Ownership structure and the success of shopping centres in the Netherlands

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Abstract:
Shopping centres have become an increasingly important part of the global retail landscape. The development of shopping centres has been extremely dynamic in the past couple decades. A thorough understanding of what makes a shopping centre succesful has become very relevant considering the number of stakeholders and often-large financial investments involved with shopping centres. Previous research has proven that numerous sociodemographic, accessibility and property characteristics influence the rental value of shopping centres. Due to the historical development of the retail environment in the Netherlands shopping centres often have numerous owners. It is unclear what the effect of fragmented ownership is on the rental valur of shopping centres. This research quantitatively researches the effect of fragmented ownership, to conclude that fragmented ownership has a negative effect (-10%) on the rental value. This implies that single ownership increases the success of a shopping centre.

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1. Introduction

'The importance of malls in retail research cannot be marginalised. Malls provide the basic environment that attracts customers, keeps them shopping and brings them back' (Kowinski, 1985, p. 32). In the past 30 years, the importance of shopping centres in retail research has only increased. Furthermore, research into the success factors of shopping centres provides valuable information for all shareholders involved.

In the Netherlands, there are more than 1,100 shopping centres, representing 13% of all Dutch retail areas (Dynamis, 2017). According to CBRE (2018), the Dutch retail structure is currently experiencing a transformation: the traditional hierarchical structure of central and supporting retail areas is increasingly replaced by a retail structure based on run, fun, and goal shopping areas (CBRE, 2018). Shopping centres are an important part of this transformation because they are compact retail areas that can provide these three objectives. In line with this transformation, a more thorough understanding of what makes a shopping centre successful in the Netherlands is relevant.

Shopping centres in the Netherlands are complex projects that often develop over time and in phases. One of the results of this form of development is that they can have numerous owners who own between one and many stores in a single shopping centre (NRW, 2017). The Hamershof in Leusden is a shopping centre with 52 stores and 48 different owners, and fragmented ownership is one of the reasons that discussions about renovating the centre have taken eight years.[1] Another example is the Paddepoel in Groningen, a shopping centre for which discussions about opening times have lead to heated arguments between owners and fines of up to €60,000 euros.[2] These two cases are examples in which disagreements between owners have lead to the obstruction of decisions that are necessary for a shopping centre's success. However, in comparison to a large, global real estate investor acting as a single owner, numerous smaller, local owners may be much more familiar with problems and the potential of the area in which a shopping centre is located (Borgers and Timmermans, 1997). Therefore, the focus of this research is to quantitatively determine the effect of fragmented ownership on shopping centres' success. This research will be focussed on answering the research question; to what extent does fragmented ownership affect the rental value of

[1] Leusder Krant (2017).Renovatie Hamershof stap dichterbij. [online] Leusder Krant. Available at: http://leusderkrant.nl/lokaal/renovatie-hamershof-stap-dichterbij-269127

[2] NRC (2017).Dicht op koopzondag? Boete!. [online] NRC. Available at: https://www.nrc.nl/nieuws/2017/10/12/dicht-op-koopzondag-boete-13447529-a1576907

shopping centres? The information from this research can provide the stakeholders of such centres with relevant information concerning processes within them and when making investment decisions.

A quantitative approach to the fragmentation of ownership of shopping centres has not previously been presented in academic literature. Earlier academic research about shopping centres has analysed the effect of a wide variety of variables regarding rental values in shopping centres, emphasising the importance of the centre's accessibility, socio-demographic characteristics of the area in which the centre is located and various property attributes, such as tenant-mix (Dennis et al., 2002; Brown, 1992; Van der Waerden et al., 1998). Lowry (1997) has found that constant innovation and renovation are essential for the success of shopping centres and that cooperation between stakeholders is a part of this process. Previous academic research has also attempted to theoretically interpret the effect of fragmented ownership of property rights for different types of real estate and concluded that fragmentation leads to the underutilisation of property (Schulz et al., 2002). Buitelaar and Segeren (2011) have focused on property rights in residential building projects and found that fragmented ownership leads to building delays and higher costs. However, existing research about shopping centres neglects the possible influence of fragmented ownership on the success of a shopping centre. Therefore, this research addresses a gap in academic research and provides important information for shopping centre stakeholders.

The remainder of this paper is organised as follows. In Section 2, a theoretical background about important variables affecting the success of shopping centres and fragmented ownership of property is provided. Section 3 explains the methodology and how the data for the research was collected and manipulated. In Section 4, the results of the data are presented and discussed, followed by a conclusion and discussion of the results in Section 5.

2. Literature Review

Shopping centre rents are determined by a combination of numerous sociodemographic factors, accessibility factors and property attributes. The following section provides a discussion of previous research about fragmented ownership of commercial real estate en real estate development project; followed by a discussion of previous research about other shopping centre rent determinants. At the end of this section, a hypothesis is formulated based on the literature.

2.1 Fragmented ownership structure in real estate

The relationship between the fragmented ownership of shopping centres and the estimated rental value has not previously been researched in academic literature. Therefore, this section analyses the scientific literature relevant for understanding the possible effects of the fragmented ownership of shopping centres.

Schulz et al. (2002) have expanded research on the fragmentation of property based on earlier research about the danger of excessive propertisation (Heller, 1998; Buchanan and Yoon, 2000; Depoorter and Parisi, 2001). They indicate that when "multiple owners hold rights to exclude others from a scarce resource and no one exercises an effective privilege of use, the resources may be prone to underuse" (Schulz et al., 2002, p. 32). This problem is known as the tragedy of the anti-commons. In an anti-common, a property scheme means that multiple owners own the effective rights of exclusion in a scarce resource, such as a shopping centre. The coexistence of the multiple exclusion rights owned by different parties creates conditions in which the optimal capacities of the property are not reached (Parisi, Schulz and Depoorter, 2005). In the case of a property with multiple exclusion rights, co-owners may have incentives to withhold resources or be uncooperative with other users, leading to inefficient use of the property (Heller, 1998). Property owners may use these exclusion rights even when cooperation in the use of the scarce resource could yield net social benefits.

Findings by Schulz et al. (2002) suggest that a commercial property has higher investment yields if ownership is unified instead of varied. They elaborate this reasoning, explaining that "the degree to which the fragmented owners underinvest increases with the degree to which they are affected by the investments of other owners." For example, when there is a stronger positive externality of neighbouring owners' investments, they are less willing to invest in improving the quality of their own property. According to Parisi, Schultz and Depoorter

(2005), the problem of underinvestment with fragmented ownership also increases with the amount of different owners.

Buitelaar and Seegeren (2011) have researched the effect of fragmented ownership on residential building projects in the Netherlands and how these were affected when property rights of land were divided between different landowners. In terms of land property rights, it is not the land that is owned, but the right to use that land and the right to generate income from the land (Demsetz, 1974). They present two residential building projects containing more than 150 apartments in Nijmegen and in Alkmaar (Buitelaar and Segeren, 2011). Previous to the residential building developments, both building sites were owned by more than one owner. Buitelaar and Segeren (2011) conclude that the land assembly process to facilitate the development delayed the project and caused very high transaction costs, strongly affecting the profitability in both cases.

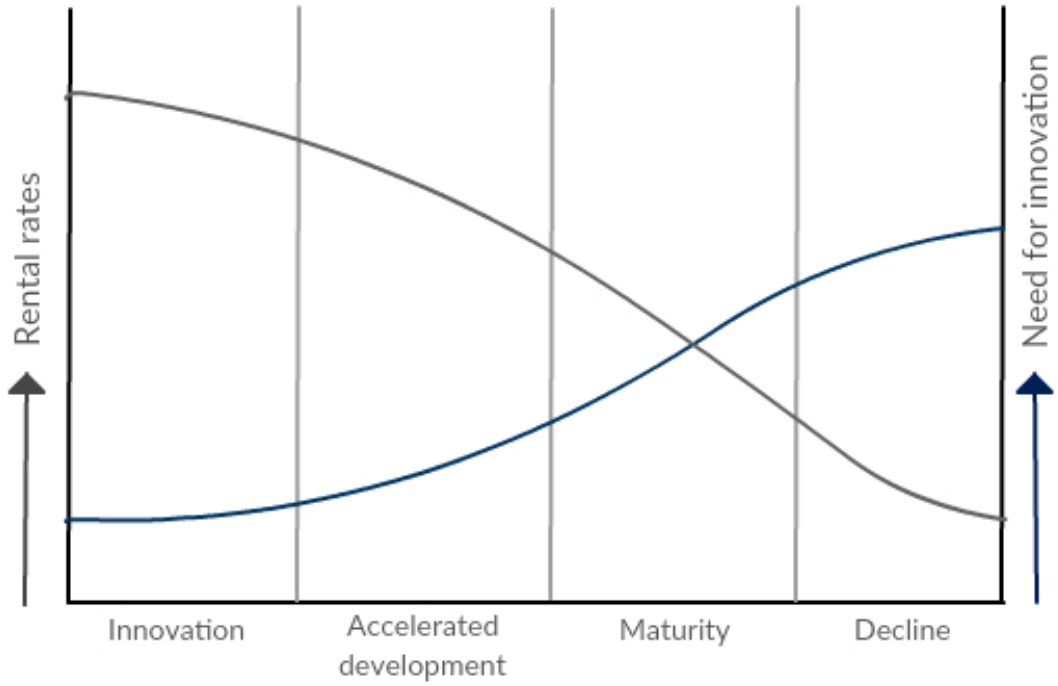

Figure 1: Shopping centre life cycle (own adaptation of Lowry 1997)

Shopping centre life cycle and the need for innovation

In 1997, Lowry developed the shopping centre life cycle to identify the different stages of a shopping centre that emphasise the need for innovation. The shopping centre life cycle is important for understanding the possible consequences of fragmented ownership because it emphasises the centrality of cooperation between owners in maintaining a shopping centre and how fragmented ownership may result in difficulties in maintaining one. Different

adaptations of Lowry's structure exist, but they all identify the same four critical stages: innovation (launch), growth (accelerated development), maturity and decline (Berman and Evans, 2011; Dunne et. al., 2002). The distinction between the different stages explains the different processes and costs involved in planning, building, and managing a shopping centre because they can be quite high. It is important for developers, owners and retailers to understand the strategic planning of a shopping centre and how they can best cooperate (Lowry, 1997).

According to Lowry (1997), shopping centres decrease in attractiveness over time as a result of a decrease in visual attractiveness, which might cause tenants to prefer newer shopping centres. As shown in Figure 1, the quality of a shopping centre declines over time, causing rental rates to fall. The blue and the grey lines represent the inverse relationship between a need for innovation and the rental rates of shopping centres; in other words, innovation is needed to improve the quality of a shopping centre (Lowry, 1997). To summarise, fragmented ownership of shopping centres makes renovations and innovation more difficult. Using the shopping centre life cycle to identify the importance of new initiatives, fragmented ownership may thus negatively affect the success of a shopping centre.

Intellectual capital and the importance of local owners

Intellectual capital summarises the knowledge resources, information, experiences, skills, structures, culture and relationships of businesses, which can collectively make a business more successful and create wealth (Wexler, 2002). Typically, local owners in markets and communities of which they themselves are part can provide such information (Watson et al., 2005). Thus, local shopping centre owners can provide knowledge of their geographic locations and labour markets, which can be an efficient source of financial, managerial and information capital (Dant and Kaufmann, 2003). Based on the theory of intellectual capital, numerous local owners of a shopping centre can provide more such knowledge than a large global real estate investor that is a single owner. This means that shopping centres with numerous owners may be more efficient in providing what the local market demands. Therefore, a shopping centre with numerous local owners may be more capable of providing the local market's needs.

