Externalities, Sales, and Rents in Shopping Malls

Master Thesis

By

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COLOFON

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SUMMARY

Fueled by an increase in mobility, the shopping mall revolutionized the retail landscape after it first arrived in the late 1950's in the United States. Though increasing car ownership was a condition for the rise of the shopping mall, the true reason for its success lies in the tenant mix the mall offers. This thesis will examine the tenant mix by answering the following main research question: "How do the externalities generated by the tenant mix influence both the sales and rents of tenants in shopping malls?" To answer this question, an empirical study on Turkish shopping malls is conducted to examine the externalities generated by the tenant mix. The contribution of this thesis is twofold. First, this thesis is the first empirical study into shopping center rents in which Turkish data is used, where most of the research so far has been conducted in North America (predominantly the US). This new geographical region provides insights into the universality or context dependency of the way in which externalities are generated and internalized in shopping malls. A second contribution is that this thesis does not only focus on the externalities generated by anchor tenants (as the study by Gould et al., 2005), but also the externalities generated by clusters of homogeneous retailers.

In this thesis, the existence of externalities generated by heterogeneous tenants have been confirmed. This thesis shows that the presence of anchor tenants positively influences the sales of non-anchor tenants. These externalities are internalized through rents. Non-anchors pay a premium to be located in a mall where the externalities generated by anchors are larger, and anchor tenants are rewarded discounts for the externalities they generate. Not every non-anchor tenant appears to benefit equally from the presence of anchors. Especially non-anchors that depend on the traffic generated by anchors (such as tenants in the 'Services' category) appear to benefit the most. This is also reflected by the fact that these tenants are willing to pay a higher premium on rents compared to non-anchors that benefit less. Also not every anchor generates the same externality, with international anchor tenants generating larger externalities than national anchors. This difference can be attributed to the brand strength and exclusivity of international anchors.

This thesis also examined the externalities of a cluster of homogeneous tenants. Externalities generated by clusters of homogeneous stores are less straightforward in that they can be either positive or negative. This duality appears to be confirmed by the analysis in this thesis. Some product categories appear to benefit mostly from a more competitive environment, whereas other product categories appear to benefit mostly from a more monopolistic environment. Examining the effects on rents, it appears that stores that benefit from a more competitive environment are willing to pay higher rents to be located in a mall with more (secondary) competitors. Whereas stores that benefit from a more monopolistic environment are willing to pay higher rents to have access to this monopolistic position in a mall.

PREFACE

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1. INTRODUCTION

Fueled by an increase in mobility, the shopping mall revolutionized the retail landscape after it first arrived in the late 1950's in the United States (Carter, 2009). Though increasing car ownership was a condition for the rise of the shopping mall, the true reason for its success lies in the tenant mix the mall offers. The reason why the tenant mix is an important factor of success can be explained by general retail location theories. These studies find that the composition of stores at any shopping location influences the amount of customers attracted to that shopping location. Shopping malls therefore actively manage their tenant mix in order to maximize the amount of customers visiting the mall. Through this active and centralized management, shopping malls are able to internalize the externalities generated by the tenant mix. The efficiency in which shopping malls internalize externalities, makes shopping malls stand out from other types of retail locations, such as city center shopping locations. Even though the tenant mix is one of the most important determinants of a shopping malls financial success (Eppli & Benjamin, 1994; Kirkup & Rafiq, 1994; Pashigian & Gould, 1998; Carter, 2009; Yiu & Xu, 2012), empirical research into the externalities generated by the tenant mix falls behind (Yiu & Xu, 2012). As a consequence, shopping mall management often relies on intuition and experience when deciding on the tenant mix (Yiu & Xu, 2012).

Research into the tenant mix can be categorized into two main branches. The first branch of research looks into consumer behavior and preferences, and how this (theoretically) influences tenant mix strategies (see for example Bruwer, 1996; Nicholls et al., 2002; Nisco & Napolitano, 2006; Teller & Reutterer, 2008; or Eppli & Benjamin, 1994, for an overview of earlier literature). Knowledge on consumer behavior and preferences provides the basis for many retail location theories and also helps mall management in making decisions regarding ideal compositions of the tenant mix. The biggest downsides of this type of research is that it is either context dependent, qualitative, or only provides mall management with intuitive results (Yiu & Xu, 2012).

The second branch of research into the tenant mix focuses on the size of the externalities generated in shopping malls and how these externalities are internalized. Insights into the size of the externalities and the internalization process are key to mall management, because it provides them with knowledge on the dynamics of externalities in shopping malls, the efficiency of the allocation of mall space, and whether or not the asset value of the shopping mall is maximized. The issue with this branch of research is that there are only a small number of empirical studies due to data limitations. Shopping mall owners are often reluctant in providing academics with access to confidential data on the rents and sales of their shopping malls. When data is made available, this often only consists of data on rent levels. For this reason, most of the empirical studies into the externalities in shopping malls focus on how differences in rents can be explained by who generates, and who receives the externalities (see for example Brueckner, 1993; Gerbich, 1998; Pashigian & Gould, 1998; Des Rosiers et al., 2009; Yuo et al., 2010;

Des Rosiers et al., 2016). A drawback of these studies is that it only provides intuitive results (tenants that generate externalities receive subsidies on rent), and more importantly, these studies do not estimate the size of the externality and neither estimate whether mall space is efficiently allocated. Only a single study so far, by Gould et al. (2005), estimates the size of the externalities in shopping malls and the efficiency of space allocation, using data on both rents and sales of tenants. A drawback of this study is that it only focuses on the externalities generated by 'anchor' tenants. Another downside is the fact that it is only a single study from the United States. It is therefore unclear to what extent the results are transferable to other shopping malls, in other countries.

This thesis will examine the tenant mix by answering the following main research question: "How do the externalities generated by the tenant mix influence both the sales and rents of tenants in shopping malls?" To answer this question, an empirical study on 11 Turkish shopping malls is conducted to examine the externalities generated by the tenant mix. The contribution of this thesis is twofold. First, this thesis is the first empirical study into shopping center rents in which Turkish data is used, where most of the research so far has been conducted in North America (predominantly the US). This new geographical region provides insights into the universality or context dependency of the way in which externalities are generated and internalized in shopping malls. A second contribution is that this thesis does not only focus on the externalities generated by anchor tenants (as the study by Gould et al., 2005), but also the externalities generated by clusters of homogeneous retailers. Preliminary findings of this thesis are that when anchor presence is increased in shopping malls, so are the externalities that the anchor tenants generate. This is reflected by the fact that both the sales and rents of non-anchor tenants go up when anchor presence is increased in a shopping mall. Another preliminary finding of this thesis is that with regards to clusters of homogeneous tenants, some sectors appear to benefit from a more competitive environment, whereas other sectors appear to benefit mostly from a more monopolistic environment. To build up the arguments that explain these findings, this thesis is structured as followed: Chapter 2 (Theoretical Framework) presents an overview of existing literature on retail location theories, and how this applies to the tenant mix of shopping malls. After the Theoretical Framework, chapter 3 (Methodology), 4 (Data), and 5 (Results), will discuss the empirical part of this thesis. Conclusions follow in chapter 6.

2. THEORETICAL FRAMEWORK

Understanding the way space is priced is at the core of real estate research. In perfect markets, prices of goods are set by demand and supply. However, the market for mall space is not a perfect market. There are only limited suppliers of mall space in a single market, and more importantly, within a mall there is only one supplier of space, the '*developer*' or '*owner*' of the mall. But next to the supply side not being a perfect market, also the tenants are not all equal. Some tenants will be more important for the owner of the mall than others. For this reason the price a tenant in a mall will pay is not (only) a function of demand and supply, but one of bargaining power between the tenant and the owner. Many of the determinants of rental values in shopping malls are directly related to how these determinants also impact the bargaining power of the tenant or owner.

A shopping mall is a unique shopping location that contains a cluster of stores. Even though clustering of retailers also happens naturally, since retailers want to benefit from agglomeration advantages (Yuo et al., 2010), a shopping mall is different. In a shopping mall, the owner is actively managing the mall, ensuring high quality public space and facilities, a good tenant mix, and advertise the mall to potential customers. While doing so, the owner always tries to maximize the net cash flows of the shopping mall, because this will maximize the asset value of the shopping mall (Eppli & Benjamin, 1994; Bruwer, 1996; Carter, 2009). Net cash flows (or the rental income) of the mall are increased by an increased number of sales of the individual tenants. Revenue of the tenants, in their part, are increased by an increase in footfall of the mall (Sirmans & Guidry, 1993). One of the most successful ways to increase footfall within a mall is to create an optimal tenant mix within the mall.

2.1 THE TENANT MIX AND HETEROGENEOUS RETAILERS

The reasons why shopping malls are attractive for customers can be found in retail location theory. Retail location theory explains why concentrations of both heterogeneous and homogeneous stores in a single shopping mall can be beneficial for both the customer and the retailer. Retail location theory, for that matter, explains why the tenant mix offered by shopping malls is one of the key drivers in attracting customers to the shopping mall and determining revenue and rents of the individual tenants and the mall as a whole.

In retail location theory of heterogeneous retailers, travel costs are considered as one of the main determinants of where people go to buy their products (Eppli & Benjamin, 1994). Central place theory, the location theory proposed by Christaller (1933), states that customers will visit the nearest shopping location where they are able to obtain a certain good, since this minimizes travel costs. The maximum distance customers are willing to travel depends on the type of product they are going to purchase. Expensive goods, that are purchased infrequently, will attract customers from a larger distance whereas day-to-day products will only attract customers from nearby (Christaller, 1933). The result is a hierarchy

in shopping locations where only some shopping locations contain retailers who sell expensive goods, and many shopping locations contain shops for day-to-day products (Christaller, 1933). One of the shortcomings of Christaller's central place theory is that it depends on the assumption of single purpose shopping trips (Eppli & Benjamin, 1994). However nowadays, customers mostly undertake multipurpose shopping trips (Hanson, 1980; O'Kelly, 1981; Eppli & Benjamin, 1994). When multipurpose shopping trips are considered, the nearest shopping location is not necessarily the preferred shopping destination of the customer (Hanson, 1980; O'Kelly, 1981; Eppli & Benjamin, 1994). In multipurpose shopping trips, customers prefer visiting a single shopping location with a concentration of the stores they are looking for, even if this means bypassing the nearest shopping location. The single stop minimizes travel (and time) costs as opposed to visiting a series of individual shopping locations (Brueckner, 1993; Eppli & Benjamin, 1994; Bacon, 1971; Bell et al., 1974; Lentnek et al., 1981; Bacon, 1984; Mulligan, 1984; 1987). The chances that a concentrated shopping location can serve the needs of the multipurpose shopper increase when the diversity of the shopping location increases (Brueckner, 1993; Eaton & Lipsey, 1982; Mulligan, 1983). It is for this reason that Reilly's law of retail gravitation states that larger centers will attract more customers, over a larger distance (Reilly, 1931). Reilly's law uses size, rather than diversity, but both are positively correlated (Sirmans & Guidry, 1993; Gatzlaff et al., 1994; Yiu & Xu, 2012). When size increases, so do the number of stores that can be located at the shopping location (Brueckner, 1993). Also, when the size of an individual store increases, the retailer will be able to sell a wider range of products, increasing the diversity of the individual store and attracting more customers to the shopping location (Brueckner, 1993). In line with this, empirical research finds that when diversity of products and stores in the mall increase, so does the share of customers for whom the mall is not the nearest shopping location (Clark, 1968).

In a shopping mall, an example of a highly concentrated shopping location, every store adds to the diversity and therefore attractiveness of the mall. A store will benefit from the presence of any other store in the same mall when both stores are heterogeneous, which means they are in different product categories. The presence of both stores at a single shopping location (as opposed to the stores being located in isolation) increases the likelihood that multipurpose shoppers can minimize their travel costs by visiting this shopping mall (Brueckner, 1993). The result is that the number of customers (and therefore the revenue) of a store in a shopping mall will be dependent on the other stores located in that mall (Brueckner, 1993). This positive effect generated by one store and benefiting the other is called a positive externality or inter-store externality (Brueckner, 1993). The size of the externality that a store generates for another store depends on a number of aspects. First, when the size of the store that generates the externality increases, the externality it generates for the other store will also increase. This is because with increasing size, a store will be able to sell a wider variety of products, attracting more customers to the mall that would potentially also visit other stores in the shopping mall (Brueckner, 1993). The size of the externality also depends on the type of store that generates the externality. Stores

that sell products that are on the shopping lists of only few multipurpose shoppers generate only small externalities, or no externalities at all. On the other hand, stores that sell products that can be found on the shopping lists of many multipurpose shoppers generate large externalities. The size of the externality also depends on the type of store that receives the potential benefits (Gould et al., 2005). Some products will often be bought in isolation (often large and bulky items) whereas others are often bought on multipurpose shopping trips. The former might benefit less from being located in the mall than the latter. The exact externalities generated or received by specific types of stores depend on the shopping lists of customers in the target market of the mall and is thus location specific. On a more abstract level it is important that a synergy exists between the stores in the mall (Yuo et al., 2003; Fujita & Thisse, 2002). Synergy between stores exist when certain combinations of products are often found together on the shopping lists of multipurpose shoppers. As a result these stores will benefit from each other's presence. A second general statement that can be made is that stores that add the highest diversity to the mall and sell products found on the shopping lists of many shoppers, will generate the largest externalities. Tenants that generate the largest externalities are often referred to as anchor stores (Gould et al., 2005). An example of a type of store that adds a lot of diversity is a department store (Brueckner, 1993), but also certain brand stores are anchor stores since they are popular among many customers. The externalities generated by anchor stores are called retail demand externalities (Eppli & Benjamin, 1994). Retail demand externalities generated by anchors are different from externalities generated by non-anchors in that anchors generate large positive externalities for almost all types of other stores in the shopping mall (Gould et al., 2005). Most of the mall stores are for the largest part dependent on the externalities generated by anchor stores, more so than on non-anchors (Pashigian & Gould, 1998). The impact of anchor stores on the revenues of non-anchor stores has been tested empirically by Gould et al. (2005). It is found in their dataset, containing 2,500 stores in 35 malls in the United States, that when the percentage of space covered by anchors in a mall increases, so do the revenues of the non-anchor tenants in the mall. A one-standard deviation increase in the percentage of space covered by an anchor in a mall, increases the revenues per square foot of non-anchors by 8.73% (Gould et al., 2005). The exact size of the effect however, depends on the type of anchor store. It is found that the largest externalities are created by anchors with a national reputation that sell high to moderate quality goods (Gould et al., 2005). The smallest externalities are generated by anchors that were only just established in local markets and started expanding their markets into new malls (Gould et al., 2005). This supports the idea that reputation and popularity of anchors is positively correlated with the size of the externality generated. As mentioned earlier, the exact size of the externality generated also depends on the type of store that receives the externality. This has also been tested for by Gould et al. (2005). They find that stores benefit the least from anchor presence when they mostly attract their own customers, these are the categories furniture stores and restaurants. Both sell products that are often found in isolation on a shopping list. Fast food, jewelry, music, hobby stores, and clothing stores (men, women and unisex) on

the other hand, benefit the most from anchor store presence for exactly the opposite reason (Gould et al., 2005).

