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Game of Retailers

The relationship between external shopping centers and downtown retailers in Swedish municipalities

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Abstract

This thesis investigates the relationship between access to external shopping centers and the scale of downtown retailing for Swedish municipalities. To do so we propose two competing scenarios for how such a relationship may be shaped. These scenarios are (i) that an external shopping center can attract the customers that otherwise would shop in the downtown district, or possibly (ii) that the availability of and access to external shopping centers can increase the attractiveness of a given local retail market overall. The question we pose is important to answer for retailers as well as for local policymakers, as it can influence their investment decisions. We use a measure of access to external shopping centers to account for the distance sensitivity, and the spatial continuum in the retailing industry. By using geo-coded data, we determine the total number of shops at the 5 and 1 kilometer distance from the central business district in Swedish municipalities. To establish the relationship between access to external shopping centers in a municipality and the scale of its retail market, we use cross-sectional data from 2013, and perform several OLS multiple regression analyses. We find a positive relationship between access to external shopping centers and the scale of the downtown retail district. The result holds for urban municipalities and for the accessibility measures on the regional and extra-regional level.

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1 Introduction

Shopping centers have evolved from the 15th century bazaars of the Middle East to the modern shopping centers in the 1950s. The phenomenon has spread around the world and is today a part of consumers' everyday shopping behavior (Eppli and Benjamin, 1994; Abaza, 2001; Manzo, 2005). In the second half of the 20th century households became smaller and more spread out. The developments in transportation infrastructure and rising level of car ownership started a process of decentralization and suburbanization (Boarnet, 1994). The more intense use of the car led to a decrease in the cost of transportation. This development enabled the rapid establishment of external shopping centers (Cohen, 1996). Initially shopping centers served as complements to downtown retailing, but over time shopping centers instead became an alternative to the traditional downtown retail area by offering attractive attributes valued by consumers. In downtown areas the distance to consumers is shorter and therefore travel costs are lower. Shopping centers have the potential to attract a larger number of consumers to the market area. The increase in demand following the larger number of consumers could spill over to the downtown retail district and thus be beneficial for the retailers both in the city center and in the periphery. However, it is also possible that consumers choose the external centers over the downtown area and in that way reduce downtown retailing activity. The increased competition could then lead to the decay of the city center with gentrification and empty stores as a consequence.

The tensions between shopping centers and downtown retailing is subject to an ongoing discussion in many developed countries and this thesis aims to shed light on this matter. We approach the relationship between out-of-town and downtown retailing by looking at accessibility to external shopping centers in the local municipal markets of Sweden. This way we can examine if such accessibility is positively or negatively related to the scale of the downtown retail district. Retailing as an economic activity is not confined to municipal or regional borders but occurs between municipalities and regions (Haynes & Fotheringham, 1984). With the technological development of transportation, travel has become cheaper and faster over long distances. Even with this development the retail industry is highly sensitive to distance (Huff, 1964; Brown, 1994). This is the reason why we use a measure of accessibility to external shopping centers to account for spatial continuity. It allows us to capture the supply of external shopping centers in a municipality where the relevance of all external retail centers are accounted for, not only those that are located within the municipal borders. Moreover, the importance of access to external shopping centers to the performance of the downtown retail cluster can be examined by looking at the number of shops at varying distances from the central business district (CBD). We follow such an approach because the number of stores in the city center is a good proxy for the retail agglomeration, benefits of which are further discussed in the thesis.

Traditionally, retail clusters emerge in the center of a city (Rogers, 1969; Lee, 1974; Okabe, Asami & Miki, 1985). The city center offers the highest market potential and is the most accessible location for both labor and customers (Brown, 1994). Proximity to the market is important for retailers as it is more likely a consumer will decide to make a trip if the destination is near. The external shopping center is located further from the market area, often requiring consumers to make longer trips. Although external shopping centers imply higher transportation and time costs, such costs may be offset by the attractive attributes of these external centers, such as free parking, entertainment facilities, a larger variety of shops, security and climate convenience due to the enclosed structure (Yadav & Siraj, 2014).

The aim of this thesis is to shed light on the discussion between external shopping centers and downtown retail performance. The question we ask is how accessibility to external shopping centers relates to the scale of downtown retailing. This question proposes two competing scenarios: (i) an external shopping center can attract the customers that otherwise would shop in the downtown district, imposing a competing destination to the retailers in close proximity, or possibly (ii) the availability of and access to external shopping centers can increase the attractiveness of a given local retail market overall, which would imply a higher demand for downtown retailing in that market. In the first scenario, the increased competition imply that external shopping centers are "stealing" the demand for downtown retailers. In the second scenario, the overall increase in demand in a particular local market would benefit both the external centers and the downtown district. To be able to determine which scenario best fits our results, we perform a number of regressions testing the relationship between access to external shopping centers and the scale of downtown retailing. We acknowledge that the place in regional hierarchy of a local market, and how urbanized the market is should play a significant role for the relationship we are examining. Therefore, we also look into how the relationship varies between urban and rural retail markets.

This matter has been examined and discussed by other researchers, however there are limited examples where spatial continuum is taken into account when looking at the relevance of external shopping centers in limited market boundaries. By having access to geo-coded data we have the possibility to distinguish between stores at different distances from the central business district (CBD). This data gives us a unique possibility to examine the effect of external shopping centers not only on all stores in the municipality but on the stores in the city center, avoiding the problem of double-counting. The accessibility measure used in the regression is based on travel distances within the municipal, regional or extra-regional area. Calculating access to shopping centers is a new use of the theoretical model of accessibility. Our results and analysis could also be beneficial for municipalities in their evaluation of the establishment of external shopping centers or in the decision to invest in such a project. Today many municipalities are focusing on revitalizing the downtown shopping districts to provide an alternative for consumers and to strengthen the competitiveness of downtown retail districts. With the results found in this thesis we can contribute to the discussion on the necessity of such investments.

The main findings of our thesis are that accessibility to external shopping centers positively relates to the scale of the downtown retail district. This result holds for the accessibility measures at the regional and extra-regional level provided that the municipality is classified as urban. Such findings indicates that external shopping centers are likely to increase the range of demand and attract consumers that can spill over to downtown retailing in urban retail markets, whereas such relationship is not present for their rural counterparts.

1.1 Disposition

The paper continues with the previous literature on the tensions between external shopping centers and the downtown district. Following that, a section on the historical background of shopping centers will be provided. Later the thesis offers the theoretical framework on which we base our analysis. In the empirical analysis we present our data and the methods used in developing our models. We present our findings in the analysis, and summarized results in the conclusion.

2 Previous Literature

Historically, shopping districts have served as a link to the downtown business district. Since World War 2, shopping has increasingly moved to external shopping centers (Peiser & Xiong, 2003). As the shopping center became increasingly popular in the second half of the 2000th century, authorities started to favor the external shopping centers in order to increase the attractiveness of suburban areas and cater their needs (Dawson, 1983). This led to an increase in the popularity and the number of external shopping centers over the world. Following this expansion, tensions arose between the external shopping centers and downtown retail districts. The downtown district blamed the external centers for "stealing" customers and reducing their profits. Several agents, from shop owners to the decision makers in local governments, have been involved in the discussion on the influence of external shopping centers on downtown retail districts (Jonassen 1953, 1955; Bearden, 1977; Bergström, 2000). In Sweden, local authorities are solely responsible for the planning of commercial centers in the municipality (Kärrholm and Nylund, 2011), as long as they obey the rules imposed by the Building Act[1]. Due to external shopping centers being perceived as a threat, planners have been hesitant to create new establishments, mostly because of the difficulty in predicting the effect of such new centers on the consumption patterns in a city (Bergström, 2000). During the 1990's the turnover from the external shopping centers more than doubled and increased the general opposition to shopping centers by politicians and downtown shopkeepers (Kärrholm and Nylund, 2011).

With the establishment of an external shopping center the local price index decreases, reducing the price of goods due to increased competition. The increased competition imposes a negative impact on demand per firm, leading to a crowding out effect. It also increases the consumer surplus due to lower price indices, indicating a cost of living effect. When the additional income generated by the new establishment is being spent locally, the presence of the competitor would increase the demand per firm, indicating a market size effect. The influence on downtown retailing with the establishment of an external center is ambiguous and depends on which one of these effects is stronger. In this paper we attempt to clarify which effect is stronger in external shopping centers' relationship to downtown retailing in Sweden (Forslid & Ottaviano, 2003). The well being of households in a city is positively related to the quantity of goods and the variation of these goods available in the economy. With the establishment of an external shopping center the number of retail stores and the variety of goods available increases, suggesting the population is better off than before (Johansson & Quigley, 2004). The attractiveness of external shopping centers may not serve only as a factor pulling consumers from the downtown retail district. External shopping centers can also attract consumers from surrounding regions, suggesting a spillover effect on the downtown retail district. The view that external shopping centers have a negative impact on downtown retail performance might therefore not be entirely true. Wrigley and Dolega (2011) found that downtown retailers could compete with and even outperform the external centers. The downtown districts can favor from having complementary services such as restaurants and having geographical advantages such as being located by the coastline.

Bearden (1977) examined the US market and found that the decline in popularity of downtown retail districts is largely due to residential areas relocating to the suburbs, increased traffic congestion and the establishment of suburban shopping centers. Some of the attributes determining store popularity are atmosphere, location, parking and the friendliness of

[1] In the Swedish Building Act, PBL, the conditions for the planning of land use, water use and construction are found. The purpose is, with regard to the freedom of the individual, to promote community development with equal and good social living conditions. There should be a long-term and sustainable habitat for the society today and future generations (Notisum, 2016).

salespersons. The externally located shopping centers are at an advantage as they have free parking and easy access. Downtown retailers cannot compete only with store attributes but are affected by the attributes of the downtown district (Bearden, 1977). Another study of the US market by Peiser and Xiong (2003) shows that downtown shopping districts have decreased in popularity due to a perception of high crime rates in downtown areas. In the US several factors can explain the decline of downtown shopping districts, such as traffic congestion, interstate highway development, industrial development and decentralization of employment and housing. These factors pull consumers to suburban malls, however there are also factors pushing consumers from the downtown shopping districts. Some of these push factors are crime, poor public schools and a growing concentration of minority groups in the downtown area. Recently the downtown retail district has reemerged as a cultural center with entertainment oriented shopping and residences (Peiser & Xiong, 2003; Maronick, 2007).

When performing a case study of an out-of-town shopping center in Västerås, Isaksson and Storbjörk (2012) showed the challenges in the form of environmental impact related to shopping center establishment. The project was meant to strengthen the position of Västerås as a regional center for trade and shopping, to generate more employment and to increase industrial competitiveness and growth. However, the establishment also caused significant negative environmental impact. The project destroyed a valuable recreational area, with ecological and cultural importance. The establishment of the shopping center is also expected to cause a 35-40 percent increase in traffic, leading to noise and air pollution. (Isaksson and Storbjörk, 2012).

