CESIS Electronic Working Paper Series

Paper No. 335

RETAIL CITY
Does accessibility to shops explain place attractiveness?

Özge Öner

December, 2013

The Royal Institute of technology
Centre of Excellence for Science and Innovation Studies (CESIS)
http://www.cesis.se

RETAIL CITY

Does accessibility to shops explain place attractiveness?

Özge Öner[1][2]

Abstract

This paper explores the role of retail as an amenity and how it contributes to place attractiveness. In this investigation the impact of accessibility to shops on average house prices is investigated using a fixed effect estimation. The analysis use data for Swedish municipalities through the years 2002-2008. The empirical design is constructed using the across-cities spatial equilibrium framework of Roback (1982), and house prices are assumed to reflect the attractiveness of municipalities. In order to capture the precise impact from retail access, mean wages, population density, unemployment, leisure service concentration, and municipal tax levels are controlled for. Results indicate a strong relationship between retail access and place attractiveness, where a retail-premium on house prices is found to be present for Swedish municipalities.

JEL codes: L81, O18, P25

Keywords: urban amenities, housing market, retail sector

[1] Jönköping International Business School, SWEDEN
[2] Centre for Entrepreneurship and Spatial Economics

1. Introduction

The traditional approach to understand urban and rural development is that it is the consequence of the spatial distribution and uses of the traditional factors of production (land, labor and capital) is challenged by relatively recent studies. Instead, these studies emphasize the importance of consumption possibilities and urban amenities for the growth and development of cities and regions (Lloyd and Clark, 2001; Clark, 2003). Urban public authorities and actors in the private sector have started to increase their attention to the possibility of enhancing the attractiveness of their location in order to attract future residents, tourists, conventioneers, and retail consumers. It is argued that as firms and individuals became more mobile, the role of consumption possibilities in a city as an attractive attribute became more notable over the last decades (Glaeser et al, 2001).

This paper aims to investigate the explanatory power of retailing for the attractiveness of a place. The empirical application relates to spatial equilibrium in an open city system. The theoretical framework for a static spatial equilibrium across cities suggests that (in an equilibrium) housing prices should reflect people's willingness to reside in a place, and should be explained by the wage levels under the assumption that all places offer identical opportunities to their residents. However, previous research shows that in some cities, housing prices increase faster than the wage levels (Glaeser, 2001). This implies that people are willing to pay a higher premium for housing with respect to how much money they earn. Amenities, as discussed in the Rosen-Roback framework, are proven to capture most of the unobserved characteristics that yield the variation in the housing prices. High amenity cities are found to grow and develop faster than the low-amenity cities in this strand of literature. Building on this idea, the paper aims to determine to what extent retail acts as an urban amenity. In particular, it takes accessibility to the shops in the local market, as well as in the region into account and examines the retail-premium for housing prices, which is the product of this accessibility. To capture the value of retailing for place attractiveness, the empirical application controls for the scale of the market, concentration of leisure services, tax levels and overall labor market conditions.

The analysis is conducted with Swedish data on the municipal level for the years 2002-2008. The empirical design uses fixed effects estimation to isolate the effect of time invariant assets in a municipality that contributes to place attractiveness (such as natural amenities, climate and coastal border). The findings of the paper confirm the importance of retail access for the attractiveness of a city.

The paper provides a theoretical framework under three separate headings, where spatial externalities, spatial equilibrium and the relative importance of retailing for place attractiveness is discussed. The empirical section follows with a cluster analyses and fixed effect estimation. The paper concludes with a discussion of the results.

2. Theoretical framework

2.1. Spatial equilibrium across cities

The rationale behind the empirical application in this paper comes from a static spatial equilibrium framework (see Roback, 1982), which is extended further to capture the impact of accessibility to shops on place attractiveness (reflected in the housing prices). The spatial equilibrium approach has three distinct equilibrium condition for residents, employers and builders. One of the assumptions for spatial equilibrium across cities is that individuals must be optimally choosing their location. Most of the models that deal with a spatial equilibrium across cities assumes a single type of individual, which implies that the utility levels across space must be identical[3].

One of the differences between within city and across city spatial equilibrium is that we assume wage levels to be constant in the first, while we acknowledge wage differentials across cities in the later. As Glaeser (2008) notes, although productivity differences across space has a great influence on labor demand, for the sake of simplicity, labor demand can be considered exogenous rather than endogenous. In the Rosen-Roback framework for static spatial equilibrium across cities, housing prices are explained not only by wage levels but also with amenities present in a location (Rosen, 1979; Roback, 1982). In her paper, Roback (1982) discusses how workers are distributed across locations with varying amenities and how this is reflected in wages and housing prices. In her theoretical framework, a representative worker[4] (consumer of housing) satisfies a budget constraint as follows;

$$\max U(x, l^c; s) \ \ subject\ to\ w + I = x + l^c r \qquad (1)$$

Where s is the quantity of amenities in his location, x is the composite commodity consumed and, l^c is housing (residential land) consumed. In the equation, w denotes the wages and, r stands for the rental payments.

The indirect utility function[5], V, then is;

$$V(w, r; s) = k \qquad (2)$$

This equation implies that the wages and rents must be different across cities with varying quantities of amenity in order to equalize the individual utility in these cities.

[3] Assumption of more than one type of individual makes the computation of equilibrium problematic (see Glaeser, 2008 for further discussion).

[4] All consumers (workers) are assumed to be identical in tastes and skills and the amount of labor supplied by each labor is assumed to be independent of the wage.

[5] $\partial V/\partial s > 0$ because s is an amenity.

The second component of the equilibrium is on the firms (employers) side, represented by a production function[6], $X = f(l^p, N; s)$, which consists of l^p, land used in production, and N, which is the total number of workers in a city[7]. The equilibrium condition[8][9] for firms then is;

$$C(w, r; s) = 1 \qquad (3)$$

Equation 2 and 3 in this framework determines wages (w) and rents (r) as functions of amenity in a place (s). It means the wages and rents (housing values) can be determined by the interaction of the equilibrium conditions for firms and consumers (or workers), which are the two sides of the market[10].