Summarized, retail location theory of heterogeneous retailers provides a number of expectations with regards to the relationship between the sales of individual tenants and externalities generated by the tenant mix. First, it is expected that when the size of a shopping mall increases, the externalities in the mall increase, which results in higher sales levels for individual tenants. Second, in theory every tenant contributes to the diversity of the mall and is therefore able to generate externalities. The exact size of the externality a tenant generates depends on the strength of the tenant that generates the externality (with anchors generating the largest externalities). Third, when the presence of an externality generating tenant is increased, the externality this tenant generates increases as well. Finally, the size of the externality also depends on the store that receives the positive effects of the externality, with stores in some sectors benefiting more from externalities generated by the tenant mix than others.

2.2 THE TENANT MIX AND HOMOGENEOUS RETAILERS

The benefits of a concentration of heterogeneous retailers in a shopping mall can be explained by the minimization of travel costs for multipurpose customers. However, these concepts cannot explain the benefits of a concentration of homogeneous retailers in a shopping mall. Brueckner (1993) considers the effect two stores have on each other to be different when both stores are homogeneous. When two stores are in the same product category, Brueckner (1993) expects these stores to generate a negative externality for each other. This negative externality is generated because of an increase in competition when both stores are located in the same mall (Brueckner, 1993). Competition is increased even further when the size of either of the two stores is increased (Brueckner, 1993). The negative externalities Brueckner expects however, may only hold when the products sold by these two stores are assumed to be perfectly homogeneous and thus perfectly interchangeable. Perfectly interchangeable goods are called lower order goods, and customers do not patronize specific retailers when buying these products (Eaton & Lipsey, 1982). The decisive reason for the customer as to where to buy a lower order good is made through which retailer offers the product for the lowest price (Eaton & Lipsey, 1982; Carter & Allen, 2012). The owner of a mall should therefore restrict the entry of homogeneous lower order retailers in a shopping mall in order to prevent direct competition on price between retailers in the mall (Eaton & Lipsey, 1982).

In contrast, Brueckner's (1993) expectation may not hold when higher order product categories are considered. Within higher order product categories, products sold by different retailers in the same product group are often not perfectly homogeneous, but they are slightly differentiated homogeneous

products. The result of slightly differentiated products is that secondary competitors[1] compete on non-price oriented factors such as quality. This can diminish the negative externality expected by Brueckner (1993) and result in a stable concentration of homogeneous firms (Hotelling, 1929). Even though Hotelling (1929) believed that minimum differentiation[2] on its own could result in a stable concentration of homogeneous retailers, many scholars have criticized this by proving minimum differentiation on its own was not enough to result in stable concentration of homogeneous firms (Chamberlin, 1933; Lerner & Singer, 1937; Eaton & Lipsey, 1975; d'Aspremont et al., 1979; Gabszewicz & Thisse, 1979; Economides, 1984; Eaton & Lipsey, 1979; Eppli & Benjamin, 1994). Other authors showed that, when minimum differentiation is combined with the concepts of comparison shopping, consumer uncertainty and different consumer preferences, a homogeneous concentration of retailers is not just stable, but also beneficial for both the customer and the retailer (Webber, 1972; Eaton & Lipsey, 1979). Consumer uncertainty means that consumers are uncertain on the fact they will be able to find their preferred product at a specific retailer. In order to minimize this uncertainty, consumers favor a mall where homogeneous retailers are concentrated in order to conduct comparison shopping (Lösch, 1954; Eaton & Lipsey, 1979). Especially when homogeneous retailers are still heterogeneous enough, and consumer preferences are considered heterogeneous as well, De Palma et al. (1985) find that revenues of homogeneous retailers benefit from a concentration of secondary competitors. If shopping malls contain in their tenant mix a sufficient number of higher order homogeneous retailers, the consumer is willing to travel further to this shopping mall and bypass the nearest mall. A visit to a mall with a concentration of higher order homogeneous retailers, as opposed to visiting a series of isolated shopping locations, will minimize search cost and the risk of not finding the product that the customer is looking for (Eaton & Lipsey, 1979; De Palma et al., 1985; Stokvis & Cloar, 1991). Comparison shopping is even more attractive in planned shopping malls, because a planned shopping mall also provides the consumers with information on the different retailers located in a single mall, showing immediately at which retailers consumers can comparison shop (Stokvis & Cloar, 1991). Empirical evidence has confirmed the importance of secondary competitors in a shopping mall. Nevin and Houston (1980), and Hise et al. (1983) find a positive relation between the revenues of a shopping mall and the number of secondary competitors in a mall. This finding is the opposite from what Brueckner expected since Brueckner does not make the distinction between higher order and lower order goods sold by homogeneous retailers.

Summarized, location theory of homogeneous retailers provides two expectations with regards to the relationship between the sales of individual tenants and the externalities generated by the tenant mix.

[1] When two stores sell products in the same product category, but the products of the two stores are still heterogeneous enough, these stores are called secondary competitors (Eppli & Benjamin, 1994).

[2] This term was coined later by Boulding (1966) for the concept described by Hotelling (1929) (Eaton & Lipsey, 1979)

First, it is expected that sectors in which perfectly homogeneous products are sold (or services are provided) a non-competitive (or monopolistic) environment will benefit the sales of the individual tenant. An increase in competition will result in an increase of negative externalities that will lower the sales of the individual tenant. Second, it is expected that sectors in which slightly differentiated homogeneous goods are sold (or services are provided) a competitive environment will benefit the sales of the individual tenant. An increase in secondary competitors will result in an increase of positive externalities that will increase the sales of the individual tenant.

2.3 EXTERNALITIES AND RENTS

The positive and negative externalities described above are not unique to shopping malls. However, what is unique to shopping malls, is the efficiency in which shopping malls are able to internalize these externalities through the rents charged to the different tenants. A shopping mall is able to internalize externalities through rents because the owner owns (or at least manages) a significant part of the space in a mall. It is for this reason that externalities can be used to explain why rental differences might exist between different tenants within a shopping mall, or between malls with different tenant mixes.

As discussed above, the revenue of a tenant does not only depend on the tenant itself, but also on the presence of other stores in the shopping mall, and the size of the externalities these other stores generate. If a store with a fixed surface is considered, this store will be willing to pay more for the same space when it is located in a shopping location in which there are externality generating tenants as opposed to an isolated shopping location (Brueckner, 1993). Since the size of the externalities generated by the other tenants is linked to the size of these other stores, theory suggests that when there is an increase in the surface of externality generating stores, the demand curve of the receiving store shifts up (Brueckner, 1993). This effect has been tested for by Gould et al. (2005). In their sample of 2,500 stores in 35 malls in the United States, they find that when the share of anchor space in a mall increases by one standard deviation, the rents per square foot of non-anchor tenants increase by 6.13% (Gould et al., 2005). Just as with the increase in revenue discussed earlier, the size of the increase in rent non-anchors are willing to pay for the increase in anchor presence, depends on the type of anchor. The highest increase in rents are caused by anchors with a national reputation that sell high to moderate quality goods (Gould et al., 2005). Again, the size of the positive externality generated by anchors also depends on the product category of the store that receives the externalities (Gould et al., 2005). The stores that benefit the most in terms of increased revenues, are willing to pay the highest increase in rent when anchor presence is increased (Gould et al., 2005). Other empirical research into the influence of externalities on rents by Gatzlaff et al. (1994) uses a different perspective. They show that the loss of an anchor tenant in a shopping mall will cause an average decrease of 26.14% in rents paid by non-anchors (Gatzlaff et al., 1994). This is likely an overestimation because part of the rental decrease estimated by Gatzlaff et al. (1994) is caused by an increase in vacancies in the shopping mall.

Apart from the fact that externalities influence the willingness to pay of tenants, externalities also influence the rent the owner is willing to accept from potential tenants, or the discounts the tenant is able to demand. Just as the tenant, the owner of a mall tries to maximize the cash flows it receives. When allocating space to a tenant, the owner of the mall will allocate space to this tenant until the marginal cost of space (the construction cost of a square meter of space) is equal to the rent this tenant is willing to pay for this additional surface, the marginal revenues (Brueckner, 1993). However, when a tenant is generating externalities, the marginal cost of space for the owner is not solely the fixed construction cost per square meter. The true marginal cost of space for the owner is the construction costs minus the increase in rent of all the other tenants in the mall caused by an increase of space of the externality generating tenant (Brueckner, 1993). When a tenant generates no externalities, the externality term will be zero and the marginal costs will be equal to construction costs (Brueckner, 1993). As discussed, lower order homogeneous retailers may also generate negative externalities for each other, but they can still generate positive externalities for other stores in the mall. The owner of the mall should therefore balance the positive and the negative externalities generated by lower order homogeneous stores (Brueckner, 1993). As a consequence of the marginal costs of space being influenced by externalities, an owner can reward stores that generate larger externalities with a larger discount and thus lower rents (Brueckner, 1993). However, this does not mean that those tenants who generate the largest externalities will always pay the lowest rent. Apart from the externalities a tenant generates, its rent will also depend on its price sensitivity of demand (Brueckner, 1993). However, when two equally sized stores in the same mall are considered with the same price sensitivity of demand, their rental differences will only be determined by differences in externality generating power (Brueckner, 1993). Pashigian and Gould (1998) confirmed this theoretical hypothesis. They find that anchor stores pay significantly lower rents per square foot than non-anchor stores with the same sales per square foot, even after controlling for store size (both influence the price sensitivity of demand partially) (Pashigian & Gould, 1998). Pashigian and Gould (1998) also find that sales per square foot of anchors are almost constant across different types of malls. However, anchors receive significantly larger discounts in malls where they generate larger externalities (Pashigian & Gould, 1998). This also shows that sales per square foot is not a good proxy for the size of the externalities tenants generate, as was suggested by Benjamin et al. (1990).

Summarized, this section shows how externalities of the tenant mix influence the rent levels of individual tenants within shopping malls. Some tenants are able to demand large discounts because of the externalities they generate, and others are willing to pay premiums to benefit from the externalities.

2.4 OTHER DETERMINANTS OF RENTS AND SALES

To isolate the effect of the tenant mix and externalities in a shopping mall, empirical models should control for other determinants that influence rents in a shopping mall. This subsection will provide an overview of other determinants found in the literature.

LEASE STRUCTURES

Rents of tenants in shopping malls exist of two main components, a base rent, and a percentage rent (Benjamin et al., 1990; Brueggeman & Fisher, 2011). The base rent is a fixed component which is either flat or indexed yearly to inflation (Brueggeman & Fisher, 2011). The percentage rent is a flexible component and is determined by the sales of the tenant. If the sales of a tenant reach a (predetermined) threshold, a percentage of the sales above this threshold is paid to the owner as rent (Benjamin et al., 1990; Brueggeman & Fisher, 2011). Percentage rent is a way to transfer risk from tenants to the owner and a way to incentivize the owner to create an environment that generates high sales volumes for the tenants (Benjamin et al., 1990; Brueggeman & Fisher, 2011). When percentage rent is included in the lease, the owner of the mall has an option on the future sales of a tenant, for which the owner pays by lowering the fixed base rent of the tenant (Benjamin et al., 1990). Leaving everything else constant, when the percentage ratio increases, the option becomes more valuable causing a decrease in base rent (Benjamin et al., 1990). Also, when the threshold level rises, the option on future sales of the tenant is less valuable, which is reflected higher base rents (Benjamin et al., 1990).

Other contract provisions are renewal and cancellation options. Contracts that contain renewal options benefit the tenant and therefore the tenant is willing to pay a higher rent when a renewal option is included in the contract (Benjamin et al., 1992; Carter, 2009). Contracts that contain cancellation clauses benefit the owner and therefore tenants can demand lower rents when cancellation clauses are attached to the contract (Benjamin et al., 1990; 1992).

A lease also specifies the length of the lease, which is negatively correlated to the amount of rent a tenant pays (Benjamin et al., 1992). If a longer lease is signed, costs for the owner like search costs and renovation costs but also the risk of future vacancies are lowered significantly, resulting in a lower rent (Benjamin et al., 1992). Even though the tenant also benefits from longer leases, these benefits do not outweigh those of the owner, and therefore the net effect is a discount on rent when the lease term increases (Benjamin et al., 1992). However, opposite results have also been found by Tay et al. (1999) and Yuo et al. (2010). This is probably due to context dependency of the results (Yuo et al., 2010). Another empirical study finds no significant effect of the length of the lease on base rent (see McCann & Ward, 2004).