3 Historical Background of Shopping Centers

The expansion of external shopping centers is a part of the structural change of the retail industry. It is an attempt by the industry to organize retail trade in a more cost efficient way by using better distribution methods and scale economies (Bergström, 2000; Dawson, 1983). External shopping centers have been established successfully in many local municipal markets which shows that they are also appreciated by consumers. The main reason for the enormous success is the wide range of products, competitive prices and the time saved by being able to make several purchases at the same time (Ghosh, 1986). In 2014 global shopping center development reached record levels, fueled by a growing middle class, retail expansion and urbanization of large cities (Patel and Hung, 2014). In the same year, retail sales globally, including in-store and internet purchases, is estimated by eMarketer to exceed $ 22 trillion and is expected to grow by 5.5 % over the next five years (eMarketer.com, 2014). China is the most active market in shopping center development followed by the BRIC countries and other emerging markets, while the shopping center development in the US and Western Europe is continuously at a low level (Patel and Hung, 2014).

While the popularity of external shopping centers is declining in Western Europe and the US, it is growing in importance in emerging markets such as China, India and Thailand. These countries are characterized by a growing middle class with larger purchasing power. Although consumer behavior varies from the task oriented individualistic consumer in China to the entertainment and leisure oriented consumer in Thailand and India, they have all seen a dramatic change in the retail sector during the last decade (Cai & Shannon, 2012). As a contrast to the expanding retail markets in Asia is the stagnating development in Western Europe and the US (Patel and Hung, 2014). The use of local development policies increased in the 1970s, with an expected decline in the number of shopping center establishments. As predicted the number of shopping center openings decreased and started the process of the revival of

downtown retail districts (Shoag & Veuger, 2014). For example in the US, “dead malls” have become a well-known feature in many cities. The empty structures, and parking lots creates a feeling of abandonment and bring down property values in their vicinity, leading to suburban decay (Griffith, 1999). An estimated 3,800 abandoned shopping centers can be found in the US, as previously thriving retail centers lost their consumers to newer and larger malls or internet commerce. Another factor that is causing a decline in the popularity of external shopping centers, is a new taste for urban living and main street shopping, people have grown tired of malls and wish to shop in real towns instead (Griffith, 1999). Dead malls can resurrect as centers for entertainment or as nightlife locations with restaurants, bars and nightclubs (Grossman, 1992). The suburbanization led to a population loss in the city center, reducing the attraction of investment in the downtown area. As a countermeasure to the popular shopping centers, the downtown retail district restructured their market to mimic the attributes of shopping centers. In the perspective of the local government, a prestigious image of the city is important as a promotion tool. Therefore, investments were made to centralize the structure of the city center since the revitalization of the downtown area creates a good image of the city (Dawson, 1983). A structured downtown retail cluster with longer opening hours and entertainment led to the increased popularity of the downtown retail district.

The root of shopping centers date back to the 15th century, a predecessor to the modern shopping center is the covered bazaar of Isfahan (Encyclopedia Britannica, 2015). The bazaar is the traditional open area in Iranian cities, an important section of the commercial activities, and a center for social, cultural and religious activities. Another example of an early shopping center is the Grand Bazaar in Istanbul, a metropolis said to be a merchant’s paradise (Echikson, 2007). The Grand Bazaar, established in 1461, is the heart of the city and like a city in itself, with around 4000 shops (Kummer, 1995). The bazaar is the oldest and largest shopping center in the world as well as an important historical site (Yildrim, 2014). Today city planners and other authorities are considering the bazaar more carefully, as an element of sustainable development planning. (Assari, Mahesh & Emtehani, 2011).

The retail environment in Sweden has followed the global trend and changed dramatically over the last decades. A change in shopping behavior has moved consumption from the downtown retail district to external shopping centers. The development of infrastructure and travel technology has enabled the distance from home to store to increase and external shopping centers to expand. This development started in the 1950s with rising standards of living, and escalated in the 1990s with increased consumption (Kärrholm and Nylund, 2011). In 1980 Sweden had 40 shopping centers accounting for 5 percent of retail revenue. The number of shopping centers is steadily increasing in Sweden with 358 shopping centers in 2014, accounting for 35 percent of total retail sales. (HUI, 2014). The Swedish development is in no way unique but follows an international trend with shopping centers growing larger and turning into entertainments sites (Jackson, 1996; Bergström, 2000). Retail is a highly important topic for research due to the scope of the industry. In Sweden the retail sector accounted for 11 percent of all employment in 2012 and attributed to an 11 percent share of GDP (Svensk Handel, 2014). It is the largest and most important employer for youth workers (16-24 years), accounting for 19 % of all youth employment in 2011 (Svensk Handel, 2014).

4 Theory

In the theory section we present the theoretical framework that serves as the foundation for our empirical study and analysis. The theory is based on existing research in the field of urban and regional economics. First, we look into the literature on agglomeration economies and how it relates to the retail sector. We then explore the classical location theory on central places that predicts the spatial distribution of economic activities, including retailing. The third theory deals with accessibility, which we use to measure access to external shopping centers.

4.1 Agglomeration Economies

Agglomeration economies arise with the clustering of economic activity and occur mainly due to economies of scale benefits. The sources of agglomeration dates back to Marshall and his work on agglomeration economies from 1890 (Duranton & Puga, 2004). This topic has more recently been examined by a large body of literature, where the reasons for agglomeration are commonly listed as matching, sharing and learning (Duranton & Puga, 2004). An industry will agglomerate if firms are located in areas that have natural cost advantages (Ellison & Glaeser, 1999). When considering scale economies, a distinction can be made between localization and urbanization economies. Localization economies exist when externalities are industry specific and urbanization economies focus on the importance of external scale economies between industries (Dicken & Lloyd, 1990). The need for interaction between economic agents and proximity to the market and other economic agents is what drives the agglomeration process. Externalities such as information spillovers and the presence of imperfect competition are also important for the co-location of firms. A retail district is more likely to form with the existence of product differentiation and sufficiently low transportation costs. Agglomeration is even more likely to occur when considering incomplete information about varieties and prices among consumers (Billings & Johnson, 2016). Without dispersing forces such as competition, pollution and crime, agglomeration would be even stronger. However, since both consumers and producers derive utility from the amount of space they occupy, the crowding of the center decreases utility and acts as a spreading force. This means that the activities that are most dependent on proximity, such as retailing, will locate in the center of a city (Fujita & Thisse, 2002). This is predicted in both von Thünens monocentric city model (1966) and Bid-Rent theory based on a study by Haig (1927).

The demand for retail activities is directly dependent on the spatial distribution of consumers. When firms make decisions they are affected by the choices of the consumers. In turn, the consumers' choice of location and consumption are dependent on the location of firms likewise. Consumers have a "love of variety" and since firms differentiate their products a buyer will travel to several locations to obtain many varieties (Fujita & Thisse, 2002). Consumers have limited information and therefore a retail cluster with more varieties enables consumers to minimize their search costs. The easy access to external shopping centers and free parking decresases transport costs for consumers (Nelson, 1970). If a firm chose to locate with other firms it will, through economies of scope, generate a demand externality for the consumers. However, this positive effect is contrasted by increased competition (Fujita & Thisse, 2002). Parr and Denike (1970) find that retailers selling similar goods choose to cluster due to the benefits from agglomeration. Besides agglomeration benefits there are also significant economic returns to the co-location of retail establishments in cities (Artle, 1959).

External shopping centers also enjoys the benefits of agglomeration but do not have the same proximity to the market as the downtown retail district does. Retail clusters that locate away from the center attempts to artificially recreate the agglomeration benefits that occur in a city.

While downtown retail clusters emerge naturally and evolve over time, external retail clusters are often established via planning. The tension that occurs between the naturally emerged centers and the planned external centers is at the heart of this thesis. The external location reduces the cost of land but increases transport costs for consumers as the distance is larger from the market. External centers can, like downtown retail districts create a demand externality by locating together (Brown, 1994). However, the centers can utilize more space and provide a larger variety of goods compared to downtown retailers, adopting the characteristics of naturally emerged retail clusters. Golledge, Rushton and Clark (1966) found that 35 percent of consumers travel further than the distance to their closest shopping center for the purchase of goods, but travel to a variety of locations depending on the good or service they are looking for. Moreover, Hanson (1980) found a low number of single purpose shopping trips for travels to and from work when examining the case of Uppsala in Sweden. Similar types of retail stores tend to cluster together (Klaesson & Öner, 2014) and their survival can be explained in part by the existence of multipurpose shopping (Ghosh, 1986). Consumers prefer multipurpose shopping over single purpose shopping as it reduces time cost and travel cost. Agglomeration is beneficial for both high-order and low-order stores, by clustering with high-order stores, low-order retailers have a large monetary benefit as it reaches consumers outside its proximal market area (Ghosh, 1986).

The principle of minimum differentiation is one of the first approaches to retail agglomeration presented by Hotelling (1929). Hotelling argues that stores selling similar products or services tend to cluster in the center of a marketplace to benefit from the scale of the market. Several researchers (Hinloopen & Marrewijk, 1999; Economides, 1984) reject the result from Hotelling's location game. Chamberlin's work on monopolistic competition suggest that with product differentiation comes the concept of variety and all retail shops could not locate at the same place (Chamberlin, 1937). In his study Chamberlin wanted to reaffirm the nature of monopolistic competition as opposed to imperfect competition. Arguing that most economic situations are comprised by both competition and monopoly, and by neglecting any of the two forces a false view is presented (Chamberlin, 1937).

4.2 Central Place Theory

The Central Place theory originates from Christaller (1966) and Lösch (1954). It provides an understanding for the movement of consumers in a city. The theory explains the uneven distribution of economic activity across space. A "central place" is identified as having a high level of interaction between sellers and buyers, this is why retail activities are located in the center of a market (Öner, 2014). It is useful for real world examples, where not all cities are monocentric, even though a homogenous plane is assumed the theory provides an understanding for how retailers locate (Christaller, 1966; Lösch, 1954).

Locations exhibit different levels of centrality. A central place has many varieties of goods and services and a less central place has fewer varieties. Large centers provide both low-order goods, purchased more often, and high-order goods, purchased less frequently. Less central places tend to only provide low-order goods. Central place theory ranks cities by size in a hierarchical system, with the most central places ranked higher up, followed by smaller and more peripheral places. Central places do not emerge as often, and are more spread out geographically than less central places. Cities are connected in the hierarchal system suggesting that larger cities are connected to smaller cities and therefore influence their growth (Dicken and Lloyd, 1990). In a study by Berry and Garrison (1958) the frequency of occurrence of city size in an area is found to be similar across areas. They developed the concept of the hierarchal system further and found that retail markets also can be included in the systems. Small clusters of retail stores are located

in the city center and at larger distances from the CBD stores cluster in shopping centers, with larger clusters located in the periphery (Öner, 2014).

