a way to understand how uncertainty and related informational asymmetries affect location decisions. It is also hypothesized that information exchange networks arise with social capital. Social capital entails networks of institutions and relationships of trust among economic actors that develop within particular local cultures. Such institutions and social relationships are firmly established within a localized economy, and cannot be replicated outside the home base. These historically determined networks bind entrepreneurs to their local community—and may help explain the strength of investor preferences for the local (home) environment.

Previous empirical research on industrial location has attempted to model the site selection decision as a function of specific area characteristics like markets, agglomeration economies, and factor costs (Bartik [1], Carlton [2], Coughlin and Segev [5], Coughlin *et al.* [6], Guimarães *et al.* [10], Hansen [13], Head *et al.* [14], Luger and Shetty [16], Woodward [25]). These approaches treat industrial location as an unconstrained decision that, once taken, reveals the decision maker's preference for the area's attributes. The probability of a new plant being opened at a particular site depends on the relative level of profits that can be derived at this site and hence on the site's attributes compared with those of all other alternatives.

Carlton [2], in one of the first attempts to model location selection using discrete choice models, established the importance of localization economies (savings resulting

from existing spatial clusters of the same industry which are internalized by firms of that specific industry) in explaining domestic branch plant location across the U.S. metropolitan areas. Bartik's [1] approach to domestic plant location across U.S. states found that higher urbanization economies (i.e. savings that accrue from the agglomeration of general economic activity and are picked up by all firms) as well as lower labor costs and taxes attract new investment. Using Brazilian data for the São Paulo region, Hansen [13] confirmed the relevance of localization and urbanization economies (while failing to show the importance of land, labor and transportation costs).

Foreign-owned firms' location decisions within a host country represent another strand of empirical work based on discrete choice models. Some authors have confirmed the attractiveness of agglomeration economies (Luger and Shetty [16], Coughlin [6], Woodward [25], Smith and Florida [23], Head *et al.* [14], Guimarães *et al.* [10]) and provided mixed evidence on the importance of cost factors. Additionally, Coughlin *et al.* [6], Woodward [25] and Smith and Florida's [23] indicate that better accessibility to input and output markets has a positive influence on the location of foreign-owned businesses within the United States.

The discrete choice literature conceptualizes the location problem as a process of "random profit maximization" and implicitly assumes that the decision maker evaluates the potential profit at every possible location with identical knowledge (or equal uncertainty) regarding the impact of the area's attributes on his profit function. While this seems to be a reasonable assumption in analyzing the behavior of an outsider (a foreign investor case), it is a less plausible assumption for domestic investors. Domestic investors will have quite different expectations about profitability depending on their local knowledge. In fact, it is likely that domestic investors will have different levels of uncertainty with respect to the pool of available sites. Particularly, when the domestic

investor evaluates potential profits, and compares the home environment with that of all others sites, it is unlikely that there is equal uncertainty concerning the characteristics of the local and non-local sites. This is because the investor has an accumulated stock of knowledge of each particular site's attributes. Thus, lower labor costs or taxes, higher agglomeration economies, or better accessibility to input and output markets in a given outside area, may be insufficient to offset information costs associated with other locations.¹ Therefore, in the case of domestic firms' location decisions, there is asymmetric information regarding the sites' attributes.

This paper's main contribution is to model investors' profit-maximizing location when facing asymmetric information costs. Investors incur no (or very low) information costs when deciding to locate in the local environment. For other locations, investors will have higher information costs. A similar local-versus-non-local asymmetry is one of the bedrocks of foreign direct investment theory, where foreign investors face competitive disadvantage vis-à-vis domestic investors. All else being equal, foreign firms lack knowledge about the peculiarities of the local product and factor market conditions compared with domestic competitors. Foreign firms face what Caves [3] called a "disadvantage of alien status." The theory of multinational enterprise takes as its starting point the notion that an entrepreneur holds geographically specific information. Caves [4, pp. 57-58] contends that "[t]he typical entrepreneur, a native of some particular country, brings to his or her business activities a general knowledge of its legal and social system and its peculiar 'ways of doing things.'" It is then held that when the investor extends the firm's operations beyond the familiar boundaries of the business that he or she incurs fixed transaction learning costs when opening an operation in the non-local environment. The theory states that the multinational enterprise (like the multi-local) faces a disadvantage with respect to local competitors,

“who access that social and cultural milieu as a spillover without explicit costs” (Caves [4] p. 58). Nevertheless, the foreign (non-local) investor may compete in distance markets with compensating, firm-specific proprietary assets developed in the national (local) market. They may also be more prone to seek the advantages of agglomeration economies as a countervailing advantage to the informational disadvantage.

