“In search of services in the market place. A probability of presence approach for retail services in Sweden”

AUTHORS	Johan Klaesson Charlotta Mellander Özge Öner

ARTICLE INFO	Johan Klaesson, Charlotta Mellander and Özge Öner (2012). In search of services in the market place. A probability of presence approach for retail services in Sweden. *Innovative Marketing* , *8*(3)
RELEASED ON	Thursday, 08 November 2012
JOURNAL	"Innovative Marketing "
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES
0

NUMBER OF FIGURES
0

NUMBER OF TABLES
0

Johan Klaesson (Sweden), Charlotta Mellander (Sweden), Özge Öner (Sweden)

In search of services in the market place. A probability of presence approach for retail services in Sweden

Abstract

This paper examines the probability of finding a number of retail services in Swedish municipalities with respect to their market potential. In particular, the authors investigate how different degrees of market potential affects the presence of certain retail activities in central and non-central municipalities in Sweden. Using a probabilistic approach, the results suggest that, for both central and non-central municipalities, the probability of finding certain retail services depends heavily on the market potential within the municipality. The size of the external market is determined to have a varying impact depending both on the size of the market place, and the type of the retail branch investigated.

Keywords: diversity, market size, consumer retail services.

Introduction

European consumption patterns have shifted recently, mimicking changes in other advanced markets. A study by Leefland and van Raaji (1995) shows that European households are spending larger shares on retail and leisure services. Simultaneously, household sizes have declined, leading to a decrease in the demand for basic services and products, supplied by the retail sector, e.g. household appliances, furnishing, telephone, heating etc. (Birkin et al., 2002).

Despite the emergence of shopping on the periphery, city centers and high shopping streets retained their importance (Birkin et al., 2002). Field (1997) mentions that three quarters of all shopping still take place on European high streets. While high shopping streets remain important, the nature of their activities has changed. Retailing in durable goods (furniture, electronics etc.) has moved out of the core and cafes, bars, apparel shops and music shops now predominate. In many European countries, the retail market is still dominated by small shops that are clustered in the town centers although over the last decades a rapid emergence of retail shopping centers is experienced.

Coincident with these changes in Europe, Sweden has experienced a significant change in the retail landscape as well. Local and national planning legislation in the 1960s, 1970s and 1980s encouraged the growth of retailing in the peripheral areas in Sweden. Although in the beginning, the rise of out-of-town retailing was not perceived as a substitute to the downtown retailing, today nearby to most of the Swedish central municipalities, a shopping center with diverse consumption possibilities can be found. Even though the country is sparsely populated, Sweden ranks second when it comes to the total floor space of retail shopping centers per capita afterNorway (Birkin et al., 2002). A rapid increase in land rent has also affected the location of retail by moving the less distance sensitive and more mature products out from the bigger and more expensive market places, which left room in the city centers for more distance sensitive services.

Retail services play a dual role in the modern economy. They are ever more important area of production – a sight of employment and output growth. As Dunning (1989) points out, the growth of consumer services helped to propel a shift from manufacturing to services in advanced nations towards the end of the twentieth century. At the same time, the sector plays an important role in consumption. A vast amount of research has shown that retail services play a major role for regional attractiveness, with consumers preferring regions with diverse consumption possibilities.

The influence of market size on production is particularly strong in retail services where consumption either occurs at the production site or very close by. Although most of the goods and services provided by the retail sector can be consumed away, they are not likely to be exported beyond their region of origin. Any reallocation of individuals and households between regions would thus, be expected to influence retail geography. In Sweden, large metropolitan regions have seen striking population increases while market size has decreased in rural areas. Given the weaker market potential in smaller regions, where retail services are less diverse today than fifteen years ago, we might expect a corresponding decline in retail activities.

While changes to the local market might affect the location of retail services, conditions on the production side might also be influential. For instance, in certain segments of the retail sector, the share of large scale establishments has grown. Larger establishments entail larger fixed costs, and consequently they require larger markets to

recover these. Thus, the analysis of the relocation of the industry calls for the simultaneous investigation of internal fixed costs and market size.

Our hypothesis is that the diversity of retail services in a given municipality would be directly linked to the market size of it. The probability of finding a certain type of retailing activity therefore – to a great extent – can be explained via market potential. This positive relation between the market size and the diversity of retail services in a given market is also expected to vary across central and non-central municipalities. Our paper aims to shed some light on this issue by using Swedish data and utilizing a logit model. We conduct the analysis by pooling the data on Swedish retail establishments from 2004 to 2009, for which we follow a probabilistic approach. The empirical analysis is based on the investigation of probability distributions and a logit-model. It also utilizes the functional region division for Sweden, analyzing the probability for central and non-central[1] municipalities separately.

The rest of the paper is organized as follows. In the next section we present the underlying theories that motivate our study. Section 2 introduces a simplified model relating regional service diversity to market size. In section 3 the data and the empirical model are specified. In section 5 we analyze our results, before offering conclusions in the final section.

1. Market size and scale economies in relation to retail services

A region's ability to attract households and firms can be assumed to be explained – at least partially – by available market supply and amenities. One important determinant of such supply is linked to the fact that the service markets often have strong location ties. Many services require direct interaction between buyers and sellers. This means that there is a mutual dependency between the locations of firms' and households. Firms in the service sector are dependent on access to the households and other firms that consume their services. At the same time, households and firms are clients purchase services from other firms, so that they can function efficiently. This form of mutual dependency drives the agglomeration economies that can be found in urban regions.

The 'agglomeration economies' discussion is a crucially important component in the locational analysis of retail services since they explain how producers (such as retailers on a high street) might lower costs by collocating. Higher turnovers in larger markets can be explained by lower average fixed costs, due to a large number of units produced, which in turn makes it possible to cover total cost even at lower price levels. Central-place theory suggests that cities are connected in system of cities in a hierarchically ranked (rank-size) structure. Larger cities are likely to be linked closely to cities of a smaller size, and to influence the growth of smaller connected places. We expect for the number of services available in a central-city to increase as its rank increases (Dicken and Lloyd, 1990)[2]. The type of hierarchical order for cities as well is found to be similar for retail markets. The study of Berry and Garrison (1958a, 1958b) suggests that the similar stratification exists in the retail markets, as small clusters of retail establishments along a street is followed by neighborhood shopping centers, community shopping centers and to a larger extend by regional shopping centers.