TENANT CHARACTERISTICS

One of the most important tenant characteristics that influences both the revenue and the rents of the tenant is the size of the unit the tenant rents. If the surface of a unit increases, the tenant is able to sell a wider variety of products and therefore able to attract more customers (Brueckner, 1993). This means that a unit with a larger surface will have higher revenue, keeping everything else constant. However, additional surface increases the revenue of the tenant at a decreasing rate (Brueckner, 1993). This results

in a downward sloping demand curve, meaning a tenant will be willing to pay less per square meter for every additional square meter (Brueckner, 1993). A larger tenant is also able to demand lower rents from the owner because of two reasons. First, larger units generate larger externalities, which consequently influences rent levels (as mentioned in 2.3), though this does not apply to every tenant. Second, larger units are able to exert larger bargaining power because of the large market share of total mall floorspace occupied by these tenants (Tay et al., 1999)

Next to the surface the tenant occupies, there are two other tenant characteristics that influence the sales and the rents of the tenant. First, the product category of the tenant influences both sales and rent due to different business models. Second, the floor on which the tenant is located influences the sales and the rents of the tenant. The further the floor is located from the main entrance, the lower the footfall it receives. This negatively impacts the sales of the tenants on these more unattractive floors and therefore also the rents/m2 of these units.

LOCATION AND MARKET

The location of a shopping mall determines the shopping mall's catchment area, competition, and market and is therefore an important determinant of rent levels in shopping malls. Regarding the catchment area, rent and sales levels will be positively related to the number of people in the catchment area of the mall and their spending power. Rent and sales levels are also positively related to market conditions (Sirmans & Guidry, 1993). Vacancies, a proxy for excess supply, and time trend variables to proxy economic outlooks are often included in empirical models (Sirmans & Guidry, 1993). With regards to competition, the monopoly power of the shopping mall is important. If a shopping mall contains most of the mall space in a market, this shifts the bargaining position in favor of the owner. The owner can use this bargaining power to demand higher rent levels. When competition increases, rents and sales should be lower to reflect the increased choice in shopping malls for both the tenant and the customer.

SHOPPING MALL CHARACTERISTICS

Different shopping mall characteristics influence the rents and sales in shopping malls. First, the age of a shopping mall impacts rents. The direction of the effect depends on the context. Mostly it is assumed that age impacts rents in a mall negatively (Sirmans & Guidry, 1993). When the age of a mall increases, the consumer drawing power of a mall decreases. Newer malls have a competitive advantage over older malls because they better fit shopping styles of that time (in both design and tenant mix) and new malls have not yet suffered from physical depreciation of the property (Sirmans & Guidry, 1993). Though the above has been confirmed empirically in the US and the UK, other results have been found in Hong Kong. Tay et al. (1999) find that age is positively related to shopping mall rents in Hong Kong. In Hong Kong, shopping malls must establish themselves in a market before they become popular. When the age of a shopping mall in Hong Kong increases, they gain customers because of becoming known among

customers and gaining a reputation (Tay et al., 1999). Also, shopping malls in Hong Kong are often renovated, and tenant mixes are relatively easy to adjust because of the typical lease length in Hong Kong (Tay et al., 1999). The two relationships discussed above are not necessarily mutually exclusive. It is also possible that both relationships are valid at different points in time. For this reason, Yuo et al. (2011) predict a non-linear relationship between shopping mall age and rents and sales of the tenants.

The last feature of shopping malls that is important is its size, a feature that has been discussed before in 2.1 of this chapter. Consensus is that when the size of the shopping mall increases, so does its customer drawing power and therefore the rental levels are higher in larger shopping malls.

3. METHODOLOGY

This thesis will use an ordinary least squares (OLS) linear regression as the statistical model to examine the externalities generated by the tenant mix and how these externalities influence both the rents and sales of the tenants in shopping malls. The model results will be tested for multicollinearity using VIF-values. A VIF-value over 10 is considered to be an indication of serious multicollinearity. The presence of heteroscedasticity will be tested for using a Breusch-Pagan/Cook-Weisberg test. If heteroscedasticity is detected, White's robust standard errors will be used to make inferences.

3.1 TENANT MIX OPERATIONALIZATION

The operationalization of the tenant mix consists of two variables: the share of gross leasable area (GLA) in a mall dedicated to anchors (in line with Gould et al., 2005) and a special specification of the Herfindahl-Hirschman index (in line with Des Rosiers et al., 2009). The share of GLA covered by anchors is an operationalization of the retail demand externalities that have been discussed in the Theoretical Framework and reflects the presence of anchors in a shopping mall. Anchor presence is specified as a share rather than actual GLA, because the actual GLA covered by anchors is sensitive for the size of the shopping mall. For this reason, taking the total GLA is not an option since it would not measure the importance of anchors in a specific mall, but merely follow the size of the mall. This thesis will only focus on the (retail demand) externalities generated by anchors, and not the externalities generated by individual product categories or the synergies between product categories because the dataset does not allow for this. A focus on the anchors is justified, since anchors are mostly considered as the most important externality generating tenants.

A special specification of the Herfindahl-Hirschman index (HHI) will be added to the models and is used to measure the competitiveness within a sector in a mall.[3] Since the positive or negative externalities generated by homogeneous tenants depend on the amount of competitiveness within a sector, the HHI can be regarded as a proxy of the externalities of homogeneous tenants in a mall. The specification of the HHI in the thesis is based on the specification by Des Rosiers et al. (2009), who call this specification an inter-category retail concentration index. They specify the index as followed:

$$HHI = \sum_{k=1}^{n} \left[\frac{GLA_{ij}^{k}}{GLA_{ij}}\right]^{2} = \sum_{k=1}^{n} M_{kij}^{2} \quad (1)$$

Where the numerator is the GLA of store *k*, in retail category *i* and shopping mall *j*, and the denominator is the total GLA of product category *i* within shopping mall *j*. The part between brackets can also be written more simply as *M*, the share of the total GLA in product category *i* and shopping mall *j* occupied

[3] In economics, the HHI is used to measure the amount of competition within markets.

by tenant *k* in the same mall and product category. The index ranges from 0 to 1, where 1 means that all the GLA is concentrated within a single tenant and 0 means that the GLA is distributed among an infinite number of tenants. If n-number of stores all have an equal share of GLA within a mall, the value of the index will be equal to 1/n. The value of the index will be larger than 1/n if one of the n-number of stores has a larger than average share of GLA, reflecting a more concentrated distribution and less competitive environment. The inter-category retail concentration index, when used in a model on both sales/m2 and base rent/m2, can reveal whether tenants within a specific category benefit from a more competitive environment, or a more monopolistic environment. Des Rosiers et al. (2009) were only able to use this variable in a model on the base rent of a tenant, which makes the interpretation of the estimated coefficient complex. This complexity arises because, as Des Rosiers et al. (2009) hypothesize, a higher concentration of GLA within a single tenant for a specific product category significantly increases this tenant's bargaining power vis-à-vis the owner, which results in the tenant being able to demand lower rents. This means that when solely used in a model on rent, the inter-category retail concentration index is not only a measure of competitiveness, but also a measure of bargaining power. This makes it hard to distinguish what is causing the estimated coefficient. However, in this thesis, the index will also be used in a model on sales/m2, which is not influenced by bargaining power. Therefore, it is possible to isolate the effect of the externalities generated by the competitiveness of a sector, from the effects caused by a change in bargaining power. A benefit of using the inter-category retail concentration index is that it is not sensitive for differences in mall sizes. This is a problem when using a different operationalization of competitiveness within a sector, such as the actual number of secondary competitors. However, what should be kept in mind is that the index can have the same value for two completely different store compositions. The idea of the index is that even though the store composition can be different, it still reflects the same level of competitiveness and thus the same value is justified.

3.2 SELECTION OF CONTROL VARIABLES

Control variables will be added to the models in line with the determinants discussed in the Theoretical Framework. Not all the determinants will be used (directly) in the models. As will be discussed more extensively in chapter 4, high correlations (>0.90) between some of the variables exist. To minimize multicollinearity some of these variables will not be included. The decision on which variables to include is made on which of the variables results in the best model and/or which variables are most interesting from a theoretical point of view. Some of the determinants need to be combined or transformed before they are added in the models, this will be discussed in the paragraphs below. Table 1 at the end of this chapter presents the final variables that will be included in the regression models.

The market control variables cannot be entered in the model individually, because of correlations between them and other control variables (for example, the correlation between the size of the mall and

the catchment area population is nearly one). To be able to still use an intuitive and complete market control variable, a combined variable is created. This variable is defined as followed:

$$Players\ per\ 10\ million\ euros = \frac{\left(\frac{Number\ of\ competitors\ in\ the\ catchment\ Area}{Population \times disposable\ income}\right)}{10.000.000} \quad (2)$$

This variable combines the total population of the catchment area and the disposable income per person to calculate the total disposable income in the catchment area. Then, the total disposable income is put into context by including the number of competitors that need to share this income. The value of this variable will decrease when either the number of competitors decline, or the population and/or income increases. This gives the expectation that this variable is negatively related to base rent. The share of total GLA in the market owned by the mall is not used as competition measure because it is highly correlated to both the catchment area population and income (see Chapter 4).

The two dependent variables (*Rent/m2* and *Sales/m2*) and one of the independent variables (*Area*) need to be transformed to be able to fit a linear model. These three variables are all highly positively skewed and therefore they are transformed using a natural logarithm. The Theoretical Framework also supports the transformation of the *Area* variable, because the relation of the *Area* to both the *Rent/m2* and the *Sales/m2* is expected to be non-linear.

The leases in the dataset are signed over the years 2008-2016. Even though the leases are already indexed for inflation, year dummies are used to control for different economic conditions and forecasts at the time of signing the lease.

Two variables on lease structures that have been discussed in the Theoretical Framework will not be added in the model. The first variable is a dummy variable for renewal or cancellation options. This variable will not be added because these options are not specified in any of the leases in the dataset. The second variable is the threshold level after which the tenant will pay percentage rent. Even though most of the tenants pay percentage rent, the threshold level cannot be added in the model due to an endogeneity issue. The owner uses what is called a *natural breakpoint* to determine the threshold level, which is calculated as:

$$Threshold\ level = Natural\ Breakpoint = \frac{Base\ rent\ (€)}{Percentage\ rent\ (\%)} \quad (3)$$

Equation (3) shows that the threshold level is directly related to the base rent (the dependent variable in the models on Rent/m2) and the percentage rent, which means that the threshold level is endogenous to

the dependent variable and an independent variable in the model. For this reason, the threshold level is not included in the model.

3.3 LOCATION FIXED EFFECT MODELS

The models in which tenant mix variables are included will be compared with models that include location fixed effects in the form of mall name dummies. These mall name dummies will estimate location effects such as the accessibility and market characteristics, but also more subjective characteristics such as the overall look and feel of the mall. A benefit of using location dummies is that it lowers the risk of omitted variable bias. However, mall name dummies cannot be included in the same models as the models in which tenant mix variables are included, because the tenant mix variables vary at the mall level.

Table 1 - Description of Variables

Name	Description	Type	Transformation
Dependent variables			
Rent/m2 (€)	*The base rent paid by the tenant divided by the total area of the unit, in euros (€).*	Numerical	Yes; natural logarithm
Sales/m2 (₺)	*The average sales per month of the tenant over the year 2016, divided by the total area of the unit. Sales are reported in Turkish lira (₺).*	Numerical	Yes; natural logarithm
Tenant Characteristics			
Area (m2)	*The gross leasable area (GLA) of the unit.*	Numerical	Yes; natural logarithm
Unit Location	*The floor where the unit is located on.*	Dummy	No
Product categories	*Dummy variables for all the distinct product categories at Retail Type 2 level (for an overview see, Appendix B).*	Dummy	No
Contract specifications (only when Rent/m2 is the dependent variable)			
Lease Length (years)	*The length of the lease in years when the lease was signed.*	Numerical	No
Percentage Rent	*The percentage that determines when and how much percentage rent is paid.*	Numerical	No
Mall Characteristics			
Location Fixed effects	*The name of the mall as dummy.*	Dummy	No
Mall Size (m2)	*The size of the mall (GLA) in square meters.*	Numerical	No
Shopping Mall Age	*The age of the shopping mall in months. Either when the contract was signed (models on rent) or current age (models on sales).*	Numerical	No
Market characteristics			
Players per 10 Million Euros	*The number of competitors of a shopping mall divided by the total income in the catchment area (number of inhabitants multiplied to the average available income per person).*	Numerical	No
Vacancy Rate (%)	*The percentage of GLA vacant in the shopping mall.*	Numerical	No
Year the Lease started	*The year the lease started, to control for economic outlook at the moment of signing.*	Dummy	No
Tenant mix variables			
Anchor Share (%)	*The percentage of GLA in a shopping mall that is covered by anchor tenants.*	Numerical	No
Herfindahl index	*Measures the concentration of GLA within a category from 0-1. 1 being all GLA concentrated in a single tenant (monopoly) and 0 meaning the GLA is spread over infinite tenants (perfect competition).*	Numerical	No

4. DATA

This thesis uses a unique dataset that contains information on 1,487 current tenants (as of March 2017) within 11 shopping malls located across Turkey (see Figure 1 and Appendix A). This dataset was made available by Multi Corporation, a leading (re)developer, manager, and owner of shopping center real estate in Europe and Turkey. The dataset contains information on (1) the store name, (2) the product category of the store, (3) the year the lease was signed, (4) the lease length when the contract was signed, (5) the location (floor level) of the tenant within the shopping mall, (6) the size of the tenant in square meters (m2), (7) the contract rent (either base rent, percentage rent, or both) of the tenant in euros (€), and (8) the revenue of the tenant in Turkish lira (₺) per month. Also, data on mall characteristics such as shopping mall size, the number of parking spots and opening date were made available by the owner.