In central place theory producers end up in a spatial equilibrium with hexagonal markets where each producer is limited by the market area of its competitors. Christaller is the first who refers this to this as the "real range" (Klaesson & Öner, 2014). It explains at which distance consumers are not willing to spend more time or money and thus, demand is zero (Dicken and Lloyd, 1990). A similar but more useful concept may be the "threshold range" which is a smaller area than the real range and explains the minimum range of demand that a producer needs to be able to supply goods with normal profits (Parr & Denike, 1970). This range is determined by the cost for consumers, when choosing what center to patronize when purchasing a specific good, consumers evaluate the price of the good together with transport cost. If the cost is too high the consumer will choose to purchase the good in a shopping center at a closer distance (Parr and Denike, 1970). Huff (1964) gives support to the idea that demand decreases with distance, due to higher transport costs, and therefore results in a higher total price. The share of consumers choosing a specific retailer depends on the breadth and depth of the goods and services offered, and the distance a consumer is willing to travel depends on the good or service that is to be purchased (Huff, 1964).

A high-order good is usually expensive and only purchased occasionally whereas a low-order good is less expensive and bought more frequently. The distance a consumer is willing to travel in order to obtain a certain good should be greater for high-order goods suggesting that high-order goods are less sensitive to distance than low-order goods. This relates to multipurpose shopping where a consumer travels further for a high-order good and will then be able to purchase low-order goods at the same location. A shopping center can benefit from this since the location outside the city allows for large complexes of high-order goods as well as low-order goods. This is good for the retailers because consumers are willing to travel further for the high-order goods and since they engage in multipurpose shopping the low-order goods have a higher accessibility to the market and a wider range of potential demand (Ghosh, 1986). This would suggest that shopping centers have a potential to steal demand from the downtown area.

The spatial organization of retail can also be explained by the Retail Gravitation Model. In 1929 William Reilly developed what would be known as Reilly's Law of Retail Gravitation (Öner, 2014):

> *"Two cities draw trade from any intermediate town (or city) approximately in direct proportion to the populations of the two cities and in inverse proportion to the square of the distance from these two cities to the intermediate town" (**Reilly, 1931, pg.9**).*

Spatial interaction as reflected by the model of retail gravitation is assumed to be a function of two variables, attraction or mass and distance (Huff & Jenks, 1968). There are several forces influencing the number of people who travel between a given origin and a given destination, such as gravity, pulling people towards a destination and friction of distance, acting against further travel (Mayo, Jarvis & Xander, 1988). Huff (1964) developed a popular modification of Reilly's Law and used the model to estimate the size and shape of trading areas. Huff also introduced multiple retail markets by focusing on consumers rather than firms. Following the idea that consumers choose among retail markets based on two attributes of a center, size as a positive aspect and travel time as a negative aspect (Huff, 1964). Kivell and Shaw (1980) found that spatial interaction models such as the retail gravitation model would not be able to provide a complete framework for the prediction of retail location. However, gravity theory cannot be dismissed completely as it could have valuable use as a sub-model in central place studies (Kivell & Shaw, 1980). By using a production-constrained gravity model, Fotheringham (1982)

showed that if there exists competition between destinations, or if agglomeration effects are present, the gravity model will be misspecified. The bias in the parameters estimated resulting from such misspecification could produce "spatial structure bias" in estimated distance-decay parameters. The severity of the bias varies with variations in spatial structure, and in particularly being dependent on the pattern of accessibility existing in a spatial system (Fotheringham, 1983).

4.3 Access to external shopping centers

> *"Everything is related to everything else, but near things are more related than distant things." (Tobler, 1970, pg.236).*

Tobler's famous first law of geography explains how distance is an important factor for explaining how economic activity in space relates to one another. A way to measure this is by using accessibility to take into account the time-distance between different locations. Weibull (1980) suggests that accessibility is related to the concepts of nearness, proximity, ease of spatial interaction, potential of opportunities for interaction, and potentiality of contacts with activities or suppliers. He also claims that accessibility is related to the choice of spatial interaction. Each different opportunity, in our case access to retail centers, require consideration of the particular attributes that is associated with retailing. The emergence of the car and development of transportation infrastructure made the existence of external shopping centers possible. The decrease in transportation costs was both the physical cost of money but also a decrease in the time spent travelling. We will measure time-distance cost to take regional distance into account (Ejermo & Gråsjö, 2014). The accessibility to external shopping centers decays with distance, and we write this as a function as defined by Johansson and Klaesson (2001):

$$f(c_{ij}) = \exp\{-\lambda t_{ij}\} \qquad (1)$$

Where t_{ij} represents the time distance between two municipalities and λ is a time sensitivity parameter which shows that access to external shopping centers decays as time distance increases. The accessibility is measured as a combination of the time distance factor and the willingness to travel. The probability that a consumer will make a trip is greater at smaller distances. This is a negative exponential function which is more commonly used today compared to the traditional reciprocal function (Ingram, 1971).

We measure municipal, regional and extra-regional accessibility to shopping centers for the municipalities in Sweden separately, following Johansson et al. (2002). By using this division, we are able to seize potential dependencies between different locations (Karlsson & Gråsjö, 2013). Municipal access is the accessibility within municipality i, regional access is the accessibility from surrounding municipalities excluding municipality i and extra-regional access measures the accessibility from all of Sweden excluding the two previous measures. S_j is the opportunity in each municipality, here being the external shopping center.

Municipal access to external shopping centers $$Acc_i^M = S_j exp\{-\lambda t_{ii}\} \qquad (2)$$

Regional access to external shopping centers $$Acc_i^R = \sum_{j=1}^{n} S_j exp\{-\lambda t_{ij}\} \qquad (3)$$

Extra-regional access to external shopping centers $$Acc_i^E = \sum_{j=1}^{n} S_j exp\{-\lambda t_{ij}\} \qquad (4)$$

Equation 3 sums all j's belonging to the same region as municipality *i*. In equation 4 all j's are summed for all municipalities excluding the ones belonging to the region *i*. These three accessibility measures is the foundation for the regression analysis. We use them to account for the importance of spatial continuum which relates to the location of an event in a space-time dimension. As our accessibility measures take travel time in a municipal, regional and extra-regional area into account, we have a good determinant of accessibility to a specific location across all Swedish municipalities. By measuring the accessibility to external shopping centers across space we have a measure of access to all external shopping centers in each municipality. Distance works as a hindrance to consumption, the importance of distance decay of demand depends on the good to be consumed (Klaesson & Öner, 2014). This would imply that external centers outside of the municipal border are still relevant for consumers within the municipality, as they choose to travel a further distance for some types of goods.

5 Empirical Analysis

We test the relationship between the access to all external shopping centers for each municipality and the scale of retail in the municipal market. Several multiple regression analyses are performed using data for Swedish Municipalities in 2013. The regressions are used to determine how much of the variance in the dependent variable that can be described by the explanatory variables. The relative contribution of each explanatory variable is analyzed as well as the significance of the hypothesized scenarios. Such analysis allows for an examination of the overall patterns of the relationship between out-of-town and downtown retail clusters. We aggregate geo-coded data for the number of stores as well as independent stores, stores not part of a chain, within a 5 and 1 kilometer distance from the city center. This gives us the possibility to examine the relationship between access to external shopping centers and the scale of downtown retail on different distances from the CBD. The CBD is defined as a 250 by 250 square meter grid that accommodates the highest number of unique economic activities in a municipality. By doing this we do not only reduce the problem of double counting but it also enables us to see the influence of external shopping centers on downtown retail, at both the very core of the center as well as at a larger distance. In our analysis we want to examine the variation between urban and rural municipalities. It has been found that early development of external shopping centers is to a large extent concentrated to larger cities (Dawson, 1983). We therefore expect a large number of external shopping centers to be located in urban municipalities, and by splitting the dataset into urban and rural municipalities we can perform two regressions and analyze the results separately.

5.1 Data

In the empirical section of this study, multiple-source secondary data is used. Two datasets are combined to run the multiple regression analyses. The main datasets used in the empirical application are rAps and the Swedish Shopping Center Directory. rAps is a regional planning tool, to be used for single- and multiple regional analysis, with data provided by SCB (Statistics Sweden) and the Swedish Agency for Economics and Regional Growth (Tillväxtverket). The rAps system consists of statistics and models for analysis and prognoses in the short- and long-term. It is a two-part system, with one part being the regional information system (rAps- RIS) and the second a model system. The statistic information in rAps is regionally distributed statistics over the labor market, the population, commercial- and industrial life, regional economics as well as complete tables for municipalities, counties and FA-regions. rAps is used by various regional actors, such as regional associations, municipalities, governmental agencies and Swedish universities. The system perspective on a regional level combined with the level of detail in the statistics makes the prognosis tool a valuable instrument for regional analysis. We

will use these tools mainly to find statistic data that enable us to make a cross-regional analysis; this data will then be used as variables in the regression (SCB, 2015).

The Swedish Shopping Center Directory (SSCD) is used to derive definitions of different types of shopping centers and to find data, specific for Swedish shopping centers. The data is used as variables in the regression to find what relationship external shopping centers have with the scale of downtown retail. The Swedish Shopping Center Directory is a unique database with information on Swedish shopping centers and retail areas. It contains information on turnover, square meter area, number of visitors, tenants, etc. The database holds information on more than 350 Swedish shopping centers and retail parks that have a square meter area of 5000 and above. The database is operated by Datscha AB, a supplier of services for information and analysis of commercial real estate, and is updated by HUI Research and the Nordic Council of Shopping Centers (NCSC) an organization representing the shopping center industry in the Nordic market. The Swedish Shopping Center Directory was launched in 2013 by "Centrumutveckling", and was acquired by Datscha AB in 2014, merging SSCD and "Centrumfakta" making SSCD the only shopping center database in Sweden (Datscha, 2016). In table 1 the variables used in the regressions are presented under the data source from which they are collected.

Table 1: Data Sources and Variables Collected

Statistics Sweden	**Raps**	**Swedish Shopping Centre Directory**
Number of stores in city center at a 5 and 1 km radius	Number of restaurants	Number of Shopping Centers
Number of independent stores in city center at a 5 and 1 km radius.	Population	Total Tenants in shopping centers
	Population density	
Central dummy		
Coastal dummy		

5.2 Empirical Strategy

With the data described above, we start by analyzing the correlations to identify the degree of linear relationship between the variables employed in the analysis. Once the degree of linear association is established we perform several multiple regression analyses. This way we can examine the dependence of one variable on more than one explanatory variable. The multiple regression tells how much of the variance in the dependent variable can be explained by the independent variables. By looking at the multiple regression we can observe the significant relationship and the relative contribution of each variable. For explanation of the regression the ordinary least squares method will be used, because of its attractive statistical properties. Ordinary least squares (OLS) is a method for estimating the unknown parameters in a linear regression model, with the goal of minimizing the differences between the observed responses in a dataset and the responses predicted by the linear approximation of the data. The smaller the differences, the better the model fits the data.