Recently, (New) Urban Economics ((N)UE) has sought to explain agglomeration economies and locational choices as a function of transportation costs (Alonso, 1964; Fujita, 1988; Krugman, 1991a). Based on the tradition of von Thünen (1826), Christaller (1933), and Lösch (1940), the NUE provides a micro-foundation for urban spatial structure studies (Alonso, 1960; 1964; Muth, 1961; 1969; Mills, 1967). The structure of the city is determined by incomes, tastes, housing, commuting conditions, and the relative use and pricing of urban/nonurban land. Based on von Thünen like models, the NUE defines the region as a flat plane with one well-defined central business district and with transportation equally costly in all directions. From this, an optimal level of population or housing density can be derived as a function of the distance from the central business district. This basically implies that there is an optimal size of the region, and that the region is monocentric, with just one city core.

The New Economic Geography (NEG) approach discusses how variety (Krugman, 1991; Fujita et al., 1999a; Fujita and Thisse, 2002), can be shared by agglomerated firms in both consumption and production. The demand side expresses a preference for variety in consumption, and the supply side gains the efficiency from increased diversity in intermediate goods. Intermediate product varieties are associated with fixed production costs and will be supplied only in places where the demand for intermediaries is large enough. This means that variety in-

[1] Central versus non-central municipality division in Sweden is made based on the local labor markets which are 81 in total. Each of these 81 functional economic regions (FER) consist of one core municipality surrounded by several peripheral municipalities.

[2] Empirical studies, for example, the frequently cited study made by Noyelle and Stanback (1983) for the US economy, support the existence of the rank-size rule.

creases with market-size. The production function for final goods exhibits increasing returns in the number of intermediate product varieties.

The NEG sees industrial spatial structure as the outcome of two opposing types of forces: agglomeration (centripetal forces) and dispersion (the centrifugal forces). Work by Quigley (1998) has suggested that firm-based diversity is associated with economic growth, since the existence of a diverse set of industries attracts customers. Economic growth is thus influenced by agglomeration within and across industries.

Urban regions, especially city regions, are also more conducive to production since they in general host a higher density of amenities which can attract talent and creative people (Glaeser et al., 2001; Florida, 2002), which in turn attract firms and industries. Models associated with this alternative perspective suggests that the agglomeration of consumption is important. In work by Rosen (1979) and Roback (1982), quality of life plays a major role for migration and relocation patterns, which in turn affect industry location.

Glaeser et al. (2001) conclude that consumption forces might underlie the new industrial geography. Improvements in transportation systems decrease the interregional transportation costs. This reduces regional access costs to services such as live sports, theatre music, and other services (ie. restaurants) that benefit from a critical mass of customers. The new urban environment is also supposed to offer low costs for interpersonal relationships and meetings within an urban region.

Glaeser's theory suggests a positive relationship between growth, regional diversity and market size. Market size can be interpreted as access to population and purchasing power (income). Given this theoretical framework, we should expect a positive relation market size on one hand, and the diversity of retail service markets on the other. The probability of finding a diversity of retail services should increase with market size, which will further be discussed in the following section.

2. Retail service diversity and market size

Economic performance of retail services is highly related to location and market size. Turnover, sales volume, and profits are mostly determined by the conditions that are associated with market size, which in turn is related to distance or/and travelling time in combination with population size. Together they make up the regional purchasing power. While manufacturing goods can be produced in one region and consumed in another, service production and consumption most often take place in the same locale. Therefore, bigger market size means more production and consumption possibilities, and is assumed to have a positive effect on both the number and diversity of services offered.

A big body of literature has sought to apply central place theory to retail services in particular. Countries with intensive retail planning policies, such as Sweden, the Netherlands and the UK, have utilized the central place theory throughout the years to guide policy (Dawson, 1980; Borchert, 1988; Sparks and Dawson, 1989). In a retail context, central place theory suggests that the distance and transportation costs determine the demand for retail services. This implies that demand for retail in location x will decrease as transports costs to that place rise. Models based on central place theory propose that the demand would fall down to zero after a certain point and the threshold would be different for different types of goods and services (Christaller, 1933; Lösch, 1940). The variation of the threshold is expected to depend on product type. Relatively more durable and expensive products, which are consumed less frequently, have higher threshold than products consumed frequently (groceries, bakery items etc.) (Brown, 1993). By the same token, variation in the type of retail services provided in a place should be influenced by whether a place is central or not.

Our model originates from the studies by Lancaster (1975) and Dixit and Stiglitz (1977). We focus on the demand side of the market, including increasing returns and monopolistic competition. The algebraic approach towards monopolistic competition is based on a Chamberlinian-type of model.

In this case, we consider a typical household that maximizes utility U from a bundle of goods A and retail services S. The utility function is homogenous of degree one and is expressed as in equation (1) below:

$$U = A^{\alpha} S^{\beta}, \tag{1}$$

where α and β are the non-negative constants and they sum up to 1. We assume that the corresponding sub-utility, with a focus on retail services is specified by equation (2) that has constant elasticity of substitution (CES-form):

$$S = \left(\sum_{1}^{n} s_i^{1-\frac{1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \sigma > 1, \tag{2}$$

where σ is the elasticity of substitution between i different retail services S. The services may be seen as different intermediates for buyers in the market. If we shall allow some S_i to be zero, σ needs to be

larger than one. This means that buyers do not necessarily need to purchase every service that is offered. σ is large when the services are close substitutes to each other, meaning, in situations when σ is large preferences for variety is not very significant and when σ is close to one variety in consumer service provision is important and can be seen as complementary to each other[3]. One should notice that we use the assumption of constant marginal utility as consumption of a particular service increases. All services are symmetric, and hence, have identical costs and production functions. This assumption simplifies the algebraic expressions and by using these assumptions, we can redefine the sub-utility function for services as equation (3) below:

$$S = n^{\frac{\sigma}{\sigma-1}} s. \tag{3}$$

Equation (3) shows that S becomes small with a larger σ. However, as σ approaches to one, the power will be of substantial size. This consideration shows that if complementarities are strong between consumer services, the corresponding utility among buyers will be positively affected by high accessibility to a large variety of such services. In order to explore the properties of equation (3) further we can assume that there is a total number of inputs for retail service providers M in their sub-utility function. Let $M = ns$ be the total number of input services for the retail sector. Therefore, the equation can be reformulated as shown in equation (3) as:

$$\frac{S}{M} = n^{\frac{1}{\sigma-1}}, \tag{4}$$

where S/M denotes the utility per consumer service in average. It is interesting that equation (4) is increasing in n, which can be interpreted as existing increasing returns for utility with respect to number and diversity of consumer services. In other words, a regional market with greater number of consumer services can be expected to be more attractive for consumers than a regional market where fewer services are present.