In the urban and regional literature, the issue raised by asymmetric information is considered in Webber [24], the only comprehensive treatment of uncertainty and location. Webber’s essential argument is that investors will value factors that reduce uncertainty; in particular, agglomeration economies and proximity to the large markets. For example, Webber suggested that uncertainty is not a separate location influence, but should be understood as how it affects (reinforces) the external economies of agglomeration. In an empirical specification of location decision making, this suggests that agglomeration reflects uncertainty influences, calling for the addition of interaction terms that capture the local/non-local dichotomy. The friction of distance increases uncertainty, thus increasing the tendency toward agglomeration. In a comprehensive regional economics literature review, Richardson ([22], p. 62) echoed Webber’s view, noting that uncertainty reinforces agglomeration “... because of the risks of peripheral locations and the greater incentive to co-ordinate decisions.”

In this paper we present a basic discrete choice model that allows us to test our hypothesis that domestic investors (local and non-local) maximize profits facing information costs. We apply this model to the location choices of newly established domestic plants in the Portuguese manufacturing sector for 1995 through 1997. The organization of the paper is as follows. In the next section we examine this later hypothesis in more detail and present our model and data. In section III we discuss the traditional

location determinants and those tested in this research. Section IV presents empirical findings, while the last section (section V) summarizes the main conclusions of the paper.

II. MODEL AND DATA

The Model

Given its sound theoretical underpinnings, McFadden's conditional logit formulation has been the preferred econometric technique used in empirical industrial location studies. The basic approach, developed by Carlton [2], consists in treating the location decision problem as one of "random profit maximization". Given a set of mutually exclusive regions, investor i weighs in all the regional characteristics of the available spatial choice set and selects the one that will potentially give him the highest profit. More formally, he assigns to each region j a potential profit of,

$$\pi_{ij} = \bar{\omega}_{ij} + \varepsilon_{ij},$$

and elects to place his new investment in the region m such that,

$$\pi_{im} > \pi_{ij} \quad \forall j, j \neq m.$$

The two components of his profit are quite different. The first is the systematic part and consists of a deterministic function of all observable characteristics that impact on profit. The second, ε_{ij} , captures the stochastic nature of the process by absorbing all non-observed heterogeneity as well as the intrinsic randomness associated with the investor and the choice *per se*. Typically, one specifies $\bar{\omega}_{ij}$ as a linear combination of the area characteristics and estimates a set of coefficients that transmit how the way different factors affect potential profits. In this case,

$$\bar{\omega}_{ij} = \sum_{r=1}^k \beta_r X_{rj}, \quad (\text{eq. 1})$$

where the X s are explanatory variables related to the choice characteristics.

Usually, the conventional approach treats all the choices in an equal footing, disregarding the fact that in the case of domestic firms' location decisions there exists a problem of asymmetric information about the sites'. To address this potential problem, we included an explanatory variable that allows the investor to value differently the potential profit associated with each choice. The variable is introduced as an alternative specific constant set to one if that area coincides with the investor's "area of business" and zero otherwise. We will test two specifications. The first is of the type,

$$\omega_{ij} = \sum_{r=1}^k \beta_r X_{rj} + \gamma D_{ij}, \quad (\text{eq.2})$$

where γ is a coefficient associated with the alternative specific constant. The estimated parameter will be positive if there are lower information costs (and higher profits) associated with the "area of business" of the investor.

An alternative specification admits that the investor values differently the impact of relevant factors in accordance with the local-versus-non-local nature of the choice. Actually, in line with Webber's [24] work, it is credible that those factors that affect potential profit by reducing uncertainty (and thus information costs) are not as significant when the choice under consideration is the investor's local "area of business." In contrast, for other locations, the investor will have higher information costs and thus will value factors that reduce uncertainty, i.e. agglomeration economies and proximity to the market (Webber [23]). We disagree with Richardson's [22, p. 62] assertion that location decisions in the presence of uncertainty may give rise to a form of "satisficing" behavior (where the objective is obtain "secure" profits), rather than profit maximization. One of the advantages of our approach is that the investor chooses the area with the highest expected profit, explicitly tying the empirical model to economic theory.

To explore the interaction of uncertainty with area characteristics that affect the profit function, we will test another specification, where we let

$$\bar{\omega}_{ij} = \sum_{r=1}^k \beta_r X_{rj} + \sum_{r=1}^k \gamma_r X_{rj} D_{ij}. \quad (\text{eq.3})$$

For any region other than the investor's "area of business" ($D_{ij} = 0$), the potential profit is given by the first summation term of the above equality and the associated coefficients are β_r . For the region coinciding with the investor's "area of business" $D_{ij} = 1$, and then the coefficients in the profit function become $\beta_r + \gamma_r$.