An issue we may encounter in our regression is omitted-variable bias, such a wage sum measuring the purchasing power of the population in a municipality, this occurs when a model is created in which it incorrectly leaves out one or more relevant independent variable. The

model then compensates for the missing variable by overestimating or underestimating the effect of one of the other variables. For omitted variable bias to exist in a linear regression, the omitted variable must be correlated with the dependent variable and one or more of the independent variables specified in the regression. One major assumption of OLS regression is that the values are uncorrelated with the error terms. When omitted variable bias is present, this assumption is violated and causes the OLS estimator to be biased. The omitted variable bias is the most common example of endogeneity. Endogeneity occurs when an independent variable is correlated with the error term, this can arise through measurement error or omitted variables. The most important source of endogeneity is reverse causality. Reverse causality is when the direction of a cause-and-effect relationship is looped.

In this paper we use cross-sectional data, with several variables collected at the same point in time. Cross-sectional data can suffer from heterogeneity, when the individuality of each variable is comprised in the disturbance term μ. This could lead to the error term being correlated with some of the regressors included in the model, and the estimated coefficients being biased and inconsistent. A way to counteract this is to use a fixed effect model. However, we cannot do this in our analysis since the nature of our shopping center data does not allow for a panel dataset. Cross-sectional data only provides us with a snapshot in time, and the results may have been different with another time-frame. With this type of data, it is also difficult to establish a cause and effect relationship. Being aware of these limitations we chose to perform a cross-sectional analysis, which dictates that we cannot make any causal claims for the relationship between our dependent and independent variables. We implicitly assume that the external centers affect the downtown district, to be able to perform the regressions, however we reserve the possibility of a reversed relationship. Still we believe that observing a pattern between them is of importance for understanding the dynamics between external and downtown retail clusters. Instead we will investigate the relationship between accessibility to external shopping centers and downtown retail districts in broad terms.

5.3 Variables

Number of shops: In the model created we have three dependent variables, the number of stores in the center of a municipality at a 5 and 1 kilometer distance from the CBD. The central business district is defined as a 250 by 250 square meter grid that accommodates the highest number of unique economic activities in a municipality. At the same distances from the CBD we have the number of independent stores, which are the retailers that do not belong to a chain. Independent stores are more likely to be found in the city center since the cost structure there may be favorable to the one in the external centers. In external shopping centers anchor stores often pay a reduced rent which drives out the independent stores (Shoag & Veuger, 2014). The independent stores will serve as a measure of diversity and enable us to better see the importance of urban characteristics and agglomeration. When running the different regressions, the result tells us if the relation between access to external shopping centers and the scale of downtown retail varies across the distances. The number of stores at each distance is computed from geo-coded data for stores in the city center. This data is not directly available to us but rather we are provided with the number of stores at varying distances in aggregates. The distances are measured from the city center and widens until all stores at a 5 kilometer distance from the center are counted. This avoids the problem of double counting the stores used in the regression. Without geo-coded data we do not have the ability to distinguish the stores in external shopping centers from stores in the city center. The categories of retail stores included in the geo-coded data are food, clothing, household and specialized stores. This spatial distinction helps us examine if accessibility to external shopping centers has a different interaction with the number of stores in the central business district at different distances. We use the scale of the downtown district as a measure for performance of downtown retailing.

When controlling for size, a municipality with a larger number of stores in the city center is assumed more successful. Due to the benefits of agglomeration we assume that a large number of stores in the city center is a good measure of municipal retail performance.

Access to external shopping centers: The main explanatory variables used in the regression are the three accessibility measures on municipal, regional and extra-regional level. These measures are calculated for access to external shopping centers and for the number of tenants in the external shopping centers. The accessibility measure is preferred for measuring relationships in retailing as we can take distance sensitivity into account. The definition of shopping centers used in this paper is all shopping centers with a rental square meter area of more than 5000 and a minimum cluster of five stores. Therefore, many superstores are excluded from the sample. In our measure of external shopping centers, we include outlet centers, regional malls, super-regional malls, retail parks and regional retail parks. In Sweden 47 out of 290 municipalities has at least one of these shopping centers within its borders. These shopping centers are by definition located outside of the city center and therefore we chose to aggregate them into a single accessibility measure for external shopping centers. The definitions are derived from the Swedish Shopping Center Directory and a closer description can be found in appendix 1. By using accessibility on the municipal, regional and extra-regional level we can distinguish between different types of demand and consumer behavior.

The distinction between the different accessibility measures on the municipal, regional and extra-regional level is determined by travel distance within the area. Within a municipality the time distances vary in the range between 8 to 15 minutes. In a region the average time distance is in the range of 20 to 50 minutes. The time distance in extra-regional regions are on average longer than 60 minutes (Johansson, et al., 2002).

The accessibility on the municipal and regional level contained a number of observations with zero values. To be able to perform the log transformation of the variable we added 1 to the cases with the value zero in order to obtain a zero in the logged variable and avoid losing any observations. We controlled for this data modification by adding a dummy for municipal and regional accessibility where the variable obtained a value of 1 if we added a 1 and 0 if we did not make any modification.

Population Density: To see if the characteristics of the municipality have any influence on the relationship between access to external shopping center and the scale of downtown retailing, we performed two different regressions to account for the size and characteristics of the municipality. Following the idea of Christaller (1966) of a hierarchical system of cities, based on the assumption that larger cities can support a wider range of activities. In the hierarchal system cities are ranked by size, with the most central places ranked higher up, followed by smaller and more peripheral places (Dicken and Lloyd, 1990). Therefore, we chose to first include population density to control for the size and capture the characteristics of the municipality. A denser populated municipality suggests that the municipality is large and have a high level of economic interactions between sellers and buyers.

Population: Another way to control for size and municipal characteristics is to us a population variable and to split the regression between urban and rural municipalities. We use the log transformation of population in a municipality to account for the size. Naturally a large municipality will have more shops in the center compared to a smaller municipality. It is therefore important to include population as a measure of size so the results do not become skewed.

Urban and Rural: To distinguish between urban and rural municipalities we split the regression. With this model we split our dataset in the two different categories and run the regressions separately. We classify urban municipalities as big-city areas and city areas and rural municipalities are defined as hinterland and scarcely populated hinterland. The definitions of the categorizations can be found in table 2 (Jordbruksverket, 2015). An urban municipality is larger and has more diversity than its rural counterpart. The reasoning of the central place theory suggests that larger cities with urban characteristics such as diversity are able to support a wider range of economic activity. Moreover, Dawson (1983) concluded from his study that early development of external shopping centers is more likely to be concentrated to urban municipalities. With the division of urban and rural municipalities being founded in theory we believe it enables the determination of the importance of municipal characteristics to the relationship between our dependent and independent variables.

Table 2: Municipality Classifications

Urban Municipalities		**Rural Municipalities**	
Big-city areas	**City areas**	**Hinterland**	**Scarcely populated hinterland**
Population more than 100 000 and at a maximum distance of 60 km to Stockholm, Gothenburg or Malmö.	Municipalities with a minimum of 30 000 inhabitants, where the largest city has at least 25 000 inhabitants.	Municipalities not included in the big-city or city area classification.	Municipalities not included in the three former classifications
Or cities with more than 70 000 inhabitants excluding the above at a 30 km distance from Stockholm, Gothenburg or Malmö.	Smaller neighboring municipalities can also be categorized as a city area if commuters to the larger municipality are more than 50 percent of the night population.	With a population density of minimum five inhabitants per square kilometer.	With a population density of less than five inhabitants per square kilometer.
Or cities with 10 000 to 69 999 inhabitants at a 20 km distance from Stockholm, Gothenburg or Malmö.			
47 big city areas municipalities in Sweden	46 city area municipalities in Sweden	164 hinterland municipalities in Sweden	33 scarcely populated hinterland municipalities in Sweden

Control variables: To further test our model we add a number of other control variables to see how our results change, the variables can be found in table 1 and the regressions containing them in Appendix 4. We add *a coastal dummy* to be able to capture the geographical differences in the municipalities located at the coast. In another regression we add *a central dummy,* the central dummy will be used to see if being the central municipality in the region influences the results.

A coastal dummy will control for the higher accessibility along coasts, municipalities located close to water often become summer destinations for tourists. This seasonal increase in consumers could explain a higher economic in coastal municipalities than in their inland equivalents.

A central dummy will be used to explain if there is any difference between municipalities that are the center of its LA region. Sweden has 81 LA regions and thus 81 municipalities of the 290 are centers of their region, these municipalities could be expected to be larger than others in the region and therefore have larger economic activity.

5.4 Models

In the process of structuring the models and choosing which variables to include in the regression analysis we have created and analyzed both descriptive tables and correlation tables. Included in the tables below are the variables we chose to use in the regression analysis, extended versions of them can be found in appendix 4.

Descriptive Statistics Analysis

Table 3: Descriptive statistics for the base model

Variable	Observations	Mean	Std.	Min	Max
Retail stores 5 km	290	92.131	223.342	1	2888
Retail stores 1 km	290	78.714	179.227	1	2285
Municipal access to shopping centers *(log transformed)*	290	.108	.326	-.315	1.833
Regional access to shopping centers *(log transformed)*	290	.0148	1.017	-2.937	2.610
Extra-regional access to shopping centers *(log transformed)*	290	-1.646	1.355	-10.820	.509
Population *(log transformed)*	290	9.829	.959	7.798	13.708

Table 3 shows the descriptive statistics for the variables included in our regression. This table provides an overview of the minimum and maximum values, the mean values as well as the standard deviations. The number of observations are satisfactory for performing a regression analysis. The year used to gather data is 2013, which is the latest year in which data is available. We are also interested in the possible difference between urban and rural municipalities and will perform two separate regressions based on a sample with the 93 urban municipalities and 197 rural municipalities in Sweden.

Correlation Analysis

Table 4: Correlation matrix for base model

	Retail stores 5 km	Retail stores 1 km	Municipal access to shopping centers	Regional access to shopping centers	Extra-regional access to shopping centers	Population
Retail stores 5 km	1					
Retail stores 1 km	0.952*	1				
Municipal access to shopping centers	0.262*	0.223*	1			
Regional access to shopping centers	0.223*	0.162*	0.186*	1		
Extra-regional access to shopping centers	0.207*	0.197*	0.002	0.0860	1	
Population	0.407*	0.372*	0.587*	0.369*	0.195*	1

Remark: All variables in the correlation matrix are log transformed

The correlation analysis of the dependent and independent variables used in the regression analysis is presented in table 4. The accessibility measures correlates significantly at the 5% level with both the dependent variables. Population correlates strongly with the all variables and we can expect it to affect the results of the regressions. Even though it displays this correlation we need to control for size of the municipalities and we keep this in mind in the analysis. The dependent variables, the number of retail stores at different distances from the city center also exhibit a strong correlation (0.952) with each other. The result is not strange since the number of stores in a city center at different distances describes the same thing. The store count at the 5 km distance includes the stores at 1 km. A full correlation table with all variables is presented in appendix 5.