The cost function for the typical firm in the retail sector is the same as for the total sector. We assume a most common version of the cost function written as follows:

$$TC = n(as + F), \tag{5}$$

where TC is total costs, a is variable costs (equal to marginal costs) and F is fixed costs. As indicated from the cost function we assume increasing returns to scale in production of services. Moreover, we assume that TC is proportional to the market size and thereby determined by the underlying market conditions in the region. Thus, different regions would be different in TC. This condition can be written as equation (6) below:

$$bLw=TC, \tag{6}$$

or reorganizing the terms we obtain:

$$\frac{TC}{L} = bw, \tag{7}$$

where L is the population size in the region, b is the share the 'regional budget' spent on retail service sector (all services in aggregate) and w is the average wage (for the whole population). Equation (5) can be rewritten as:

$$\frac{TC}{n} = as + F \tag{8}$$

in other terms:

$$s = \frac{1}{a}\left(\frac{TC}{n} - F\right). \tag{9}$$

Equation (8) can then be substituted into equation (3) and we get:

$$S = \frac{n^{\frac{\sigma}{\sigma-1}}}{a}\left(\frac{TC}{n} - F\right) \tag{10}$$

or

$$S = \frac{n^{\frac{\sigma}{\sigma-1}}}{a}\left(\frac{bLw}{n} - F\right). \tag{11}$$

Equation (11) can be rewritten as:

$$S = \frac{bLwn^{\frac{1}{\sigma-1}}}{a} - \frac{Fn^{\frac{\sigma}{\sigma-1}}}{a}. \tag{12}$$

Differentiating equation (12) with respect to n and setting $\delta S/\delta n=0$ we find out the optimum number of consumer services in a local market. Optimal number of retail services established in a market is:

$$n = \frac{bLw}{\sigma F}. \tag{13}$$

From equation (13) it is found that the optimum number of consumer services in market is determined by the population size (L), the level of the average wage (w), the budget share spent on servic-

[3] This means that we take substitutability into consideration. A desirable feature of the model is that it takes into account both substitutability and acknowledge if different service are complements to each other.

es in the region (b), the size of the fixed costs in the service industry (F) and the elasticity of substitution between services (σ).

A change in any right-hand side variable effects market conditions for services. It is quite reasonable to assume that market size can be measured as wage sum (given that there are no substantial and systematic income differences between regions) and in combination with the consideration of access to this market potential. The regional differences in income per capita in Sweden are relatively small relative to other nations. However, regional differences still exist. In this analysis we find that industrial mix and regional size can explain such differences. Given this, we use functional region definition to identify whether a municipality is central or not, together with aggregated wage sums in order to account for these regional differences in the analysis.

3. Data and empirical model

The data is obtained from Statistics Sweden, for the years between 2004 and 2009. It provides employment information for the selected retail services for each municipality in Sweden. Our choice of years is motivated by the changes in consumption patterns and also the major increase in land rent which may have affected the location of consumer retail services. Moreover, by pooling the data for the given years, we could obtain sufficient number of observations on several retail service establishments that would otherwise be dropped out of the statistical analysis due to the binary characteristic of the data.

In the regression analysis we split the sample between central and non-central municipalities, since the former is expected to play a more influential role in the supply of retail services, while the consumers from latter can be expected to commute to the core in order to consume retail goods and services. The construct of central and non-central municipalities in a Swedish context is based on integrated labor markets. Municipalities that have intensive commuting in between constitute a functional region, which also corresponds to a local labor market. There are 81 local labor markets in Sweden with one central municipality in the core of each. The relevance of this division for the type of study we conduct is the fact that economic activity within a region is much more intensive than across regions (Johansson, 1997). Market potential is a measure for the magnitude of economic concentration and network opportunities within and between regions (Lakshmanan and Hansen, 1965). Klaesson et al. (2011) shed some light on the need of making a distinction between internal and external market potentials of functional regions, given that different type of goods and services have different levels of interaction-intensity, meaning interaction between buyers and sellers. Johansson and Karlsson (2001) also mentions that these interaction-sensitive goods and services have distance-sensitive transaction costs that rise sharply when these transactions take place between regions rather than within.

As emphasized earlier, interaction-intensity is what constitutes the foundation of most of the retail services. Not to mention, some retail services are more interaction-intensive than the others, suggesting that their dependency on the market potential within the functional region will be higher than the others.

We use establishment based retail activities that are listed under "retail trade" in the industry classifications. There are a total of 54 retail services, 38 of which is analyzed by logit estimations. Due to the binary construct of the data, services that are present almost in every municipality, and those that are rarely present are dropped automatically from the statistical analysis. Both a list for the retail branches that are treated by the regression analysis and a list for those that are not suitable for the probabilistic approach due to over or under presence can be found in the Appendix.

Table 1. Descriptive statistics

Variables	Obs	Mean	Standard deviation	Min	Max
Presence	93960	0,65	0,48	0	1
Municipal wage sum	93960	3,71	8,42	0,19	130,22
Local labor market wage sum	93960	37,55	72,41	0	290,19
Stockholm dummy	93960	0,86	0,28	0	1
Gothenburg dummy	93960	0,45	0,21	0	1
Malmö dummy	93960	0,48	0,21	0	1
Year dummies	93960	0,17	0,37	0	1