The relevance of any of the above formulations can be easily tested because they nest the simpler model (equation 1) as a special case. The model is easily operationalized by defining a distributional assumption for the stochastic terms. As McFadden pointed out, if we assume the error terms to be distributed independently and according to a Weibull distribution we end up with the logistic formulation. Because we have a set of 275 spatial alternatives, consisting of all the existing *concelhos* in Portugal,² it is impractical to implement estimation by traditional methods. Fortunately, McFadden [19] showed that when working with a random sample of choices, one could still obtain consistent estimators for the unknown parameters. Consequently, we assume that each investor faces a set of 20 choices, consisting of the actual selected choice, the investor's "area of business," and other choices drawn randomly.

Identification of Greenfield Plants and Investor's "Area of Business"

We use a yearly survey, *Quadros do Pessoal*, collected by Portugal's Ministry of Employment for all the existing companies operating in the country (except family businesses without wage-earning employees). This survey consists of data on every worker as well as some basic information on each company such as location, sector of

activity, and number of employees. Most importantly, since 1995, firms have been required to provide information on the year they started their activity. This allowed us to exactly identify all newly created manufacturing companies in continental Portugal from 1995 to 1997, the last available year in the data set. Because our focus was on private domestic investment we excluded companies that were totally or partially owned by foreign or public investors.

For each company we have available detailed information on every worker including their professional status,³ birth date, and social security number. Thus, we were able to identify the newly created companies which have workers with a professional status of “owner.”⁴ Next, we merged the owner information with the records for all the existing workers in the *Quadros do Pessoal* data set for the previous years using data from 1992 to 1996. We used as a matching key the worker’s social security number as well as his birth date. Thus, we were able to find the *concelho* where they were exerting their economic activity prior to creating the new firm (the investor’s “area of business”).⁵ Our final data includes 1,246 start-ups that fully satisfied the above mentioned criteria.

The spatial distribution of these investments is displayed in Maps 1 and 2 given in an appendix. As can be seen, both maps indicate a strong concentration in the more urbanized western side of the country and particularly in the coastal corridor within and between Porto and Lisbon, Portugal’s largest cities. A closer examination of the two distributions, however, reveals some plants formed in the investor’s “area of business” (Map 1) are located in the extreme eastern *concelhos*; this is not the case for plants created outside the investor’s area of business (Map 2).

Table 1 gives descriptive values concerning the number of non-local plants (created outside an investor’s area of business, as shown in Map 2 of the appendix)

versus local (inside the investors' area of business, or Map 1). Note that most investments are local. The high number of new plant births found in the entrepreneur's home environment (900 of 1246 investments, or 72 percent of the total) should be accounted for in any empirical work. Also, note in Table 1 that the distribution of non-local investments is more concentrated in the main urban areas (Porto and Lisbon) when compared with local. This suggests that urban (agglomeration) economies may attract non-local investments.

Table 1
Distribution of Local and Non-local Investments

	Number		Percent	
	A: Non-local	B: Local	A: Non-local	B: Local
Porto (Distrito)	99	231	28.61%	25.67%
Lisbon (Distrito)	48	71	13.87%	7.89%
Others	199	598	57.51%	66.44%
Total	346	900	100.00%	100.00%

Notes: A: Spatial distribution of new manufacturing plants created outside investor's "area of business" (1995-1997); B: Spatial distribution of new manufacturing plants created in the investor's "area of business" (1995-1997).

III. LOCATION DETERMINANTS

Table 2 displays the independent variables used in the location analysis of local and non-local investments. Previous empirical research emphasizes three different sets of location determinants: agglomeration, or external economies; costs of production factors like wages and land, and market distance/accessibility. We also test these factors and examine how they differ for investments made inside and outside the owner's area of business.

A primary interest of this investigation is agglomeration, well established as a location determinant. From urban theory, the role of the two types of agglomeration is familiar. First, *localization economies* result from the spatial concentration of firms of a particular sector. Intra-sectoral spatial clusters serve as a pool of favorable conditions (e.g. output and input intermediate markets, natural resources, specialized labor, knowledge spillovers). Firms of a specific industry internalize the cost savings involved in location. To measure localization economies, we use the share of manufacturing employment in the same 3-digit standard industrial classification (SIC) as the investor.

Table 2 shows the prior expectations regarding *localization economies*. The theoretical and empirical work to date strongly suggests that intra-industry economies will strongly and positively influence profits and thus location decisions (see Table 2, "Expected Effects" column). Indeed, localization should affect both local and non-local investors. For non-local decisions, these economies will positively offset uncertainty. It may be, however, that decisions to invest by entrepreneurs in their "area of business" will also reflect localization since an industrial cluster is likely to be their existing base. In other words, *localization economies* reflect the likelihood that firms are already found in dense intra-industry clusters, especially for the relatively small firms considered in

the Portuguese case, which require external economies. Henderson (1999) even argues that localization benefits single plant firms more than corporate firms since single firms (like small firms here) do not have internal information networks and thus do not depend on the external local milieu. In any case, the argument for non-local investors being particularly attracted to localization is unclear.