Models

We are testing a series of regressions to be able to interpret the relationship between the number of shops in the downtown district and the accessibility to shopping centers. Equation 5 shows the base regression we use.

$$\log y_j = \alpha_i + \beta_1 \log x_{MA} + \beta_2 \log x_{RA} + \beta_3 \log x_{EA} + D_M x_M + D_R x_R + \varepsilon_i \qquad (5)$$

y_j represents the total number of stores in the CBD when j is 5 or 1 kilometer. x_{MA} is the municipal access to external shopping centers, x_{RA} the regional access to external shopping centers and x_{EA} the extra-regional access to external shopping centers. D_M and D_R are the dummies for municipal and regional accessibility respectively[2]. α_i and ε_i refers to the intercept and error term.

$$\log y_j = \alpha_i + \beta_1 \log x_{MA} + \beta_2 \log x_{RA} + \beta_3 \log x_{EA} + \beta_4 \log x_{pop} + \varepsilon_i \qquad (6)$$

In equation 6 we add x_{pop}which represents population that controls for the size of the municipalities. Both equation 5 and 6 are run with the access to tenants in shopping centers to account for the size of external centers and also with the number of independent stores in the

[2] These dummies show that we added 1 to the municipalities with 0 accessibility. We did this to get a 0 in the logged variable. The dummies will not be part of any of the output regression tables and are not shown in any of the following equations..

city center as the dependent variable. This gives us 4 types of regressions which are shown in table 5. The number of independent stores is a way to capture the diversity in the city and to give a better indication regarding the presence of agglomeration. This is not the core of the analysis for this thesis, however it provides a better understanding of the results and enable us to make a wider interpretation of the relationship between external shopping centers and downtown retailing.

We split equation 6 into equation 7a and 7b where the sample now is divided between urban and rural municipalities. This distinction enables us to comment on the importance of urban characteristics and it also provides a chance to test the hierarchical order suggested by central place theory. Another variable that both control for the size of municipalities and urban features is population density. We show these results in Appendix 3 and comment on them in the analysis.

$$\log y_{ij\ Urban} = \alpha_i + \beta_1 \log x_{MA} + \beta_2 \log x_{RA} + \beta_3 \log x_{EA} + \beta_4 \log x_{pop} + \varepsilon_i \qquad (7a)$$

$$\log y_{ij\ Rural} = \alpha_i + \beta_1 \log x_{MA} + \beta_2 \log x_{RA} + \beta_3 \log x_{EA} + \beta_4 \log x_{pop} + \varepsilon_i \qquad (7b)$$

To see if the results change we add some control variables to the models. In a first step we add them to the base model (equation 5) and in a second step we add them to the full model (equation 7a and 7b). The results can be found in appendix 4.

Table 5: Types of regressions

	Regression type 1		Regression type 2		Regression type 3		Regression type 4	
	5 km	1 km	5 km	1 km	5 km	1 km	5 km	1 km
Dependent variable	Number of stores in the city center		Number of stores in the city center		Number of independent stores in the city center		Number of independent stores in the city center	
Accessibility measure	Access to external shopping centers		Access to tenants in external shopping centers		Access to external shopping centers		Access to tenants in external shopping centers	

6 Analysis

The first regression is based on equation 5, where the number of stores on the 5 and 1 kilometer distance is dependent on the three accessibility measures to external shopping centers and population. Since the explanatory variables are log transformed they express elasticity. The results from the regression are found in table 6.

Table 6: Number of retail stores against access to external shopping centers without population

VARIABLES	Retail stores 5 km	Retail stores 1 km
Municipal access to shopping centers	**0.623*** **	**0.497** **
	(0.223)	(0.209)
Regional access to shopping centers	**0.167*** **	**0.101** *
	(0.0630)	(0.0592)
Extra regional access to shopping centers	**0.146*** **	**0.138*** **
	(0.0467)	(0.0437)
Constant	4.054***	3.572***
	(0.165)	(0.155)
Observations	290	288
R-squared	0.153	0.108

Remark: All variables are log transformed. Values in parentheses are standard errors.

When analyzing the results, we find all accessibility measures significant and with a positive relationship on all distances from the CBD. These results would support the second scenario, with a positive relationship between access to external shopping center and the scale of downtown retailing. However, we cannot make any casual claims as of the effect or direction of such a relationship, and can only see an indication of a positive relationship between the dependent and independent variables. In equation 5 we have not included any population variable to control for the size of the municipality, we do so in the next regressions to see how this affects our results.

Table 7: Number of retail stores against access to external shopping centers and population

VARIABLES	Retail stores 5 km	Retail stores 1 km
Municipal access to shopping centers	0.256	0.145
	(0.235)	(0.220)
Regional access to shopping centers	0.0918	0.0278
	(0.0640)	(0.0603)
Extra regional access to shopping centers	**0.0984** **	**0.0921** **
	(0.0469)	(0.0440)
Population	**0.416*** **	**0.395*** **
	(0.101)	(0.0955)
Constant	-0.386	-0.652
	(1.095)	(1.032)
Observations	290	288
R-squared	0.201	0.160

Remark: All variables in the table are log transformed

When reviewing the results based on equation 6 we find significant positive results for the extra-regional accessibility and population at all distances. These results along with the previous regression indicate some evidence for a positive relationship between external shopping centers and the scale of downtown retailing. This would imply that the result fits best with the second scenario of a positive relationship. Accessibility and population are in some degree both measures of size as larger municipalities often have higher accessibility. Municipal accessibility to shopping centers has no significant impact on the number of shops in the downtown district. The result could be driven by the fact that we are examining external shopping centers that are located further from the Central Business District (CBD). The location of this type of centers allows them to serve several municipalities in the same region or in other regions. The insignificant result at municipal as well as regional level could also be due to the strong correlation with population which may capture both these accessibility measures. The results from table 6 shows that both municipal and regional accessibility may have some effect on the relationship we examine even if this is not shown in table 7.

Considering the first law of geography we could expect municipal access to be important for the municipalities with an external shopping center. However, an external center is more characterized by ease of spatial interaction and potential for interaction, than nearness or proximity. This means that consumers may consider a longer trip to the external centers due to the easier access compared to a city center. This suggests that shopping centers indeed are more of a regional matter than a municipal one. This can be explained by the municipality having a real range of demand serving its population. By increasing the number of stores in the municipality as is the case with an external shopping center, local demand is confined by the population within the municipal border and is therefore not likely to increase. This implies that external shopping centers have a large attraction power on consumers from other municipalities and regions. Access to external shopping centers on the extra-regional level is significant at both distances from the city center. This suggests that consumers travel across regional borders to shop at external shopping centers and this demand spills over on downtown retailing. One explanation for this is that external shopping centers are only present in 47 of the Swedish municipalities, thus they become destinations for consumers desiring a larger variety of goods and other benefits associated with retail firms clustering in shopping centers. This would go along the lines of what Berry and Garrison (1958) suggested about the hierarchical system of firms including retailers. This also supports the idea that a center that is providing high-order goods can increase the real range demand for firms and attract customer from a larger area.

We also believe that there should be a difference in the results for municipalities of different sizes and characteristics. We therefore perform a regression splitting the dataset into urban and rural municipalities. This way we can observe if municipalities with urban characteristics influence the results in any way, this split is performed as shown in equation 7a and 7b and the result are displayed in table 8.

Table 8: Base regression: urban and rural municipalities

VARIABLES	Retail stores 5 km		Retail stores 1 km	
	Urban	Rural	Urban	Rural
Municipal access to shopping centers	0.144	-0.255	0.101	-0.270
	(0.235)	(0.644)	(0.250)	(0.585)
Regional access to shopping centers	**0.189****	0.0753	0.0805	0.113
	(0.0750)	(0.134)	(0.0798)	(0.122)
Extra regional access to shopping centers	**0.279*****	0.0792	**0.277*****	0.0659
	(0.0842)	(0.0566)	(0.0895)	(0.0515)
Population	**0.726*****	**0.389*****	**0.675*****	**0.363*****
	(0.141)	(0.141)	(0.152)	(0.128)
Constant	**-3.455****	-0.150	**-3.436****	-0.248
	(1.526)	(1.500)	(1.645)	(1.363)
Observations	93	197	91	197
R-squared	0.536	0.085	0.430	0.089

Remark: All variables in the correlation matrix are log transformed

When we distinguish between urban and rural municipalities (table 8) we find that the results are only true for urban municipalities. This suggests that shopping centers can increase the real range of demand and attract more customers that can spill over to the downtown retail district. It must however be a municipality that has urban characteristics such as diversity, size and higher accessibility for this interaction to exist. If a municipality is urban there should be a shared attraction force for the shopping center and the downtown district. This suggest that the spillover effect only exist if the municipality has some attraction power in itself and therefore there is a mutual drawing power from the center and the municipality. This follows Christaller's (1966) idea of a hierarchical system of cities that is dependent on the assumption that larger cities can support a wider range of activities. It is also suggested by Dawson (1983) that external shopping centers have a tendency to locate in urban municipalities. It is important to note that the relationship could also be reversed. If a municipality has a high density of retail activity this could be an advantageous site for an external shopping center to locate. It is also possible that the focus of revitalization of the downtown districts in the presence of external shopping centers during recent decades, is what creates the positive relationship we observe.

From table 8 we observe that access to external shopping centers on the regional and extra-regional level has a positive relationship to the number of stores in the city center. When controlling for size and splitting the dataset into urban and rural municipalities the significance is reduced for the accessibility on the municipal and regional level, which could be due to the strong correlation with population. The split between urban and rural decrease the number of observations and we therefore use population density instead to account for both the characteristics and the size of the municipalities. The results from these regressions are found in appendix 3 and show some significance at the municipal level but not at the regional level. The strong correlation of population and population density with the accessibility measures (appendix 5) are likely to affect the results.

The insignificant results for rural municipalities imply that the city center in a rural municipality is not related to accessibility to external shopping centers. One explanation for this is that external shopping centers to a large extent are located in urban municipalities. When consumers

travel outside of their municipality they do so more seldom and it will not impact consumption in their home municipality. In urban municipalities the positive relationship between accessibility to external shopping centers and the scale of the downtown retail district implies that large municipalities with already established central business districts are positively impacted by the establishment of an external shopping center due to the spillover effect of demand. The results suggest that urban characteristics are important for the relationship between external shopping centers and the downtown retail district. As can be seen in the two regressions for urban and rural municipalities, urban municipalities have larger benefits from the clustering of retail activity. Jacobs (1970) gave an explanation for this phenomenon stating that urbanization is a prerequisite of agglomeration rather than a consequence of it.