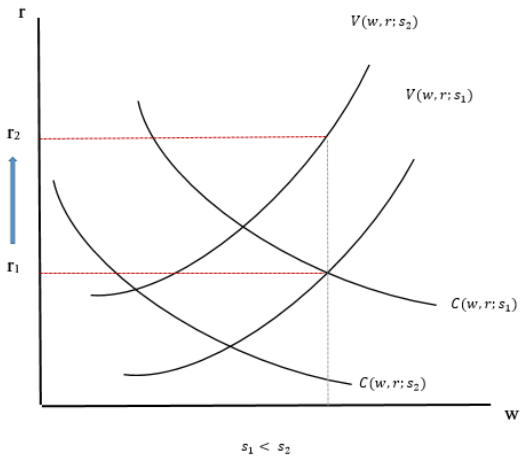


Figure 1: Spatial equilibrium for firms and individuals in places with varying amenity

Figure-1 above, (adapted from Roback, 1982), shows the effect of different quantities of amenities in space on wages and rents. The argument is that high rents discourage both firms and workers from locating in an area. While worker equilibrium requires high rents in high amenity areas to inhibit immigration, firm equilibrium requires low rents in high amenity areas to justify the firm location[11]. The empirical application of this paper deals exclusively with one side of the equilibrium presented in the Roback framework, which is the individuals and the determinants behind their location decisions. Figure 1 shows that, at a given wage rate, a shift in the quantity of amenities will result an increase in the rental

[6] Constant returns to scale production function
[7] By assumption, capital is perfectly mobile, thus, it is uninfluenced by amenities. This means the returns to capital will be equal in all places. That is why capital is not included in the optimization.
[8] Equation 3 for the equilibrium condition for firms is a unit cost function where unit cost must equal product price. If the unity is not present, firms would be expected to move their capital to more profitable cities.
[9] In the theoretical framework of Roback (1982) there is a distinction between productive and unproductive amenities. For example it is argued that C_s can be smaller than zero, implying the cost of an unproductive amenity *(e.g. clean air)*.
[10] See Roback (1980) for market-clearing conditions, where the wage and rent gradients are influenced by the utility level.
[11] Roback (1982) makes a distinction between productive and unproductive amenities. The argument is that is amenity in an area is productive, the rents would rise but the change in wages would be ambiguous.

(housing) prices. This means that holding the wage constant, we should see a positive impact from the quantity of amenities on the housing prices in the respective city.

There are certain aspects of this framework that deserves careful treatment. Firstly, Roback (1982) argues that firms will want to locate in places with lower rental cost, as depicted in the cost function for firms earlier. Given that the individuals will have the willingness to be located in high amenity places, they need to be compensated with higher wages at low amenity places to achieve the same utility. However, the cost function for firms in this framework have strict assumptions. Firms are assumed to operate under constant-returns-to-scale. Also, capital is perfectly mobile, meaning that it will be equally productive in different cities. Although scale related variables like population density and population growth are introduced as explanatory variables into the empirical application of this framework by Roback (1982), the theoretical framework itself is rather silent about the relationship between market size and productivity[12]. However, we know from the previous research that there is a strong relationship between market size and productivity, both for firms and individuals (Ciccone and Hall, 1996; Puga, 2010; Combes et al., 2012). Another issue with the framework is that amenities are assumed to be independent of the market size as well. Amenities are mostly treated to be intrinsic to the location (e.g. natural amenities). For that reason, the linear relationship between market size and external amenities like size of the retail sector or consumer services are not discussed in this type of framework.

2.2. Spatial Externalities

Spatial externalities are closely tied to the attractiveness of places, the impact of which is reflected in the housing markets. The depth and breadth of consumer amenities, natural amenities, opportunities in the labor market, and natural and cultural assets attract households to the hosting town or region. Consequently, increased demand for residential space in these places results in higher prices in the housing markets (Riviera-Batiz, 1988; Brueckner et al., 1999).

Primarily, housing prices are affected by proximity to urban nodes, where agglomerative forces[13] provides individuals with several advantages. For example, densely populated areas relates to higher access to larger job markets with a possible urban wage premium and better labor market matching (Glaeser and Máre, 1994; Ciccone and Hall, 1996; Helsley and Strange, 1990; Andersson et al., 2013). Not only jobs, but almost all economic activities are distributed across space in a systematic manner. Location theories dealing with the systematic variation in the spatial distribution of economic activities dates back to von Thunen (1826). In his approach, transportation costs (depending on the distance to the central market) are

[12] Population density, for example, is treated as a form of amenity, impact of which is expected to be reflected on wage levels in the empirical application in this framework. However, the results for this relationship is found to be insignificant

[13] The concept of 'Agglomeration Economies' is introduced by Marshall in 1890, where the gains from shared inputs and mutual interaction is emphasized.

proposed to be the main determinant of how economic activities with varying interaction intensity are distributed across space -which results in varying land prices-. Theories on the importance of size and density of urban areas has further been developed by several location theorists following this essential idea (Weber, 1909; Christaller, 1933; Lösch, 1954; Isard, 1956; Beckmann, 1958; Alonso, 1964).

As it is discussed by these traditional location theories, proximity to a central market place and the resulting economic density are undoubtedly very important components of place attractiveness. However, the identification of what makes a place attractive is a fairly complex task. Some of the attractive assets of a place relates to natural amenities such as open space, parks and green areas, urban forest, farmlands and water covers, which are found to contribute to the location premium that is reflected in the housing prices (Cheshire and Sheppard, 1995; Tyrväinen and Miettinen, 2000; Irwin, 2002; Andersson and West, 2006; Gibbons et al., 2011). The earlier literature argues that the spatial heterogeneity in the housing prices can – at least to some extent- be explained by these kinds of local 'open space amenities' (Geoghegan et al., 1997; Cho et al., 2008). Yet, most of the amenities that are not intrinsic to locations are the products of agglomerative forces and density in space. The agglomeration of private and public services (and goods) are acknowledged to be one of the most important determinants of the variation in the housing prices across cities, as well as across countries (Dubin and Sung, 1987; Andersson, 1997; Adair et al., 2000; Söderberg and Janssen, 2001; Andersson et al., 2010).

On the household and individual consumer side, there are several gains associated with the agglomerative forces, which also relates to the importance of urban amenities for place attractiveness. Rivera-Batiz (1988) points out that a greater variety in local goods and consumption of traded goods have a great impact on household utility. The provision of public goods and services is also found to be easier in places with a high degree of localized spillovers (Artle, 1959; Andersson, 1985).