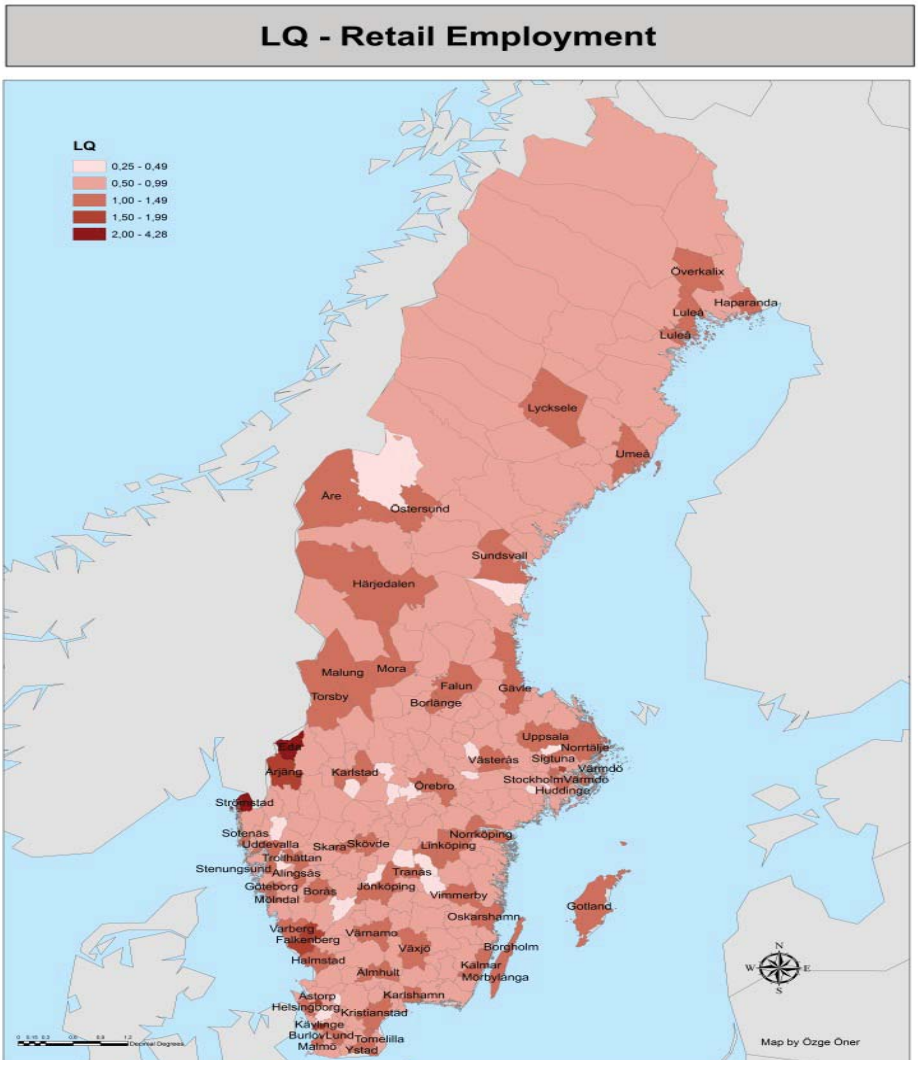

Fig. 1. Employment dynamics in the Swedish retail sector by municipalities

The map in Figure 1 shows the distribution of location quotients for retail employment across Swedish municipalities. Location quotients are calculated as follows:

$$Location\ quotients = \frac{Retail\ employment\ in\ municipality\ i / Total\ employment\ in\ municipality\ i}{Retail\ employment\ in\ Sweden / Total\ employment\ in\ Sweden}.$$

A location quotient is a useful tool to show how much an industry is concentrated in a location with respect to the other economic activities. So if an LQ higher than 1 in municipality *i* our context means that the retail sector in that municipality is more concentrated than the rest of the economic activities.

The concentration across large municipalities and metropolitan regions is a well expected result. However one striking feature of the map for LQ is that now it is clearly visible how retail is concentrated across the Norwegian border, where the demand is not only driven domestically. Municipalities like Strömstad, Arjång, Eda are known to attract consumers from Norway given the lower price levels for goods and services. Also places like Åre and Härjedalen are popular in terms of winter sports, meaning the demand for retail is not exclusive to the domestic consumers.

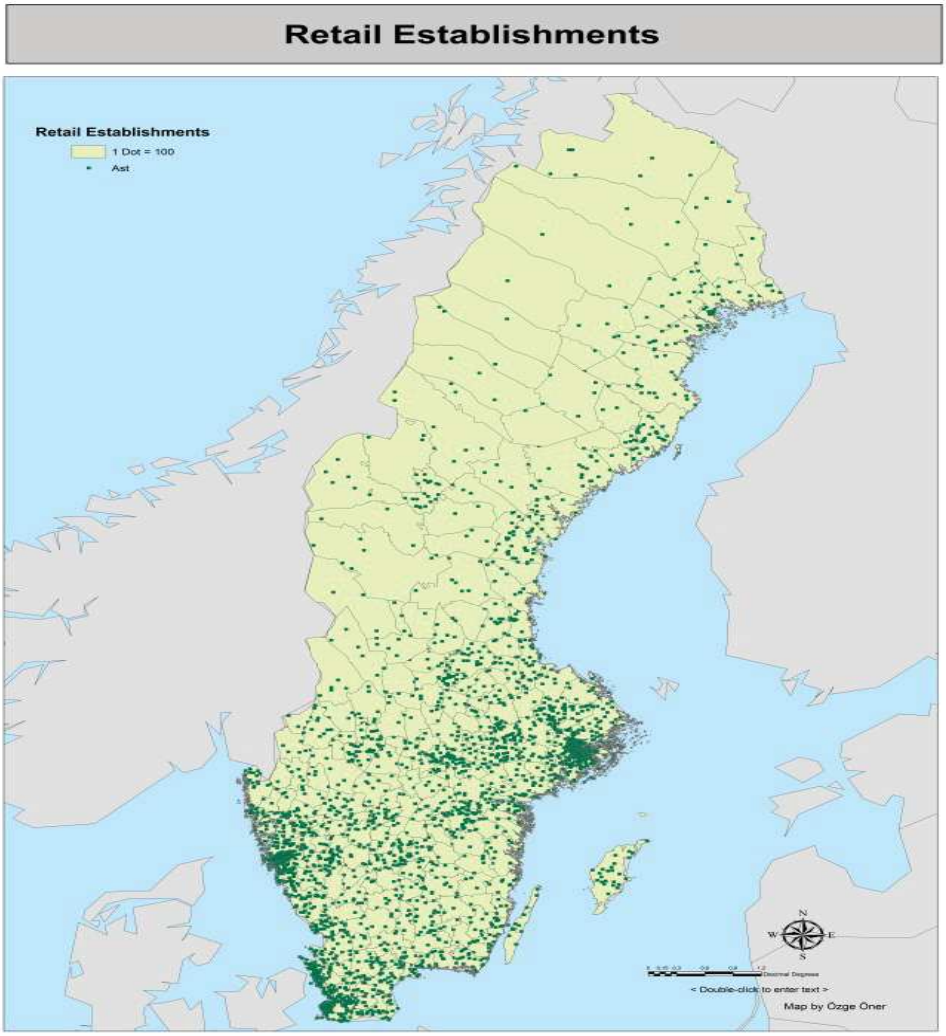

Fig. 2. Retail establishments by Swedish municipalities

Figure 2 shows the distribution of the retail establishments across space in Swedish municipalities. Each dot in the map represents 100 retail establishments. The municipalities that are highly populated by the dots, therefore, are implying retail clusters. The picture with the distribution of establishments in comparison to the location quotients is somewhat different. Those municipalities that are high in LQ, with higher concentration of retailing are not necessarily always the ones that are high in establishment number. This is due to the fact that the type of retailing along the Norwegian border is not very service oriented. In other words, establishments are used mostly for food retailing (and a like) and they are big in scale. Meaning although the concentration of the overall retailing activity is higher, we wouldn't expect high variation in the types of services. Hence, this leads to the discussion that diversity in retailing cannot always be measured in absolute terms. A place with high retailing concentration can lack variation in the services.