The attraction power of external shopping centers can be due to the benefits of agglomeration from clustering with firms selling similar goods. Johansson and Quigley (2004) bring forth the idea that the formation and efficiency of agglomeration arise from its characteristic as public capital with households and firms sharing the benefits from agglomeration. When retail firms create large clusters the demand created enable firms to develop differentiated products. Due to consumers' "love of variety" differentiated products increase consumer satisfaction. This suggests that larger cities are more productive and that the well-being of the inhabitants should increase with the size of the city (Johansson & Quigley, 2004). This is similar to the results we can see in the split regression for urban and rural municipalities. Urban municipalities are positively influenced by the establishment of a retail cluster, increasing the size of the retail sector and thus consumer satisfaction. An external shopping center as a competitor has an influence on the local retail market in a number of ways. As suggested by Forslid and Ottaviano (2003) the new competitor can have a crowding out effect on existing firms, reducing demand per firm, stealing consumers from downtown retailers. It could also increase local expenditure through the additional income generated by the retail cluster, with this additional income spent locally it could increase demand per firm. In the regressions performed we see a positive relationship between accessibility to external shopping centers and the scale of downtown retailing, suggesting that the second effect is larger. The circular agglomeration process is an idea presented by many researchers (Harris, 1954; Krugman & Venables, 1993) where individual producers choose locations with good access to markets and suppliers, the establishment of the new firm then improves the market- and supply access to other producers in that location. The new agglomeration of firms improves the variety and access to goods in the local market, increasing consumer demand and the attractiveness of the local market.

Externalities, both positive and negative, are a common justification for government intervention, with the establishment of external shopping centers a number of positive and negative externalities arises as mentioned earlier in this paper. According to Shoag and Veuger (2014) it should therefore be true that the local government facing the largest positive externalities should be those implementing the most generous development policies. By looking at our results, large government interventions should not be necessary for the revitalization of downtown retailing. However external shopping centers have existed for many decades and the tension between downtown retailing and external centers as well as the political discussion have been around for just as long. It could be that the positive impact we observe is due to investments already made in downtown retail districts. If this was the case, we would expect the results to be positive across all municipalities with external shopping centers not only in the urban areas. The decision to locate close to an external shopping center is normally well-defined and determined on the municipal level. The Coase theorem predicts that in such situations the private sector will provide mechanisms for internalizing the spillovers created. The increase in demand generated by a large anchor store, will be heavily cross-subsidized through private mechanisms such as a nearby located shopping centers, in which anchor stores often pay reduced or no rent (Shoag & Veuger, 2014).

For the number of stores at the 1 kilometer distance from the city center we observe no significance for accessibility on the municipal or regional level in table 8 and a lower significance in table 6. Implying that access to external shopping centers has a less significant relation to the number of stores in the very center of a city. Parr and Denike (1970) provide an explanation for this by using the threshold range. All cities have a threshold range of stores in the city core that serves its own population. As the demand in the city core is sufficient for these stores to earn a normal profit, the spillover demand from external shopping centers will not have as large of an influence on the number of stores in the core of the city. The stores at the 1 kilometer distance from the city core have by a combination of transport costs and price setting, low enough cost for consumers to choose these stores before external shopping centers. At this distance, stores will see a somewhat positive influence from the establishment of an external shopping center but not as large as on other distances from the city core.

To analyze this result further we have performed a number of regressions to evaluate the relationship between different variables on the number of stores in the city center. These other regressions have the same structure as equation 7a and 7b where the sample is split between urban and rural. However, we use different accessibility measures and change our dependent variables to similar but slightly different variables to be able to better interpret the relationship. This gives us 4 types of regressions as shown in table 5 above. When we use number of independent shops in the center as the dependent variable we obtain similar results as in the base regression (appendix 2). This confirms our belief that urban characteristics are important since significant results for number of independent stores shows that diversity positively relates to accessibility. We also ran regressions with number of tenants in the external shopping centers as the foundation for the accessibility measure (appendix 2). This shows the same pattern once again but also some significance for rural municipalities at the extra-regional level for both total stores and independent stores. Since the results follow the same pattern when we make these slight changes we consider them credible.

When we split the regression the sub-sample with the urban municipalities contains 93 observations. This is a quite low number when considering adding other control variables. Therefore we add them one at a time to distinguish their significance and see how they affect the accessibility measures[3] (appendix 4). We observe positive significant coefficients for the coastal and central dummy when we exclude population, indicating that they may have some influence on the relationship. However as these variables are not central to our research question we will not analyze them further. The general conclusion from adding control variables is that the accessibility measures do not lose much significance. The unchanging coefficients of the base regression when we add control variables indicate some robustness of the results. The R^2 values from the base regression shows values around 0.2. When splitting the regression we observe that the data is more closely fitted to the regression line for urban municipalities with values around 0.5. For rural municipalities the data does not fit the regression line very well with an R^2 around 0.09. This would confirm the assumptions made previously that the model provides a better explanation for urban municipalities. To test for possible multicollinearity we performed a variance inflation factor (VIF) test and found no sign of multicollinearity in the variables.

[3] We performed one regression with all control variables and found that everything turned insignificant. We believe this was due to the low number of observations.

7 Conclusion

In this thesis our aim is to determine if the relationship between access to external shopping centers and the scale of the downtown retail district is positive or negative. From the empirical analysis we find that the access to external shopping centers at the regional and extra-regional level is positively associated with the scale of downtown retailing in a municipality. This result is true only for urban municipalities, which we discover from splitting the data set in two separate sub-samples. The results suggest that a positive relationship holds only for municipalities displaying characteristics such as diversity, size and high accessibility. This brings us to the conclusion that external shopping centers only have a positive influence on the scale of downtown retailing if the municipality has a diversified and well-established retail market in the city core. The existence of external shopping centers in itself confirms the existence of agglomeration benefits. However, the results suggest that the attraction power of external shopping centers stretches beyond municipal borders. Thus, showing that the agglomeration benefits of the external shopping centers makes consumers travel from not only within the municipality but from other municipalities and regions to take advantage of the benefits provided by the clustered firms. Regional and extra-regional accessibility was found to have an impact on the scale of downtown retail while municipal access did not. Previous studies on accessibility to retail areas suggest that the power of demand is highly dependent on proximity. However, our results suggest that external shopping centers are not as dependent on demand in the close proximity but rather on consumers traveling further distances. This could be explained by the range of demand; external shopping centers provide high-order goods, enabling them to draw demand from a larger area. According to the results, external shopping centers do not pose a threat to downtown retailing but can rather be a good addition to the local retail market. However, the results do not tell the whole story, some municipalities may have an external shopping center drawing demand from downtown retailing reducing the scale of the city center, this cannot be observed as our results does not apply to the individual case.

The pressure on local politicians to invest in the downtown area to revitalize trade has been high during recent decades. When observing the results, we can conclude that such investments are not necessary as the scale of downtown retail is positively impacted by access to external shopping centers in urban municipalities. The insignificant results for rural municipalities suggests that there is no relationship between access to external shopping centers and the scale of downtown retailing, any investments should therefore not be necessary. In the evaluation of an external shopping center establishment not only the effect on demand per firms should be considered but also the impact on the well-being of consumers. The relative contribution of each effect must be considered to not only preserve the local retail market but also the satisfaction of households. To make a definite recommendation for municipal intervention in retail markets, further research is recommended. Continued research on the topic could confirm the causality of the relationship and the size of the effect of external centers on downtown retailing.

8 References

Abaza, M. (2001). Shopping malls, consumer culture and the reshaping of public space in Egypt. Theory, Culture & Society, 18(5), 97-122.

Artle, R. (1959). Studies in the structure of the Stockholm economy: towards a framework for projecting metropolitan community development

Assari, A., Mahesh, T. M., Emtehani, M. R., & Assari, E. (2011). Comparative sustainability of bazaar in Iranian traditional cities: Case studies in Isfahan and Tabriz. International Journal on Technical and Physical Problems of Engineering (IJTPE), (9), 18-24.

Bearden, W. O. (1977). Determinant attributes of store patronage-downtown versus outlying shopping centers. *Journal of Retailing*, *53*(2), 15.

Bergström, F. (2000). Är externa köpcentra ett hot mot cityhandeln? *Ekonomisk debatt*, *28*(4), 331-343.

Berry, B. J., & Garrison, W. L. (1958). Alternate explanations of urban rank-size relationships 1. *Annals of the Association of American Geographers*, *48*(1), 83-90.

Billings, S. B., & Johnson, E. B. (2016). Agglomeration within an urban area. *Journal of Urban Economics*, *91*, 13-25.

Boarnet, M. G. (1994). The monocentric model and employment location. *Journal of Urban Economics*, *36*(1), 79-97.

Brown, S. (1994). Retail location at the micro-scale: inventory and prospect. *Service Industries Journal*, *14*(4), 542-576.

Cai, Y., & Shannon, R. (2012). Personal values and mall shopping behavior: The mediating role of attitude and intention among Chinese and Thai consumers. *Australasian Marketing Journal (AMJ)*, *20*(1), 37-47.

Chamberlin, E. H. (1937). Monopolistic or imperfect competition? *The Quarterly Journal of Economics*, 557-580.

Christaller, W. (1966). *Central places in southern Germany*. Prentice-Hall.Cohen, L. (1996). From town center to shopping center: The reconfiguration of community marketplaces in postwar America. The American Historical Review, 101(4), 1050-1081.

Datscha AB (2016). *About SSCD*. Retrieved May 2, 2016, from address: http://www.sscd.se/about

Dawson, J. A. (1983). Shopping centre development. Longman. London

Dicken, P., & Lloyd, P. E. (1990). *Location in space: Theoretical perspectives in economic geography*. New York: Harper & Row.

Duranton, G., & Puga, D. (2004). Micro-foundations of urban agglomeration economies. *Handbook of regional and urban economics*, *4*, 2063-2117.

Echikson, W. (2007). Tapping into turkey. *The Wall Street Journal Online*, *6*.

Economides, N. (1984). The principle of minimum differentiation revisited. European Economic Review, 24(3), 345-368.

Editors of Encyclopaedia Britannica, 2015. http://global.britannica.com/place/Esfahan

Ejermo, O., & Gråsjö, U. (2014). Accessibility to R&D: a re-examination of the consequences for invention and innovation. *Knowledge, Innovation and Space*, 51.

Ellison, G., & Glaeser, E. L. (1999). The geographic concentration of industry: does natural advantage explain agglomeration?. *The American Economic Review*, *89*(2), 311-316.

eMarketer (2014). *Retail Sales Worldwide Will Top $22 Trillion This Year*. Retrieved May 8, from address:http://www.emarketer.com/Article/Retail-Sales-Worldwide-Will Top-22-Trillion-This-Year/1011765

Eppli, M. J & Benjamin, J. D. (1994). The Evolution of Shopping Center Research: A Review and Analysis. *The Journal of Real Estate*. 9 (1): 5-32.