2.3. Retail and place attractiveness

The pillars of place attractiveness can be summarized under a few essential elements of a city: *architecture, cultural infrastructure, public & private services* and *shops*. Some of these elements are intrinsic to a place, whereas the presence of some others relates to the size of the market and externalities. A Geographic proximity to these elements elevates the quality of life aspect of places. In that sense, probably the most important aspect of cities is that it provides individuals with higher access to people[14], consumer amenities and other kinds of cultural and historical amenities. In that sense a *city* (or town) itself can be considered to be a *territorial public good*, as it is proposed by Andersson and Andersson (2006). The urban amenity premium is discussed in the earlier literature, where the above-mentioned assets of cities are found to contribute to place attractiveness and housing values (Des Rosiers et al., 2000; Glaeser et al., 2005).

[14] It is essential for the interaction between individuals, as well as between economic agents, and crucial for network development (Andersson and Karlqvist, 1976; Lucas, 2001).

How does *retail* come into play when we think about place attractiveness? Can we acknowledge retail as an important amenity in cities (towns)? Historically, we have experienced a drastic increase in leisure time in advanced nations. Data from many countries show an increase in the share of disposable income that is allocated to the consumption of leisure goods and services (Andersson and Andersson, 2006). Together with increased mobility of individuals, the demand for amenities and quality of life attributes in space increased accordingly (Graves and Linneman, 1979: Clark, 2003). The importance of the increase in leisure expenditures to the entire retail sector is undeniable. For example, Krafft and Mantrala (2006) stress that, changing consumer needs and increasing interest in the shopping experience has altered the retailing landscape in the 21st century. Retailers' role as the providers of goods for utilitarian purposes transformed into a rather complex form following consumers' increasing appreciation for diverse consumption possibilities in space. Shops, as well as other consumer services, are different from the natural amenities in that sense, since they are highly related to the economic performance of cities and agglomerative forces. Recent empirical studies show that urban density facilitates consumption, and cities with urban amenities have grown faster than low-amenity cities (Glaeser, 2001).

Thinking about the amenity role of retailers (shops) for place attractiveness requires one to take not only the presence of stores, but also 'accessibility' to the stores into account. In this line of thinking, benefits from retailers are not only about the utility one derives from the actual shopping, but also from the indirect effects of having a certain scale of a retail market in close proximity. Presence of stores in a market is mainly driven by the size of the market, in terms of the potential demand in the immediate surroundings. However, stores do not only serve to the residents in very close proximity but also to the consumers travelling from other market locations. This kind of demand inflow should then have a multiplier effect for the city, meaning that the impact of retailing for the overall economy and attractiveness in a town can extend beyond the linear relationship between the sector and the size of the respective market. Thus, for a consumer, the relevant retail market almost always extends beyond the politically defined boundaries of a town where the individual lives.

To some extent, shops are like public goods, mimicking a historical monument or a park, in terms of contributing to place attractiveness. A consumer doesn't always need to purchase an item at a given store to enjoy the beautifully displayed shop-window. The vibrant environment provided by the presence of a retail cluster fosters increased interaction in space, which in itself is a positive attribute. Concentration of shops in a market attracts visitors from other places (similar to the touristic attractions), which has a multiplier effect for the overall local economy. The idea of retailers acting like quasi-public goods requires one to visit the fundamentals of 'public goods'. In the Tibout (1956) type of framework, rational individuals are expected to leave places with less attractive local public goods and move to the places with more attractive local public goods. In his argument, individuals 'vote with their feet', by migrating towards places with higher attractive attributes associated with the local public goods. For goods to be defined as pure public goods, they should be consumed without rivalry or exclusion. However, in the case of shops,

distance (accessibility) serves as an exclusionary force, since a consumer needs to be located at a certain proximity to enjoy the presence of a shop, directly by consumption, or indirectly via its aforementioned contributions to place attractiveness.

3. Data, variables & empirical strategy

Data

The data used in this study is obtained from Statistics Sweden, and it covers a seven years period for the Swedish municipalities between 2002 and 2008. The data is used to perform fixed effect estimations, as well as for a cluster analysis. The map below shows the Swedish municipalities, which is the respective geographical aggregation used in the analysis. In Sweden, there are 290 municipalities, each of which belongs to one of the 81 local labor markets. The map is shaded with respect to population density in each municipality, and the dots represent the spatial distribution of stores to give an overview. The strong relationship between the population density and the availability of stores is evident in the map. We see a clustering of stores in the southern part of the country, especially around the three metropolitan regions, Stockholm, Malmö and Gothenburg.

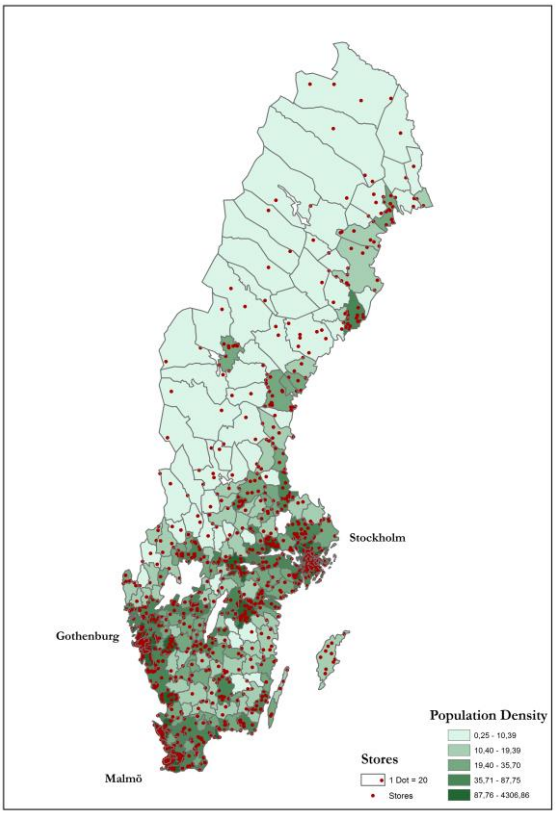


Figure 2: Swedish municipalities and the spatial distribution of stores

Variables

Housing Prices: Average housing prices for each municipality is introduced to the analysis as the dependent variable. Housing prices are treated as proxies to the place attractiveness in the empirical framework. The variable is log transformed.