2.2 Other determinants of shopping centre rents

Early research on shopping centre patronage and theories predicted the spatial pattern and attraction of malls based on factors such as distance and population density (Christaller, 1933; Reilly, 1931; Huff, 1964). However, according to Moore and Mason (1969), the validity of the above-mentioned models is questionable because they assume similar decisions from shoppers with different economic and demographic characteristics. Consumers do not always make rational decisions and are influenced by more factors than distance and population density. Generally speaking, rental prices follow similar trends in different countries; however, there may be small differences.

Demographics

Different demographic and area characteristics have been found useful in differentiating the success of different shopping locations (Koot, 2006; Des Rosiers et al., 2005; Sirmans et al., 2005; Francois et al., 2005; Meija and Benjamin, 2002). Important determinants in previous research have included population density and purchasing power in the area around a shopping centre. Koot (2006) has analysed the determinants of rental levels for more than 100 planned Dutch shopping centres using a regression model, which showed that a higher purchasing power per capita had a significantly positive effective on rental levels. Bakker (2011) has found the same trend when analysing the determinants of inner-city shopping centres in the Netherlands. Another important determinant of shopping centre rental value in previous research is the population density of the area around the shopping centre. Majoor (2009) and Bakker (2011) have found that the highest potential (prime) rents of shopping centres and the population within a two-kilometre radius around a shopping centre are positively related with rental value.

Accessibility

Less extensive research has been conducted concerning the relationship between shopping centre rents and accessibility; however, some important variables have been identified. Weltevreden (2007) has emphasised that low accessibility of a retail location makes online shopping more attractive, with the result that consumers choose to shop online instead of going to the physical store. Tay et al. (1999) have examined the factors important for rental values of shopping centres in Hong Kong, mentioning that public transport is important because of how densely built and populated the city is. The results show that high

accessibility by public transport increases the customer-drawing power of shopping centres and increases the rental rates charged (Tay et al., 1999). Parking is a complicated variable in explaining shopping centre rents, and previous research and reports have reached different conclusions. However, some of the most recent research in the Netherlands by Stienstra (2013) has noted that adequate parking facilities are essential for a shopping centre's functioning.

Property attributes

All previous research emphasises that the size of the shopping centre has a significantly positive effect on the rental values (Sirmans et al., Koot, 2006, Bakker, 2011, Yuo et. al., 2004). In some research, this even emerged as the main determinant of the rent (Koot, 2006). Another important aspect of shopping centres is the variety of tenants and the retail mix. Retail and commercial service stores can cluster together in shopping centres and may experience advantages from doing so (Yuo et. al., 2008). A mixture of different, small tenants can provide variety and increase a shopping centre's attractiveness (Teller, 2008). According to Grunhagen and Mittlestaedt (2001), as opening hours lengthen, the attractiveness of a shopping centre increases because it improves ease of access. This meets the time-saving and flexibility needs of modern consumers (Grunhagen and Mittlestaedt, 2001).

2.3 Hypotheses

As no academic research exists on the fragmented ownership of shopping centres, it is important to first determine whether fragmented ownership has an effect on the rental value. The theories developed by Schulz et al. (2002) and Lowry (1997) suggest that fragmented ownership has a negative effect on the rental value; research from Buitelaar and Seegeren (2011) about fragmented ownership in residential building projects suggests a similar conclusion. However, numerous small owners may provide much more intellectual capital than a large single global real estate investor. The following hypotheses test the above theories:

H_0: Fragmented ownership does not have an effect on the rental value of a shopping centre

H_1: Fragmented ownership affects the rental value of a shopping centre

3. Data and methodology

The following section first provides an overview of the database, followed by the descriptive statistics of the variables used for the analysis. Next, the relevance of using hedonic regression in real estate research is highlighted, and, finally, the empirical model for analysing the effect of fragmented ownership on shopping centres is presented.

3.1 Development of shopping centres in the Netherlands and reasons for fragmented ownership

In the Netherlands, shopping centres are a fairly young concept compared to the rest of Western Europe and the United States, dating back about 300 years. The first shopping centres developed in the Netherlands were outdoor and not planned within the urban hierarchy; no attention was paid to parking facilities, and it was unclear where the shopping centre ended. Throughout history, the retail market developed and shopping passages, supermarkets, shopping centres and furniture boulevards were developed (Evers, Kooijman & Krabben, 2011).

Furthermore, the Dutch retail market is often characterised as intrinsic (Borchert, 1998; Bolt, 1998), meaning that a relatively large amount of its retail locations are located in close proximity to consumers in terms of physical distance and travel time. One of the reasons this structure developed in the Netherlands is because of the large amount of average-sized cities with short travel times between them (Rosenbaum et al., 1998). The intrinsic structure of Dutch retail indicates that consumers demand retail locations near their homes. The most important consequence is that, instead of developing large-scale shopping areas covering all retail demands, in the Netherlands, many small retail centres developed. As mentioned above, these smaller centres gradually increased in size and facilities over time. The gradual development of shopping areas is one of the most important reasons that fragmented ownership of shopping centres and shopping streets became common in the Netherlands.

3.2 The dataset

The dataset used for the analysis includes 294 shopping centres in the Netherlands and was obtained from JLL (2017) and shopping centres in the Netherlands in 2017. All shopping centres have a gross leasable area of at least 5,000 square metres (ICSC, 2017) and at least 20 ‘selling points’. This term, used by Locatus, includes all parties renting an area in a shopping centre, including stores, ATM machines and food and beverage facilities. Locatus is the

leading research centre concerning retail data in the Netherlands and updates their databases on a quarterly basis. Their database provides an overview of all retail locations in the Netherlands and important information concerning the type of store and location and store size. Locatus uses the terms 'central' and 'supportive' to indicate the shopping centre's location type. A shopping centre with a central location is located in the most densely populated areas of a city, while a supportive location indicates a location outside the city centre of cities, such as the suburbs. In the dataset, 133 shopping centres have a central location and 161 have a supportive location; therefore, both types are well represented. Futhermore, Locatus groups shopping centres into a "comparison" and a "convenience" shopping area category. A comparison shopping centre is focused on non-daily and luxury stores. A convenience shopping centre is focused on stores selling goods for daily use. 130 shopping centres in the database are comparison shopping centres and 164 shopping centres are convenience shopping centres.

Another division Locatus uses for retail areas is based on the size and target population; its five categories are centres located on inner-city shopping streets, in main shopping areas, outside the main shopping area, in urban district centres and in small district centres. As shown in Figure 2, these types are all represented in the dataset. The shopping centres in the dataset are also located throughout the Netherlands, as shown in Figure 3, and all 12 provinces are represented.

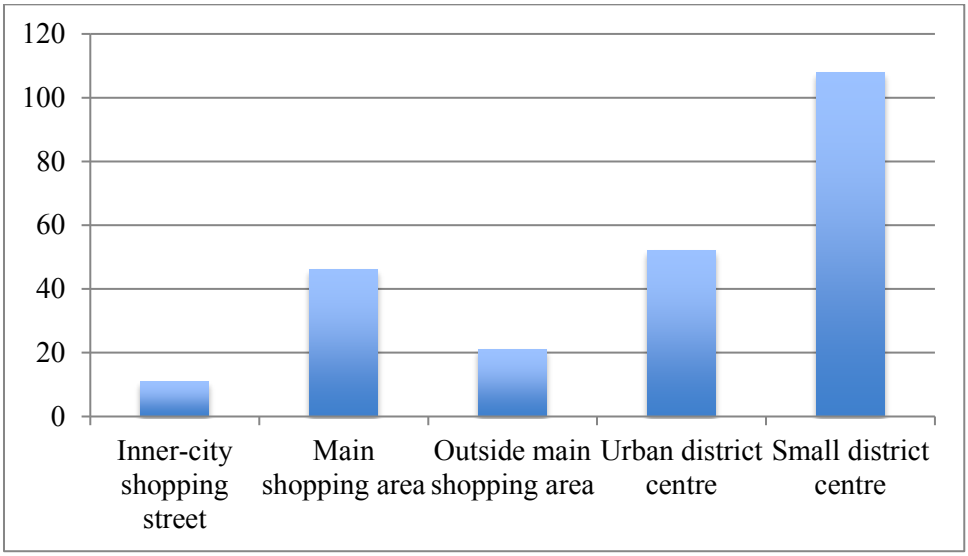

Figure 2: Types of location of the shopping centres in the dataset (source: JLL Dataset)

Figure 3: Locations of the shopping centres in the dataset (source: address information from Locatus maps in GIS)

3.2.2 Dependent Variable

The dependent variable in the analysis is the estimated rental value (ERV). This variable was collected based on the taxation dataset provided by JLL. The data used comes from between 2014 and 2017 and provides the market rent estimated by the taxation department. Since taxation is based on a subjective appraisal of value, the market rent is considered 'estimated'. Fundainbusiness.nl was used to compare the estimated market rent from the data with the asking price for a retail area offered on the website in the same shopping centre. There are numerous limitations involved in using the ERV as a dependent variable in this research. Firstly, the data comes from between 2014 and 2017. This means that rental values may have increased or decreased in this period of time and may not be completely accurate. Another problem involved in using the estimated rental value is that this is an average value for a shopping centre. Large supermarkets often pay a lower rent in comparison to smaller stores.

Therefore, a shopping centre with a large supermarket may have a lower average rental value, while this does not accurately reflect the average rents paid by other stores. The rents paid by smaller stores in a shopping centre may very well be higher than the rent paid by smaller stores in another shopping centre. However, a large shopping centre pushes the average rent down. This is definitely a limitation and influences tha accuracy of the analysis. Nonetheless, data about retail rents is very limited and the retail market is not a very transparent market. More detailed and accurate information is unavailable.

The method that will be used is a linear regression; this will be further specificied in the next section. Ordinary least squares (OLS) is a common estimation method for linear models. It is important that the model satisfies the OLS assumptions. One of these assumptions is that the dependent variable has a normal distribution. The dependent variable, ERV, does not have a normal distribution and has to be transformed into a natural logarithm. Figure 4 shows the transformation of the variable 'estimated rental value'. The other OLS assumptions are found in appendix III.