Forslid, R., & Ottaviano, G. I. (2003). An analytically solvable core-periphery model. Journal of Economic Geography, 3(3), 229-240.

Fotheringham, A. S. (1982). Distance-decay parameters: a reply.

Fotheringham, A. S. (1983). Some theoretical aspects of destination choice and their relevance to production-constrained gravity models. Environment and Planning A, 15(8), 1121-1132.
Fujita, M., & Thisse, J. F. (2002). Economics of agglomeration: cities, industrial location, and regional growth. Cambridge university press.
Ghosh, A. (1986). The value of a mall and other insights from a revised central place model. Journal of retailing, 62(1), 79-97.
Golledge, R. G., Rushton, G., & Clark, W. A. (1966). Some spatial characteristics of Iowa's dispersed farm population and their implications for the grouping of central place functions. *Economic Geography*, *42* (3): 261-272.
Griffith, V. (1999, October 15). Urban reality catches up with the American mall: Suburban shopping centers are dying as consumers switch from artificial environments to city shopping. *Financial Times,* p.04.
Grossman, L. (1992, November 16). Retailing: Developed to Reinvigorate Downtowns, Many Urban Malls are Disappointments. *Wall Street Journal,* p. page B1.
Haig, R. M. (1927). Regional Survey of New York and Its Environs, Major Economic Factors in Metropolitan Growth and Arrangement. *Volume I, New York, Regional Plan of New York and Its Environs*.
Hanson, S. (1980). Spatial diversification and multipurpose travel: implications for choice theory. *Geographical Analysis*, *12* (3): 245-257.
Harris, C. D. (1954). The, Market as a Factor in the Localization of Industry in the United States. Annals of the association of American geographers, 44(4), 315-348.
Haynes, K. E., & Fotheringham, A. S. (1984). Gravity and spatial interaction models (Vol. 2). Beverly Hills: Sage publications.
Hinloopen, J., & Van Marrewijk, C. (1999). On the limits and possibilities of the principle of minimum differentiation. International Journal of Industrial Organization, 17(5), 735-750.
Hotelling, H. (1929). Stability in Competition. *The Economic Journal*, 39 (153): 41-57
Huff, D. L. (1964). Defining and estimating a trading area. *The Journal of Marketing*, 34-38.
Huff, D. L., & Jenks, G. F. (1968). A graphic interpretation of the friction of distance in gravity models. Annals of the Association of American Geographers, 58(4), 814-824.
HUI (2014). *Antalet Köpcentrum Fortsätter Öka*. Retrieved March 23, 2016, from address: http://www.hui.se/nyheter/antalet-kopcentrum-fortsatter-oka
Isaksson, K., & Storbjörk, S. (2012). Strategy making and power in environmental assessments. Lessons from the establishment of an out-of-town shopping centre in Västerås, Sweden. *Environmental impact assessment review*, *34*, 65-73.
Ingram, D. R. (1971). The concept of accessibility: a search for an operational form. *Regional studies*, *5*(2), 101-107.
Jackson, K. T. (1996). All the world's a mall: Reflections on the social and economic consequences of the American shopping center. *The American Historical Review*,*101*(4), 1111-1121.
Jacobs, J. (1970). The economy of cities. The economy of cities.
Johansson, B., & Klaesson, J. (2001) Förhandsanalys av förändringar i transport- och bebyggelse system. mimeo. Jönköping international business school
Johansson, B., Klaesson, J., & Olsson, M. (2002). Time distances and labor market integration. *Papers in regional science*, *81*(3), 305-327.
Johansson, B., & Quigley, J. M. (2004). Agglomeration and networks in spatial economies. In *Fifty Years of Regional Science* (pp. 165-176). Springer Berlin Heidelberg.
Jonassen, C. T. (1953). Downtown versus suburban shopping (Vol. 1). Bureau of Business Research, Ohio State University.
Jonassen, C. T. (1955). The Shopping Center versus Downtown: A motivation research on shopping habits and attitudes in three cities (No. 75). Bureau of Business Research, College of Commerce and Administration, Ohio State University.
Jordbruksverket (2015). *Så här definerar vi landsbygd*. Retrieved May 6, from address: http://www.jordbruksverket.se/etjanster/etjanster/landsbygdsutveckling/alltomlandet/sahardefinierarvilandsbygd.4.362991bd13f31cadcc256b.html
Karlsson, C., & Gråsjö, U. (2013). *Accessibility: a useful analytical and empirical tool in spatial economics–experiences from Sweden* (No. 314). Royal Institute of Technology,

CESIS-Centre of Excellence for Science and Innovation Studies.
Kivell, P. T., & Shaw, G. (1980). The study of retail location. Retail Geography. RLE Retailing and Distribution: New York.
Klaesson, J., & Öner, Ö. (2014). Market Reach for Retail Services. *The Review of Regional Studies*, *44*(2), 153.
Krugman, P., & Venables, A. (1993). Integration, specialization, and the adjustment (No. w4559). National Bureau of Economic Research.
Kummer, C. (1995, 01). Turkish delight. *The Atlantic Monthly, 275*, 40-43. Retrieved from http://login.bibl.proxy.hj.se/login?url=http://search.proquest.com/docview/223097400?accountid=11754
Kärrholm, M., & Nylund, K. (2011). Escalating consumption and spatial planning: Notes on the evolution of Swedish retail spaces. *European Planning Studies*, *19*(6), 1043-1059.
Lee, Y. (1974). An analysis of spatial mobility of urban activities in downtown Denver. The Annals of Regional Science, 8(1), 95-108.
Lösch, A. (1954). The Economics of Location. Yale University Press.
Manzo, J. (2005). Social control and the management of "personal" space in shopping malls. Space and Culture, 8(1), 83-97.
Maronick, T. J. (2007). Specialty retail center's impact on downtown shopping, dining, and entertainment. International Journal of Retail & Distribution Management, 35(7), 556-568.
Mayo, E. J., Jarvis, L. P., & Xander, J. A. (1988). Beyond the gravity model. Journal of the Academy of Marketing Science, 16(3-4), 23-29.
Nelson, P. (1970). Information and consumer behavior. *Journal of political economy*, *78*(2), 311-329.
Notisum. (2016) Plan- och bygglag (2010:900). Retrieved May 14, 2016, from address: http://www.notisum.se/rnp/sls/lag/20100900.HTM
Okabe, A., Asami, Y., & Miki, F. (1985). Statistical analysis of the spatial association of convenience-goods stores by use of a random clumping model. Journal of Regional Science, 25(1), 11-28.
Parr, J. B., & Denike, K. G. (1970). Theoretical problems in central place analysis. *Economic Geography*, *46*(4), 568-586.
Patel, N. & Hung L. for CBRE (2014). Global Viewpoint: Shopping Centre Development- The Most Active Cities Globally. Retrieved 2016-03-24. From: http://www.cbre.ie/portal/pls/portal/CBWEB.utils_news_public.show_image?id=16535&field=doc1&trans=n
Peiser, R., & Xiong, J. (2003). Crime and town centers: are downtowns more dangerous than suburban shopping nodes?. *Journal of Real Estate Research*,*25*(4), 577-606.
Reilly, W. J. (1931). *The law of retail gravitation*. WJ Reilly. Pg.9
Rogers, A. (1969). Quadrat analysis of urban dispersion: 2. Case studies of urban retail systems. Environment and Planning A, 1(2), 155-171.
SCB, (2016). *MONA- leveranssystemet för mikrodata*. Retrieved May 2, 2016, from address: http://www.scb.se/sv_/Vara-tjanster/Bestalla-mikrodata/MONA/
SCB (2015). *Välkommen till Regional informationssystem (rAps-RIS)*. Retrieved May 2, 2016, from address: https://www.h5.scb.se/raps/
Shoag, D., & Veuger, S. (2014). Shops and the City: Evidence on Local Externalities and Local Government Policy from Big Box Bankruptcies.
Svensk Handel (2014). *Handelns betydelse för Sveriges ekonomi*. Retrieved May 8, from address: http://www.svenskhandel.se/globalassets/handelns-betydelse-for sveriges-ekonomi2.pdf
Tobler, W. R. (1970). A computer movie simulating urban growth in the Detroit region. *Economic geography*, *46*, 234-240. Pg.236
Von Thünen, J. H., & Hall, P. G. (1966). *Isolated state: an English edition of Der isolierte Staat*. Pergamon.
Weibull, J. W. (1980). On the numerical measurement of accessibility. *Environment and Planning A*, *12*(1), 53-67.

Wrigley, N., & Dolega, L. (2011). Resilience, fragility, and adaptation: new evidence on the performance of UK high streets during global economic crisis and its policy implications. Environment and Planning A, 43(10), 2337-2363.
Yadav, S., & Siraj, S. (2014). Mall Patronage Behaviour: Understanding the Inter-Linkages Between Shopping Motives, Shopper Demographics, and Shopping Behaviour. Indian journal of Marketing, 44(11), 36-48.
Yildirim, Y. T. (2014). Differences among managerial values of small-scale entrepreneurs, who have diverse ethnicities: An example of grand bazaar, istanbul-turkey. *Advances in Management and Applied Economics, 4*(2), 69-79.
Öner, Ö. (2014). Retail location.

Appendix 1

Table A1.1 Definitions of Shopping Centers

Type of center	
Neighborhood Center	Located in residential areas providing goods and services for the daily needs of the closest residential area. It has a square meter area (Gross Leasable Area, GLA) and a cluster of 7-15 shops. The center is located in a market area with up to 15 000 inhabitants. The main store in the center is typically a supermarket, together with customer service stores to cover the basic daily needs. The dataset contains 22 observations of neighborhood centers.
Community Centers	Located in a residential area providing durable and convenience goods along with various services. Local-level public service facilities, e.g. library and local offices of government agencies are often present. The square meter area (GLA) of community centers is between 7 000 - 20 000 and has 16 - 35 shops. The center is located in a market area with 30 000 - 60 000 inhabitants. The main stores in the center are typically one or two major supermarkets and a few national durable chains. The center also has broad range of services as well as some type of coffee/food establishment. The dataset contains 59 observations of community centers.
City Malls	Located in the center of a city with a square meter area (GLA) of 5 000, the center is often a small structure. The stores and services provided are various sorts of durable goods as well as some food option or convenience goods. The dataset contains 109 observations of city malls.
Outlet Centers*	Shopping centers located outside the city center and residential areas and has an average square meter area (GLA) of 15 000. It sells goods at discount prices. The dataset contains 5 observations of outlet centers.
Regional Malls*	Shopping centers located externally and containing all retail categories. Has a square meter area (GLA) of 20 000 - 70 000 and a number of shops between 50 and 80. The Regional Mall is typically located in a market area with 100 000 inhabitants. The main stores are usually one or more department stores, such as hypermarkets, large supermarkets, large national chains and restaurant services. The dataset contains 43 observations of regional malls.
Super-Regional Malls*	A shopping center containing all retail categories as well as entertainment. It has a square meter area (GLA) of more than 70 000, with a minimum of 80 shops. The stores and services are usually several department stores, such as hypermarkets, large supermarket, large national chains and restaurant services. The dataset contains 1 observation of super-regional malls.
Retail Parks*	Retail parks are an agglomeration of retail stores without original planning; it is often placed in close proximity to another shopping center, e.g. out-of-town. It has a square meter area (GLA) of 5 000 - 70 000 with a minimum of 5 shops. The stores and services available are usually a number of large stores in varying sectors, the stores are grouped together with/around a common parking space. The dataset contains 108 observations of retail parks.
Regional Retail Parks*	Regional retail parks are an agglomeration of retail stores without original planning; it is often placed in close proximity to another shopping center, e.g. out-of-town. The square meter area (GLA) is typically larger than 70 000, with a minimum of five stores. The stores and services available are usually a number of large stores in varying sectors; the stores are grouped together with/around a common parking space. The dataset contains 10 observations of regional retail parks.
Theme Centers	Theme centers have a focus on entertainment. The square meter area (GLA) is typically larger than 5 000. The stores and services available are usually cinema and bowling. The dataset contains 1 observation of theme centers.