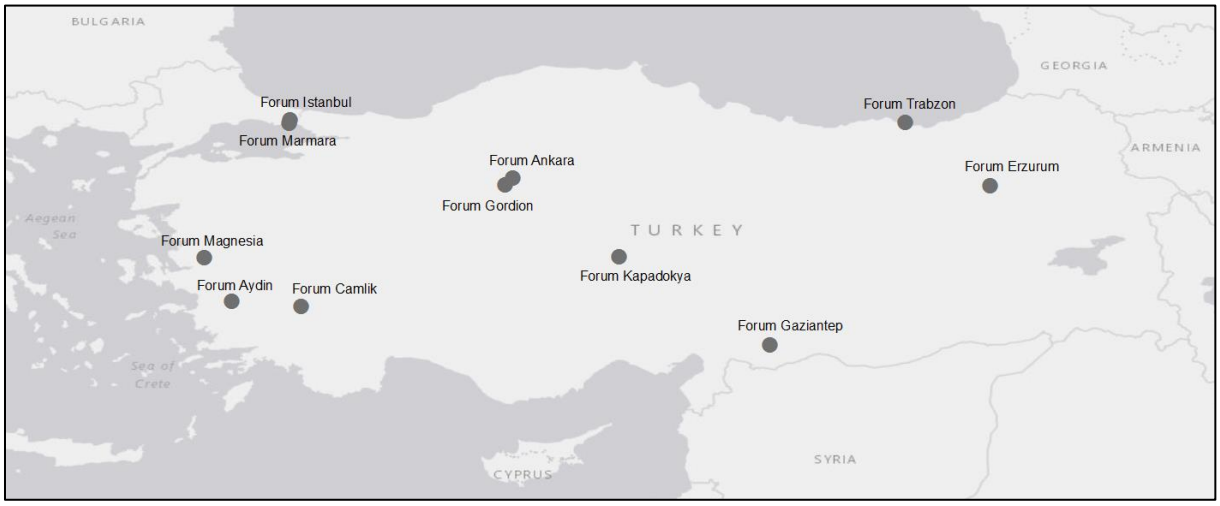

Figure 1. The location of the shopping malls in the dataset.

The data on tenants and mall characteristics is combined with market data from Urbistat and RegioData Research. Urbistat provides a tool which allows its user to define a catchment area using drive times (also incorporating the amount of traffic) rather than absolute distances, as is most often used in previous research. This is important, since shopping malls are often placed strategically along highway exits and entrances. Using drive times instead of absolute distances will therefore result in a more correctly defined catchment area in which the accessibility of a location is incorporated. After the catchment area is defined, Urbistat can calculate the number of people, their income, and the mall's competitors within the catchment area. RegioData Research also provides market data on competitors and their GLA. Using this data, the market share of a shopping mall can be calculated. Mostly the data on competitors by RegioData Research and Urbistat is equal. In the rare case that differences were encountered, both were checked on their accuracy and the most trustworthy number was used. RegioData Research also provides a categorization of shopping malls, ranging from community center to superregional center for the malls in the dataset. Distinctions between different types of malls is made both on size and diversity in product offerings.

4.1 TURKISH RETAIL MARKET

Due to shopping mall research being sensitive to the context in which it is conducted, an understanding of the Turkish retail market, and Turkey in general is necessary to understand the context of this study.

Turkey is located at the crossroads of continents, with Europe to its west and (central) Asia to its east. The geographical location of Turkey makes it an interesting country for international (real estate) investors, since it taps into multiple market regions. Turkey is especially interesting for retail investment due to its strong fundamentals. Turkey has a population of around 80 million inhabitants (comparable to Germany) making it Europe's third largest country (including Russia). Turkey's population is relatively young and growing, with increasing urbanization and a growing middle class. Growth is expected to gradually slowdown in the coming years due to lower fertility, but the influx of refugees is likely to become an important driver for population growth in the future. Next to demographic growth, the economy of Turkey has been rapidly growing in the period between 2002-2012, with stabilizing growth in the past years. This combination of both volume and growth makes Turkey a unique country in Europe, and highly attractive for retail investment over the past decade. This was even further reinforced by the fact that the impact of the Global Financial Crisis was limited in Turkey. However, the Turkish economy is also volatile and becoming less transparent due to political instability, especially in recent years. Reflecting its geographical location, Turkey often shifts political alliances. Turkey was in the process of becoming an EU member, which meant that Turkey's laws and regulations were mostly stimulated by the EU candidacy objectives. However, since 2005, politics in Turkey attached less value on the EU and the country shifted back to nepotism and clientelism. This shift was strengthened by the fact that a single party holds a majority government and leaves the country highly polarized. The political situation became even more unstable when in the summer of 2016 a coup attempt in Turkey failed. This coup attempt still has major political impact and also resulted in political influence in businesses. However, with regards to the retail sector, the consequences are limited. Both private consumption and retail sales still grow around 3% yearly. On macro-economic level however, pressure on the Turkish lira keeps increasing (inflation at 8%, depreciation against the Euro around 10% yearly) and the Turkish bonds were downgraded from investment grade to junk status by Moody's (Fitch's, Turkey's only investment grade rating, changed the outlook for Turkey to negative). Also, the third quarter of 2016 saw Turkey's first negative GDP growth in years, creating a risk of Turkey sliding into a recession. The political situation remains unstable in the future, which is reflected in a volatile economic situation. Turkey also recently switched to an executive presidential system. This shift does provide Turkey with some political stability, but not necessarily with democracy, nor ending polarization.

The socio-economic developments described above impacted the way in which the retail market has developed in Turkey in the past 15 years. The shopping mall culture in Turkey is relatively young. In

the beginning of this century, only a small number of shopping malls were located in Turkey. However, in the period between 2002-2013, shopping mall stock (in m2) quadrupled and the number of shopping malls rose from around 50 to 350. This boom mostly had to do with the strong fundamentals that were discussed above, but also because of a transformation of the retail sector from traditional retail channels like bazaars and small scale (unorganized) retailing to modern shopping malls. This new retail environment, and the potential for growth attracted many international retailers in the period between 2005-2010. In recent years however, an increasing number of international retailers decided to leave the Turkish market. International retailers often stated competition with Turkish formats, and tax and import regulations as the main reason for their departure. But not only international retailers are rethinking their positions. Also domestic retailers are starting to rethink where they want to be located, and start to focus on those locations that perform well. This is something that will mostly affect secondary assets. Domestic retailers also experience management level changes due to the fall out of the failed coup. The depreciation of the Turkish lira also puts pressure on the performance of retailers in Turkey. In contrast with the boom period 2002-2013, recently shopping mall development has been delayed due to the political situation. In the aftermath of the coup, many investment decisions were delayed and it is unclear whether these delays will eventually result in the cancelation of projects. Investment volumes are also low, with limited investments since 2008. Due to the lack of reference deals, yields for shopping malls are hard to determine and volatile.

Next to the socio-economic developments described above, there are also other processes shaping the Turkish retail sector and shopping malls more specifically. A first development is the rise of online shopping. The market capitalization of online shopping is still small, but growing fast, especially in well-connected cities such as Ankara, Istanbul and Izmir. However, this growth should be seen in the context of overall market growth, and is parallel to growth in physical retail sales. Nevertheless, shopping mall owners should be prepared for a growing market share of online sales and a blurring between channels, with physical retailers opening online channels. Also other consumer preferences shape shopping malls, for example the anchor profile in Turkey is diverse, with not a sole focus on department stores (as is the mostly the case in the US). Many of the anchor stores in Turkey are popular brand name stores, and are spread over a number of product categories such as fashion and entertainment. However, traditional anchors such as department stores and supermarkets are also located in Turkish shopping malls. The anchor profile also influences refurbishment options. In US malls, the structure of the mall is often in a way that it has a predetermined location for department stores. Once a department store leaves, the owner of the mall almost has no other option than to find a new department store at this location of the mall. This means that the impact of an anchor leaving in the US might be much larger than in Turkish malls, where most of the anchor units can be refurbished and made suitable for (anchor) tenants in another product category. Another difference with the US with regards to

consumer preferences is the fact that food courts are often a destination in Turkish malls, and not merely a convenience while shopping (as is mostly the case in the US).

A final remark on the Turkish retail real estate context that should be made has to do with the leases of tenants. In Turkey, tenants can terminate their contracts relatively easily without major consequences. When tenants wish to terminate their contracts, the only consequence is a marginal fine.

4.2 DESCRIPTIVE STATISTICS

Table 2 presents the descriptive statistics of the tenants in the dataset. From the original dataset containing 1,487 observations, 121 observations have been omitted because of incomplete information, and nine observations are considered as outliers. For the largest part, the omitted observations are the kiosks in the shopping malls (106 observations), whose exact area is not reported, nor the exact sector they are in. The base rent reported in Table 2, is the current (March 2017) base rent per square meter. This means that it is the base rent as negotiated when the lease was signed, indexed yearly to inflation. The percentage rent is the percentage that determines when, and how much percentage rent the tenant must pay. The sales stated, are the average monthly sales over 2016 per square meter in Turkish lira. The average sales over a year are used, to avoid problems with seasonality.

Table 2 shows that the dataset contains two distinct groups: anchor tenants and non-anchor tenants. Looking into these two separate groups reveals some indications for the externalities anchor tenants generate. In total, 94 anchors and 1,263 non-anchors are identified in the dataset. Instead of only using size as a distinction between anchors and non-anchors (as was done in earlier empirical research, see for example Yuo et al., 2008), the owner was asked to identify key tenants in every shopping mall. This approach is taken because, in practice, it is not just the size of a unit that makes a tenant an anchor. However, even when using the owner's distinction, Table 2 shows that anchor tenants are on average almost 16 times larger than non-anchors. Anchors also pay lower base rents per square meter and receive an average 'discount' of 72.1% when compared to an average non-anchor tenant. This discount is expected from the Theoretical Framework and is an indication of the externalities anchor tenants generate, which are internalized through a discount on their rent. This internalization process will be discussed more extensively in chapter 5 and Appendix E. The size of the percentage rent is also different, with anchors having a lower percentage rent than non-anchors, and fewer anchors pay percentage rent compared to non-anchors. However, the difference is not as large as was found by Gould et al. (2005), who find in their dataset containing US malls, that only a quarter of the anchors pay percentage rent (in this dataset 97.87% of the anchors pay percentage rent). There appears to be a higher preference among anchors in Turkey to pay percentage rents than in the United States. This observation can be explained by the Turkish context that was discussed before. In the Theoretical Framework it was discussed that percentage rents can be used as a risk transfer from the tenant to the owner. Considering that Turkey has

a volatile market with economic instability, it is likely that anchor tenants will negotiate percentage rents to hedge against an uncertain future. The US market, especially in the time of the study of Gould et al. (2005), is much more stable. For this reason, US anchor tenants might have a lower preference in paying percentage rents. Another reason that can explain the difference in preference for paying percentage rents has to do with the anchor profile.

Table 2 - Descriptive Statistics Tenants

	Mean	Standard deviation	Min.	Max.	N
All Tenants					
Size (m2)	406.29	1,082.20	6	16063.76	1,357
Base Rent (m2)	43.85	27.24	1.84	212.17	1,357
Percentage Rent	7.06	2.28	0	20	1,357
Sales/m2 (₺)	1068.92	1213.03	11.14	23086.27	1,357
Lease Length (years)	7.57	2.88	2	26	1,357
Age of mall when the contract was signed (months)	22.46	28.83	0	102	1,357
Non-Anchors					
Size (m2)	198.98	197.25	6	1,593	1,263
Base rent/m2 (€)	46.16	26.78	1.84	212.17	1,263
Percentage Rent	7.12	2.14	0	16	1,263
Sales/m2 (₺)	1106.42	1242.35	15.22	23,086.27	1,263
Lease Length (years)	7.35	2.70	2	17	1,263
Age of mall when the contract was signed (months)	23.54	29.22	0	102	1,263
Pays Percentage rent (%)	98.89		0	1	1,263
Anchors					
Size (m2)	3191.78	2849.96	234	16063.76	94
Base rent/m2 (€)	12.89	6.40	2.30	33.16	94
Percentage Rent	6.24	3.60	0	20	94
Sales/m2 (₺)	565.08	484.43	11.14	2266.72	94
Lease Length (years)	10.50	3.51	4	26	94
Age of mall when the contract was signed (months)	7.94	17.34	0	72	94
Pays Percentage rent (%)	97.87		0	1	94

Source: Multi Corporation.

As discussed before, in the US most of the anchors are department stores, whereas the anchor profile in Turkey is much more diverse. It is conceivable that the different types of anchors have different preferences regarding percentage rent. A last point of interest found in Table 2, is the relative stability of anchor tenants compared to non-anchor tenants. On average, anchor tenants sign longer leases than non-anchor tenants. The relative stability of anchor tenants is also reflected in the fact that the average current anchor tenant signed their lease within the first year (7-8 months) after the opening of the

shopping mall, where this is nearly two years (23-24 months) for the average non-anchor. Of all the current tenants, 64% of the anchors were in the shopping mall when it opened compared to 42% of the non-anchors. This stability shows two things. First, an owner knows the importance of anchor tenants to attract non-anchor tenants and will therefore try to sign these tenants very early in the development process of the mall. The owner also needs to guarantee non-anchors that the anchor presence is structural, and for this reason, longer leases will be signed with anchor tenants. An owner is also more willing to sign a longer lease with anchor tenants, because an owner has more trust that an anchor will not default before the end of the lease, and the owner has more trust in the stability of the value the anchor adds to the mall over time. Non-anchors are more unstable in both regards. From this analysis and Table 2, it can be concluded that anchors and non-anchors are two distinct groups within the dataset, mostly caused by the externalities anchor tenants generate.