Retail Access: Accessibility to retailers (shops) is the variable of interest in this paper. The aim is to capture the actual impact from having a large enough retail market in close proximity on the attractiveness of a place. This paper uses an accessibility measure for the calculation of store potential in a municipality, where not only the number of stores but also time-distances are taken into account.

Calculations are done based on the earlier work of Johansson, Klaesson, and Olsson (2002), which is further developed in Johansson and Klaesson's paper (2011) where they investigate the agglomeration dynamics of business services. Total retail accessibility of each municipality can be expressed as shown below in equation 4. By calculating the accessibility to retail, we account not only for the stores in the respective municipalities, but also stores that are located in the neighboring municipalities that are hosted in the same region (the 81 Swedish local labor markets). The reason is that there almost certainly exists spillover effects across municipal boundaries that are located in the same region[15]. Thus the total retail accessibility consists two components, one for the access to shops in the respective municipality, and one for the access to stores in the region the municipality located. We know that, for a fair share of retailing activities, the relevant market boundaries extend beyond the municipal borders (Öner, 2014). In equation 4, RA_m^M accounts for the intra-municipal and RA_m^R accounts for the intra-regional retail accessibility. These two components together compiles the *Retail Access* variable.

$$RA_m^{tot} = RA_m^M + RA_m^R \qquad (4)$$

The calculations are done as shown below, where S_m denotes the number of stores in municipality m, and S_R in denotes the number of stores in the hosting region R, excluding those in municipality m. The distance decay parameters in the equations are denoted by λ, where they have different values for the municipality and the region[16]. The travelling time[17] within the municipality is denoted by t_{mm} , while t_{mR} denotes the traveling time between the municipality m and rest of the municipalities in the same region.

Municipal market size: $RA_m^M = S_m \, e^{\{-\lambda_M t_{mm}\}}$

Regional market size: $RA_m^R = \sum_{R-m} S_R \, e^{\{-\lambda_R t_{mR}\}}$

[15] This type of spatial dependence within regions can be seen in the maps exhibiting the cluster analysis in the relevant section of the paper.
[16] Distance decay parameters are calculated by Johansson et al (2002) by using real commuting data between the Swedish municipalities.
[17] By car.

Accounting for distance decay is particularly important for this type of framework since it allows us to control for spatial dependencies, and account for a spatial continuum (Andersson and Gråsjö, 2009). The retail markets are not cut with visible boundaries. In fact, (with varying sensitivities to distance depending on the type of retailing in question) consumers don't only patronize the closest stores, but also those that are located further from their very immediate market (Öner & Larsson, 2013).

The variable of interest, *Retail Access* (denoted as RA later in the model) is highly market size driven. In large markets (densely populated cities) we naturally see a larger number of shops. This means that if one looks at the impact of available stores within a certain area on housing prices, this may be a mere reflection of the size effect. Thus, investigating the actual place attractiveness impact driven from having stores in a location requires one to eliminate this type of a size effect. The linear relationship between the market size (population density) and retailing in the analysis is eliminated by orthogonalization of this variable against *Population Density*. It means that the results obtained for the retail variable reflects the impact from retailing on housing prices (place attractiveness) that do not relate to the market size.

Population Density: In Roback (1982), population density is introduced to the empirical application as a form of amenity, the impact of which is found to be insignificant (on the wage levels once the amenities are held constant). In this paper, population density is treated as a control for market size, as well as used for the orthogonalization of the *Retail Access* variable. Looking at the number of people per square kilometer is much more accurate then accounting for the population as a whole, since the impact from population density on housing prices should be much higher than the alternative market size measures. In fact, in the analysis most of the variation in the housing prices is expected to be explained by the population density. This variable is not only a mere size control, but also relates to the scale advantages that are discussed under spatial externalities in the theoretical framework.

Mean Wages*:* Average wages in a municipality is one of the main components of the spatial equilibrium framework as discussed previously. This variable is also log transformed.

Leisure service concentration: Establishments providing leisure and recreation related services are summed and divided by the total number of establishments in a municipality in order to have a measure for the concentration of these services. The services that are included in this variable are hotels, restaurants, bars, movie theatres, arts, fair centers and amusement parks, libraries, museums, sports establishments, and beauty and wellness related services.

Municipal Tax*:* Municipal tax rates are expected to exhibit a negative effect on the place attractiveness based on 'voting with your feet' phenomena of Tibout (1956). In this type of framework, rational individuals are expected to leave places with less attractive local public goods and move to the places with more attractive local public goods. Higher tax levels should imply a relatively higher cost for what is provided locally and are expected to have a negative impact on place attractiveness.

Unemployment share: Share of the population that is unemployed is introduced to the analysis to control for the overall labor market conditions. In the Roback (1982) framework, the impact of unemployment on the wage levels is found to be consistently insignificant. Thus a similar result may also appear here for its impact on the housing prices.

Empirical strategy

The empirical design of this paper has its roots in the aforementioned spatial equilibrium framework. First, two maps are displayed showing a cluster analysis performed on the Swedish municipalities for *Housing Prices* and *Retail Access*. Theory suggests that housing prices should reflect the attractiveness of a place, and it is the product of amenities, wage levels and several other place specific characteristics. Cluster analysis is used to outline the spatial pattern for the variable of interest with respect to housing prices.