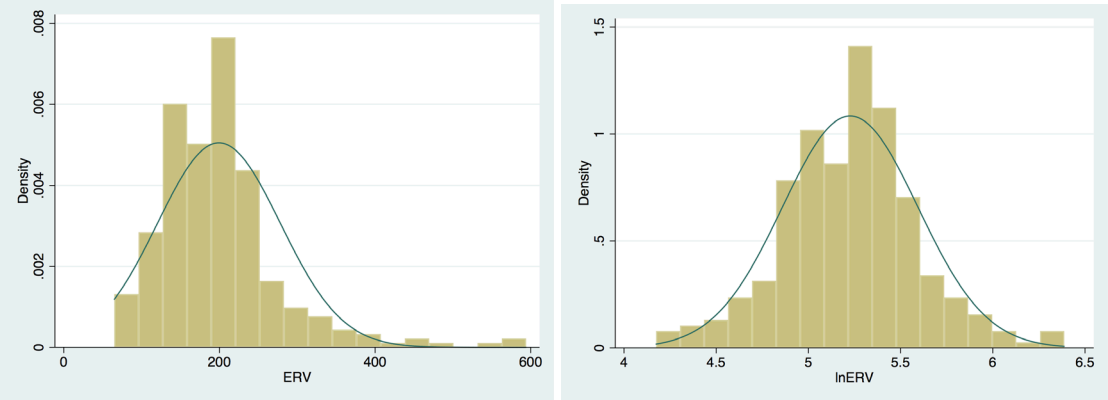

Figure 4: Transformation of the variable ERV; left: before transformation, and right: after transformation

3.2.1 Independent Variables

The independent variables are divided into three categories, and the following section provides an overview of the different variables used in the analysis for each. All the data used for the independent variables comes from databases updated 2017. An overview of the independent variable is shown in Table 1, and the variables are explained by category.

Table 1: Overview of variables included in the analysis

Variable	Description
Accessibility characteristics	
Parking places	Amount of parking places relative to total GLA (parking spots/GLA)
Paid parking	Dummy paid parking (1 = yes)
Parking cost	Euros paid per hour
Distance to closest highway entrance or exit	Total drive time in minutes
Distance to closest public transport stop	Total walking time in minutes
Socio-demographic characteristics	
Population	Logarithm of total population within a two-, five- and 10-kilometre radius of the shopping centre
Purchasing power	Logarithm of average purchasing power in a two-, five- and 10-kilometre radius of the shopping centre
Property Attributes	
Year built	Age of the shopping centre
Renovation	Years since last renovation
Total GLA (sq m)	Logarithm of gross leasable area of shopping centre
Opening times	Hours open per day
Open on Sunday	Dummy open on Sunday (yes = 1)
International retailers	Percentage of international retailers of total selling points
Concentration daily convenience stores	Herfindahl index of daily convenience stores
Concentration fashion and luxury stores	Herfindahl index of fashion and luxury stores
Ownership structure	Dummy ownership structure (1 = two or more owners)

Accessibility characteristics

The accessibility characteristics were divided into five variables, summarised in Table 1. First, the amount of parking places was obtained from the JLL shopping centre dataset, and missing data was provided using parkeerlijn.nl. Since smaller shopping centres require fewer parking facilities, the amount of parking places was calculated relative to the shopping centre's total GLA. The variables 'paid parking' and 'parking cost' were also obtained from parkeerlijn.nl; for the former, a dummy variable was used, and the latter is expressed in euros

per hour. The distance to the closest highway entrance or exit and the distance to the closest public transport stop from the shopping centre were both obtained using GIS.

Socio-demographic characteristics

Based on the literature review, two socio-demographic variables are relevant to understanding the success of shopping centres. The total population around the shopping centres was calculated within a two-, five- and 10-kilometre range using GIS. The analysis used the logarithm of the population. The average purchasing power per capita in a two-, five- and 10-kilometre radius was also obtained using GIS, and the analysis used the logarithm of the average purchasing power.

Property attributes

The property attributes, which consist of nine variables, refer to specific characteristics concerning the construction of the shopping centre, the mix of stores and the ownership structure. The year in which the shopping centre was built, years since last renovation and the total GLA were obtained from the JLL shopping centre dataset, and the analysis used the logarithm of the total GLA. The opening times and whether the shopping centre is open on Sundays were obtained from openingstijden.nl. The former is expressed as the amount of hours the shopping centre is open on an average day (thus excluding the weekend and Thursday), and a dummy expresses whether the shopping centre is open on Sunday. All information concerning the selling points was obtained from Locatus. First, the variable 'international retailers' was calculated using the percentage of selling points that are international retailers of the total selling points in the shopping centre. An overview of the international retailers is provided in Appendix I. The variables 'concentration of daily convenience stores' and 'concentration of fashion and luxury stores' were calculated using the Herfindahl index (whose calculation is provided in Appendix II). Finally, the variable 'ownership structure' was obtained from Kadaster. an administrative system of the Dutch government that records real estate boundaries and ownership. The ownership structure is divided into two categories, one owner and two or more owners.

3.3 Descriptive statistics

Table 2 provides an overview of the descriptive statistics of the variables used in the analysis. In 51% of the cases in the dataset, ownership is fragmented; Table 4 shows the mean for

fragmented ownership. Furthermore, the descriptive statistics indicate a high degree of variability in the dataset. For example, focussing on the variable 'parking cost per hour', the standard deviation is higher than the mean. For many other variables, such as the distance variables, age variables and population variables, the standard deviation is high relative to the mean. The only variable with a low degree of variability of is 'opening hours per day', indicating that most shopping centres are open for a similar amount of hours.

One of the previously mentioned OLS assumptions is that there is no multicollinearity between between independent variables. Appendix IV provides the correlation matrix of all variables described; this matrix displays the correlation coefficients between sets of variables. Each independent variable in the table is analysed for the degree of correlation with each of the other independent variables, which is relevant to testing whether the variables are truly independent of each other. It is important to note that, based on the correlation matrix, there is little correlation between the age of the shopping centre and fragmented ownership. This may have been relevant considering the historical development of fragmented ownership. However, it is not necessary to include an interaction variable to control for this effect.

Table 2: Overview of descriptive statistics

Variable	***M***	***SD***
Accessibility characteristics		
Parking places (parking places/GLA)	0.03	0.02
Paid parking	70%	
Parking cost per hour (€)	0.48	0.80
Distance to closest highway entrance or exit (driving time in minutes)	6.75	5.05
Distance to closest public transport stop (walking time in minutes)	3.20	2.74
Socio-demographic characteristics		
Population within two-km radius	34,978.68	17,713.64
Population within five-km radius	123,179.00	84,712.15
Population within 10-km radius	342,075.50	243,316,50
Average purchasing power (€) in two-km radius	18,151.69	1,928.18
Average purchasing power in (€) five-km radius	18,336.11	1,501.18
Average purchasing power in (€) 10-km radius	18,475.96	1,241.64

Property Attributes		
Age of shopping centre	33.56	14.78
Years since renovation	11.93	8.59
GLA (sq m)	13,629.07	12,595.82
Hours open per day	8.99	0.78
Open on Sunday	68%	
International retailers (%)	4.89	0.05
Herfindahl index of daily convenience stores	0.33	0.16
Herfindahl index of fashion and luxury stores	0.15	0.10
Fragmented ownership	51%	
Dependent variable		
Estimated rental value (in Euros)	199.35	78.98

Note *N*=294; for Herfindahl index of convenience and luxury stores *N*=202

3.4 Methodology

The complexity of the different variables relevant to explaining the rental value of shopping centres makes it difficult to measure the marginal effects of the different variables on the rental value. To measure these effects and thus determine the effect of fragmented ownership, a hedonic analysis was applied. The hedonic pricing model has often been used in academic research to measure the effect of externalities on the residential market (Li and Brown, 1980; Irwin and Bockstael, 2001; Sirmans et al., 2005). Following this usage, it has also been widely used as an important method in understanding the pricing of certain attributes of commercial properties (Dunse and Jones, 1998; Slade, 2002).

Rosen (1974) and Lancaster (1966) have established the current interpretations of the hedonic method. According to Rosen (1974, p. 34), 'heterogeneous goods are valued for their utility-bearing attributes of characteristics'. His interpretation supports the claim that the price paid for a particular property is the sum of all the implied prices the market gives to the different attributes associated with it. Therefore, if all information about property prices and attributes is available, using regression analysis, it is possible to derive the implied price of each attribute, the hedonic price and the relative contribution of each characteristic in affecting a property's price.

A shopping centre is an example of a heterogeneous good that consists of a combination of characteristics intrinsic to it. Each owner within a shopping centre is assumed to derive profit from its characteristics. In this research, each shopping centre is defined by different characteristics identified in the literature review, which determined that the simplest form of relating the rental value of the shopping centre to its individual attributes is:

Rental value (shopping centre) = f (socio-demographic characteristics, accessibility characteristics, property attributes)

Hedonic models in real estate pricing most commonly use a semi-logarithmic functional form (Hill, 2011). Based on the variables explained in the literature review and the overview, the empirical model is defined as follows:

$$(1)\ln(ERV)_C = \beta_0 + \beta_1 \ln(GLA)_c + \beta_2 Age_c + \beta_3 Ren_c + \beta_4 Park_c + \beta_5 Paid_c + \beta_6 Cost_c + \beta_7 HW_c + \beta_8 PT_c + \beta_9 \ln(Pop2km)_c + \beta_{10} \ln(Purch2km)_c + \beta_{11} Open_c + \beta_{12} Sun_c + \beta_{13} HD_c + \beta_{14} HFL_C + \beta_{15} OS_C + \varepsilon$$

The dependent variable *Ln(ERV)* is the natural logarithm of the rents, β_0 is the y-intercept and c represents the specific shopping centre. *Ln(GLA)* is the natural logarithm of the total gross leasable are of the shopping centre, *AGE* is its age and *REN* is the number of years since it was last renovated (and is only included if a renovation has taken place). *PARK* is the amount of parking places relative to the gross leasable area, and *Paid* and *Cost* are dummies for whether there is paid parking and the parking cost per hour. The second part involves the accessibility of the shopping centre. *HW* is the drive time to the nearest highway entrance from the specific shopping centre, and *PT* is the walking time to the closest public transport stop. *Ln(Popnkm)* and *ln(Purchnkm)* are, respectively, the population within a two-kilometre radius of the shopping centre and the average purchasing power within the same range. *Open* is the total hours the shopping centre is open on a regular day, and *Sun* is a dummy variable representing whether the shopping centre is open on Sunday. *HD* and *HFL* are the Herfindahl index for the retail categories of daily convenience stores and fashion and luxury stores. Finally, *OS* is a dummy for the shopping centre's ownership structure.

$\beta_1 \ldots \beta_n$ represent the coefficients of the different parameters, and ε represents the random error. The parameters β were estimated using OLS and therefore the above functional form allows for an empirical estimate the effect of ownership structure on a shopping centre's estimated rental value.