Appendix B shows the distribution of the tenants per product category, as used by the owner. The categorization of the owner consists of two levels, Retail Type 1 is a more global categorization where Retail Type 2 is a more refined categorization. The distinction between anchors and non-anchors is also visible here. For example, some sectors contain only anchor tenants (supermarkets and department stores), where others contain only non-anchor tenants (services and gastronomy/food). This is in line with the Theoretical Framework, that says that stores selling a large variety of goods, like department stores, are anchors. However, another observation is that the anchor profile is diverse, with anchors spread over different product categories and a large share of anchor stores being fashion retailers. This observation fits the Turkish context as described earlier. Table 9, in Appendix C shows the distribution of the stores over the different shopping malls by using the Herfindahl index (therefore, this table also contains the descriptive statistics of this variable). From Appendix C, it becomes clear that there is a wide variety in the Herfindahl index within and between categories. Some categories will contain only some stores in certain malls, and many in others. Also some categories have only a single store in every mall, such as supermarkets. This is also expected from theory, since supermarkets are often regarded as selling perfectly homogeneous goods. To prevent competition, owners will limit the entry of these tenants to just a single unit within a shopping mall. Finally, a category such as Fashion has many stores in every mall, though there are still differences between malls. This makes sense, in that Fashion is traditionally a category in which comparison shopping is an important consumer behavior.

Table 3 presents the descriptive statistics of the malls in the dataset. The age of the mall stated in Table 3, is the age of the mall in March 2017 in months. The shopping malls in the dataset are young, especially when put into context of the average lease length from Table 2. The age of the malls in the dataset range from 4 to 9 years, with an average of around 7 years, whereas the average lease length of all tenants is between 7 and 8 years. Because of the malls being relatively young, neither extensions nor refurbishments have been conducted in any of the malls. The malls in the dataset show a large variability

in size (GLA), with the largest mall being nearly 9.5 times larger than the smallest, and a large standard deviation. This large variability in size also explains the large variability in the number of anchors, with larger malls containing significantly more anchors than smaller malls. However, the share of GLA dedicated to anchors is much more stable and is not heavily correlated with the size of the mall. Table 3 shows that on average, around 48% of the GLA of a shopping mall is dedicated to anchor stores. Table 2 shows this is very costly for the owner since nearly half of the mall will be leased to tenants that receive significant 'discounts' on their rent. Again, this is an indication that anchor tenants generate significant externalities for non-anchor tenants, otherwise an owner would not dedicate around 48% of the GLA of the mall to low paying anchor tenants. Table 3 also shows that most of the shopping malls in the dataset are categorized as regional centers (using the definition of RegioData Research) where only three of the shopping malls are superregional centers and two are community centers.

Table 3 - Descriptive Statistics Shopping Malls

	Mean	Standard deviation	Min.	Max.	N
Number of Anchors	9.45	5.14	4	21	11
Anchor Share (%)	48.26	7.8	38.05	64.16	11
Age of the mall (months)	85.5	20.85	42	107	11
Number of Tenants	152.45	68.20	70	285	11
Size of Mall (m2)	62,086.58	47,810.95	18,573	172,648	11
Community center	0.18		0	1	11
Regional center	0.55		0	1	11
Superregional center	0.27		0	1	11

Source: Multi Corporation and RegioData Research (2017)

Finally, Table 4 presents the descriptive statistics for the market variables. For every mall, the catchment area has been defined as the area covered in a 30-minute drive. Again, the large variability between shopping malls is visible, with some malls being in a highly competitive environment and others having a monopoly within their catchment area. Malls that have larger market shares are often located in areas that have an income below the national average and/or fewer people, whereas malls in a more competitive environment are often located in areas with a higher than average income and/or inhabitants.

Table 4 – Descriptive Statistics Market

	Mean	Standard deviation	Min.	Max.	N
Market share GLA (%)	33.22	32.57	3.50	100.00	11
Vacancy rate (%)	3.43	2.38	0.39	6.86	11
Catchment area (minutes)	30	0	30	30	11
Catchment area population	1,656,433	1,654,800	291,975	6,229,163	11
Catchment area income (Turkey=100)	116.24	32.22	72.76	163.00	11
Number of Players	14.64	16.98	1	50	11
Number of competitors per 1000 inhabitants	0.011	0.008	0.003	0.028	11

Sources: Urbistat (2017), RegioData Research (2017)

5. RESULTS

Table 5 presents the results of the models estimating the *Sales/m2* (Models 1-3) and the *Rent/m2* (Models 4-6) of non-anchor tenants in the dataset. All models in Table 5 are highly significant, with F-statistics that clearly reject the null hypothesis that the coefficients are equal to zero. Most of the variables are highly significant in at least some of the model specifications, with *Lease Length* being an exception. Model performance is in line with comparable models in other empirical studies. There is a clear distinction between the explanatory power of the models on *Sales/m2* and the models on *Rent/m2*. The models on *Sales/m2* explain around 46.5% of the variance in the data, whereas the models on *Rent/m2* explain around 76% of the variance in the data.

Model 1 and 4 in Table 5 use location fixed effects to estimate the *Sales/m2* and *Rents/m2* of non-anchor tenants. As discussed in chapter 3, when using location fixed effects, the variables of interest cannot be added in the regression and therefore these two regressions are of no further interest when it comes to the externalities generated by the tenant mix. However, these two models show that when compared to the models in which location fixed effects are not used, model performance is comparable.

5.1 EXTERNALITIES GENERATED BY ANCHORS

Indications of the externalities generated by anchors, such as considerable discounts on the base rents of anchor tenants, and the large share of mall space dedicated to lower paying anchors, have been discussed in chapter 4. This section will provide evidence for the externalities anchor tenants generate for non-anchor tenants by examining how anchor presence influences both the sales and the rents of non-anchor tenants. Model 2 in Table 5, shows that there is a significant and positive causality between the share of mall space dedicated to anchors, and the sales of non-anchor tenants. This is in line with the Theoretical Framework and findings of Gould et al. (2005). This confirms that anchor stores generate positive externalities for non-anchor tenants in the shopping mall. Using the coefficient of *Anchor Share* in Model 2, the externalities anchors generate can be quantified. A one-standard deviation increase (a 7.8% increase, see chapter 4) in mall space dedicated to anchors, results in a 4.63%[4] increase in sales per square meter for non-anchor tenants.

[4] Because of the log-linear relation between the *Sales/m2* and *Anchor Share* in this model, the increase in *Sales/m2* (in percent) can be calculated by multiplying the coefficient of *Anchor Share* (estimated in Model 2) by the change in the variable *Anchor Share* (0.078) and finally multiplying this with 100. This results in a 4,63% (=0.594×0.078×100) change of *Sales/m2*.

Table 5 – Regressions on the Sales and Rents of Non-Anchor Tenants

	(1) Sales/m2	(2) Sales/m2	(3) Sales/m2	(4) Rent/m2	(5) Rent/m2	(6) Rent/m2
Anchor Share (%)		0.594*			1.101***	
		(1.90)			(5.60)	
Share International Anchor			0.555**			1.061***
			(2.05)			(6.10)
Share National Anchor			0.311			0.866***
			(0.84)			(4.01)
Herfindahl index		0.135	0.146		-0.198**	-0.180***
		(0.86)	(0.94)		(-2.30)	(-2.09)
Area (m2)	-0.313***	-0.316***	-0.317***	-0.418***	-0.416***	-0.417***
	(-10.42)	(-10.48)	(-10.48)	(-20.93)	(-21.16)	(-21.08)
Percentage Rent				-0.011	-0.012	-0.011
				(-1.26)	(-1.34)	(-1.33)
Lease Length (years)				-0.005	-0.004	-0.004
				(-0.81)	(-0.70)	(-0.78)
Mall Size (m2)		1.81×10^{-6} ***	1.84×10^{-6} **		3.24×10^{-6} ***	3.40×10^{-6} ***
		(3.75)	(3.76)		(11.41)	(12.52)
Shopping Mall Age		0.004***	0.003**		-0.003***	-0.004***
		(3.78)	(2.30)		(-4.97)	(-4.68)
Vacancy Rate (%)		-0.071***	-0.082***		-0.083***	-0.097***
		(-8.29)	(-6.59)		(-16.34)	(12.93)
Players per 10 Million euros		16.81***	17.09***		25.23***	24.55***
		(2.84)	(2.85)		(8.29)	(7.70)
Constant	8.159***	7.595***	7.822***	5.823***	5.327***	5.509***
	(52.34)	(29.75)	(30.51)	(44.09)	(33.99)	(38.94)
Product categories	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Unit Location	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Location Fixed effects	*Yes*	*No*	*No*	*Yes*	*No*	*No*
Year the Lease started	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*
F-statistic	532.10***	575.75***	564.05***	2155.46***	2050.71***	2051.48***
N	1,263	1,263	1,263	1,263	1,263	1,263
adj. R-sq	0.460	0.458	0.458	0.763	0.754	0.756
Root MSE	0.561	0.562	0.562	0.297	0.302	0.301

This table presents the regressions estimating the sales (models 1-3) and rents (models 4-6) of non-anchor tenants in 11 Turkish shopping malls. The regressions include two variables for the tenant mix, Anchor Share (which is split between national and international anchor share in Model 3 and 6) and the Herfindahl index.
T-statistics in parentheses
**p<0.10; **p<0.05; ***p<0.01*
White's robust standard errors are used

A non-anchor tenant in the dataset has average monthly sales of 1106.42 Turkish liras per square meter. This means that when 7.8% extra mall space is dedicated to anchor tenants, the sales per square meter of the average non-anchor go up with 51.26 Turkish liras, or 15.32 euros per square meter, per month.[5] This increase in sales/m2 due to larger anchor presence should increase the non-anchor's willingness to

[5] Using the average exchange rate over 2016: 1 euro is equal to 3.3432 Turkish liras.

pay per square meter. This is confirmed by Model 5 in Table 5, which finds a significant and positive causality between the share of mall space dedicated to anchors and base rent of non-anchor tenants. Using the coefficient of *Anchor Share*, Model 5 shows that a one-standard deviation increase in mall space dedicated to anchors results in an 8.59% increase in (base) rent per square meter for non-anchor tenants. This is equal to an increase in base rent/m2 of 3.96 euros for the average non-anchor tenant. This shows that even though the non-anchor tenant is charged higher rents because of an increased anchor presence, this is easily compensated for by the increase in sales caused by the externalities the anchor tenants generate. The net result is a profit of €11.36 for the average non-anchor tenant.

Looking at Model 2 and 5 in Table 5, it shows that increasing anchor space will always be beneficial for the sales of non-anchor tenants, and the rents an owner can demand from non-anchor tenants. However, this does not mean that an owner will maximize the mall's rental income by blindly increasing anchor space. As was made clear in chapter 4, dedicating mall space to anchor tenants comes at a cost to the owner, since anchor space is heavily subsidized. For this reason, a developer should carefully balance both anchor space and non-anchor space in order to maximize rental income of the shopping mall. Appendix D illustrates the dilemma a developer faces when internalizing the externalities of anchor tenants. The example in Appendix D is highly context dependent and should only be considered as an illustration of the internalization process. However, an interesting conclusion from Appendix D is that a developer of a mall does not necessarily need to maximize externalities in the shopping mall in order to maximize a mall's rental income.

As was discussed in the Theoretical Framework, the strength of the anchor influences the size of the externality that it generates. To further investigate this, Models 3 and 6 in Table 5 split *Anchor Share* into two categories: the share of mall space dedicated to international anchors (*Share International Anchors*) and to national anchors (*Share National Anchors*). Models 3 and 6 in Table 5 show that there is a difference in the size of the externality generated by the two types of anchors. The estimated coefficient for *Share International Anchor* is larger than the estimated coefficient for *Share National Anchor* in both the models on *Sales/m2* and *Rent/m2*. This reveals that international anchors generate larger externalities than national anchors. This can be explained by the fact that these international anchors are more popular among customers and also more exclusive in Turkey. However, the rents/m2 international anchors pay are not significantly lower than the rents/m2 national anchors pay. This means it is more beneficial for the owner to dedicate GLA to international anchors than to national anchors. It should be noted however, that some product categories contain mostly one type of anchor (see Appendix F). It might be the case that for certain product categories the owner has no choice for an international anchor, or the externalities created by an international anchor and national anchor are not significantly different (think of a category such as entertainment, which mostly contains cinemas). Also the fact that many international retailers are leaving Turkey should be taken into account (see chapter 4.1).

The Theoretical Framework also discussed that the size of the externality is not only determined by the tenant that generates the externality, but also by the store that receives the externality. To test this, Table 6 presents the robustness of Models 2 and 5 (in Table 5) over different product categories.