Urbanization economies, however, should strongly affect firms operating in an uncertain environment. Urbanization economies are inter-sectoral externalities accruing from the clustering of general economic activity and benefit all plants locating in a particular area. Woodward and Glickman (1991) found that urbanization was statistically significant in a logit regression of new foreign plant start-ups in U.S. counties. In Portugal, foreign firms (presumably unfamiliar with local conditions) exhibit a strong preference for domestic business services in making location decisions (Guimarães *et al.* 2000). Similarly, urbanization should strongly and positively influence new non-local domestic manufacturing births in Portuguese *concelhos*, given higher uncertainty and need to benefit from the greater variety of business and financial services. Therefore, it was expected that urbanization economies should exert a strong pull on non-local investment decisions, and may statistically differ from decisions to invest in the local “area of business.” As in Bartik (1985) and Coughlin *et al.* (1991) we measure *urbanization economies* as the total manufacturing employment per square kilometer.

The existing evidence concerning the impact of factor prices on location, i.e. the cost of labor, land and capital, is mixed. Most studies have tested for the relevance of *labor costs*, but only a few were able to statistically validate this variable. In the case of domestic location, Bartik (1985) found that higher wages deterred investment, a conclusion not met by others studying the same phenomena [Carlton (1983); Hansen (1987)]. Similar ambiguous evidence was found for the foreign-owned firms location

decisions within the host country. While Woodward (1992) did not find a significant relationship, Luger and Shetty (1985) and Coughlin *et al.* (1991) provided evidence on the relevance of this factor to explain industrial location decisions. In our study, *labor costs* are measured by an index of the *concelho*'s average manufacturing base wage rate. This variable should negatively influence the probability of investment in any case. There is no reason *a priori* to believe that they should distinctly affect non-local compared with local decisions, or more certain compared with less certain investments.

Besides labor, land represents another major cost facing investors. Despite the prominence of land costs in the neoclassical economic theory of location, previous empirical research failed to establish its relevance. This failure was partially credited to the unavailability of reliable data by Bartik (1985), who used state population density to “proxy” industrial land prices, arguing that population density should reflect the price of this factor, because residential and industrial users compete for land. However, Hansen (1987), using data on prices for unserviced industrial land, was also unable to confirm the relevance of this factor. Because we did not have such data available for the Portuguese *concelhos*, we followed Bartik's suggestion for capturing *land costs* in the model, which is much more relevant for the present study, given the small spatial dimension. Like wages, the relationship between uncertainty and *land costs* is ambiguous *a priori*.

Capital represents another cost sometimes considered in location. In the Portuguese case, we do not consider the cost of capital because it is almost invariant across alternatives. Interest rates do not differ across *concelhos*, and despite some minor differences in municipal taxes, the overall tax burden on manufacturing activity comes mostly from taxes set at the national level.

Market accessibility is another fundamental factor that must be taken into any account of manufacturing location decision making. An independent variable commonly

used to measure the dimension of consumer markets is *per capita* regional income. As pointed out in the introduction, Coughlin *et al.* (1991) and Woodward (1992) found a significant relationship between this variable and the location of investment across U.S. states. As also suggested by Coughlin *et al.* (1991), from a theoretical point of view, one must however take into account that the market targeted by the firms can take many configurations that deviate from the considered area boundaries. In particular, when the analysis is performed at a small regional level, as it is in our study, the explanatory performance of this indicator must be low. First, firms can easily gain market access to neighboring *concelhos*. Second, the dimension of the *concelho* market seems to be too small to attract industrial investments.

To account for market accessibility, and address the above concerns, we enter two variables in the model. The road time distance to the Porto-Lisbon corridor (the more urbanized coastal side of the country) measures *major urban accessibility*, i.e. access to the largest markets. *Minor urban accessibility*, i.e., access to regional markets, is proxied by the distance in time by road from each *concelho* to the administrative center (the capital) of the related *distrito*. Besides the 275 *concelhos* that form the main spatial choice set, Portugal is divided into 18 larger *distritos*. The two accessibility variables also pick up transportation costs, the availability of regional and national road infrastructure in each *concelho*, and access to core regions where more and better quality of information is available.