Model 2 and Model 3 will show whether the effects of variables change when distance assumptions are adjusted. *Ln(Popnkm)* and *ln(Purchnkm)* are, respectively, the population within a five-kilometre and 10-kilometre radius of the shopping centre and the average purchasing power within the same range.

$$(2)\ln(ERV)_C = \beta_0 + \beta_1 \ln(GLA)_c + \beta_2 Age_c + \beta_3 Ren_c + \beta_4 Park_c + \beta_5 Paid_c + \beta_6 Cost_c + \beta_7 HW_c + \beta_8 PT_c + \beta_9 \ln(Pop5km)_c + \beta_{10} \ln(Purch5km)_c + \beta_{11} Open_c + \beta_{12} Sun_c + \beta_{13} HD_c + \beta_{14} HFL_C + \beta_{15} OS_C + \varepsilon$$

$$(3)\ln(ERV)_C = \beta_0 + \beta_1 \ln(GLA)_c + \beta_2 Age_c + \beta_3 Ren_c + \beta_4 Park_c + \beta_5 Paid_c + \beta_6 Cost_c + \beta_7 HW_c + \beta_8 PT_c + \beta_9 \ln(Pop10km)_c + \beta_{10} \ln(Purch10km)_c + \beta_{11} Open_c + \beta_{12} Sun_c + \beta_{13} HD_c + \beta_{14} HFL_C + \beta_{15} OS_C + \varepsilon$$

Model 4 excludes the Herfindahl index as one of the independent variables. To calculate the Herfindahl index at least five stores of a certain category have to be present in the shopping centre. In this research daily convenience stores and luxury stors are adopted as categories for which the Herfindahl is calculated, as these are the most common types of stores in shopping centres. However, 92 shopping centres do not have five stores of these categories, which results in 92 shopping centres not being included in Model 1, Model 2 and Model 3. By excluding the Herfindahl index, Model 4 includes all 294 observations in the database. *Ln(Popnkm)* and *ln(Purchnkm)* are, respectively, the population within a two-kilometre radius of the shopping centre and the average purchasing power within the same range.

$$(4)\ln(ERV)_C = \beta_0 + \beta_1 \ln(GLA)_c + \beta_2 Age_c + \beta_3 Ren_c + \beta_4 Park_c + \beta_5 Paid_c + \beta_6 Cost_c + \beta_7 HW_c + \beta_8 PT_c + \beta_9 \ln(Pop2km)_c + \beta_{10} \ln(Purch2km)_c + \beta_{11} Open_c + \beta_{12} Sun_c + \beta_{13} OS_C + \varepsilon$$

4. Results

In the following section, the results of the semi-logarithmic regression are discussed to answer the research question, that is, whether fragmented ownership affects the estimated rental value of shopping centres. In the first section, different model specifications are presented to understand which variables are explanatory for the estimated rental value, and the section also discusses whether these results align with the previously mentioned literature.

4.1 Empirical Results

Table 3 reports the results of three specifications of the model presented in the previous chapter. The results include 202 observations. In Model 1 the distance variables, population density and purchasing power, are included at a radius of two kilometres. In Model 2 and Model 3, the above-mentioned variables are included at a five-kilometre and 10-kilometre radius. In all three models, fragmented ownership is significant in explaining the dependent variable, the logarithm of the estimated rental value. The three models report an r-squared between 0.313 and 0.345; this value indicates that approximately 35% of the variance in the estimated rental value is explained by the variables in the regression. The fit of the three different models is presented in appendix VI.

Table 3: Specification Model, Model 2 and Model 3

	Model 1	**Model 2**	**Model 3**
Dependent Variable	***Ln(ERV)***	***Ln(ERV)***	***Ln(ERV)***
Owners dummy	-0.103**	-0.097**	-0.113**
	(0.046)	(0.049)	(0.049)
Parking/GLA	2.322**	2.580**	2.679**
	(1.164)	(1.182)	(1.203)
Paid parking (1=yes)	-0.157	-0.172	-0.159
	(0.109)	(0.109)	(0.104)
Parking cost/hour	-0.151***	-0.130**	-0.107*
	(0.057)	(0.058)	(0.560)
Drive time to highway	-0.005	-0.003	-0.004
	(0.004)	(0.004)	(0.005)
Walking time to public transport	-0.010	-0.010	-0.104
	(0.009)	(0.009)	(0.009)
LnPop_2km	0.172***		
	(0.041)		
LnPop_5km		0.108**	
		(0.044)	
LnPop_10km			0.052*
			(0.0388)
LnPurch_2km	-0.0167		

	(0.223)		
LnPurch_5km		0.047	
		(0.286)	
LnPurch_10km			0.455*
			(0.345)
Age	-0.006***	-0.005***	-0.005***
	(0.057)	(0.001)	(0.002)
LnTotalGLA	0.167***	0.187***	0.203***
	(0.057)	(0.058)	(0.057)
Hours open	0.158	0.027	0.030
	(0.044)	(0.457)	(0.047)
Open Sunday (1=yes)	-0.180	-0.030	-0.028
	(0.051)	(0.053)	(0.053)
% International	0.883**	0.741*	0.600
retailers	(0.430)	(0.460)	(0.497)
Herfindahl daily	0.074	0.082	0.720
	(0.136)	(0.137)	(0.139)
Herfindahl fashion	-0.207	-0.215	-0.192
	(0.289)	(0.281)	(0.272)
Constant	4.069	2.197	-1.411
	(2.597)	(3.079)	(3.376)
Observations	202	202	202
R-squared	0.345	0.321	0.313

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

Model 1 reports that the dummy representing fragmented ownership has a relatively high significance level (p=0.027) in explaining variation in the estimated rental value. To interpret the effect of a dummy variable on a dependent logarithmic variable, the exponent of the coefficient of the independent variable must be calculated. The coefficient of the ownership dummy is -0.103; therefore, the calculation is $-(\exp^{(0.103)})-1*100=-10.3$. According to Model 1, shopping centres with fragmented ownership have on average a 10.3% lower estimated rental value than shopping centres with unified ownership. By interpreting Model 1 it is possible to answer the main question approached by this research, whether fragemented ownership affects the rental value of shopping centres. According to Model 1 fragmented ownership affects the estimated rental value of shopping centres and according to Model 1 the effect of fragmented ownership on the estimated rental value of shopping centres is negative.

The results presented in model 1 are in line with the theory of excessive propertization formulated by Schulz (2002, p. 32), that when "multiple owners hold rights to exclude others

from a scarce resource and no one exercises an effective privilege of use, the resources may be prone to underuse". Similarly Schulz (2002) suggests that a commercial property has higher investment yields if ownership is unified instead of varied. Parisi, Schulz and Depoorter (2005) also imply that numerous owners will negatively affect the possibilities of optimal use and investment yields of a commercial property. Model 1 reports significant results for the variable fragmented ownership that are in line with the literature. Therefore, H_0, assuming that fragmented ownership does not affect the estimated rental value, is rejected, and H_1, assuming fragmented ownership has an effect on fragmented ownership, is not rejected.

Model 1 does not completely align with expectations based on previous literature concerning the significance and coefficients of the control variables. The presence of paid parking, the drive time to the nearest highway entrance or exit and the walking time to the nearest public transport stop are accessibility-related variables with a low level of significance in explaining the estimated rental value. This is not in line with research from Weltevreden (2007) and Tay et al. (1999), who have emphasised the importance of adequate public transport connection and paid parking. A possible reason for this inconsistency with previous research may be the dynamic nature of the retail environment and human preferences changing. Since Tay et al. (1999) and Weltevreden (2007) published their research many infrastructural developments have taken place and it is likely that accessibility of shopping centres has generally improved. In 2018 accessibility generally is always "very good" in the Netherlands, this is a possibility why accessibility currently does not have a significant effect on the estimated rental value of shopping centres.

The amount of parking spaces relative to the gross leasable floor area of the shopping centre and the parking cost per hour present a high level of significance in explaining the variation in estimated rental value, which does follow the results of previous research from Weltevreden (2007). The coefficient for the amount of parking places relative to the gross leasable area is the highest relative to the coefficients of all other variables. This conforms with research by Stienstra (2013), in which the focus was shifted from the expenses of parking to simply offering sufficient parking facilities.

The significance of the variables concerning the socio-demographic characteristics is also not fully in line with previously discussed literature. In accordance with research from Majoor (2009) and Bakker (2011), the population density within a two-kilometre radius of the shopping centre is significant in explaining its estimated rental value. In contrast to research

from Koot (2007), the average purchasing power within a two-kilometre radius had a low level of significance in explaining the estimated rental value.

The high level of significance of the shopping centre's total surface area in explaining the estimated rental value follows previously examined literature (Sirmans et al., Koot, 2006, Bakker, 2011, Yuo et. al., 2004). However, the retail mix (represented by the Herfindahl index) reports a low level of significance in explaining the estimated rental value of shopping centres. This neither aligns with research from You et al. (2008), which emphasising the effect of the attractiveness of similar stores agglomerating together, nor with the research of Teller (2008) that highlighted the attractiveness of a large variety of stores in one place. According to Grunhagen and Mittlestaedt (2001), as opening hours lengthen, the attractiveness of a shopping centre increases because ease of access is improved. However, in contrast to this research, the model reports a low level of significance for the variables concerning openings hours.

In the specification for Model 2 the total population within a five-kilometre radius and the average purchasing power within the same range were included. The total population and average purchasing power within a two-kilometre radius were excluded in Model 2. The results are similar to the previous model and again report many differences in comparison to the previous literature concerning the control variables. However, it is important to mention that the dummy presenting ownership showed similar results to the previous model specification ($p=0.050$). According to Model 2, a shopping centre with fragmented ownership has on average a 9.7% lower estimated rental value ($-(\exp^{(0.097)})-1*100=-9.7$) than shopping centres with unified ownership. This means that according to Model 2 fragmented ownership will have a negative effect on the estimated rental value of shopping centres. The level of significance of numerous control variables is lower in Model 2 relative to Model 1; for example, parking cost per hour became less significant in explaining variation in estimated rental value. The total population within a five-kilometre radius had a lower significance level and a lower coefficient than the total population within a two-kilometre radius, in line with research from Majoor (2009) and Bakker (2011). The age of the shopping centre and the natural logarithm of the total gross leasable area had similar coefficients and significance levels as those presented by the previous model specification.

Finally, in Model 3, the total population within a 10-kilometre radius and the average purchasing power within the same range were included. The total population and average purchasing power variables included in Model 1 and Model 2 were excluded in Model 3. Model 3 largely reports the same results as Model 1 and Model 2. The fragmented ownership

dummy variable has a relatively high significance level in explaining the variation in estimated rental value (p=0.023). According to model 3 specification, a shopping centre with fragmented ownership has on average a 11.3% lower estimated rental value (–(exp$^{(0.113)}$)-1*100=-11.3) than shopping centres with unified ownership. This means that according to Model 3 fragmented ownership will have a negative effect on the estimated rental value of shopping centres. These results are in line with Model 1 and Model 2, implying that fragmented ownership has a negative effect on the estimated rental value of shopping centres. Furthermore, when looking at the control variable it is remarkable that the total population within a 10-kilometre radius clearly decreased in the level of significance compared to the total population within a two-kilometre and five-kilometre radius. On the other hand, the average purchasing power within a 10-kilometre radius had a higher significance level relative to a two-kilometre and five-kilometre radius, which closely aligns with research from Koot (2007). For the variable age of shopping centre and the natural logarithm of the total gross leasable area, results similar to the previous models follow.

4.2 Results excluding the Herfindahl Index

Table 4 reports the results of the regression using the specification for Model 4. Contrasting to the previous three models, Model 4 does not include the Herfindahl index. The results are based on 294 observations. Fragmented ownership is significant in explaining the dependent variable, the logarithm of the estimated rental value. Model 4 reports an r-squared of 0.32; this value indicates that approximately 32% of the variance in the estimated rental value is explained by the variables included in the regression.

The results reported in Model 4 are similar to the results reported in the previous three models. According to Model 4, a shopping centre with fragmented ownership has on average a 9.5% lower estimated rental value (-(exp$^{(0.095)}$)-1*100=-9.5) than shopping centres with unified ownership. The significance of certain variables in explaining the estimated rental value is different compared to the previous three models. The variables concerning the age of shopping centre and total parking places relative to the gross leasable area are less siginificant in Model 4 than in the previrous three models. The dummy variable representing whether there is paid parking has increased in significance level. Overall, the results for Model 4 validate that H_0, assuming that fragmented ownership does not affect the estimated rental value, is rejected, and H_1, assuming fragmented ownership has an effect on fragmented ownership, is not rejected.