Table 2. Number of municipalities where different retail service sectors are present

Top 10	Description	Number of municipalities*
52112	Non-specialized stores with food, beverages and tobacco predominating	290
52310	Pharmacy	290
52250	Retail sale of alcoholic and other beverages	288
52487	Retail sale of flowers and other plants	283
52485	Retail sale of sports and leisure goods	283
52461	Retail sale of hardware, plumbing and building materials	282
52421	Retail sale of men's, women's and children's clothing, mixed	279
52443	Retail sale of glassware, china and kitchenware	276
52499	Retail sale in specialized stores n.e.c.	268

Table 2 (cont.). Number of municipalities where different retail service sectors are present

Top 10	Description	Number of municipalities*
52410	Retail sale of textiles	267
Bottom 10		
52453	Retail sale of gramophone records, tapes, CDs, DVDs and video tapes	113
52210	Retail sale of fruit and vegetables	110
52495	Retail sale of wallpaper, carpets, rugs and floor coverings	94
52121	Other retail sale in department stores and the like	93
52111	Retail sale in department stores and the like with food, beverages and tobacco predominating	83
52220	Retail sale of meat and meat products	80
52492	Retail sale of coins and stamps	51
52320	Retail sale of medical and orthopaedic goods	45
52425	Retail sale of furs	26
52497	Retail sale of office furniture	16

Note: *Mean of the values is from 2004 to 2009.

Table 2 provides the description that is useful to see how the probabilistic approach treats the impact of market size on the presence of various retail branches. The table is constructed to see how many municipalities have the presence of retail branches in Sweden. Top 10 and bottom 10 retail branches in terms of the number of municipalities they are present in are shown above. Looking at the top 10 list we can see that the non-specialized stores and pharmacies are present in every municipality in Sweden. Retail sale of alcoholic beverages (Systembolaget), retail sale of sports and leisure goods, retail sale of construction related goods, mixed clothing and textile are highly present. This explains why theses retail service branches are excluded from the analysis since it capture the probability of presence.

By the same token, when we look at the bottom 10 list, we see the sale of niche products in highly specialized stores. As discussed earlier, given that the fixed costs for these retail establishments are very high with respect to the demand for their goods, they have even a higher need to be located close to the large market places. This is a plausible explanation to why these retail branches are rarely present in Swedish municipalities. Rare presence of them is also the explanation to the exclusion of many of them from the regression analysis.

Table 3. Average establishment size in terms of number of employees in retailing

Top 10	Description	Average establishment size in terms of employees
52112	Non-specialized stores with food, beverages and tobacco predominating	203,24
52421	Retail sale of men's, women's and children's clothing, mixed	48,43
52461	Retail sale of hardware, plumbing and building materials	38,1
52310	Pharmacy	36,5
52111	Retail sale in department stores and the like with food, beverages and tobacco predominating	33,63
52441	Retail sale of furniture	30,25
52485	Retail sale of sports and leisure goods	25,8
52423	Retail sale of women's clothing	25,38
52452	Retail sale of radio and television sets	20,97
52250	Retail sale of alcoholic and other beverages	18,15
Bottom 10		
52453	Retail sale of gramophone records, tapes, CDs, DVDs and video tapes	1,54
52491	Retail sale of art; art gallery activities	1,39
52472	Retail sale of newspapers and magazines	1,37
52210	Retail sale of fruit and vegetables	1,18
52501	Retail sale of antiques and second-hand books	0,87
52220	Retail sale of meat and meat products	0,86
52320	Retail sale of medical and orthopaedic goods	0,24
52425	Retail sale of furs	0,19
52497	Retail sale of office furniture	0,17
52492	Retail sale of coins and stamps	0,12

Note: *Mean of the values is from 2004 to 2009.

Average establishment size is important in the sense that it is reflecting the relation between larger fixed costs and presence. If a retail activity requires an establishment to be large, the impact of market size for its presence in a location must be higher. The reason is to be able to cover the higher fixed costs by a larger audience.

4. Analysis

The empirical analysis is designed to investigate the probability of finding selected retail services in municipalities based on the proximate and regional-market size.

The selection of services has been made with respect to identifying branches and activities that are assumed to be sensitive to market size. A common characteristic of the retail services is that they can be assumed to represent 'marginal services', analogues to the concept stated from the rank-size distributions (Dicken and Lloyd, 1990).

The method we use is to estimate a binary logit-model, using the probability distribution:

$$P_i(x) = \frac{1}{1 + e^{-(\alpha + \beta x_i)}}, \tag{14}$$

where P_i is the probability that a retail service is present in municipality i. x_i is the size of municipality i in terms of population. α and β are estimated parameters. $P_i = 1$ (0 otherwise) if the particular retail service is present (if there exists at least one establishment).

If we set

$$\frac{dP_i^{\,2}(x_i)}{dx^{\,2}} = 0 \tag{15}$$

and solve for x_i, we obtain

$$x_i = -\frac{\alpha}{\beta}. \tag{16}$$

Equation (16) gives the x_i-value where the slope of the probability curve attains its maximum value. That is, at that x_i-value the effect of purchasing power (in terms of population size) on the probability of presence of the retail service i is at its highest. If we solve for x_i directly from equation (14) we obtain

$$x_i = -\left(\frac{\alpha}{\beta}\right)\left(1 + \frac{1}{\alpha}\ln\left(\frac{1 - P_i}{P_i}\right)\right). \tag{17}$$

From Equation (17), we can calculate the market size (population) that is required for every level of probability for the presence of retail service i. When market size is measured in terms of accessibility, we use the following definition:

$$X_i = \sum_j x_j e^{-\lambda t_{ij}} = x_i e^{-\lambda t_{ii}} + \\ + \sum_{j \in R} x_j e^{-\lambda t_{ij}} + \sum_{j \notin R} x_j e^{-\lambda t_{ij}}, \tag{18}$$

where X_i is the accessibility to purchasing power measured as population in municipality i, x_j is the purchasing power (population) in municipality j, λ is a distance decay parameter and t_{ij} is the time-distance between municipalities i and j if one travels by car. Internal accessibility is given by the same formula and t_{ii} measures the average time-distance between zones in municipality i. In the estimations performed with accessibility measures x_i is substituted by X_i in equations (14) to (17).