TABLE 2

Independent Variables: Definitions, Expected Effects, and Sources

Variables	Definition	Expected Effect	Data Source
Localization Economies	Share of manufacturing employment in the same 3 digit SIC as the investor	Positive	DEMESS, Lisbon, Portugal, 1995
Urbanization Economies	Log of Total Manufacturing Employment per square km	Positive	DEMESS, Lisbon, Portugal, 1995
Labor Costs	Index of <i>concelho</i> manufacturing wage (base = national average)	Negative	DEMESS, Lisbon, Portugal, 1995
Land Costs	Log of population density	Negative	National Institute of Statistics (INE) , Lisbon, Portugal- 1991
Major Urban Accessibility	Log of distance by road in time to Porto and Lisbon	Negative	Unpublished data ⁶
Minor Urban Accessibility	Log of distance by road in time to the <i>distrito</i> ⁷ administrative center	Negative	Unpublished data
Investor's "Area of Business"	Dummy: 1 if that <i>concelho</i> coincides with the investor's "area of business" and 0 otherwise	Positive	DEMESS, Lisbon, Portugal, 1992 to 1997

Uncertainty should enhance the pull of market accessibility. Webber [24] argues that uncertainty promotes location near markets, especially in large cities (in this case Lisbon and Porto). Thus, it was believed that *major urban accessibility* should be strongly associated with non-local decisions, where uncertainty is greater than with local firms.

Finally, as argued before, we include an additional explanatory variable, the *investor's "area of business,"* to test our hypothesis that in the case of domestic firms' location decisions there exists a problem of asymmetric information about the sites' attributes. While the local/non-local variable is rarely tested, it has appeared in location studies as an explanation with an underlying economic justification consistent, namely, that it is consistent with profit maximization. For example, Pred [20] argued site selection decisions made with imperfect knowledge may lead an entrepreneur to select a familiar home location because it maximizes "access to relevant information needed for profitable production" (see also Richardson [22] p. 64).

Potentially, the *investor's area of business* variable reflects personal factors (community ties and friendships as well as proximity to home and family) on the part of the entrepreneur. The location literature is unclear about the importance of personal factors compared with strictly economic decision-making criteria. The issue has not been considered since the late 1950s and early 1960s, and even then only through survey research of limited scope (Richardson [22]). In one of the more thorough studies, Greenhut [12] surveyed location decision makers in Florida and found that demand and cost factor were dominant, while purely personal factors (without economic advantages) were not important to inducing location. However, decision makers sometimes favored a location when there were personal relationships with economic advantages

(friendships with customers, suppliers, or bankers).

While the recent location literature has been silent about asymmetric information or personal factors in location, a growing body of work on social capital may be relevant to understanding the local/non-local distinction. Social capital encompasses a set of norms, networks, and other forms of local social connections (Woolcock [26]; Glaeser, Laibson, and Sacerdote [11]; DiPasquale and Glaeser [8]). Recent interest in the subject picked up following Putnam[21], who argued that relatively high levels of social capital in northern Italy correlated with greater economic growth. Seen through the lens of social capital, personal ties and trust are intangible benefits that develop only through long-term relationships in an individual's home community. In Portuguese *concelhos*, like the Italian communities Putnam describes, entrepreneurs are engaged in civic activities and frequently meet in work and non-work related organizations.

Thus, entrepreneurs' localized social capital may have an influence on new site selection decisions. Explicitly linking social capital investment to location decisions is beyond the scope of this paper, yet the literature suggests that an entrepreneur's social capital is often particular to the home location. If so, social capital connections can generate positive returns for the entrepreneur and constitute an important asset that could not be easily replicated outside the investor's home base. We believe that the *investor's "area of business"* variable tested in our model may capture entrepreneurs' considerations of localized social capital investment. Social capital helps explain the high number of new plant births found in the entrepreneur's home environment (as displayed in Table 1) as well as some of the findings reported in the next section.

IV. EMPIRICAL RESULTS

Table 3 presents the results of our estimations. The model performed well as can be seen from the chi-square statistics for the likelihood ratio tests of overall significance. The appropriateness of the model is confirmed by the remarkable stability of the coefficients and the individual t-values across specifications.

Both specifications used for the traditional model (equation 1) show that the location factors tested in earlier empirical studies are also appropriate to explain the location determinants of domestic start-ups in Portugal. In fact, when compared with other studies we find stronger evidence of their relevance. Both measures of agglomeration economies are statistically significant and have the correct sign, confirming Hansen's [13] results on domestic firm creation in São Paulo, Brazil, and Guimarães et al. [10] study on FDI location decisions within Portugal. The evidence presented here, however, extends beyond previous work and shows differences between local and non-local investors.

We find evidence that for domestic investors *labor costs* are a relevant factor. While similar results for the sign of the coefficient associated with this variable were obtained on the studies reviewed earlier, only Bartik's [1] U.S. state analysis was able to statistically confirm the significance of this factor for domestic decision location. As pointed out before, previous empirical research failed to confirm the importance of *land costs*. The proxy used for *land costs* had the expected sign and was statistically significant, most likely because we were operating with small-area choice sets. The inclusion of market *accessibility* variables in specification 2 increased marginally the explanatory power of the model.⁸ Road time to the Porto-Lisbon corridor has the expected sign, and the coefficient associated with this variable is statistically different from zero. The same is

true for road time to the *distrito*, or minor market. Thus, in specification 2 the evidence is statistically significant for *major* and *minor market accessibility*. This is despite the fact that most of the investments considered in our study are relatively small.⁹