Table 4: Specifications Model 4

	Model 4
Dependent Variable	***Ln(ERV)***
Owners dummy	-0.095**
	(0.040)
Parking/GLA	1.766*
	(0.971)
Paid parking (1=yes)	-0.180**
	(0.096)
Parking cost/hour	-0.131
	(0.055)
Drive time to highway	-0.005
	(0.004)
Walking time to public transport	-0.004
	(0.007)
LnPop_2km	0.190***
	(0.040)
LnPurch_2km	-0.080
	(0.191)
Age	-0.003*
	(0.057)
LnTotalGLA	0.141***
	(0.039)
Hours open	-0.034
	(0.025)
Open Sunday (1=yes)	-0.030
	(0.044)
% International retailers	1.180**
	(0.463)
Constant	2.024
	(2.078)
Observations	294
R-squared	0.320
Robust standard errors in parentheses	
*** p<0.01, **p<0.05, *p<0.1	

4.3 Effect of Comaparison and Convenience Shopping Centres

One of the reasons fragmented ownership of shopping centres developed in the Netherlands is because there are many average-sized cities with short travel times between them (Rosenbaum et al., 1998). The most important consequence is that, instead of developing large-scale shopping areas covering all retail demands, in the Netherlands, many small retail centres developed. The planning of larger shopping centres often requires more centralized planning and unified ownership. According to Locatus (2018) comparison shopping centres

are often larger and require more extensive planning than convenience shopping centres. This is due to more international and large-scale retailers being involved. Convenience shopping centres are often smaller and involve more local and regional retailers. This difference may mean that effect of fragmented ownership is forced up by convenience shopping centres.

The Chow test is a statistical test that will tell whether the regression coefficients are different when the data is split (Chen and Tzang, 1988). To perform the Chow test it is necessary to separate the dataset into convenience shopping centres and comparison shopping centres and run two separate regressions. The null hypothesis is that the intercepts and the slopes of the separate regressions are identical. Table 5 reports the results of the separate regressions for convenience and comparison shopping centres using the specification presented for Model 4. The result of the Chow test is F(9, 270) = 1.323 (calculations in appendix V) this means that there is no structural break in the data between the comparison and convenience shopping centre category and the null hypothesis is not rejected.

Table 5: Regression results after splitting data

	Comparison	**Convenience**
Dependent Variable	***Ln(ERV)***	***Ln(ERV)***
Owners dummy	-0.078*	-0.102**
	(0.063)	(0.053)
Parking/GLA	4.066***	0.313
	(1.521)	(1.130)
Paid parking (1=yes)	-0.327***	-0.429**
	(0.112)	(0.207)
Parking cost/hour	-0.227***	-0.150
	(0.066)	(0.110)
Drive time to highway	-0.007	-0.003
	(0.012)	(0.005)
Walking time to public transport	-0.012	-0.009
	(0.009)	(0.012)
LnPop_2km	0.248***	0.155***
	(0.070)	(0.053)
LnPurch_2km	0.180	0.025
	(0.288)	(0.255)
Age	-0.005**	-0.002
	(0.002)	(0.002)
LnTotalGLA	0.153***	0.137**
	(0.053)	(0.067)
Hours open	-0.055	-0.015
	(0.043)	(0.031)
Open Sunday (1=yes)	-0.037	-0.044
	(0.051)	(0.031)

% International retailers	1.021*	0.355
	(0.605)	(0.852)
Constant	0.088	1.572
	(3.195)	(2.726)
Observations	130	164
R-squared	0.421	0.182
Robust standard errors in parentheses *** p<0.01, **p<0.05, *p<0.1		

5. Conclusion

In this research, the effect of fragmented ownership on the estimated rental value of shopping centres was analysed. A multiple regression analysis identified the effect of fragmented ownership on the estimated rental value of shopping centres. The analysis was based on a dataset comprised of shopping centres located in the Netherlands, and various control variables were included in the analysis. According to Model 1 presented in the previous chapter, the effect of fragmented ownership is a 10.3% lower estimated rental value for the shopping centre. Model 2 and Model 3 served as a robustness check to see whether the conclusion changed when different variables were used. Model 2 and Model 3 also implied that fragmented ownership has a negative effect on the estimated rental value of shopping centrs. As proven by the case examples mentioned in the introduction a difficulty to make decisions and tedious decision-making processes concerning renovations can be related to fragmented ownership. Therefore, a reason for the above-mentioned results presenting a lower estimated rental value when a shopping centre has fragmented ownership may be caused by a lack of innovation and renovation decisions being made regarding the shopping centre. Furthermore, a long process for implicating innovation and renovation decisions as a result of fragmented ownership may also negatively affect the estimated rental value.

As with all empirical academic research, there are limitations and issues in generalising this research and accepting its validity. The most significant issue this research faces is the low level of transparency concerning data about retail real estate. There are no results issued concerning the turnover of stores and shopping centres, and almost all information concerning rental contracts is only available to the lessor and the lessee. This means that much valuable data concerning specific information such as rental prices, the length of rental contracts and various incentives are not included in this research. However, this information is extremely relevant in identifying the success of a retail location (Sirmans and Guidry, 1993). The scarcity of the availability of this data is the largest limitation to this research, and it is related to the fact that the study concerns retail real estate. A larger dataset would strengthen the reliability of the results. Other real estate sectors, such as the office and industrial sectors, experience a much more transparent market concerning the availability of information and data. Another limitation, which is in line with the previously mentioned issue, is the use of estimated rental value as the dependent variable. The estimated rental value is based on structural and market factors concerning a reasonable rent for a particular shopping centre. However, the rental rate may differ completely from the estimated rental value due to incentives, the type of contract and its length.

Taking the points mentioned above into consideration a large part of understanding the success of shopping centres is closely related to understanding the choices consumers make. Also, trends in the retail market are constantly emphasizing the importance of the experience of visiting a shopping centre, relative to the actual shopping. This trend means it is becoming more important for the stakeholders of shopping centres to understand how to create the best experience for consumers at a shopping centre. Further research can focus on how to create the best combination of different property factors and facilities at a shopping centre, so consumers have the best possible experience and spend a lot of time at a shopping centre.

Finally, based on this study, it is fair to say that much research remains to be done concerning shopping centres. Shopping centres are extremely dynamic because they are based on human consumption and entertainment, and these factors constantly change. This is also an important factor in which retail real estate differs from other sectors, making it more complex. A next step to broaden reseach about fragmented ownership of shopping centres is to understand exactly why fragmented ownership negatively impacts the estimated rental value. Based on research by Lowry (1997) a possible cause is a lack of renovation and innovation regarding shopping centres with fragmented ownership, as seen in the two examples mentioned in the introduction. However, clearly identifying these processes using case studies of shopping centres with fragmented ownership and unified ownership can provide valuable information to understand how fragmented ownership affects innovation and renovation of shopping centres. However, the conclusion based on this research is that, in the current retail environment, fragmented ownership negatively influences the estimated rental value of shopping centres in the Netherlands.

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7. Appendix

I. International retailers overview

(Zelfst/nvt)	Regional	HAIRAPP	National	RUNNERSWORLD	National
100% VOETBAL	Regional	HAIRPOINT	National	RUNNERZ	Regional
123WONEN	National	HAKKY	National	S.OLIVER	International
2THELOO	Regional	HALFORDS	National	SACHA	National
65PLUS	Regional	HANDYMAN	Regional	SAHAN	Regional
A TOT Z	Regional	HANS ANDERS	National	SALON B	Regional
ABN AMRO	Regional	HANS STRUIJK	National	SAMSONITE	International
ABN AMRO ATM	Regional	HAPPY FOOD	National	SANDWICH	National
ACCENT	Regional	HART FOR HER	National	SANIFAIR	Regional
ACDAPHA	Regional	HAS DONER	Regional	SASSOON	Regional
ACTIEF WERKT	National	HEIJERMAN	National	SCAPINO	National
ACTION	National	HEMA	International	SCHIJVENS	Regional
ADAM BRANDST	National	HEMA KIOSK	National	SCHOONENBERG	National
ADECCO	Regional	HEMARKT	National	SCHUURMAN	National
ADIDAS	International	HENDRIKSBLOE	Regional	SCORE	National
AH PUP	National	HENNYS RITS	Regional	SCOTCH&SODA	International
AH XL	National	HI-FI KLUBBE	National	SERVICE APOT	National
AKO	National	HILVERS	Regional	SHABU SHABU	National
AKTIE SPORT	National	HISTOIRE DOR	Regional	SHELL	International
ALBERT HEIJN	National	HIZI HAIR	Regional	SHOEBY	National
ALDI-MARKT	Regional	HOEKSTRA ECK	National	SHOETIME	National
ALEXANDERHOE	Regional	HOEPELMAN	Regional	SIEBEL	National
ALPHEGA	Regional	HOLLAND&BARR	National	SIMITÃ‡I DÃœNY	Regional
AMAC	International	HOMMERSON	Regional	SIMON LEVELT	National
AMAZING ORIE	National	HOOGVL SLIJT	National	SISSY-BOY	National
AMBACHTELIJK	National	HOOGVLIET	National	SISSY-BOY HL	National
AMBACHTSBAKK	National	HOOGVLIETPUP	National	SIX	International
AMERICA TODA	National	HOUSE SHOES	National	SLENDER YOU	National
AMI	National	HUBO NL	National	SMIT	Regional
AMIGO	National	HUDSON	National	SMULWERELD	National
AMMERLAAN	Regional	HUDSONS BAY	International	SNEAKERS	National
ANNA V TOOR	National	HUGO BOSS	International	SNS BANK	Regional
ANWB	National	HUIS & HYPOT	National	SNS BANK ATM	Regional
ANYTIME FITN	Regional	HUISDIERVOOR	National	SO LOW	National
ANYTYME	Regional	HUNKEMÃ–LLER	International	SOLA FABRIEK	National
APPEL & EI	National	HYPOTH VISIE	National	SPARE RIB EX	National
ARGOS	Regional	ICI PARIS XL	International	SPECIALIZED	National
ARIANE INDEN	Regional	IJSCUYPJE	Regional	SPECSAVERS	National
ART	Regional	IKKS	International	SPORT 2000	International
ARTIFLEX	National	ING	Regional	SPORT INN	National
ÃšWTOPSLIJTER	National	ING ATM	Regional	SPORTCITY	National
ATM ONBEKEND	Regional	ING ATM	Regional	SPORTS WORLD	National
ATTENT	National	INKSTATION	National	STARBUCKS	International
AUSTRALIAN	International	INTERCITY	Regional	START PEOPLE	National
AVEDA	National	INTERSPORT	International	STEPS	National