Later, the empirical design provides a regression analysis to determine the actual impact from Retail Access on place attractiveness. The variable of interest, *Retail Access*, is denoted by RA in the model below. The goal is to capture the actual impact from access to retailers (shops) on the place attractiveness. Place attractiveness is proxied by *Housing Prices*, denoted by HP in the model. Market scale is controlled by *Population Density*, denoted by PD. As part of the theoretical framework, average wage levels in a municipality *m,* in time *t* is controlled for, which is denoted by W in the model. $Z'_{m,t}$ is a vector of spatial characteristics for a given municipality $\boldsymbol{m}$ at a given year $\boldsymbol{t}$, which control for the concentration of leisure services, unemployment rate, and tax levels. The analysis is conducted with fixed effect estimation, in order to isolate place specific characteristics that are not time variant. Most of the natural, historical, and cultural amenities are endogenous to the municipalities in question and time invariant, the impact of which is then captured by the fixed-effect error term u_m. In this way, it is possible to capture the actual impact from retailing on place attractiveness without upward biased estimates.

$$\ln HP_{m,t} = \alpha + \gamma ln\, RA_{m,t} + \delta ln\, PD_{m,t} + \emptyset lnW_{m,t} + Z'_{m,t}\rho + u_m + \varepsilon_{m,t} \qquad (5)$$

Based on the aforementioned theoretical discussions, one may also argue that the amenity impact should be evident in the wage levels as well. However, the impact of amenities are much more capitalized into housing prices than they are into wage levels (Nilsson, 2013). Meaning any change in the set of amenities in space should be reflected in the housing prices faster and more obvious than in the wage levels.

4. Results: Does accessibility to shops explain place attractiveness?

4.1. Cluster analysis

The two maps we see below represents a Hot Spot Analysis for retail and amenity share in Swedish municipalities. The Hot Spot Analysis calculates the 'Getis-Ord Gi' statistic for each feature in a dataset (Getis & Ord, 1992). The resultant z-scores and p-values tell us where features with either high or low values cluster spatially. This tool works by looking at each feature within the context of neighboring features. A feature with a high value is interesting but may not be a statistically significant hot spot. To be a statistically significant hot spot, a feature should have a high value and should be surrounded by other features with high values as well. The local sum for a feature and its neighbors is compared proportionally to the sum of all features; when the local sum is very different from the expected local sum, and that difference is too large to be the result of random chance, a statistically significant z-score results.

The interpretation of the maps below is quite straightforward. The Gi* statistic returned for each feature in the dataset is a z-score. For statistically significant and positive z-scores, we see the more intense the clustering of high values (hot spot). Whereas for statistically significant negative z-scores, the more intense the clustering of low values (cold spot). The first map represents the spatial clusters for the *Housing Prices*, whereas the second represents *Retail Access* in Swedish municipalities.

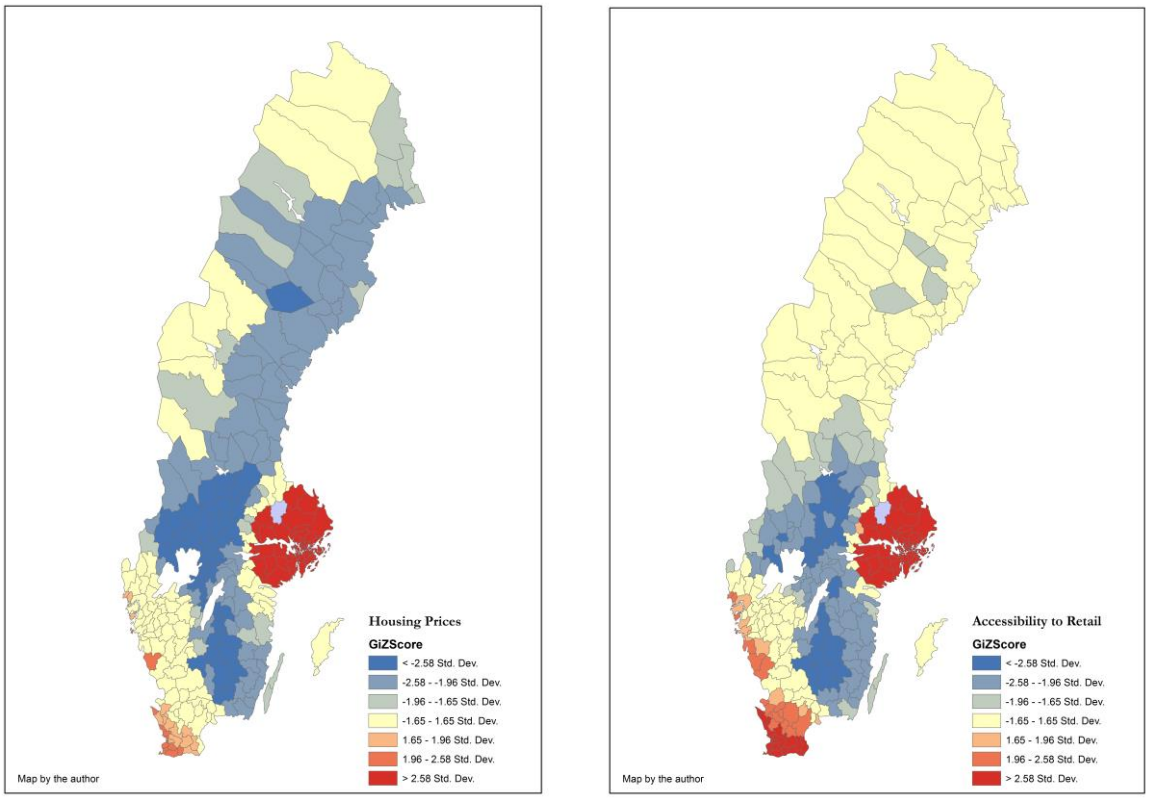


Figure 2: Cluster analysis for Housing Prices *(left)*, and for Retail Access *(right)* in Swedish municipalities.

When reading these maps, one thing we should bear in mind that they do not display the high vs. low values. But they rather display the clustering of high and low values with respect to the neighboring municipalities. Meaning even if a municipality has a relatively high value, if the surrounding municipalities do not, it won't show up as a hot spot (and the same logic holds for the cold spots).

We see that the two maps are exhibiting similar patterns in terms of where the hot spots are observed. What is interesting is that although the southern part of the country is larger in economic activities in absolute terms (as seen in Figure 2 previously), cluster analysis do not explicitly favor the south. In fact, the hot spots for housing prices are notable almost exclusively in the Stockholm region and somewhat around Malmö. Almost all the rest of the country appears to be either insignificant or underscored with respect to the national average.

The picture for retailing, on the other hand, is more vivid with respect to the hot spots. We see high values for retail access to appear around the three metropolitan markets Stockholm, Malmö and Gothenburg. The spillover of the high values appears to be much stronger than the previous map for housing prices. Nevertheless, similar to the housing prices, the southern part of the country doesn't exhibit a much clustering of high values for retail access. Instead, we see that the cold spots come out almost exclusively in this part of the country, where northern municipalities appear to correspond to the national average, with no statistically significant clustering.