*Remark: The shopping center categories marked with a * are included in our sample as "external shopping centers".*

Appendix 2

Table A2.1 Number of retail stores against Accessibility to tenants in shopping centers.

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to tenants in shopping centers	0.283***	0.222**	0.265***	0.202***
	(0.0927)	(0.0871)	(0.0838)	(0.0773)
Regional access to tenants in shopping centers	0.0765	0.0295	0.0698	-0.00332
	(0.0474)	(0.0445)	(0.0428)	(0.0399)
Extra regional access to tenants in shopping centers	0.133***	0.118***	0.138***	0.116***
	(0.0402)	(0.0377)	(0.0363)	(0.0336)
Constant	2.538***	2.433***	2.312***	2.297***
	(0.381)	(0.358)	(0.345)	(0.319)
Observations	290	288	290	287
R-squared	0.151	0.103	0.159	0.094

Remark: All variables are log transformed

Table A2.2 Number of retail stores against Accessibility to tenants in shopping centers and population.

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to tenants in shopping centers	0.134	0.0748	0.132	0.0657
	(0.0970)	(0.0914)	(0.0878)	(0.0809)
Regional access to tenants in shopping centers	0.0356	-0.0115	0.0335	-0.0401
	(0.0471)	(0.0443)	(0.0426)	(0.0395)
Extra regional access to tenants in shopping centers	0.0867**	0.0731*	0.0975***	0.0751**
	(0.0406)	(0.0381)	(0.0367)	(0.0338)
Population	0.418***	0.405***	0.371***	0.373***
	(0.101)	(0.0949)	(0.0911)	(0.0841)
Constant	-1.225	-1.209	-1.034	-1.062
	(0.980)	(0.921)	(0.887)	(0.817)
Observations	290	288	290	287
R-squared	0.200	0.158	0.206	0.154

Remark: All variables are log transformed

Appendix 3

Table A3.1: *Number of retail stores against access to shopping centers and population density.*

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to shopping centers	0.427*	0.340	0.392*	0.337*
	(0.230)	(0.216)	(0.207)	(0.192)
Regional access to shopping centers	0.0105	-0.0228	-0.00236	-0.0744
	(0.0817)	(0.0775)	(0.0737)	(0.0692)
Extra regional access to shopping centers	0.0740	0.0813*	0.0797*	0.0774*
	(0.0522)	(0.0492)	(0.0471)	(0.0439)
Population density	0.195***	0.153**	0.192***	0.151***
	(0.0661)	(0.0624)	(0.0596)	(0.0553)
Constant	3.745***	3.327***	3.472***	2.999***
	(0.194)	(0.184)	(0.175)	(0.163)
Observations	290	288	290	287
R-squared	0.179	0.127	0.189	0.122

Remark: All variables are log transformed

Table A3.2: *Number of retail stores against access to tenants in shopping centers and population density.*

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to tenants in shopping centers	0.179*	0.131	0.166*	0.113
	(0.0972)	(0.0919)	(0.0877)	(0.0814)
Regional access to tenants in shopping centers	-0.0337	-0.0665	-0.0353	-0.0963*
	(0.0586)	(0.0555)	(0.0529)	(0.0495)
Extra regional access to tenants in shopping centers	0.0590	0.0547	0.0681	0.0544
	(0.0461)	(0.0434)	(0.0416)	(0.0386)
Population density	0.210***	0.181***	0.200***	0.174***
	(0.0674)	(0.0637)	(0.0608)	(0.0564)
Constant	3.144***	2.962***	2.891***	2.809***
	(0.423)	(0.400)	(0.382)	(0.355)
R-squared	0.179	0.128	0.190	0.124

Remark: All variables are log transformed

Appendix 4

Table A4.1: *Number of retail stores against Accessibility to shopping centers with Central dummy*

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to shopping centers	0.528**	0.411*	0.502**	0.413**
	(0.226)	(0.212)	(0.205)	(0.188)
Regional access to shopping centers	0.191***	0.122**	0.173***	0.0688
	(0.0638)	(0.0600)	(0.0578)	(0.0537)
Extra regional access to shopping centers	0.151***	0.142***	0.155***	0.138***
	(0.0465)	(0.0436)	(0.0421)	(0.0390)
Central dummy	0.427**	0.377*	0.375**	0.347**
	(0.208)	(0.196)	(0.189)	(0.174)
Constant	3.967***	3.494***	3.700***	3.171***
	(0.170)	(0.160)	(0.154)	(0.142)
Observations	290	288	290	287
R-squared	0.166	0.120	0.171	0.112

Remark: The accessibility variables are log transformed.

Table A4.2: *Number of retail stores against Accessibility to shopping centers with Central dummy. Split between urban and rural municipalities.*

VARIABLES	Retail stores 5 km		Retail stores 1 km	
	Urban	Rural	Urban	Rural
Municipal access to shopping centers	0.143	-0.240	0.101	-0.262
	(0.237)	(0.646)	(0.251)	(0.587)
Regional access to shopping centers	0.206*	0.0799	0.0790	0.116
	(0.104)	(0.135)	(0.112)	(0.122)
Extra regional access to shopping centers	0.279***	0.0845	0.277***	0.0689
	(0.0847)	(0.0577)	(0.0901)	(0.0525)
Population	0.702***	0.371**	0.677***	0.352***
	(0.173)	(0.146)	(0.186)	(0.132)
Central Dummy	0.0985	0.133	-0.00823	0.0755
	(0.414)	(0.267)	(0.444)	(0.243)
Constant	-3.243*	0.0200	-3.453*	-0.152
	(1.773)	(1.541)	(1.915)	(1.401)
Observations	93	197	91	197
R-squared	0.536	0.086	0.430	0.089

Table A4.3 *Number of retail stores against Accessibility to shopping centers with Central dummy*

VARIABLES	Retail stores 5 km	Retail stores 1 km	Independent retail stores 5 km	Independent retail stores 1 km
Municipal access to shopping centers	0.582***	0.455**	0.546***	0.452**
	(0.223)	(0.209)	(0.202)	(0.185)
Regional access to shopping centers	0.162**	0.0972	0.147**	0.0458
	(0.0628)	(0.0589)	(0.0568)	(0.0528)
Extra regional access to shopping centers	0.151***	0.144***	0.156***	0.140***
	(0.0466)	(0.0436)	(0.0422)	(0.0390)
Coastal Dummy	0.247*	0.266**	0.243*	0.252**
	(0.142)	(0.133)	(0.128)	(0.118)
Constant	3.969***	3.484***	3.693***	3.159***
	(0.172)	(0.161)	(0.155)	(0.143)
Observations	290	288	290	287
R-squared	0.162	0.121	0.170	0.113

Table A4.4 *Number of retail stores against Accessibility to shopping centers with Coastal dummy. Split between urban and rural municipalities.*

VARIABLES	Retail stores 5 km		Retail stores 1 km	
	Urban	Rural	Urban	Rural
Municipal access to shopping centers	0.138	-0.391	0.0815	-0.375
	(0.237)	(0.645)	(0.249)	(0.587)
Regional access to shopping centers	0.191**	0.0945	0.0895	0.128
	(0.0756)	(0.134)	(0.0799)	(0.122)
Extra regional access to shopping centers	0.287***	0.0883	0.308***	0.0728
	(0.0877)	(0.0566)	(0.0928)	(0.0515)
Population	0.723***	0.305**	0.658***	0.298**
	(0.142)	(0.148)	(0.152)	(0.135)
Coastal Dummy	0.0560	0.364*	0.216	0.279
	(0.165)	(0.207)	(0.176)	(0.189)
Constant	-3.434**	0.600	-3.287**	0.327
	(1.535)	(1.552)	(1.645)	(1.414)
Observations	93	197	91	197
R-squared	0.536	0.099	0.440	0.099

Appendix 5

Table A4.1 Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Retail stores 5 km	1														
(2) Retail stores 1 km	0.95*	1													
(3) Independent retail stores 5 km	0.99*	0.94*	1												
(4) Independent retail stores 1 km	0.92*	0.98*	0.93*	1											
(5) Municipal access to shopping centers	0.26*	0.22*	0.26*	0.22*	1										
(6) Regional access to shopping centers	0.22*	0.16*	0.22*	0.11	0.18*	1									
(7) Extra-regional access to shopping centers	0.20*	0.19*	0.22*	0.20*	0.01	0.08	1								
(8) Municipal access to tenants in shopping centers	0.28*	0.24*	0.27*	0.21*	0.71*	0.27*	0.01	1.0000							
(9) Regional access to tenants in shopping centers	0.21*	0.11*	0.21*	0.08	0.09	0.60*	0.18*	0.1238*	1						
(10) Extra-regional access to tenants in shopping centers	0.22*	0.20*	0.25*	0.21*	0.02	0.14*	0.96*	0.0458	0.24*	1					
(11) Population density	0.40*	0.37*	0.40*	0.35*	0.58*	0.36*	0.19*	0.7406*	0.23*	0.23*	1				
(12) Centrum dummy	0.39*	0.32*	0.410*	0.30*	0.39*	0.60*	0.40*	0.4930*	0.63*	0.47*	0.63*	1			
(13) Coastal dummy	0.05	0.09	0.04	0.09	0.26*	-0.06	-0.15*	0.3283*	-0.57*	-0.18*	0.32*	-0.16*	1		
(14) Minutes to Oslo	0.16*	0.16*	0.16*	0.16*	0.20*	0.09	-0.05	0.23*	0.10	-0.03	0.32*	0.27*	0.06	1	
(15) Unemployment share	0.29*	0.24*	0.30*	0.23*	0.36*	0.24*	0.13*	0.40*	0.11	0.16*	0.49*	0.45*	0.19*	0.30*	1