AVIA XPRESS	National	INTERTOYS	Regional	STRADIVARIUS	International
BACKWERK	National	JAC HENSEN	National	STRATING KID	Regional
BAGELS&BEANS	National	JACK & JONES	International	STREET ONE	National
BAILINE	National	JACKS CASINO	National	STREGO	National
BAKKER BART	National	JAMBELLE	National	STUMPEL	Regional
BAKKER ROEL	National	JAMIN	National	STYLE HAIR	National
BAKKER VDVEN	Regional	JAN LINDERS	Regional	SUBWAY	International
BANIERHUIS	National	JD	International	SUMO	National
BARISTA CAFÃ‰	National	JDY	National	SUNCARE	National
BART SMIT	National	JEANS CENTRE	National	SUNDAYS	National
BASIC-FIT	National	JENSEN	Regional	SUNGLASS HUT	National
BBROOD	Regional	JETTS	Regional	SUPERDRY	International
BCC	National	JOHNNY S BUR	National	SUPERVLAAI	National
BE ONE	National	JOLA	National	SUSHI TIME	National
BEKKERS	National	JONES&JONES	Regional	SUSHIPOINT	National
BENETTON	International	JOOST	Regional	SUZUKI	International
BENU	National	JOUW MARKTKR	National	SVEN & SOPHI	National
BERG&BERG	International	JUICEBROTHER	Regional	SWAROVSKI	International
BERSHKA	International	JUMBO	National	SWIRLS	International
BERTUS	National	JUMBO ATM	Regional	TABAC&GIFTS	National
BETER HOREN	National	JUMBO PUP	National	TABAKTIEF	National
BEVER	National	JUMBO SLIJT	National	TACO MUNDO	National
BEWUST BETER	National	JUMPER	Regional	TAKKOFASHION	National
BEZORGBEER	National	JUST BRANDS	Regional	TALLY WEIJL	International
BIEDRONKA	Regional	JYSK	National	TAMARIS	National
BIESIEKLETTE	Regional	KAAS EN ZO	National	TANGER	National
BIG BAZAR	National	KAASHUITROMP	Regional	TASTY DONUTS	Regional
BIG L	National	KAASPAKHUIS	National	TBOEKETJE	Regional
BIG SNACK	National	KAASSPECIALI	National	TEAM KAPPERS	National
BIJOU BRIGIT	International	KAASVOORDEEL	National	TECHADOR	Regional
BIKE TOTAAL	National	KAATJE JANS	Regional	TED BAKER	International
BLOEIEND.NL	National	KALISVAART	Regional	TELE2	National
BLOKKER	National	KARWEI	National	TELECOMBINAT	National
BLOKKER SPLG	National	KEES GUTTER	Regional	TELEFOONMAKE	National
BLZ.	National	KELLYFASHION	Regional	TELEFOONSTOR	National
BOEKENVOORDE	National	KEURSLAGER	National	TELFORT	National
BOERENBOND	National	KFC	International	TEMPO-TEAM	National
BOMONT	Regional	KIJKSHOP	National	TER HORST	Regional
BONI	National	KIK	Regional	TERRE DES HO	National
BONI PUP	National	KIKO	International	TERSTAL	National
BONI SLIJTER	National	KILINÃ‡LAR	Regional	THE PRINTER	Regional
BONITA	National	KINKI KAPPER	National	THE SOCIETY	National
BOON S MARKT	National	KIOSK	National	THE STING	National
BOOTS APOTHE	International	KIPPIE	National	THE STONE	National
BOSE	International	KLAAS VAAK	Regional	THE SUNFLOWE	Regional
BOULANGER	National	KLOOTWIJK	Regional	THEATHLETESF	National
BP	International	KLUSWIJS	National	THEBODYSHOP	International
BP EXPRESS	International	KNIP&GO	National	TIJSTERMAN	Regional
BRAINWASH	Regional	KOETSHUYSCH	National	TIMBERLAND	International
BRAM LADAGE	National	KOKKY S	Regional	TIME OUT	National

BRAND OIL	National	KONING	Regional	TINQ	Regional
BRAX	International	KOOISTRA	National	TK MAXX	International
BREGGEN	National	KPN	National	T-MOBILE	National
BREGJE	National	KRIJCO	National	TOERKOOP	National
BRILSERVICE	Regional	KRINGHOLLAND	Regional	TOM TAILOR	International
BRISTOL	National	KROM	Regional	TOP 1 TOYS	National
BROEKENHUIS	Regional	KRUIDVAT	National	TOPMERK	National
BROEKMANS	Regional	KUPERS REIS	Regional	TOPSLAGER	National
BROKKING	Regional	KWALITARIA	National	TOTAL	Regional
BROWNIES&DOW	National	KWANTUM	National	TOYOTA	International
BRUNA	National	KWIKFIT	National	TOYS XL	National
BUFKES	National	L OCCITANE	International	TOYS2PLAY	National
BURGER KING	International	LA CHICA	National	TRADITIONS	Regional
C EST BON	National	LA CUBANITA	National	TRAVELXL	National
C&A	International	LA LIGNA	National	TREKPLEISTER	National
CANDYSHOP	Regional	LA PLACE	National	TREND	Regional
CARPETRIGHT	National	LA PLACE CAF	National	TRIUMPH	International
CASH CONVERT	National	LA TOSCANA	Regional	TUI	National
CAVALLARO	National	LAKE SIDE	National	TUMBLE N DRY	National
CECIL	National	LARA MODE	Regional	TUUNTE	Regional
CEX	National	LE PAIN QUOT	Regional	ULJEE	Regional
CFH	Regional	LE PERRON	National	ULLA POPKEN	National
CHANELJEWELS	International	LEADS	Regional	UNICEF	International
CHARLY	Regional	LEAPP	National	UNIQUE	National
CHASIN	National	LEEMANS	Regional	UNIVÃ‰	National
CHR LE DUC	National	LEEN BAKKER	National	USED PRODUCT	Regional
CHRIST	Regional	LEKKERDINGEN	Regional	U-STAL	Regional
CIGKOFTEM	Regional	LEOLUX	Regional	UTOPOLIS	National
CIGO	National	LEONIDAS	International	UW POELIER	Regional
CITROÃ‹N	International	LEVIS	International	UW SLAGER	Regional
CJ V KEMPEN	Regional	LEXUS	International	V KOPPEN&V E	Regional
CLAIRE S	International	LIBRIS	National	V/D BERG	Regional
CLARKS	International	LIDL	International	VAKANTIEXPER	National
CLAUDIA STRA	International	LIMBURGIA	National	VAN BEEST	Regional
CLUB KAPPERS	National	LINCHERIE	National	VAN BOXTEL	National
COFFEE COMP	National	LINDESSA	National	VAN BRUGGEN	National
COLLEGESTYLE	National	LINDT	International	VAN DAL	National
COLORS@HOME	National	LIN-O-LUX	National	VAN DALEN	National
COMBI	National	LION BEDDENS	Regional	VAN DE VEN	Regional
COMBI PLANT	Regional	LIVERA	National	VAN DELFT DE	National
COMPAENEN	National	LUBBERS	National	VAN DER WAL	National
COOLCAT	National	LUCARDI	National	VAN DONGEN	National
COOP	Regional	LUCKY JACK	Regional	VAN ESCH	Regional
COOP ATM	Regional	M.A.C	International	VAN GILS	National
COOP PUP	Regional	MAESTRO ATM	Regional	VAN HAREN	International
COOP SLIJTER	Regional	MANFIELD	National	VAN HEESWIJK	Regional
COSMO HAIRST	National	MANGO	International	VAN IERSEL	Regional
COSTES	National	MANGO MAN	International	VAN KEULEN	Regional
CRISTALCLEAN	National	MARQT	Regional	VAN MAANEN	Regional
CURVES	National	MARSKRAMER	National	VAN OS	National

D&P PERFUMUM	Regional	MASSIMO DUTT	International	VAN UFFELEN	National
DA	National	MC COMPANY	Regional	VAN VESSEM	Regional
DAGELIJKS LE	Regional	MCD	Regional	VAN VUUREN	Regional
DAKA SPORT	National	MCDONALDS	International	VANDERGRIJN	Regional
DE BEREN	Regional	MCDSLIJTERIJ	Regional	VD ASSEM	National
DE BIJENKORF	National	MCFLEK	Regional	VD HOVEN	National
DE BUREN	National	MCGREGOR	International	VEGRO THUISZ	National
DE FAKKEL BO	National	MEDIA MARKT	International	VERHAGE	Regional
DE HYPOTHEKE	National	MEDIPOINT	National	VERHOEVEN	National
DE HYPOTHSHO	National	MEDSEN APOTH	National	VERO MODA	International
DE KLER	Regional	MELIKDUCHEF	Regional	VILA	International
DE KOFFIE CF	Regional	MEN AT WORK	National	VILLEROYBOCH	International
DE LELIE	National	MERCEDES-BEN	International	VINGINO	National
DE LEUKSTE T	Regional	MEXX	International	VINK	Regional
DE LINNERIE	Regional	MEYER&MEYER	National	VISGILDE	National
DE WALVIS	Regional	MICHAEL KORS	International	VISSER	Regional
DE ZAAK VOL	National	MIJNTAFEL	National	VITAMINSTORE	National
DECO HOME	National	MILLER&MONRO	National	VITU KAPPERS	Regional
DECOKAY	National	MISS ETAM	National	VIVÃ□NT	Regional
DEEN SLIJTER	Regional	MISTER MINIT	Regional	VIVANTE	Regional
DEEN SUPERMK	Regional	MITRA	National	VLIEG	Regional
DEKA SLIJTER	Regional	MOBILE SERVI	National	VODAFONE	National
DEKAMARKT	Regional	MOCKAMORE	National	VOMAR	Regional
DELIFRANCE	National	MODA PARIS	National	VOMAR SLIJT	Regional
DERKS	National	MODE4HER	Regional	VONCKEN	Regional
DFM	National	MONEYGRAM	National	VOSKAMP	National
DIDI	National	MONEYTRANS	National	VUE	National
DIE GRENZE	Regional	MOOI	National	VVV	National
DIER ALL-IN	Regional	MOSCOW	International	WAAR	National
DIERSPECIALI	National	MS MODE	National	WAM DENIM	National
DIGITOTAAL	National	MULTIVLAAI	National	WATCH	Regional
DILLE&KAMILL	National	MYCOM	Regional	WE ARE LABEL	Regional
DIO	Regional	NAME IT	International	WE MEN	International
DIO DE NATUU	National	NATUURWINKEL	National	WE STORE	International
DIRCK III	National	NEDGAME	National	WELCOM BIJ	National
DIRK	National	NELSON	National	WELZORG	Regional
DIRK SLIJTER	National	NESPRESSO	International	WERELDWINKEL	National
DISCUS	Regional	NETTORAMA	National	WERKTALENT	National
DJEWEL	Regional	NEW YORKER	International	WESTERNUNION	International
DOBEY	National	NEWYORKDELIV	International	WESTIN	International
DOMINOS	International	NEWYORKPIZZA	International	WIBRA	National
DOPPIO ESPRE	National	NIKE STORE	International	WITTEVEEN	Regional
DOUGLAS	National	NOLLEN	Regional	WOK TO GO	National
DR SHOE	National	NOLTEN	Regional	WOLFORD	International
D-REIZEN	National	NONA	National	WOONACCENT	National
DRESSFORSUCC	Regional	NOPPIES	National	XENOS	National
DUIFHUIZEN	Regional	NORAH	Regional	YES!	Regional
DUKA	Regional	NZA	Regional	YVES ROCHER	International
DUKERS DÃ‰ BA	Regional	OBJECT	Regional	Z GENERATION	International