Equation 2 includes the investor's previous "area of business" as an alternative specific constant. The significance of our estimates increases substantially as shown by the jump in the log-likelihood value. Notwithstanding, the estimated coefficients of the remaining variables maintain their signs and magnitude, and practically all are still statistically significant. Consequently, the inclusion of this additional variable picks up a significant amount of variability unaccounted for in earlier specifications. The identified effect may be associated, as argued before, with asymmetric information that diminishes the potential profit of alternative choices in relation to the investor's previous "area of business." In fact, the coefficient associated with this variable indicates that there are potential lower information costs (and potential higher profits) associated with the investor's "area of business". Actually, for equal levels of the others variables across choices, there exists an increase in the potential profit for those who create manufacturing start-ups near their previous business environment.¹⁰

Moreover, when we consider the possibility of interaction effects between traditional variables and the investor's previous "area of business" we find evidence that investors weigh differently the importance of conventional location factors in accordance with where they plan to invest. This effect can be seen in the estimates for equation 3. In this equation the *investor's "area of business"* is introduced as an interacted dummy variable. Again, once we add this new set of variables, the log-likelihood experienced a significant increase, supplying evidence of differentiated profit functions in accordance with the environment where investors plan to invest.

Next consider local versus non-local differences given in equation 3 of Table 3. When the choice under consideration is any region other than the investor's "area of business" ($D_{ij} = 0$), the non-local investor will favour areas that minimize the expected information costs. *Urbanization economies* seem to affect these non-local investors, but not local investors. This supports the notion that uncertainty of non-local investors may lead them to access the variety of business services that major cities possess, strengthening urbanization tendencies. In contrast, *localization economies* apparently attract both new local and new non-local manufacturing start-ups in Portugal.

The other notable result found in Table 3 concerns *major* and *minor market accessibility*. Since uncertainty tends to increase with greater economic distance to the market [Webber (1972)],¹¹ those investors who plan to invest in any region other than their own "area of business" tend to value accessibility to the major urban markets of Portugal (but not accessibility to the minor markets). In contrast, those who invest in their own business geographical environment ($D_{ij} = 1$) are fully concerned with the production factors costs. Actually, among the conventional factors considered in our study, only the cost of labor and land significantly influences on the local investment decision.

TABLE 3

Regression Results:

Factors Affecting Potential Profit for New Plants Locating In Portuguese *Concelhos*

Independent Variables	Equation 1		Equation 2	Equation 3 ¹²	
	Specification 1	Specification 2		D= 0	D= 1: $\exists + ($
Localization Economies	4.187* (20.151)	4.400* (20.705)	2.830* (9.644)	3.917* (11.889)	1.525* (3.268)
Urbanization Economies	0.835* (20.690)	0.836* (18.861)	0.527* (9.591)	0.485* (6.727)	0.047 (0.424)
Labor Costs	-0.661* (-3.784)	-1.110* (-5.834)	-1.304* (-5.276)	-0.520*** (-1.671)	-2.223* (-5.396)
Land Costs	-0.317* (-5.587)	-0.433* (-7.226)	-0.312* (-4.112)	0.035 (0.357)	-0,228*** (-1.679)
Major Urban Accessibility	-	-0.606* (-3.166)	-0.542* (-2.346)	-1.193* (-3.381)	0.586 (1.187)
Minor Urban Accessibility	-	-0.240* (-8.369)	-0.033 (-0.847)	-0.035 (-0.624)	-0.068 (-1.162)
Investor's "area of business"	-	-	2.994* (39.731)	-	16.457* (2.311)
Log-Likelihood	-2530.115	-2492.239	-1584.596	-1401.842	
Chi-Squared	2405.14*	2480.89*	4296.17*	4661.68*	
McFadden R²	30.09%	31.10%	50.27%	55.59%	

Notes: N=1,246 and t-values are in parentheses. The symbols *, **, and *** denote significance at the 1%, 5% and 10% levels, respectively.

V. CONCLUSIONS

This paper adds informational asymmetry as a crucial consideration in location modeling, filling a void left in recent empirical work. We argue that local and non-local investors maximize profits where information costs arise from uncertainty about the urban and regional environment. The informational asymmetry for local and non-local investors can be seen in the differences in expected profit derived from selecting Portuguese *concelhos*. A different set of urban and regional characteristics seem to affect local and non-local investors. Agglomeration, especially urbanization economies, can apparently help offset the uncertainty associated with non-local investment decisions. In addition, the findings indicate that accessibility to major markets (as measured in time) can influence non-local decisions. In general, the “area of business” as described in this study exerts a strong pull on the investor and, for the local investor, diminishes the importance of other factors, especially urbanization and major market accessibility. In contrast, local investors’ profits are maximized (and firms start new plants) where labor costs, land costs and localization economies are favorable.