Table 6 - Estimating the Effect of 'Anchor Share' per Sector

Product category	(1) Sales/m2	(2) Rent/m2	Observations
Electronics	3.751	1.726	44
	(1.11)	(1.56)	
Fashion	0.269	0.579*	386
	(0.61)	(1.81)†	
Food Specialist	1.211	1.260**	248
	(1.35)	(2.43)†	
Household Goods	1.412	1.372**	138
	(1.18)	(2.22)	
Jewelry/Optics/Accessories	-0.132	2.471***	100
	(-0.10)	(4.48)	
Leisure/Culture	-	-	20
Personal care/Healthy/Beauty	2.316	0.566	78
	(1.48)	(0.78)	
Services	4.812	2.671	49
	(1.36)	(1.18)	
Shoes and Leather	0.104	0.694	121
	(0.15)	(1.40)	
Sports/Toys/Hobby/Media	0.050	1.389	79
	(0.03)	(1.21)	

This table presents the coefficient of the Anchor Share (%) modeled on the rents and sales of non-anchor tenants. The coefficient is estimated using individual regressions for every product category. All the regressions contain the following control variables: Area (m2); Unit Location; Product categories; Mall Size (m2); Shopping Center Age; Players per 10 Million Euros; Vacancy Rate (%); Anchor Share (%). The regressions in column 2 also include the following control variables: Lease Length; Year the Lease started; Percentage Rent.
T-statistics in parentheses
**p<0.10; **p<0.05; ***p<0.01*
†White's robust standard errors are used

Table 6 only presents the coefficient for *Anchor Share*, which is estimated by running individual regressions per product category, using the same control variables as Models 2 and 5 in Table 5 (for column 1 and 2 respectively). The non-anchor tenants are categorized at the Retail Type 1 level to increase the number of observations per product category. No regressions could be run on the 'Leisure/Culture' category, due to the low number of observations in this category (n=23). Table 6 shows that anchor presence has a positive effect on the *Sales/m2* and *Rent/m2* for almost all the

individual product categories. This is in line with the expectations from the Theoretical Framework. However, column 1 shows that there appears to be no significant relation between *Anchor Share* and *Sales/m2* for any of the individual product categories. The lack of significant results most likely has to do with the small number of observations per product category. The coefficients in column 1 differ between the product categories, indicating that not every product category appears to benefit equally from the externalities generated by anchor tenants. The 'Services' product category seems to profit the most from anchor presence with regards to sales, though no significant relationship is found. The estimated coefficient makes sense, in that services (such as dry cleaners, hairdressers, and travel agents) benefit highly from traffic generated by anchors, more than that they are able to attract customers to the mall themselves. From earlier empirical research by Gould et al. (2005), it was expected that 'Food Specialist' (like coffee shops, fast food, etc.) would also highly benefit from anchor presence because of the same reason services benefit from anchor presence. However, in the context of Turkish malls, the food court is often a destination on itself, and therefore less dependent on the traffic generated by anchor tenants. Table 6 shows 'Food Specialist' still appears to benefit from an increased anchor presence, though the coefficient is much lower compared to 'Services'. Another category that is expected to highly benefit from anchor presence are the kiosks in a shopping mall. However, as was mentioned in chapter 4, this category could not be included in the analysis. With regards to *Rent/m2*, column 2 does show significant relationships between *Anchor Share* and *Rent/m2* for some of the product categories. The reason why significant results are found in column 2 and not in column 1, most likely has to do with the fact that the sales of a tenant depend much more on the individual tenant and its business model, and less on fundamentals (which is also reflected by the lower model performance for the models on *Sales/m2* compared to *Rent/m2* in Table 5). This is even further reinforced by the low number of observations per category. In column 2, just as in column 1, 'Services' has the highest coefficient, but the coefficient is still not significant. The coefficients for 'Fashion' and 'Shoes and Leather' are relatively small in both column 1 and 2. This can be explained by the fact that their sales and rents are probably determined more by the presence of secondary competitors than anchor presence, since these two categories sell slightly differentiated homogeneous goods. This will be investigated further below.

5.2 HOMOGENEOUS RETAILERS AND EXTERNALITIES

Models 2-3 and 5-6 in Table 5, estimate the coefficient of the *Herfindahl index* (or inter-category retail concentration index), which measures the influence of the amount of competitiveness within a sector on the sales and rents of the tenants. An important observation is that the sign of the coefficient is different when comparing the models on *Sales/m2* and *Rent/m2*. From Model 2 and 3, it appears that in general, tenants benefit from a more monopolistic environment, since this will increase their sales. However, the coefficient is not significant. On the other hand, Models 5 and 6 find a significant, and negative relationship between a more monopolistic environment and base rent. This means that even though stores appear to benefit from a more monopolistic environment in terms of sales, this is not reflected in

a rent premium to be in a more monopolistic environment. The most likely explanation for this result is the one presented by Des Rosiers et al. (2009). When more of the sector's GLA is concentrated within a single tenant, this tenant's bargaining power is significantly increased, which results in the tenant being able to demand lower rents (Des Rosiers et al, 2009). Table 7 looks into the impact of the Herfindahl index per product category, to fully understand the implications of a more competitive or monopolistic environment on the rents and sales of the tenants.

Table 7 - Estimating the Effect of the Herfindahl Index per Sector

	(1)	(2)	
Product category	Sales/m2	Rent/m2	Observations
Electronics	2.197	0.126	44
	(1.72)	(0.29)	
Fashion	-0.932	-2.330**	386
	(-0.65)	(-2.30)†	
Food Specialist	0.342	2.273	248
	(0.05)	(0.69)†	
Household Goods	-1.803	-3.592**	138
	(-0.63)	(-2.34)	
Jewelry/Optics/Accessories	1.627	-0.567	100
	(1.11)	(-0.99)	
Leisure/Culture	-	-	20
Personal care/Healthy/Beauty	-0.198	-0.362	78
	(-0.31)	(-1.18)	
Services	0.492	0.030	49
	(0.46)	(0.04)	
Shoes and Leather	-0.878	-1.716***	121
	(-1.20)	(-3.27)	
Sports/Toys/Hobby/Media	0.004	-0.373	79
	(0.01)	(-0.69)	

This table presents the coefficient of the Herfindahl index modeled on the rents and sales of non-anchor tenants. The coefficient is estimated using individual regressions for every product category. All the regressions contain the following control variables: Area (m2); Unit Location; Product categories; Mall Size (m2); Shopping Center Age; Players per 10 Million Euros; Vacancy Rate (%); Anchor Share (%). The regressions in column 2 also include the following control variables: Lease Length; Year the Lease started; Percentage Rent.
T-statistics in parentheses
**p<0.10; **p<0.05; ***p<0.01*
† White's robust standard errors are used

Table 7 only presents the coefficient of the *Herfindahl index* (at the Retail Type 1 level). The coefficients are estimated using individual regressions for every product category, while using the same control variables as Models 2 and 5 in Table 5 (for column 1 and 2 respectively). As can be seen in Table 7, most of the estimated coefficients for the *Herfindahl index* are not significant. Again, just as with the

regressions in Table 6, this most likely has to do with the low number of observations per product category. An important observation that can be made from Table 7 is, that in contrast with Models 2-3 and 5-6 in Table 5, the signs estimated for the models on *Sales/m2* are almost completely equal to the signs estimated for the models on *Rent/m2*. This shows that using the Herfindahl index in a general model is less effective than in distinct models per retail category.

As has been discussed in the Methodology, for the models on *Sales/m2* (column 1 of Table 7) the *Herfindahl index* is solely related to the externalities of homogeneous stores. Column 1 of Table 7 shows a large variability in coefficients, with some categories benefiting from a more competitive environment (negative sign) and other categories benefiting from a more monopolistic environment (positive sign). When stores benefit from a more competitive environment, this most likely has to do with the fact that the presence of secondary competitors will attract consumers who want to comparison shop and minimize search costs. Both the sectors 'Fashion' and 'Shoes and Leather' have negative signs for the estimated coefficients in column 1, indicating that these sectors benefit from a more competitive environment. Due to different brands and different collections, 'Fashion' and 'Shoes and Leather' stores sell products that are slightly differentiated homogeneous products. As discussed in the Theoretical Framework, the presence of slightly differentiated products within a sector is one of the main criteria for why customers would comparison shop. The estimated coefficients for 'Fashion' and 'Shoes and Leather' therefore make sense, since a more competitive environment will attract more consumers who try to minimize search costs, increasing the individual tenant's sales.

Considering the categories that have a positive sign, the presence of more homogeneous stores results in negative externalities for these categories. From Table 7, multiple categories have positive signs. First, 'Services' sell products that are often very homogeneous. For services such as dry cleaning, the customer will only care about the price. Having multiple dry cleaners in a single mall will therefore only increase competition on price. This explains why a sector such as 'Services' will mostly benefit from a more monopolistic environment. With regards to 'Electronics', the products sold might by slightly differentiated, but a single electronics store will (for example) often sell a variety of different TVs and laptops. This is especially the case for market leaders who dominate the 'Electronics' sector. Considering this, it makes sense that also the 'Electronics' sector benefits from a more monopolistic environment.

The coefficient of the 'Food Specialist' sector is very insignificant in column 1, with a T-statistic of 0.05. Theoretically this makes sense. As was mentioned, food courts in Turkish shopping malls are often a destination on itself, these food courts thrive because of the diversity in types of cuisines that are offered. Taking this in mind, a negative sign for the *Herfindahl index* coefficient is expected. However, food stores also compete. If a single mall contains only a small number of tenants selling food, they will

highly benefit from this monopolistic environment because people still want to eat while shopping. Taking this in consideration, a positive coefficient would be expected. The insignificance of the coefficient in column 1 of Table 7 for 'Food Specialist' might indicate that these two forces are balanced, and the sales of 'Food Specialist' are not dependent on the type of environment (competitive or monopolistic).

Not all the categories in Table 7 have been discussed so far. What should be kept in mind is that not a single coefficient is found to be significant in column 1. For this reason, only those categories have been discussed for which there are solid explanations for the estimated coefficient. Also, they are only discussed with regards to the direction of the relationship. Nevertheless, the coefficients could just as likely be equal to zero.

Column 2 in Table 7 shows that some significant relations between the *Herfindahl index* and *Rent/m2* are found. The reason that for rent the *Herfindahl index* is sometimes significant can be explained by the fact that for rent, the Herfindahl is also a proxy for bargaining power (see chapter 3). As was already discussed, the signs in column 2 are mostly equal to the signs estimated for the models on *Sales/m2*. Product categories that appear to benefit from a more monopolistic environment with regards to sales, also appear to have a positive relation between the *Herfindahl index* and *Rent/m2*. This means that these tenants are willing to pay a premium to get access to this more monopolistic position. However, this does not mean that the tenant's bargaining power is not increased when more GLA is concentrated in a single tenant (as theorized by Des Rosiers et al., 2009). It might be the case that the premium the tenant pays is much lower than the benefits gained from the more monopolistic position of the tenant. It is not possible to completely isolate the effects of the (positive or negative) externalities from bargaining power. What Table 7 does show, is that in general there appears to be a relationship between the positive or negative externalities of a more competitive environment and the rents tenants are willing to pay. This confirms that in models on rents, the Herfindahl index is an operationalization of the positive or negative externalities of a more competitive environment within a sector. Caution is needed however, when only models on rent can be estimated, and no models on sales to make this comparison.

5.3 FUNDAMENTALS

Next to the variables of interest, the regressions in Table 5 also include control variables. Almost all the control variables added in the regressions in Table 5 have the signs as expected from theory, and they are robust over the different model specifications. It is expected that the sign of a variable is the same in the models on *Sales/m2* compared to the models on *Rent/m2*. This is the case for all but one control variable, *Shopping Mall Age*. Some interesting observations on the fundamentals will be discussed shortly below.

The two variables on contract specifications, *Percentage Rent* and *Lease Length*, are only applicable to the models on *Rent/m2* in which they are not significant for all the model specifications. Especially the insignificance of *Lease Length* in this study is interesting and not in line with the theory as discussed in chapter 2. The insignificance of *Lease Length* in the models is most likely caused by the context from which the dataset originates. In Turkey, contracts do not have the same value as in the countries that have been the subject of earlier empirical studies (like the United Kingdom or the US), where a significant relation between lease length and base rent was found. Leases in Turkey can be terminated relatively easily by the tenant, without large consequences with regards to penalties and fines. For this reason, longer leases will not necessarily be beneficial to the owner, making the owner not willing (and the tenant not able) to give (demand) discounts for longer leases.

With regards to mall characteristics, the coefficient for *Shopping Mall Age* deserves some further discussion. The sign of the coefficient of *Shopping Mall Age* is not constant when comparing the models on *Sales/m2* with the models on *Rent/m2*. The age of the shopping mall is positively related to the sales of a tenant. This positive relation fits the expectation that it takes time for malls to become established and popular among customers. However, as discussed in the Theoretical Framework, it is also reasonable to expect a negative relationship between shopping mall age and sales due to physical depreciation of the mall and an outdated tenant mix. As is discussed in chapter 4, most of the malls in the dataset are relatively young. For this reason, physical depreciation may not have taken place yet, and the tenant mix might still be up to date. However, this can change in the future. This might be the reason why Models 5 and 6 do find a negative relationship between *Shopping Mall Age* and *Rent/m2*. Tenants sign leases for an average period of 7 to 8 years (see chapter 4). While negotiating their lease, tenants will keep in mind that in the future the quality of the mall might be uncertain and can be subject to physical depreciation and an outdated tenant mix.. This uncertainty causes tenants to demand lower rents in advance, when signing the lease. This is a plausible reason why the relationship between *Shopping Mall Age* and *Rents/m2* is (already) negative. It is also an indication of the potential non-linearity in the relationship between shopping mall age and sales or rents in shopping malls. The dataset does not allow to further investigate this non-linearity, which is also out of the scope of this thesis.

The market control variables are both highly significant in the models in which they are included. The *Vacancy Rate*-variable has a negative relationship with *Rent/m2* in Model 5 and 6, just as expected from theory. *Vacancy Rate* is also negatively related to *Sales/m2* in Model 2 and 3. If the *Vacancy Rate* is solely a proxy for excess space in the market, this relationship would not be expected. However, the results do make sense. Vacancies can also be seen as part of the mall characteristics. When vacancies increase, the mall is losing GLA that could potentially attract customers and generate higher sales volumes for all the tenants. Vacant units can even generate negative externalities, because they lower the overall attractiveness of the mall. This explains why a significant and negative relationship is found

between *Vacancy Rate* and *Sales/m2*. The final control variable is the combined market variable that includes competition, catchment area population, and catchment area income. As was discussed in the Methodology, the variable is expected to have a negative relationship with both *Sales/m2* and *Rent/m2*. As can be seen in Table 5, the estimated coefficient is positive in Models 2-3 and 5-6. There is no obvious explanation for this counterintuitive result.