DUNGELMANN	National	ODIN	National	ZARA HOME	International
DURLINGER	Regional	OIL&VINEGAR	National	ZARA MODE	International
EAZIE	Regional	OKAY F&J	Regional	ZEEMAN	National
ECCO	International	OLYMPIA	National	ZIENGS	National
ECHTE BAKKER	National	OMODA	National	ZIZZI	National
EIGENDROGIST	National	ONLY	International	ZONVAART	Regional
EKOPLAZA	Regional	ONLY & SONS	International	ZUIVELHOEVE	National
EKOPLAZA PUP	Regional	ONLY FOR MEN	International	JANSE MODE	National
EL VITA	Regional	OOGWERELD	National	JUWELIERSHUI	Regional
ELEC WORLD	National	OOMS	Regional	PRIMARK	International
EMBRACE	Regional	OORWERK	National	JONGERIUS	Regional
EMTÃ‰	National	OP=OP VOORDE	National	BOVENDEERT	National
EMTÃ‰ SLIJTER	National	OPEN32	National	JUST A JOKE	Regional
EP	Regional	OPTIE1	National	DECORETTE	National
ERA MAKELAAR	Regional	PALTHE	National	KENGEN&VERBE	Regional
ERGOLINE-SUN	National	PANDORA	National	CKS	Regional
ERICA	Regional	PAPA JOHNS P	International	SCHAAP&CITR	National
ESMOKINGWORL	Regional	PAPERCHASE	International	HOLL CASINO	National
ESPRIT	International	PAPRIKA	International	SHOELINE	National
ESSO	National	PARFOIS	International	MARC CAIN	International
ETOS	National	PARTI	Regional	ST. STUDIO	National
EUREKA	Regional	PARTSNL	National	ASPACT	National
EUROLAND	National	PATHE	National	MUNNICHS	Regional
EURONICS	National	PAULISSEN BA	Regional	VAPIANO	National
EUROPA HAIRS	Regional	PAUW	National	LA PLACE EXP	National
EUROPART	National	PDZ	National	TROLLBEADS	National
EXECUTIEVERK	National	PEARLE	National	BJÃ–RN BORG	International
EXPERT	National	PERRY	National	FOODMASTER	National
EXPRESSO	National	PETIT BATEAU	International	COFFEELOVERS	Regional
EYE WISH	National	PETS PLACE	National	BETTY BARCLA	International
EYES + MORE	National	PETS&CO	National	STATE OF ART	National
F V LIESHOUT	Regional	PHONE HOUSE	National	7CAMICIE	International
FAMILY	National	PICTUREPEOPL	National	PURDEY	Regional
FAUNALAND	National	PIECES	International	CZ ZORGVERZ	National
FAVORS!	National	PIET ZOOMERS	Regional	ZWARTE FIETS	Regional
FEBO	National	PIPOOS	National	KEY MUSIC	International
FIELMANN	Regional	PLANTAGE B&M	Regional	LA COSTA	International
FIETSCITY	Regional	PLANTENBEURS	Regional	ENORM	National
FIETSPLUS	National	PLAZA	National	BALLORIG	National
FIETSWERELD	National	PLUS	National	XOOON	National
FINENZO	National	PLUS PUP	National	ROFRA HOME	National
FIT FOR FREE	National	PLUS SLIJTER	National	TOTAALBED	National
FIT4LADY	National	POSTMASTERS	National	TULP KEUKENS	National
FLASHCASINOS	National	POSTNL	National	MONTEL	National
FLORALE	National	POUR VOUS	Regional	SANI-DUMP	National
FLORMAR	Regional	PRÃ‰NATAL	National	HACO	National
FLYING TIGER	International	PRIJSMEPPER	National	LEDERLAND	National
FOOT LOCKER	International	PRIMA NL	National	GOOSSENS	National
FOSSIL	International	PRIMERA	National	SWISS SENSE	National
FREEWEAR	International	PRO DUO	National	BRUGMAN	National

FRUITCOMPANY	National
G&W GEZONDHE	National
GALL & GALL	National
GAME MANIA	National
GARANTIE MAK	Regional
GEBR VD BERG	Regional
GELCO	International
GELDERBLOM	National
GELDXPERT	National
GENTS	National
GERRY WEBER	International
GET WORK	Regional
GIANT STORE	National
GLOWGOLF	National
GOEMANS	National
GOUDREINET	National
GRAPEDISTRIC	National
GREEN BUDGET	Regional
GROENTE&FRUI	National
GSM REPARATI	National
GSM-SHOP	National
G-STAR RAW	International
GUESS	International
H&M	International
H&M KIDS	International
HAIRAPP	National
HAIRPOINT	National
PROFILE	National
PROMISS	National
PULL&BEAR	International
Q MAKELAARS	Regional
QINN	Regional
QOQO	Regional
RABO ADVIES	Regional
RABO ATM	Regional
RABOBANK	Regional
RALPH LAUREN	International
RANDSTAD	National
RBS ATM	Regional
READ SHOP	National
REGIOBANK	Regional
RICKENS	National
RINGFOTO	Regional
RITEL	National
RITUALS	International
RIVER ISLAND	International
RIVER WOODS	International
RIVIERA MAIS	International
ROB BOON	Regional
ROMBOUT	Regional
ROOBOL	Regional
ROODENRIJS	Regional
ROUSSEAU	Regional
RUN2DAY	National
SANDERS MEUB	National
KEUKENSALE.C	National
AANHUIS	National
HENDERS &H	National
PROFIJT MEUB	National
KEUKEN KAMPI	National
DFS	National
TEMPUR	National
KÃœCHEN TREFF	International
PIET KLERKX	National
SUPERKEUKENS	National
AUPING PLAZA	International
KVIK	National
KEUKENCONCUR	National
BETER BED	National
BRUYNZ KEUK	National
DE BOMMEL	National
CHATEAU D AX	National
BAKERSTREET	National
1982	Regional

II. Calculation Herfindahl Index

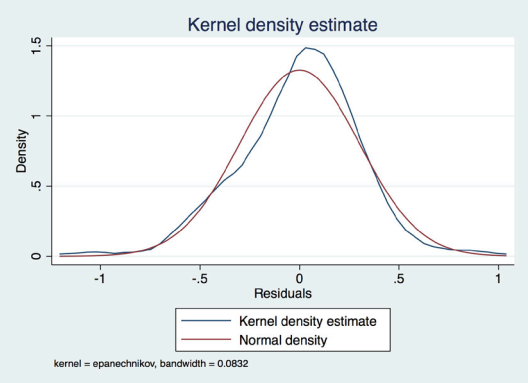
The herfindahl index of a retail category in a shopping centre is calculated using equation 1. To use the equation it is necessary to know the retail category, total number of stores belonging to that category in the shopping centre and the retail floor area of a single selling point and the total surface area of all selling points belonging to a retail category. Since the calculation provides information about whether there is a "over concentration" of a certain selling point, only the largest five selling points belonging to the analyzed retail category in a shopping centre are included. A herfindahl index below 0.15 indicates that the largest five stores in a retail category are unconcentrated, an index between 0.15 and 0.25 indicated moderate concentration and an index above 0.25 indicates high concentration.

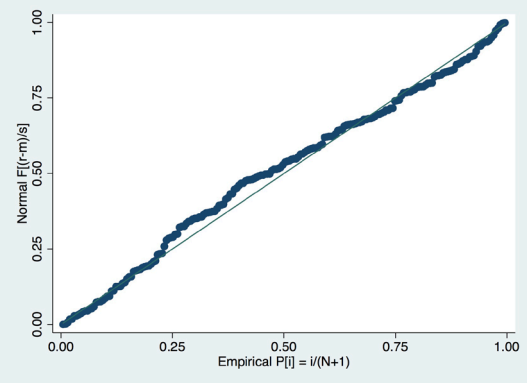
$$RETCONCINDX = \sum_{k=1}^{n} \left(\frac{RFA_{ij}^{k}}{RFA_{ij}}\right)^{2}$$

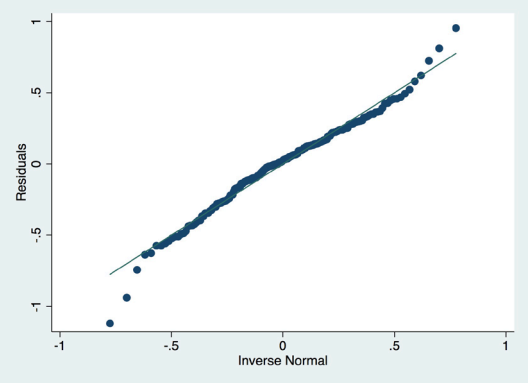
Variable	Explanation
$RETCONCINDX$	Retail concentration index for any given retail category in a given shopping centre
i	Identifies retail category
j	Identifies shopping centre
k	Identifies store within category i in shopping centre j
n	Number of stores in within category i in shopping centre j
RFA_{ij}^{k}	Retail floor area of any k store belonging to category i and located in shopping centre j
RFA_{ij}	Retail floor area of all properties belonging to category i and located in shopping centre j

III. OLS Assumptions

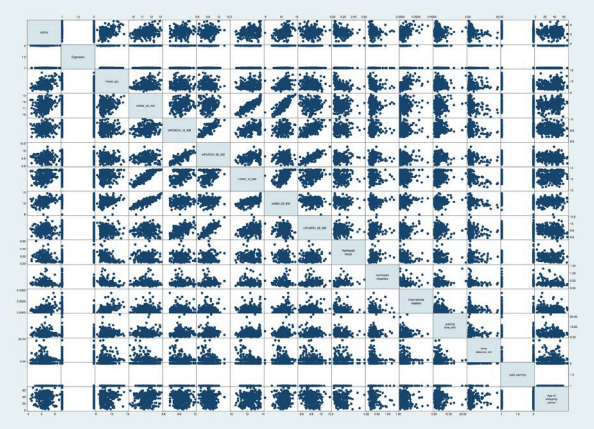
1. There needs to be a linear relationship between the dependent variable and each of the independent variables. Graphing the dependent variable and each of the independent variables can check for a linear relationship.







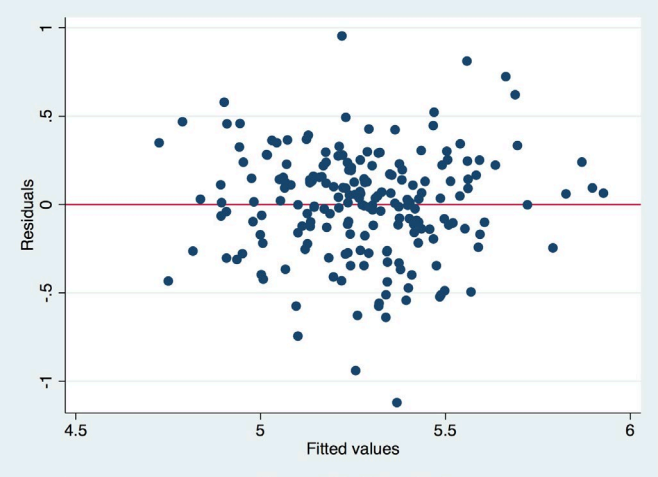
2. A regression analysis requires all residuals to be normally distributed. This assumption can be checked using a Q-Q plot and the Shapiro-Wilk test for normality.



Shapiro Wilk test for normal data					
Var.	Obs	W	V	Z	Prob>Z
r	202	0.984	2.371	1.987	0.023

3. In a linear regression there may not be any or only little multicollinearity in the data. Multicollinearity can be tested for using a correlation matrix. According to the correlation matrix (appendix IV) there are no issues with multicollinearity.