4.2. Capturing the impact of retail access on place attractiveness

In order to capture the impact from retailing on place attractiveness, the appropriate estimation technique is using a within estimator, where the estimator will track the time dynamics rather than accounting for level effects. The use of this estimation in this framework is particularly useful to eliminate the impact of time invariant characteristics of municipalities. Examining the place attractiveness through housing prices is a very challenging task, given that one needs to control for every place specific asset in order to capture the actual impact from the variable of interest. Impact from *i.e.* a municipality having coastal border, being in the center of the region, being in a metropolitan region, having border to Norway, having one or more historical monuments, having a substantial amount of open space, or having a certain type of climate on the housing prices can then be captured with the municipality-specific time-invariant component of the composite error term *(as shown in the 'empirical strategy' above)*.

The maps for the cluster analysis flag the spatial dependencies among the municipalities that are hosted in the same region. Possible impacts of these spatial dependencies are mitigated in the analysis by clustering the standard errors across regions (previously described local labor markets), and the way retail access variable is constructed also accounts for the spatial continuum in regions.

The results from the fixed effects estimation are shown below in Table-1. The R^2 value for the regression is unusually high, where it is almost 0.88. However, most of the variation in the model is explained by the *Population Density* (around 0.7 percent), which makes the rest of the variation be explained by the set of variables introduced to the model reasonable. The results obtained for the *Retail Access, Population Density* and *Average Wage* are elasticities. As explained previously, *Retail Access* variable is orthogonalized against the *Population Density*, meaning the result for this variable indicates an amenity-premium for having higher access to shops with respect to size of a municipality. Descriptive statistics and pair-wise correlations can be found in the appendix.

Also, scatter plots displaying the relationship between average housing prices and mean wages in Swedish municipalities are provided in the appendix for the year 2002 and 2008 (as they are the two main components of spatial equilibrium framework). We do not observe any extraordinary changes in the way municipalities are aligned during the period investigated by the analysis.

Table 1: Capturing the impact of retail accessibility on place attractiveness

	Housing Prices
Retail Access	0.116***
	[0.0431]
Population Density	1.860***
	[0.437]
Mean Wages	0.171**
	[0.0811]
Leisure Concentration	0.0871
	[0.235]
Unemployment (share)	-0.395
	[1.138]
Tax	-0.0185*
	[0.00984]
Constant	-0.995
	[2.340]
Year dummies	Yes
Observations	2.029
R-squared	0.878
Number of Municipality	290

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Log transformed variables: Housing Prices, Population Density, Mean Wages, and Retail Access // All VIF values are below 3

The regression has local labor market clustered standard errors to control for spatial dependencies across municipalities that are located in the same region. The impact of variables like *Mean Wage* and *Tax* levels was previously significant at the one percent confidence level whereas their significance declined down to 10 percent once the standard errors are clustered across the local labor markets. This implies that the spatial dependence is mostly relevant for the wage and tax levels of the municipalities sharing the same local labor market whereas no change in the significance of *Population Density* and *Retail Access* is observed.

According to the results, doubling the *Retail Access* in a municipality is associated with a 12 percent increase in the housing prices. It means that, even when we leave the linear relationship between the retail sector and market size out, we see a high and significant impact on place attractiveness that is the product of higher access to a higher number of stores in a municipality. The elasticity for *Population Density* exceeds 100 percent, this means that doubling the density in a municipality is associated with an over-proportionate increase in the housing prices. *Mean Wage* has a positive and significant impact on housing prices. The result for this variable implies that holding the size and the accessibility to stores constant, doubling the average wages in a municipality is associated with an approximately 17 percent increase in the attractiveness of the place, which is reflected in the housing prices.

Leisure service concentration doesn't have a significant impact on the housing prices. Once again, this variable is a share variable and it controls for over-representation of these services in a municipality. If the variable were a scale variable, the results may possibly have been different. However the impact of these services on place attractiveness is not within the scope of the present study. We find the impact from *Unemployment share* to be insignificant as well. For a similar result, Roback (1982) argues that: *"…either the risk premium for living in a high unemployment area is small or that a high unemployment rate is a proxy for weak labor demand."* (Roback, 1982, p.1269).

Higher tax levels in a municipality is associated with an approximately 0.02 decrease in housing prices. This result is also in line with the theoretical framework, which suggests people are averse to reside in places where the relative cost of public services is higher. High tax levels appear to be negative amenities for places in question according to our result.

5. Concluding remarks

Amenities, in broad strokes, constitute place-specific assets that are known to contribute to a city's or region's attractiveness. Their importance for regional growth and development is emphasized in detail by a big body of literature (Rosen, 1979; Roback, 1982; Ullman, 1954; Brueckner et al, 1999; Glaeser et al., 2001; Clark et al, 2002; Clark; 2003b). Places with attractive assets are found to attract high-skilled individuals (Brueckner et al., 1999; Florida et al. 2008). Concentration of amenities, arts and culture are

found to matter for growth of population and development not only in central markets but also at peripheral locations (Partridge et al., 2008; Mellander et al., 2011).

This paper specifically investigates the importance of retailing for place attractiveness. The main question tackled in the paper is whether the presence of retailers can be considered to be an amenity. Following a spatial equilibrium framework, an empirical investigation is carried out to capture the actual impact from accessibility to stores on the housing prices in Swedish municipalities. The analysis do not only account for the absolute number of stores, but also for accessibility to these stores. By using distance decay parameters in the calculation of retail accessibility, the spatial continuum of the retail market is taken into account in the analysis. Results show the existence of a retail-premium for housing, implying the importance of stores for the attractiveness of the municipalities in question. Alongside with retail access, population density is found to have a very strong impact on housing prices. Unemployment share is not found to be relevant for place attractiveness, whereas the tax level in a municipality is associated with a small, yet negative impact.