6. CONCLUSIONS

Shopping malls revolutionized the retail landscape due to their ability to efficiently internalize externalities generated by the tenant mix. In this thesis, two types of externalities generated by the tenant mix have been examined. First, the existence of externalities generated by heterogeneous tenants has been confirmed. This thesis showed that the presence of anchor tenants positively influences the sales of non-anchor tenants. These externalities are internalized through rents. Non-anchors pay a premium to be located in a mall where the externalities generated by anchors are larger, and anchor tenants are rewarded discounts for the externalities they generate. Not every non-anchor tenant appears to benefit equally from the presence of anchors. Especially non-anchors that depend on the traffic generated by anchors (such as tenants in the 'Services' category) appear to benefit the most. This is also reflected by the fact that these tenants are willing to pay a higher premium on rents compared to non-anchors that benefit less. Also not every anchor generates the same externality, with international anchor tenants generating larger externalities than national anchors. This difference can be attributed to the brand strength and exclusivity of international anchors.

Second, this thesis also examined the externalities of a cluster of homogeneous tenants. Externalities generated by clusters of homogeneous stores are less straightforward in that they can be either positive or negative. This duality appears to be confirmed by the analysis in this thesis. Some product categories appear to benefit mostly from a more competitive environment, whereas other product categories appear to benefit mostly from a more monopolistic environment. Examining the effects on rents, it appears that stores that benefit from a more competitive environment are willing to pay higher rents to be located in a mall with more (secondary) competitors. Whereas stores that benefit from a more monopolistic environment are willing to pay higher rents to have access to this monopolistic position in a mall.

The importance of understanding externalities and their connection with rent premiums and discounts has also been touched upon in this thesis. In Appendix D, this thesis showed that balancing anchor space versus non-anchor space has positive effects on the total rental income of the average mall in the dataset. Even though the example is highly context dependent, it does confirm the popular belief that the tenant mix has an important influence on the financial success of a shopping mall. It also shows that balancing anchor space with non-anchor space is an important tool for mall owners to increase rental income. Especially owners of large portfolios should therefore carefully consider how anchor space is balanced with non-anchor space.

6.1 LIMITATIONS

A limitation of this study is that all the data is drawn from a single owner, and all the assets are located in a single country. It is therefore hard to determine whether the results of this study are transferable to assets of other owners, and in other countries. However, general findings of this study about the working

of externalities and their direction seem to be in line with a priori expectations from the Theoretical Framework and also earlier empirical studies. This study also quantifies the externalities in exact numbers and uses these numbers to balance mall space with respect to rent premiums and subsidies caused by externalities. These exact quantifications of the externalities and the conclusions following from these calculations are not transferable to any mall outside of this dataset. These calculations do however show that developers should carefully pay attention to the tenant mix, because the tenant mix is an important factor influencing the total rental income of the shopping mall.

Another limitation of the dataset is the low number of individual malls (eleven malls). This limits the possibilities to do any robustness analyses on the mall level. Robustness analyses have been done in this thesis by comparing the effect of the tenant mix variables over different product categories. However, robustness of the results could not be checked on the mall level. For example, it was not possible to check the robustness of the tenant mix variables over the different types of malls. This is something that could provide insights into the importance of, for example, the anchor presence over different types of malls. Also, it is likely that the tenant mix becomes more important when the competition increases, because then the customer's choices increase and the tenant mix can become a competitive advantage. Unfortunately, these types of robustness analyses are not possible with only eleven distinct shopping malls in the dataset, and the distribution of these eleven shopping malls.

A final limitation was already briefly mentioned in chapter 3 of this thesis. The data does not allow for the use of variables comparable to *Anchor Share* for individual product categories, because of high correlations between the different shares of product categories and also with important control variables. For this reason, this thesis was not able to examine synergies between different product categories.

6.2 RECOMMENDATIONS

The final limitation discussed is a good starting point for future research. Understanding synergies between the different product categories can provide further insights into an efficient allocation of mall space. Using these insights, the importance of the tenant mix can be more accurately defined, and the total value that is added by an efficient allocation of mall space can be further explored. Having more extensive data that includes more individual shopping malls might be able to resolve the issue of high correlations between the different shares of the individual product categories. Another option might be to look for different proxies that measure the presence of the different product categories.

Another interesting topic for future research is to look into the use of historical data. Using historical data makes it possible to check whether the externalities generated by anchors are stable over time, or dynamic. Especially when this is linked to specific types of anchors and the age of the shopping mall, it is expected that the externalities generated by anchors are not stable, but dynamic. Finally, some

observations on the fundamental variables also provide interesting topics for future research. For example, with the use of historical data, the non-linearity of the relation between the age of the shopping mall and the rents and sales of the tenants can be investigated. This thesis also discussed that anchor tenants in this dataset often pay percentage rents, where the study of Gould et al. (2005) found that in their dataset anchors almost never pay percentage rent. It was hypothesized that this difference originated from the differences in economic (in)stability between the two empirical studies. The validity of this hypothesis could be a topic of future research.

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APPENDIX A – OVERVIEW OF SHOPPING MALLS IN THE DATASET

Mall name	Type of Mall	Gross Leasable Area (GLA) in m2	Number of Units	Parking spots	Opening date	City	City Population
Forum Istanbul	Superregional Center	176,249.00	276	5,000	October 2009	Istanbul	14,804,116
Forum Marmara	Superregional Center	135,098.70	285	4,000	April 2011	Istanbul	14,804,116
Forum Ankara	Superregional Center	81,451.76	149	3,000	September 2008	Ankara	5,270,575
Forum Gordion	Regional Center	54,475.83	152	2,300	October 2009	Ankara	5,270,575
Forum Magnesia	Community Center	18,573.00	70	450	July 2012	Manisa	309,050
Forum Aydin	Regional Center	30,291.19	105	800	September 2008	Aydin	195,951
Forum Camlik	Regional Center	32,453.00	132	1,000	April 2008	Denizli	557,300
Forum Kapadokya	Community Center	26,121.25	78	800	November 2009	Nevsehir	92,068
Forum Gaziantep	Regional Center	45,301	127	1,100	October 2013	Gaziantep	1,556,381
Forum Erzurum	Regional Center	32,879.00	115	1,097	October 2009	Erzurum	367,250
Forum Trabzon	Regional Center	51,159.70	188	1,716	June 2008	Trabzon	768,417

APPENDIX B – DISTRIBUTION OF TENANTS PER PRODUCT CATEGORY

		All tenants		Non-Anchors		Anchors	
Retail Type 1	Retail Type 2	Share (%)	N	Share (%)	N	Share (%)	N
D.I.Y./Gardening		**0.43**	**6**	**0.00**	**0**	**5.77**	**6**
	3300 - D.I.Y. and Garden	*0.43*	*6*	*0.00*	*0*	*5.77*	*6*
Department Stores		**0.72**	**10**	**0.00**	**0**	**9.62**	**10**
	8200 - Department Stores	*0.72*	*10*	*0.00*	*0*	*9.62*	*10*
Electronics		**4.27**	**59**	**3.52**	**45**	**13.46**	**14**
	3220 - Household electric	*1.81*	*25*	*0.86*	*11*	*13.46*	*14*
	4205 - Telephony/Internet	*2.46*	*34*	*2.66*	*34*	*0.00*	*0*
Fashion		**30.49**	**421**	**30.54**	**390**	**29.81**	**31**
	2100 - Mixed Ready-to-Wear	*13.40*	*185*	*12.22*	*156*	*27.88*	*29*
	2200 - Lingerie	*2.46*	*34*	*2.66*	*34*	*0.00*	*0*
	2300 - Mens Ready-to-Wear	*6.37*	*88*	*6.89*	*88*	*0.00*	*0*
	2400 - Women Ready-to-Wear	*5.14*	*71*	*5.56*	*71*	*0.00*	*0*
	2500 - Children Maternity	*3.11*	*43*	*3.21*	*41*	*1.92*	*2*
Food Specialist		**18.25**	**252**	**19.73**	**252**	**0.00**	**0**
	1100 - Gastronomy, Food stores	*18.25*	*252*	*19.73*	*252*	*0.00*	*0*
Grocery		**0.80**	**11**	**0.00**	**0**	**10.58**	**11**
	8100 - Hyper/Supermarkets	*0.80*	*11*	*0.00*	*0*	*10.58*	*11*
Household Goods		**10.14**	**140**	**10.81**	**138**	**1.92**	**2**
	3200 - Household equipment	*10.14*	*140*	*10.81*	*138*	*1.92*	*2*
Jewelry/Optics/Accessories		**7.24**	**100**	**7.83**	**100**	**0.00**	**0**
	4400 - Accessor , Jewelry	*5.14*	*71*	*5.56*	*71*	*0.00*	*0*
	5100 - Optician	*2.10*	*29*	*2.27*	*29*	*0.00*	*0*
Leisure/Culture		**3.33**	**46**	**1.80**	**23**	**22.12**	**23**
	4200 - Cultural products	*0.80*	*11*	*0.63*	*8*	*2.88*	*3*
	7000 - Entertainment	*2.53*	*35*	*1.17*	*15*	*19.23*	*20*
Personal care/Healthy/Beauty		**5.79**	**80**	**6.11**	**78**	**1.92**	**2**
	5200 - Perfumery	*0.72*	*10*	*0.78*	*10*	*0.00*	*0*
	5300 - Pharmacy	*0.36*	*5*	*0.39*	*5*	*0.00*	*0*
	5400 - Health,Hygiene Service	*4.71*	*65*	*4.93*	*63*	*1.92*	*2*
Services		**3.62**	**50**	**3.92**	**50**	**0.00**	**0**
	4500 - Tobacco	*0.22*	*3*	*0.23*	*3*	*0.00*	*0*
	5401 - Hairdressers	*0.36*	*5*	*0.39*	*5*	*0.00*	*0*
	6100 - Market Sector Services	*2.10*	*29*	*2.27*	*29*	*0.00*	*0*
	6103 - Dry cleaning, launderet	*0.58*	*8*	*0.63*	*8*	*0.00*	*0*
	6110 - Travel agency	*0.36*	*5*	*0.39*	*5*	*0.00*	*0*
Shoes and Leather		**8.91**	**123**	**9.48**	**121**	**1.92**	**2**
	2600 - Shoes	*7.53*	*104*	*7.99*	*102*	*1.92*	*2*
	2700 - Leather goods Luggage	*1.38*	*19*	*1.49*	*19*	*0.00*	*0*
Sports/Toys/Hobby/Media		**6.01**	**83**	**6.26**	**80**	**2.88**	**3**
	4100 - Sports goods	*4.42*	*61*	*4.70*	*60*	*0.96*	*1*
	4300 - Toys, gifts	*1.59*	*22*	*1.57*	*20*	*1.92*	*2*

APPENDIX C – THE HERFINDAHL INDEX

Table 9 – Descriptive statistics of the Herfindahl index for the individual product categories

Retail Type 1	Retail Type 2	Average	Standard deviation	Min.	Max.	N
D.I.Y./Gardening		**1**	**0**	**1**	**1**	**6**
	3300 - D.I.Y. and Garden	1	0	1	1	6
Department Stores		**0,80**	**0,24**	**0,50**	**1**	**10**
	8200 - Department Stores	0,80	0,24	0,50	1	10
Electronics		**0,51**	**0,14**	**0,26**	**0,83**	**59**
	3220 - Household electric	0,59	0,17	0,37	1	25
	4205 - Telephony/Internet	0,34	0,12	0,25	1	34
Fashion		**0,06**	**0,03**	**0,04**	**0,15**	**421**
	2100 - Mixed Ready-to-Wear	0,11	0,05	0,06	0,23	185
	2200 - Lingerie	0,35	0,19	0,19	1	34
	2300 - Mens Ready-to-Wear	0,15	0,08	0,07	0,37	88
	2400 - Women Ready-to-Wear	0,18	0,14	0,09	1	71
	2500 - Children Maternity	0,34	0,27	0,13	1	43
Food Specialist		**0,07**	**0,02**	**0,04**	**0,11**	**252**
	1100 - Gastronomy, Food stores	0,07	0,02	0,04	0,11	252
Grocery		**1**	**0**	**1**	**1**	**11**
	8100 - Hyper/Supermarkets	1	0	1	1	11
Household Goods		**0,11**	**0,05**	**0,06**	**0,21**	**140**
	3200 - Household equipment	0,11	0,05	0,06	0,21	140
Jewelry/Optics/Accessories		**0,14**	**0,08**	**0,07**	**0,39**	**100**
	4400 - Accessor , Jewelry	0,18	0,11	0,09	0,50	71
	5100 - Optician	0,43	0,19	0,26	1	29
Leisure/Culture		**0,40**	**0,16**	**0,19**	**0,82**	**46**
	4200 - Cultural products	1	0	1	1	11
	7000 - Entertainment	0,46	0,20	0,20	1	35
Personal care/Healthy/Beauty		**0,28**	**0,17**	**0,12**	**0,70**	**80**
	5200 - Perfumery	0,80	0,17	0,60	1	10
	5300 - Pharmacy	1	0	1	1	5
	5400 - Health,Hygiene Service	0,32	0,17	0,15	0,70	65
Services		**0,41**	**0,17**	**0,12**	**1**	**50**
	4500 - Tobacco	1	0	1	1	3
	5401 - Hairdressers	1	0	1	1	5
	6100 - Market Sector Services	0,55	0,26	0,18	1	29
	6103 - Dry cleaning, launderet	1	0	1	1	8
	6110 - Travel agency	0,83	0,21	0,57	1	5
Shoes and Leather		**0,15**	**0,08**	**0,10**	**0,54**	**123**
	2600 - Shoes	0,17	0,09	0,12	0,54	104
	2700 - Leather goods Luggage	0,54	0,21	0,36	1	19
Sports/Toys/Hobby/Media						**83**
	4100 - Sports goods	0,30	0,19	0,12	0,70	61
	4300 - Toys, gifts	0,58	0,19	0,34	1	22

APPENDIX D – BALANCING EXTERNALITIES, RENTS AND SPACE ALLOCATION

In the Theoretical Framework it was made clear that shopping malls are unique for their ability to internalize externalities through a rent setting process. The Theoretical Framework showed that when allocating mall space, the owner will face a dilemma of how much mall space should be allocated to lower paying externality generating tenants versus tenants that pay a premium. Using the coefficient of *Anchor Share* from Model 5 in Table 3 of chapter 5, this internalization process can be illustrated. To do this, this appendix will discuss the average mall in the dataset. Conclusions from the following calculations are only applicable to this specific example and are merely meant as an illustration.