We now move on the findings from our multivariate logit regression analysis. We run a regression for each retail branch and for each point in time (year 2002 and 2008). We split the sample between central (81 observations) vs. non-central municipalities (209 observations), where the central municipality represents the economic engine municipality of the local labor market, while the non-central municipalities to a larger extent fill a sub-urban role as living regions with only minor city centers. The aim is to examine the probabilities of finding each of these retail services represented in the municipality at each point in time, also depending on the municipal economic role as local labor market center or not. We will also examine differences across our two points in time.

The table representing the results of the statistical estimations using the binary logit-model can be found in the Appendix.

Internal market size, which is the market potential driven by the municipal wage sum, has a positive and significant effect on the presence of all retail branches. This is in line with theory suggesting that retail services indeed are highly dependent on the scale of the market that is close by. Hence, we can say that places with high internal market potential are more likely to have a diverse retail market, with higher terms of variation in the services that are present.

However, the situation with the impact driven from the external market potential is mixed for different retail activities. Previously we discussed that the dependence on the market size is a very commodity (or service) specific state. We know that the preference to travel varies notably depending on the type of the good or service that will be consumed. Given the nature of retailing as an economic activity, we expect a somewhat weak dependency on the external market potential, even no impact for most of the services. Looking at the results for central and non-central municipalities, they should also reflect – at least to some

extent – the competition effect due to being located large market places. In other words, for a non-central municipality, being located to a considerably larger market place should imply a negative impact, or shadowing effect.

For the sake of convenience, we provide a chart below, categorizing the regression results for the impact of external market potential on the presence of each retail branch, for central and non-central municipalities separately.

Table 4. Impact of external market potential on the presence of retail branches in Swedish municipalities

	Central			
	Positive significant	Positive significant	Insignificant	Negative significant
		Fish, crustaceans and molluscs		Second-hand goods in stores
		Bread, cakes and flour confectionery		
	Insignificant	Fruit and vegetables	Other retail sale in department stores	Retail sale in department stores and the like with food, beverages and tobacco predominating
		Retail sale of food in specialized stores	Meat and meat products	Electrical household appliances
		Cosmetic and toilet articles	Sugar confectionery	Boats and boating accessories
		Retail saleof furs	Children's clothing	
		Musical instruments and music scores	Leather goods	
		Retail sale of watches and clocks	Home furnishing textiles	
		Wallpaper, carpets, rugs and floor coverings	Gramophone records, tapes, CDs, DVDs and video tapes	
		Office furniture	Hardware, plumbing and building materials	
Non-central			Retail sale of paint	
			Newspapers and magazines	
			Photographic equipment, and related services	
			Retail sale of games and toys	
			Retail sale of art; art gallery activities	
			Retail sale of coins and stamps	
	Negative significant		Antiques and second-hand books	
			Retailsale in non-specialized stores n.e.c.	Men's clothing
			Retail sale of tobacco products	Retail sale of telecommunication equipment
			Medical and orthopaedic goods	
			Retail sale of footwear	
			Retail sale of lighting equipment	
			Retail sale of books and stationery	
			Computers, office machinery and computer program	

Note: For detailed regression results see Appendix.

Looking at the results for the external market potential from our logit estimations, we see that most of the services fall under the 'insignificant' category for both central and non-central municipalities. This is in line with the discussion around the dependence on the nearby market place.

Conclusion

This paper investigates the relationship between retail location and market size in Sweden. The retail services we have chosen to study are assumed to be dependent on the demand from the local market. Moreover, we recognize them as important characteristics of the supply side and the consumption side in the local economic milieu. From a theoretical perspective, it is reasonable to assume that the presence of the service industries can be explained by the size of the local and regional markets.

In the empirical analysis, we study the relationship between municipal market, regional market, and the probability of presence of the respective retail branches in Swedish municipalities. The market potential at a location is defined as the purchasing power (aggregated income). A binary logit-model is employed for the analysis of the selected services.

According to the results from the statistical estimations, all selected retail branches are dependent on lo-

cal market potential. The regional market (functional region) is also found to be important in some cases both depending on whether the municipality is central or not. Impact from the external market for non-central municipalities signal the competition effect driven by larger surrounding municipalities in some cases.