This paper contributes to the existing literature on retail location, as well as importance of amenities for place attractiveness by showing that -even when we control for the size effect- we observe a retail-premium, and shops acts as amenities in space. The finding that a considerable portion of the variation in housing prices across cities is explained by retail access hints to us the multidimensional importance of the sector, and the paper argues that the function of the retail sector extends beyond a simple supply and demand relationship. The retail sector is heavily regulated in countries like Sweden. Many things, from store location to the opening hours, in a retail cluster goes through a planning process. Thus, this analysis is particularly relevant for decision makers, where the indirect effect of having a certain scale of a retail market is emphasized.

References

Alonso, W. (1964). Location and land use. Toward a general theory of land rent.*Location and land use. Toward a general theory of land rent.* Harvard University Press, Cambridge, MA.

Adair, A., McGreal, S., Smyth, A., Cooper, J., & Ryley, T. (2000). House prices and accessibility: The testing of relationships within the Belfast urban area.*Housing studies*, *15*(5), 699-716.

Andersson, Å. E. (1985). Creativity–The Future of Metropolitan Regions.*Prisma, Stockholm*.

Anderson, S. T., & West, S. E. (2006). Open space, residential property values, and spatial context. *Regional Science and Urban Economics*, *36*(6), 773-789.

Andersson, Å. E. and Andersson D.E. (2006). *The economics of experiences, the arts and entertainment*. Edward Elgar Publishing.

Andersson, M., Klaesson, J., & Larsson, J. P. (2013). The sources of the urban wage premium by worker skills: Spatial sorting or agglomeration economies?.*Papers in Regional Science*.

Andersson, D. E. (1997). *Hedonic prices and center accessibility: conceptual foundations and an empirical hedonic study of the market for condominium housing in Singapore* (Doctoral dissertation, KTH).

Andersson, D. E., Shyr, O. F., & Fu, J. (2010). Does high-speed rail accessibility influence residential property prices? Hedonic estimates from southern Taiwan. *Journal of Transport Geography*, *18*(1), 166-174.

Andersson, A. E., & Karlqvist, A. N. D. E. R. S. (1976). Population and capital in geographical space. The problem of general equilibrium allocation. *Computing equilibria: how and why*, 183-195.

Andersson, M., & Gråsjö, U. (2009). Spatial dependence and the representation of space in empirical models. *The annals of regional science*, *43*(1), 159-180.

Artle, R. (1959). Studies in the structure of the Stockholm economy, Business research Institute at the Stockholm School of Economics, Stockholm.

Beckmann, M. J. (1958). City hierarchies and the distribution of city size.*Economic Development and Cultural Change*, *6*(3), 243-248.

Brueckner, J. K., Thisse, J. F., & Zenou, Y. (1999). Why is central Paris rich and downtown Detroit poor?: An amenity-based theory. *European Economic Review*, *43*(1), 91-107.

Cheshire, P., & Sheppard, S. (1995). On the price of land and the value of amenities. *Economica*, 62(246), p.247-267.

Cho, S. H., Poudyal, N. C., & Roberts, R. K. (2008). Spatial analysis of the amenity value of green open space. *Ecological Economics*, *66*(2), 403-416.

Christaller, W. (1933). Die zentralen Orte in Suddeutschland. Translated by Carlisle W. Baskin, 1966, as Central Places in Southern Germany.

Ciccone, A., & Hall, R. E. (1996). *Productivity and the density of economic activity* (No. w4313). National Bureau of Economic Research.

Clark, T. N., Lloyd, R., Wong, K. K., & Jain, P. (2002). Amenities drive urban growth. *Journal of urban affairs*, *24*(5), 493-515.

Clark, T. N. (2003). The City as an Entertainment Machine (Research in Urban Policy)(v. 9).

Clark, T. N. (2003b). 3. Urban Amenities: Lakes, opera, and juice bars: Do they drive development?. *Research in Urban Policy*, *9*, 103-140.

Combes, P. P., Duranton, G., Gobillon, L., Puga, D., & Roux, S. (2012). The productivity advantages of large cities: Distinguishing agglomeration from firm selection. *Econometrica*, *80*(6), 2543-2594.

Dawson, J. (2006). Retail Trends in Europe. Retailing in the 21st Century M. Krafft and M. K. Mantrala. Heidelberg, Springer Berlin: 41-59.

Des Rosiers, F., Thériault, M., & Villeneuve, P. Y. (2000). Sorting out access and neighbourhood factors in hedonic price modelling. *Journal of Property Investment & Finance*, *18*(3), 291-315.

Dubin, R. A., & Sung, C. H. (1987). Spatial variation in the price of housing: rent gradients in non-monocentric cities. *Urban Studies*, *24*(3), 193-204.

Florida, R. (2001). Technology and tolerance: The importance of diversity to high-technology growth.

Florida, R. (2008). Who is your city. *How the creative economy is making where to live the most important decision of your life. A member of the perseus books group, New York*.

Getis, A., & Ord, J. K. (1992). The analysis of spatial association by use of distance statistics. *Geographical analysis*, *24*(3), 189-206.

Glaeser, E. L., & Mare, D. C. (1994). *Cities and skills* (No. w4728). National Bureau of Economic Research.

Glaeser, E. L., Kolko, J., & Saiz, A. (2001). Consumer city. *Journal of economic geography*, *1*(1), 27-50.

Glaeser, E. L., Gyourko, J., & Saks, R. (2005). *Why have housing prices gone up?* (No. w11129). National Bureau of Economic Research.

Glaeser, E. L. (2008). Cities, agglomeration, and spatial equilibrium. New York: *Oxford University Press*.

Gibbons, S., Mourato, S., & Resende, G. (2011). The amenity value of English nature: a hedonic price approach. *SERC discussion paper 74, Spatial Economics Research Center*.

Geoghegan, J., Wainger, L. A., & Bockstael, N. E. (1997). Spatial landscape indices in a hedonic framework: an ecological economics analysis using GIS.*Ecological economics*, *23*(3), 251-264.

Graves, P. E., & Linneman, P. D. (1979). Household migration: Theoretical and empirical results. *Journal of urban economics*, *6*(3), 383-404.

Helsley, R. W., & Strange, W. C. (1990). Matching and agglomeration economies in a system of cities. *Regional Science and Urban Economics*,*20*(2), 189-212.

Hoyt, W. H., & Rosenthal, S. S. (1997). Household location and Tiebout: do families sort according to preferences for locational amenities?. *Journal of Urban Economics*, *42*(2), 159-178.