When looking at an average mall in the dataset, 48.26% of the mall's GLA is dedicated to anchors (Table 3, chapter 5). On average, these anchors pay a base rent of 12.89 euros per square meter, whereas non-anchors have an average base rent of 46.16 euros per square meter (Table 2, chapter 4). Combining this with the average mall size of 62.086,56 square meter (Table 3, chapter 4), the total rental income of this hypothetical mall is €1.869 million. This consist of €386 thousand rental income from anchor tenants, and €1.483 million rental income from non-anchor tenants. However, from the point of view of the owner, this space allocation does not maximize the mall's rental income. The total rental income of the hypothetical mall will be higher when less space in the mall is allocated to anchors. Even though this would result in a lower base rent per square meter for non-anchor tenants, it will also mean that a lower share of the mall is dedicated to low paying anchors. For the hypothetical mall described above, a 6.86% decrease in mall space dedicated to anchors will maximize the total rental income of the mall. This new allocation would result in a total increase in rental income of €14,856.79 (a 0.79% increase) (for the calculations, see Appendix E). This estimation shows the important influence the tenant mix has on the financial success of a shopping mall and why correctly balancing mall space is an important tool for mall owners to increase rental income.

In practice, there are side notes to the estimation made above. First, the costs of converting large (anchor) units into smaller units might be higher than the increase in rental income. Second, and maybe most importantly, the design of the mall might be such that only anchor tenants will be sustainable at the places where they are located. As has been discussed before, anchor tenants are able to attract their own customers. For this reason, anchor tenants can be (and often are) located at the edges of shopping malls, at the end of walkways, or even in their own stand-alone structure. Placing non-anchor tenants in these locations will probably mean that these non-anchor tenants have much lower sales/m2 than the ordinary in-line non-anchor tenant. The result is that these units will have much lower potential base rent/m2, diminishing the effect of having less space dedicated to low paying anchor tenants. Taking these side notes into consideration, it could be that dedicating less space to anchor tenants might not necessarily influence rents in the way that was calculated above. Also, a more efficient approach for the owner is to try to bargain for higher rents of non-anchor tenants. As was discussed, the net profit for the non-anchor

is (on average) positive when anchor presence is increased. This means that there is still a margin left which can be claimed by the owner. Instead of lowering the anchor presence with 6.86%, a rental increase of 1.00% for non-anchor tenants is enough to achieve the same total rental income level. This increase still leaves a potential net-profit for the non-anchor tenant, justified discounts for the anchor tenants, and maximized rental income for the owner.

An important conclusion that follows from this appendix, is that for a mall owner, it is not necessary to maximize the externalities generated by anchors. An owner will only be interested to increase externalities generated by anchors as long as this increases the mall's rental income.

APPENDIX E – CALCULATIONS OF RENTS WHEN BALANCING MALL SPACE

The total rental income of the shopping mall can be calculated using the following equation:

$$Total\ Rental\ income = (NAR * ((CNA * X) + 1)) * (1 - (AS + X) * TA) + (AR * ((CA * X) + 1)) * ((AS + X) * TA)$$

In this equation, the following variables are defined:
NAR = current average base rent/m2 for non-anchor tenants in shopping mall
CNA = coefficient estimated for *Anchor Share* for non-anchor tenants
X = change (either positive or negative) in mall space dedicated to anchors (in %)
AS = current share of mall space dedicated to anchors)
TA = Total GLA of shopping mall
AR = current average base rent/m2 for anchor tenants in shopping mall
CA = coefficient estimated for *Anchor Share* for anchor tenants

The equation contains the following parts:
$(NAR * ((CNA * X) + 1))$ = The base rent of the non-anchor tenant per square meter
$(1 - (AS + X) * TA)$ = The mall space dedicated to non-anchors (m2)
$(AR * ((CA * X) + 1))$ = The base rent of the anchor tenant per square meter
$((AS + X) * TA)$ = The mall space dedicated to anchor tenants (m2)

To calculate the allocation of mall space that maximizes rent, the following values need to be known:

- The total GLA of the shopping mall (in the hypothetical mall: 62.086,56 m2)
- The average base rent/m2 of non-anchor tenants (in the hypothetical mall: €45,85)
- The average base rent/m2 of anchor tenants (in the hypothetical mall: €12,15)
- The current share of mall space dedicated to anchor tenants (in the hypothetical mall: 0,4826)
- The coefficients for *Anchor Share* for both non-anchor and anchor tenants (only the coefficient for non-anchors is found to be significant and is equal to 1,0975. Because of the insignificance, the coefficient for anchor tenants will be 0, meaning the base rent/m2 of anchor tenants will be equal to AR)

To find the maximized rental income of the shopping mall and the allocation of mall space that maximizes rents, all the variables except for *X* will be filled in into the equation. Then, the function is maximized by changing the *X*. Where *AS+X* is limited between 0 and 1 and *X* can be either positive or negative. Using the *X* that maximizes rent, the allocation of mall space is equal to *AS+X* for anchor tenants and 1-(*AS+X*) for non-anchor tenants.

APPENDIX F – DISTRIBUTION OF INTERNATIONAL AND NATIONAL ANCHORS

Table 10 – Distribution of International and National Anchors

Product Category	International Chain (n)	National chain (n)	Total
2100 - Mixed Ready-to-Wear	13	16	29
2500 - Children Maternity		2	2
2600 - Shoes		2	2
3200 - Household equipment	1	1	2
3220 - Household electric	5	9	14
3300 - D.I.Y. and Garden	2	4	6
4100 - Sports goods	1		1
4200 - Cultural products		3	3
4300 - Toys, gifts		2	2
5400 - Health,Hygiene Service		2	2
7000 - Entertainment	4	16	20
8100 - Hyper/Supermarkets	10	1	11
8200 - Department Stores		10	10

Product categories in Retail Type 2

APPENDIX G – STATA SYNTAX

```
import excel "C:\Users\Nkuiper\Desktop\datafile alle malls.xlsx", sheet("DATA") firstrow

*Dropping kiosks*

drop if Areasqm == 0
drop if Areasqm == 1

*transforming rent, area and sales to natural log*

histogram Baserentm2, norm
gen logrnt = log(Baserentm2)
histogram logrnt, norm
histogram Areasqm, norm
gen logarea = log(Areasqm)
histogram logarea, norm
histogram Averagesalespsmjan16dec16, norm
gen logsales = log( Averagesalespsmjan16dec16)
histogram logsales, norm

*Descriptive statistics of the tenants (Table 2)*

sum Areasqm
sum Aresqm if Anchor!="Anchor"
sum Areasqm if Anchor=="Anchor"
sum Baserentm2
sum Baserentm2 if Anchor!="Anchor"
sum Baserentm2 if Anchor=="Anchor"
sum TurnoverRatio
sum TurnoverRatio if Anchor!="Anchor"
sum TurnoverRatio if Anchor=="Anchor"
sum Averagesalespsmjan16dec16
sum Averagesalespsmjan16dec16 if Anchor!="Anchor"
sum Averagesalespsmjan16dec16 if Anchor=="Anchor"
sum LeaseLength
sum LeaseLength if Anchor!="Anchor"
sum LeaseLength if Anchor=="Anchor"
sum Shoppingcenterage
sum Shoppingcenterage if Anchor!="Anchor"
sum Shoppingcenterage if Anchor=="Anchor"

*The remaining descriptive statistics of chapter 4 are calculated using pivot tables in Excel*

*The following regressions will only include non-anchor tenants*

drop if Anchor=="Anchor"

*looking into correlations*

pwcorr logrnt Playersper10m MallsizeM2 logarea logsales VacancyRate TurnoverRatio LeaseLength
Herfindahlconcentrationindex ShareAnchors HerfindahlRtype1 Shoppingcenterage
ShoppingCenterAgemonths, star(.05)

*not too high of correlations between the important variables and controls. multicollinearity will be
checked for with VIF values*
```

```
*Running regressions for Table 5*
*Regression 1, Table 5*

reg logsales logarea i.Sector i.UnitLocation i.Mallname
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*

reg logsales logarea i.Sector i.UnitLocation i.Mallname, robust

*Regression 2, Table 5*

reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*

reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation, robust

*Regression 3, Table 5*
reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareIntAnchors ShareNatAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*

reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareIntAnchors ShareNatAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation, robust

*Regression 4, Table 5*

reg logrnt logarea i.Sector i.UnitLocation i.Mallname TurnoverRatio LeasLength i.Leasestartyear
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*

reg logrnt logarea i.Sector i.UnitLocation i.Mallname TurnoverRatio LeasLength i.Leasestartyear,
robust

*Regression 5, Table 5*

reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation TurnoverRatio LeaseLength
i.Leasestartyear
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*
```

```
reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation TurnoverRatio LeaseLength
i.Leasestartyear, robust

*Regression 6, Table 5*
reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareIntAnchors ShareNatAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation
TurnoverRatio LeaseLength i.Leasestartyear
vif
estat hettest

*VIF is okay: below 10; is heteroscedastic therefore*

reg logsales logare MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareIntAnchors ShareNatAnchors Herfindahlconcentrationindex i.Sector i.UnitLocation
TurnoverRatio LeaseLength i.Leasestartyear, robust

*Running regressions for Table 6, column 1 and Table 7, column 1*

xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1 =="Food
Specialist"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Electronics"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Fashion"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Household Goods"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Jewelry/Optics/Accessories"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Leisure/Culture"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Personal care/Healthy/Beauty"
vif
estat hettest
```

```
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Services"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1 =="Shoes
and Leather"
vif
estat hettest
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Sports/Toys/Hobby/Media"
vif
estat hettest
```

No Heteroscedasticity. VIF values too high for regressions on Leisure and Culture, probably due to low number of obs. will not be included in final table. Some of the other categories have high VIF values, but only for some of the control variables
Final regressions for Table 6, column 1 and Table 7 column 1

```
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1 =="Food
Specialist"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Electronics"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Fashion"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Household Goods"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Jewelry/Optics/Accessories"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Personal care/Healthy/Beauty"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Services"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1 =="Shoes
and Leather"
xi: reg logsales logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors ShoppingCenterAgemonths  i.UnitLocation if SectoraggragatedRetailtype1
=="Sports/Toys/Hobby/Media"
```

Running regressions for Table 6, column 2 and Table 7, column 2

```
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Food Specialist"
vif
```

```
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Electronics"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Fashion"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Household Goods"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Jewelry/Optics/Accessories"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Leisure/Culture"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Personal care/Healthy/Beauty"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Services"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Shoes and Leather"
vif
estat hettest
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Sports/Toys/Hobby/Media"
vif
estat hettest

*Heteroscedastiticy for both Food Specialist and Fashion, VIF values in check, again Leisure and
culture will be dropped*
*Final regressions for Table 6, column 2 and Table 7 column 2*

xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Food Specialist", robust
```

```
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Electronics"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Fashion"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Household Goods"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Jewelry/Optics/Accessories"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Personal care/Healthy/Beauty"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Services"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Shoes and Leather"
xi: reg logrnt logarea Playersper10meurosincatchme  MallsizeM2 VacancyRate HerfindahlRtype1
ShareAnchors Shoppingcenterage TurnoverRatio LeaseLength  i.Leasestartyear i.UnitLocation if
SectoraggragatedRetailtype1 =="Sports/Toys/Hobby/Media"

*For the regressions in Table 8, only the anchor tenants need to be used, therefore, clear the file and
start again*

clear
import excel "C:\Users\Nkuiper\Desktop\datafile alle malls.xlsx", sheet("DATA") firstrow
drop if Anchor!="Anchor"
gen logrnt = log(Baserentm2)
gen logarea = log(Areasqm)
gen logsales = log( Averagesalespsmjan16dec16)

*Table 8 column 1, 2, 3, 4 respectively*

reg logsales logarea MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Sector
vif
estat hettest
reg logsales logarea MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation
vif
estat hettest
reg logrnt logarea MallsizeM2 Shoppingcenterage VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Sector i.Leasestartyear TurnoverRatio
LeaseLength
vif
estat hettest
reg logrnt logarea MallsizeM2 Shoppingcenterage VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Leasestartyear TurnoverRatio
LeaseLength
vif
estat hettest
```

VIF values very high for regressions 1 and 3, in which the product category dummy is included, was expected. other regressions are fine regarding VIF. all regressions heteroscedastic, therefore robust errors
Final regressions for Table 8 column 1, 2, 3, 4 respectively

```
reg logsales logarea MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Sector, robust
reg logsales logarea MallsizeM2 ShoppingCenterAge VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation, robust
reg logrnt logarea MallsizeM2 Shoppingcenterage VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Sector i.Leasestartyear TurnoverRatio
LeaseLength, robust
reg logrnt logarea MallsizeM2 Shoppingcenterage VacancyRate Playersper10meurosincatchme
ShareAnchors Herfindahlconcentrationindex i.UnitLocation i.Leasestartyear TurnoverRatio
LeaseLength, robust
```

END