References

1. Alonso, W. (1960). A Theory of the Urban Land Market, *Papers and Proceedings of the Regional Science Association*, 6, pp. 149-158.
2. Alonso, W. (1964). *Location and land use*, Cambridge, MA: Harvard University Press.
3. Berry, B.J.L. and Garrison, W.L. (1958a). Functional Bases of the Central Place Hierarchy, *Economic Geography*, 34, pp. 145-154.
4. Berry, B.J.L. and Garrison, W.L. (1958b). Recent Development of Central Place Hierarchy, *Papers and Proceedings of the Regional Science Association*, 4, pp. 107-120.
5. Birkin, M., Clarke, G., Clarke M. (2002). *Retail Geography and Intelligent Network Planning*, Wiley-Blackwell
6. Borchert, J. (1988). Recent developments in retailing in the Netherlands, *Tijdschriftvoor Econ en SocGeografie*, 79, pp. 220-226.
7. Brown, S. (1993). Retail location theory: evolution and evaluation, *The International Review of Retail, Distribution and Consumer Research*, Vol. 3, Issue 2.
8. Christaller, W. (1933). *Die zentralen Orte in Süddeutschland*, Jena: Gustav Fisher
9. Dicken, P. and Llyod, P. (1990). *Location in Space: Theoretical Perspectives in Economic Geography*, 3rdedn, New York: HarperCollins Publishers.
10. Dawson, J.A. (1980). *Retail Geography*, John Wiley & Sons, New York.
11. Field, C. (1997). *The Future of the Store: New Formats and Channels for a Changing Retail Environment*, London: Financial Time Business.
12. Florida, R. (2002). *The Rise of the Creative Class: And How it's transforming work, leisure, community and everyday Life*, New York: Basic Books.
13. Fujita, M. (1985). *Urban Economic Theory: Land Use and City Size*, Cambridge, MA: Cambridge University Press
14. Fujita, M. (1988). *Urban Economic Theory*, Cambridge: Cambridge University Press.
15. Fujita, M., Krugman, P. Mori, T. (1999b). On the Evolution of Hierarchical Urban Systems, *European Economic Review*, 43, pp. 209-251.
16. Fujita, M., Krugman, P., Venables, A.J. (1999a). *The Spatial Economy: Cities, Regions and International Trade*, Cambridge, MA: MIT
17. Fujita, M., Thisse, J.F. (2002). *Economics of agglomeration: Cities, industrial location and regional growth*, Cambridge: Cambridge University Press.
18. Glaeser, E.L., Kolko, J., Saiz, A. (2001) Consumer City, *Journal of Economic Geography*, 1, pp. 27-50.
19. Hoover, E.M. (1937). *Location Theory and the Shoe and Leather Industries*, Harvard University Press, Cambridge, MA.
20. Leefland, P., van Raaji, W. (1995). The changing consumer in the European Union, International *Journal of Research in Marketing*, 12, pp. 373-387.
21. Lösch, A. (1940). Die Räumliche Ordnung der Wirtschaft, Gustav Fischer, Jena. English translation (1954): The economics of location, New Haven, Yale University Press, Connecticut.
22. Marshall, A. (1890). *Principles of Economics*, 8th ed., Macmillan, London.
23. Mills, E. (1967). An Aggregative Model of Resource Allocation in a Metropolitan Area, *American Economic Review*, 57, pp. 197-210.
24. Ohlin, B. (1933). *Interregional and International Trade*, Harvard University Process, Cambridge, MA.
25. Quigley, J.M. (1998). Urban Diversity and Economic Growth, *Journal of Economic Perspective*, 12, pp. 127-138.
26. Roback, J. (1982). Wages, Rents, and the Quality of Life, *The Journal of Political Economy*, 90 (6), pp. 1257-1278.
27. Rosen, S. (1979). Wage-based Indexes of Urban Quality of Life, in Current Issues in Urban Economics, Mieszkowski, P., Straszheim, M., Baltimore: Johns Hopkins University Press.
28. Sparks, L., Dawson, J.A. (1989). *Land Use Policy*, Stirling: Institute for Retail Studies, University of Stirling.
29. Von Thünen, J.H. (1966). Isolated state; an English edition of Der isolierte Staat (1826). Translated by Wartenberg, C. Ed. Hall, P. Oxford, New York, Pergamon Press.
30. Weber, A. (1909). Über den Standort der Industrien, Teil I: Reine Theorie des Standorts, J.C.B. Mohr, Tübingen, English ed. by C.J. Friedrichs, Univ. Chicago Press, 1929.

Appendix

Table 1A. List of retail branches treated in the analysis

Retail No	SniCode	Description
1	52111	Retail sale in department stores and the like with food, beverages and tobacco predominating
2	52121	Other retail sale in department stores and the like
3	52129	Retail sale in non-specialized stores n.e.c.
4	52210	Retail sale of fruit and vegetables
5	52220	Retail sale of meat and meat products
6	52230	Retail sale of fish, crustaceans and molluscs
7	52241	Retail sale of bread, cakes and flour confectionery
8	52242	Retail sale of sugar confectionery
9	52260	Retail sale of tobacco products
10	52279	Retail sale of food in specialized stores n.e.c.
11	52320	Retail sale of medical and orthopaedic goods
12	52330	Retail sale of cosmetic and toilet articles
13	52422	Retail sale of men's clothing
14	52424	Retail sale of children's clothing
15	52425	Retail sale of furs
16	52431	Retail sale of footwear
17	52432	Retail sale of leather goods
18	52442	Retail sale of home furnishing textiles
19	52444	Retail sale of lighting equipment
20	52451	Retail sale of electrical household appliances
21	52453	Retail sale of gramophone records, tapes, CDs, DVDs and video tapes
22	52454	Retail sale of musical instruments and music scores
23	52461	Retail sale of hardware, plumbing and building materials
24	52462	Retail sale of paint
25	52471	Retail sale of books and stationery
26	52472	Retail sale of newspapers and magazines
27	52482	Retail sale of photographic equipment, and related services
28	52483	Retail sale of watches and clocks
29	52486	Retail sale of games and toys
30	52491	Retail sale of art; art gallery activities
31	52492	Retail sale of coins and stamps
32	52493	Retail sale of computers, office machinery and computer programs
33	52494	Retail sale of telecommunication equipment
34	52495	Retail sale of wallpaper, carpets, rugs and floor coverings
35	52496	Retail sale of boats and boating accessories
36	52497	Retail sale of office furniture
37	52501	Retail sale of antiques and second-hand books
38	52509	Retail sale of other second-hand goods in stores

Table 2A. Results of logit estimations

	Central			Non-central		
Presence of retail branch	Municipal market size	Local labor market size	Presence of retail branch	Municipal market size	Local labor market size	Presence of retail branch
1	0.570***	-0.139*	354	0.586***	0.00633	1,182
	(6.410)	(-1.927)	(0.299)	(10.28)	(0.718)	(0.190)
2	1.105***	-0.112	354	1.075***	0.00617	1,182
	(5.906)	(-0.684)	(0.398)	(13.28)	(0.641)	(0.352)
3	0.653***	0.257	354	0.870***	-0.0205***	1,182
	(3.932)	(1.168)	(0.340)	(11.23)	(-2.850)	(0.194)
4	0.181***	0.322***	354	0.619***	-0.000502	1,182
	(3.646)	(3.551)	(0.229)	(10.52)	(-0.0671)	(0.201)
5	0.262***	0.0355	354	0.187***	0.00984	1,182
	(6.246)	(0.737)	(0.213)	(4.766)	(1.362)	(0.0483)