These results point to the need for micro data sets that identify the decision maker’s local “area of business” or the entrepreneur/owner’s geographical origin. As our results clearly demonstrate, simply including the investor’s “area of business” can substantially improve the overall explanatory power of location modeling in a discrete choice framework. There is a distinct home bias in location, which can be logically explained by lower information costs. An alternative explanation could be derived from the concept of social capital. Adding a variable that captures the home location of the decision maker is thus an essential control variable in location regressions. Previous

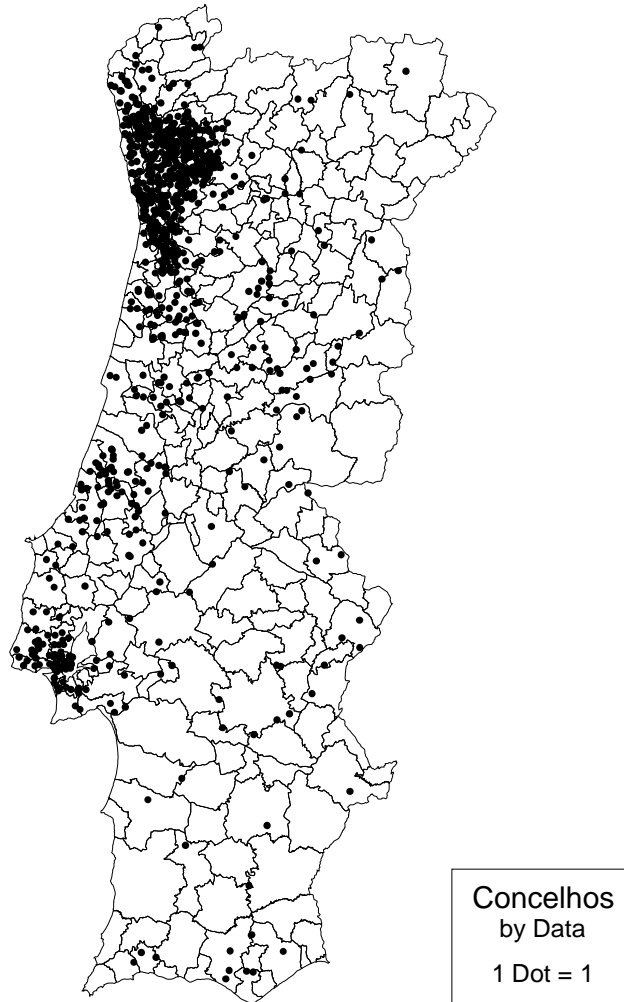
results have no doubt masked the relative influence of location factors by failing to include the home base of the investor. Yet when investing outside the home “area of business” we should expect that a different set of determinants is pertinent, given the lack of knowledge about local conditions and higher information costs associated with the non-local investment. In the Portuguese case, the evidence is strong that this local/non-local distinction makes sense. Most investment takes place in the investors’ area of business. Clearly, econometric location analysis must control for this phenomenon, or there will be significant bias in the results.

This paper points to an important distinction that is often made in the literature on international investment, but rarely in domestic investment. Just as foreign firms face greater uncertainty and asymmetric information vis-à-vis domestic investors, domestic firms face a similar problem when investing outside the home region. The theory of international direct investment (distinguishing between foreign and domestic investment decisions) is thus relevant to understanding domestic decisions (local and non-local decisions). The central notion is that the home environment is relatively certain, giving domestic firms a competitive advantage (along with potentially higher profit). Non-local and local decision makers do not evaluate the potential profit at alternative locations with the same knowledge regarding the impact of the area’s attributes on the profit function. That means a local investor has an incentive to locate the investment in the home (local) environment where there is greater certainty (and lower information costs) regarding the general business conditions. For non-local investors urbanization and market accessibility can offset the profit derived from certainty about the local region, offering countervailing advantages to the profit function. Urbanization economies and market accessibility compensate for the lack of local knowledge about production and market conditions, leading firms to cluster in urban areas even as they expand geographically.

In sum, the paper maintains that there is an often unrecognized informational asymmetry that influences investment decisions regarding new plant locations. The hypothesis advanced and then tested in the paper is that a profit-maximizing firm's objective function is affected by relative uncertainty. Social capital investments, however, could also explain strong local preferences on the part of entrepreneurs. Social capital entails information exchange. We believe that the economic advantages inherent in webs of local social (and business) relationships is compatible with our informational asymmetry hypothesis and ultimately helps explain greenfield investment patterns. Extensions of this paper could explore how informational networks operate in other local contexts and affect investment decisions.