Isard, W. (1956). Location and space-economy, MIT Press, Cambridge, MA.

Irwin, E. G. (2002). The effects of open space on residential property values.*Land economics*, *78*(4), 465-480.

Jane, J. (1961). The death and life of great American cities. *New York: Random House*.

Johansson, B., Klaesson, J., & Olsson, M. (2002). Time distances and labor market integration. *Papers in Regional Science*, *81*(3), 305-327.

Johansson, B., & Klaesson, J. (2011). Agglomeration dynamics of business services. *The annals of regional science*, *47*(2), 373-391.

Krafft, M., & Mantrala, M. K. (Eds.). (2010). *Retailing in the 21st century: current and future trends*. Springer.

Lucas, R. E. (2001). Externalities and cities. *Review of Economic Dynamics*,*4*(2), 245-274.

Lösch, A. (1940). Die räumliche Ordnung der Wirtschaft. Jena: G. Fischer. English translation (1954): The Economics of Location.

Lloyd, R., & Clark, T. N. (2001). The city as an entertainment machine. *Critical perspectives on urban redevelopment*, *6*(3), 357-78.

Mellander, C., Pettersson, L., & Öner, Ö. (2011). Culture city. *Journal of Town and City Management*, *2*(3), 246-262.

Nilsson, P. (2013). *Price Formation in Real Estate Markets* (Doctoral dissertation, Jönköping University).

Öner, Ö. & Larsson, J.P. (2013), Location and Co-lcoation in Retail – A Probabilistic Approach Using Geo-coded Data for Swedish Metropolitan Retail Markets, HUI Working Papers, No.80.

Partridge, M. D., Rickman, D. S., Ali, K., & Olfert, M. R. (2008). The geographic diversity of US nonmetropolitan growth dynamics: A geographically weighted regression approach. *Land Economics*, *84*(2), 241-266.

Puga, D. (2010). The Magnitude and Causes of Agglomeration Economies*.*Journal of Regional Science*, *50*(1), 203-219.

Rivera-Batiz, F. L. (1988). Increasing returns, monopolistic competition, and agglomeration economies in consumption and production. *Regional Science and Urban Economics*, *18*(1), 125-153.

Rosen, S. (1979). Wage-based indexes of urban quality of life. *Current issues in urban economics*, *3*.

Roback, J. (1982). Wages, rents, and the quality of life. *The Journal of Political Economy*, 1257-1278.

Söderberg, B., & Janssen, C. (2001). Estimating distance gradients for apartment properties. *Urban Studies*, *38*(1), 61-79.

Tiebout, C. M. (1956). A pure theory of local expenditures. *The journal of political economy*, *64*(5), 416-424.

Tyrväinen, L., & Miettinen, A. (2000). Property prices and urban forest amenities. *Journal of environmental economics and management*, *39*(2), 205-223.

Ullman, E. L. (1954). Amenities as a factor in regional growth. *Geographical Review*, *44*(1), 119-132.

von Thünen, J. H. (1966). The isolated state. Wartenberg, CM trans. Translation of: Der isolierte Staat (1826).

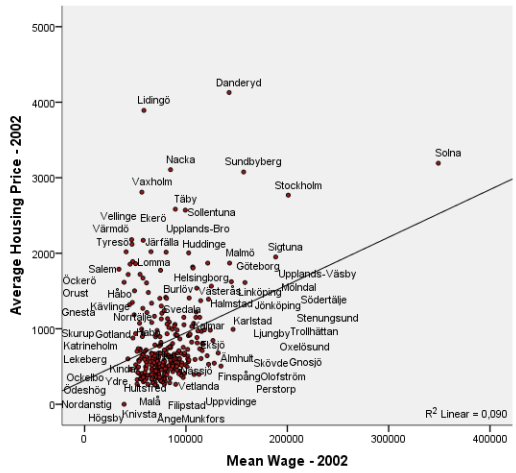
Weber, A. (1909). *Über den standort der industrien*. JCB Mohr, Tubingen; translated into English as Weber, A (1929) Alfred Weber's Theory of Location of Industries. University of Chicago Press, Chicago, Illinois.

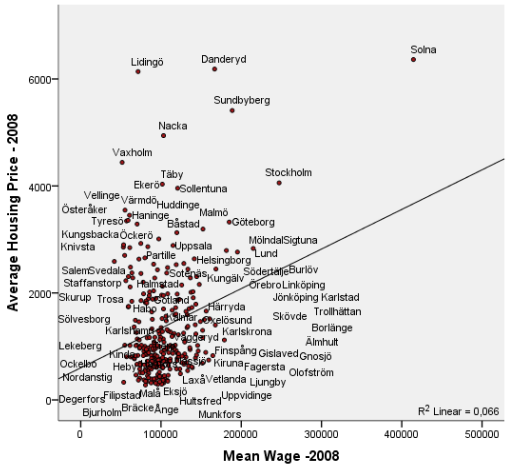
Ullman, E. L. (1954). Amenities as a factor in regional growth. *Geographical Review*, *44*(1), 119-132.

Appendix 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln_Housing	2029	6.77	0.65	5.37	8.78
Ln_Population Density	2030	3.33	1.62	-1.43	8.37
Ln_ Mean wage	2030	11.37	0.31	10.41	12.94
Ln_ Retail Accessibility	2030	4.98	1.17	1.76	7.95
Leisure service concentration	2030	0.05	0.02	0	0.11
Unemployment share	2029	0.02	0.007	0.005	0.05
Tax	2029	31.78	1.04	27.5	34.24

Appendix 2: Scatter plots





Appendix 3: Pair-wise Correlations

	Housing	Pop Density	Mean Wages	Retail Access	Leisure Con.	Unemp. share	Tax
Housing	1						
Pop Density	0.8211	1					
Mean Wages	0.1768	0.1981	1				
Retail Access	0.2373	-0.0003	-0.1654	1			
Leisure Con.	0.1024	0.0534	0.3220	-0.0718	1		
Unemp. share	-0.3039	-0.1983	0.0884	-0.1050	0.2195	1	
Tax	-0.4126	-0.4706	-0.0125	-0.0988	0.1079	0.1845	1