Table 2A (cont.). Results of logit estimations

	Central			Non-central		
Presence of retail branch	Municipal market size	Local labor market size	Number of observations & pseudo R-squares	Municipal market size	Local labor market size	Number of observations and pseudo R-squares
6	0.138***	0.116**	354	0.569***	0.0167**	1,182
	(3.641)	(2.151)	(0.116)	(9.662)	(2.471)	(0.172)
7	0.359**	1.288***	354	0.649***	0.0112	1,182
	(2.437)	(3.217)	(0.274)	(9.177)	(1.597)	(0.162)
8	1.238***	0.544	354	0.590***	0.00728	1,182
	(3.199)	(0.948)	(0.334)	(7.050)	(0.959)	(0.106)
9	1.837***	-0.397	354	1.653***	-0.0272***	1,104
	(3.962)	(-0.854)	(0.374)	(9.184)	(-2.969)	(0.210)
10	0.255**	0.394**	354	0.812***	-0.00525	1,182
	(2.477)	(2.033)	(0.239)	(9.876)	(-0.712)	(0.189)
11	0.230***	-0.0191	354	0.234***	-0.0189**	1,182
	(6.535)	(-0.469)	(0.179)	(5.207)	(-1.986)	(0.0743)
12	0.503**	1.131**	354	1.237***	0.00964	1,182
	(2.223)	(2.235)	(0.261)	(8.478)	(1.080)	(0.179)
13	4.974***	-1.823*	354	1.631***	-0.0238***	1,182
	(3.936)	(-1.811)	(0.577)	(13.04)	(-2.945)	(0.298)
14	0.232***	0.0319	354	0.641***	-0.0105	1,182
	(3.462)	(0.409)	(0.110)	(8.944)	(-1.511)	(0.164)
15	0.164***	0.102**	354	0.520***	0.0112	1,104
	(4.657)	(2.370)	(0.193)	(6.395)	(0.663)	(0.280)
16	1.453	-0.472	236	0.980***	-0.0254***	1,182
	(1.558)	(-0.625)	(0.204)	(8.531)	(-3.175)	(0.130)
17	1.166***	0.152	354	0.929***	0.00672	1,182
	(5.414)	(0.581)	(0.401)	(12.62)	(0.830)	(0.267)
18	2.527***	-0.0314	295	1.057***	0.00173	1,182
	(2.803)	(-0.0324)	(0.424)	(11.20)	(0.236)	(0.230)
19	1.015***	0.0207	354	0.901***	-0.0233***	1,182
	(4.758)	(0.0865)	(0.331)	(11.66)	(-3.170)	(0.201)
20	1.027***	-0.393**	354	1.025***	0.00894	1,182
	(3.708)	(-2.002)	(0.222)	(9.966)	(1.202)	(0.182)
21	0.495***	0.0276	354	0.514***	-0.00834	1,182
	(5.486)	(0.319)	(0.312)	(9.509)	(-1.160)	(0.150)
22	1.271***	1.005**	354	0.663***	-0.00601	1,182
	(5.151)	(2.299)	(0.458)	(10.87)	(-0.872)	(0.140)
23	0.210	18.62	118	2.691***	0.0162	1,032
	(0.390)	(0.690)	(0.606)	(5.723)	(0.870)	(0.192)
24	2.313**	-0.660	295	0.898***	-0.00222	1,11
	(2.294)	(-0.690)	(0.337)	(8.243)	(-0.281)	(0.112)
25	1.324**	0.356	295	1.603***	-0.0275***	1,182
	(2.362)	(0.456)	(0.312)	(10.52)	(-3.276)	(0.215)
26	0.261***	-0.0170	354	0.262***	-0.00782	1,182
	(4.635)	(-0.283)	(0.145)	(6.364)	(-1.210)	(0.0715)
27	1.303***	0.0512	354	0.630***	-0.00886	1,182
	(3.928)	(0.123)	(0.331)	(9.640)	(-1.289)	(0.133)
28	1.326***	0.214	354	1.008***	0.0202***	1,182
	(4.799)	(0.587)	(0.386)	(12.37)	(2.733)	(0.240)
29	1.747***	0.305	354	0.881***	-0.00511	1,182
	(4.630)	(0.611)	(0.443)	(10.19)	(-0.708)	(0.169)
30	0.505**	0.303	354	0.698***	-0.00695	1,182
	(2.327)	(0.918)	(0.188)	(9.278)	(-0.995)	(0.140)

Table 2A (cont.). Results of logit estimations

	Central			Non-central		
Presence of retail branch	Municipal market size	Local labor market size	Number of observations & pseudo R-squares	Municipal market size	Local labor market size	Number of observations and pseudo R-squares
31	0.269***	0.0128	354	0.593***	-0.00855	1,182
	(6.941)	(0.294)	(0.233)	(9.671)	(-0.816)	(0.253)
32	1.277*	0.515	295	1.494***	-0.0214**	1,104
	(1.866)	(0.520)	(0.350)	(9.193)	(-2.411)	(0.211)
33	0.990***	-0.267*	354	1.072***	-0.0291***	1,182
	(4.932)	(-1.735)	(0.287)	(12.83)	(-3.433)	(0.288)
34	0.194***	0.0881*	354	0.477***	0.00225	1,182
	(4.695)	(1.648)	(0.157)	(9.448)	(0.302)	(0.137)
35	1.004***	-0.339**	354	0.697***	0.00192	1,182
	(5.302)	(-2.534)	(0.289)	(9.649)	(0.257)	(0.215)
36	0.105***	0.122***	366	0.301***	-0.0135	1,11
	(2.891)	(2.738)	(0.144)	(3.905)	(-0.784)	(0.163)
37	0.408*	-0.183	354	1.399***	-0.00772	1,182
	(1.773)	(-1.004)	(0.113)	(8.364)	(-0.844)	(0.161)
38	1.013***	-0.332**	354	0.480***	0.0288***	1,182
	0.269***	0.0128	354	0.593***	-0.00855	1,182

Note: z-statistics are in parentheses, pseudo R-square values are in parentheses under number of obs., *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3A. Retail branches that are dropped from the statistical analysis

SniCode	Description
52112	Retail sale in other non-specialized stores with food, beverages and tobacco predominating
52250	Retail sale of alcoholic and other beverages
52271	Retail sale of health foods
52410	Retail sale of textiles
52421	Retail sale of men's, women's and children's clothing, mixed
52423	Retail sale of women's clothing
52441	Retail sale of furniture
52443	Retail sale of glassware, china and kitchenware
52452	Retail sale of radio and television sets
52481	Retail sale of spectacles and other optical goods
52484	Retail sale of jewellery, gold wares and silverware
52485	Retail sale of sports and leisure goods
52487	Retail sale of flowers and other plants
52488	Retail sale of pet animals
52499	Retail sale in specialized stores n.e.c.

Table 4A. Average establishment size for the services in relation to the impact from external market potential

		Central		
		+	+/-	-
Non-central	+	Min: 0.61 Mean: 1.06 Max: 1.51		Min: 0.47 Mean: 0.47 Max: 0.47
	+/-	Min: 0.11 Mean: 0.56 Max: 1.1	Min: 0.12 Mean: 1.52 Max: 7.35	Min: 0.77 Mean: 9.55 Max: 25.87
	-		Min: 0.1 Mean: 1.59 Max: 3.11	Min: 1.39 Mean: 1.85 Max: 2.31