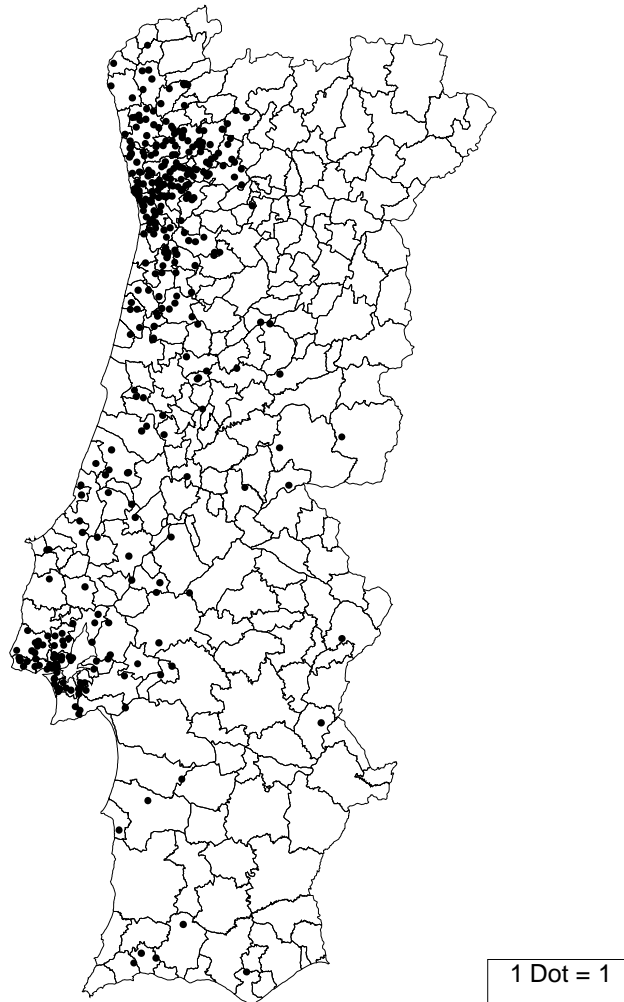
APPENDIX

Map 1: Local Investments
Spatial distribution of new manufacturing plants
created in the investor's "area of business" (1995-1997)



Note: Each dot = 1 unit. Data source: D.E.M.E.S.S., "Quadros do Pessoal."

Appendix (continued)
Map 2: Non-local Investments
Spatial distribution of new manufacturing plants
created outside investor's "area of business" (1995-1997)



Note: Each dot = 1 unit. Data source: D.E.M.E.S.S., "Quadros do Pessoal."

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ENDNOTES

¹ Personal factors, such as the upheaval of a household relocation or personal ties and friendships, can also increase the costs of locating outside the investor's own environment. We return to this point later in the paper.

² The *concelho* is a fairly small regional level in the Portuguese administrative system. The 275 Portuguese *concelhos* (mainland) have an average area of 322.5 km².

³ Each worker is uniquely classified as owner, non-wage earner family worker, wage earner and a residual category comprising rare special situations.

⁴ From a total of 6,511 newly created companies from 1995 to 1997, only 3,434 had workers with a professional status of "owner."

⁵ A substantial amount of information was lost due to several factors. First the data set does not allow us to identify investors which previous activity was on family businesses without wage earning employees or on the public administration, because these activities are not represented in the survey. Second, those who were not before in the labor force can not also be identified. Finally, the information on social security numbers is not validated because it is not used for the production of official statistics and consequently there are some coding errors and missing observations. That is why we also used as a matching key the birth date of investors. In the case where we could not successfully track one of the company owners, we excluded the observation from our sample. Even though these are rather restrictive criteria they ensure the quality of our data.

⁶ We would like to thank Adelheid Holl for providing unpublished data for the road travel times based on the 1996 Portuguese road network. The road network data has been compiled from road maps (ACP 1998/9; Michelin 1999) and detailed information from the Portuguese Road Institute (Instituto Português de Estradas).

⁷ The *distrito* is a higher administrative region level, which is composed by several adjacent *concelhos*. The Portuguese mainland is divided in eighteen *distritos* with an average area of 4.926,7 Km².

⁸ The log likelihood ratio test has a chi-square value of 11.374, significant at 1%.

⁹ In average each investment has 9.5 employees. On the other hand, 93% of these new investments have less than 20 employees.

¹⁰ As argued before, personal factors may also increase the costs of localization outside the investor's own environment.

¹¹ This later effect occurs because, as argued by Webber (1972), price variability rises with greater separation from the market. Increased distance from the final market, as

well as from suppliers, also increases the firm's uncertainty in relation to the flow of products and materials.

¹² In this equation, while column one shows the estimates of the β_r coefficients, the second column indicates the sum of the coefficients ($\beta_r + \gamma_r$) and their associated t-values. D is a dummy variable equal to one if the entrepreneur originates from that area and zero otherwise. See section II.

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