4. A linear regression analysis assumes that there is little of no autocorrelation in the data. Numerous fixed effects are included in the regression analysis.
5. Linear regression requires homoscedasticity. To check for homoscedasticity a line of best fit and the unstandardized predicted values are plotted and the Breusch-Pagan/Cook Weisberg test for heterosckedasticity are used.



Breusch-Pagan/Cook Weisberg test for heteroskedasticty:

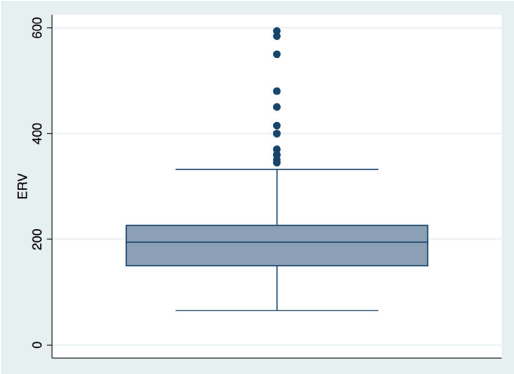
H_0: Constant Variance

Variables: fitted values of lnERV

chi2(1) = 0.16

Prob>chi2 = 0.689

6. In a linear regression there should be no significant outliers. Creating a boxplot of the dependent variable and removing the outliers can control for this.



IV. Correlation Matrix

	Age	Last renno.	Cost per hour	Paid parking	Parking / GLA	Hours open	Drive time (min)	Walking time (min)	Intnl. (%)	Herf. daily	Herf. fashion	Owner	lnERV	lnTotal GLA	Ln Pop 5km	Ln Purch 5km	Ln Purch 10km	Ln Pop 10km	Ln Pop 2km	Open Sunday	Open Thurs.	Ln Purch 2km
Age of Shopping Centre	1.000																					
Years since rennovation	0.111	1.000																				
Costperhour	(0.193)	(0.073)	1.000																			
Paid parking	0.133	0.011	(0.891)	1.000																		
Parking / GLA	0.103	0.014	(0.133)	0.061	1.000																	
Hours open	(0.014)	0.079	(0.187)	0.151	(0.111)	1.000																
Drivetime (min)	(0.133)	0.108	0.002	0.018	(0.082)	0.015	1.000															
Walkingtime (min)	(0.094)	0.052	0.119	(0.193)	0.200	(0.060)	0.005	1.000														
International (%)	(0.057)	(0.130)	0.338	(0.316)	0.061	(0.194)	(0.075)	(0.005)	1.000													
Herfindahl daily	(0.050)	0.070	(0.011)	(0.050)	(0.079)	0.001	(0.093)	0.170	0.012	1.000												
Herfindahl fashion	0.009	0.029	(0.054)	0.129	(0.271)	0.138	(0.028)	(0.093)	(0.263)	0.312	1.000											
Eigenaren	0.051	0.057	(0.117)	0.057	(0.009)	0.019	0.010	(0.110)	(0.240)	(0.086)	(0.014)	1.000										
lnERV	(0.081)	(0.104)	0.077	(0.121)	0.129	(0.010)	(0.151)	0.065	0.343	(0.067)	(0.263)	(0.234)	1.000									
lnTotal GLA	0.020	(0.171)	0.411	(0.430)	0.040	(0.337)	(0.034)	0.131	0.521	(0.224)	(0.548)	(0.120)	0.406	1.000								
Ln Pop 5km	0.180	(0.054)	0.080	(0.097)	(0.002)	(0.082)	(0.382)	0.002	0.036	(0.107)	(0.130)	(0.115)	0.272	0.230	1.000							
Ln Purch 5km	0.058	(0.061)	(0.163)	0.178	0.141	0.058	(0.214)	0.046	(0.041)	0.023	0.045	0.023	0.089	(0.067)	0.077	1.000						
Ln Purch 10km	0.107	(0.037)	(0.130)	0.133	0.115	0.021	(0.291)	0.074	(0.056	0.009	0.039	0.072	0.172	0.001	0.229	0.826	1.000					
Ln Pop 10km	0.134	(0.036)	(0.029)	0.010	0.046	(0.107)	(0.457)	0.050	0.013	(0.134)	(0.121)	(0.062)	0.228	0.157	0.844	0.317	0.428	1.000				
Ln Pop 2km	0.114	(0.082)	0.211	(0.221)	0.005	(0.048)	(0.233)	0.066	0.082	(0.051)	(0.169)	(0.115)	0.344	0.272	0.783	(0.035)	0.159	0.553	1.000			
Open Sunday	0.079	(0.081)	0.232	(0.218)	0.113	0.071	(0.235)	0.010	0.255	0.008	(0.148)	(0.089)	0.137	0.262	0.233	0.062	0.065	0.204	0.213	1.000		
Open Thursday	(0.065)	(0.068)	0.240	(0.269)	0.162	(0.129)	0.092	0.017	0.231	(0.029)	(0.274)	(0.058)	0.011	0.250	(0.119)	(0.188)	(0.225)	(0.153)	(0.060)	0.192	1.000	
Ln Purch 2km	(0.019)	(0.072)	(0.083)	0.104	0.154	(0.001)	(0.168)	0.010	0.024	0.108	0.040	(0.035)	0.020	(0.086)	0.002	0.834	0.634	0.249	(0.166)	0.059	(0.123)	1.000

V. Chow test

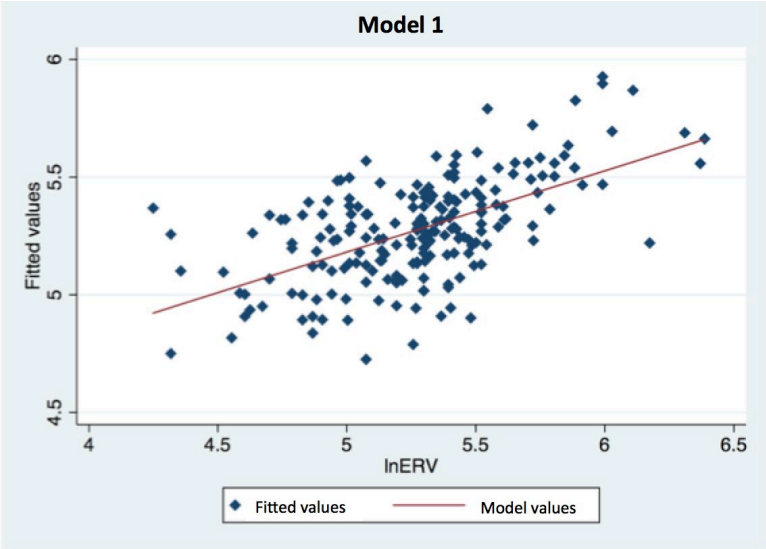
$$\frac{ess_c-(ess_1+ess_2)}{k} \rightarrow \frac{27.07-(11.97+13.96)}{9} = 1.323$$

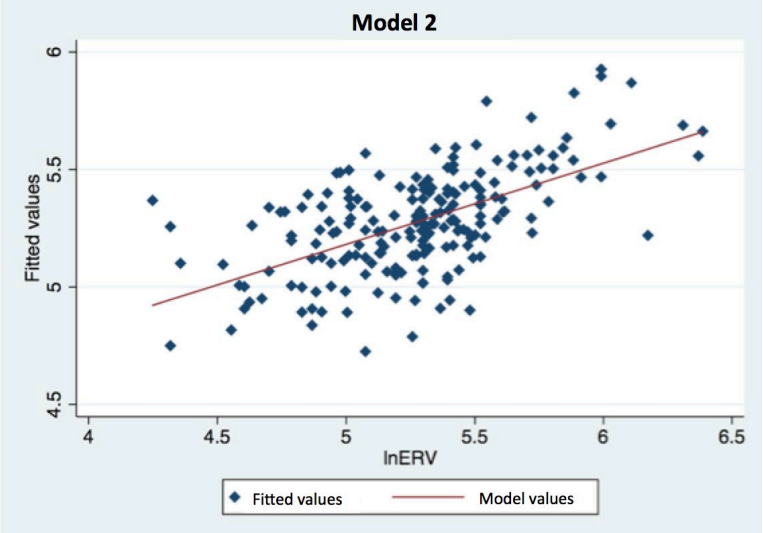
$$\frac{ess_1+ess_2}{N_1+N_2-2*k}$$

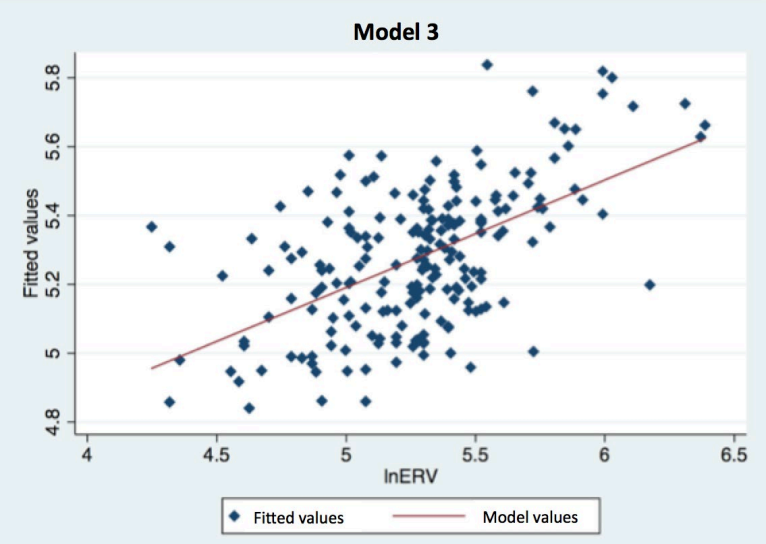
$$\frac{11.97+13.96}{130+164-2*9}$$

$$F(k, N_1 + N_2 - 2 * k) = F(9, 270)$$

VI. Model fit – Model 1, Model 2 and Model 3







VII. Stata Do File

```
import excel "/Users/Marieke/Documents/Regression database no outliers.xlsx",
sheet("Totaal") firstrow
destring _all, replace
gen lnERV = ln(ERV)
gen lntotal_gla = ln(total_gla)
gen lnINW_05_KM = ln(INW_05_KM)
gen lnPURCH_05_KM = ln(PURCH_05_KM)
gen lnPURCH_10_KM = ln(PURCH_10_KM)
gen lnINW_10_KM = ln(INW_10_KM)
gen lnINW_02_KM = ln(INW_02_KM)
tab Zondaggeopend, generate (Zondaggeopend_dum)
tab Koopavond, generate (Koopavond_dum)
gen lnPURCH_02_KM = ln(PURCH_02_KM)
summarize ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min
lnINW_02_KM lnINW_05_KM lnIN
> W_10_KM lnPURCH_02_KM lnPURCH_05_KM lnPURCH_10_KM
Ageofshoppingcentre Yearssincerennovation lntotal_gla Urenope
> nperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode
Eigenaren
histogram ERV, normal
(bin=17, start=65, width=31.117647)
. graph save Graph "/Users/Marieke/Documents/Masterthesis onderdelen/histogram
ERV.gph"
(file /Users/Marieke/Documents/Masterthesis onderdelen/histogram ERV.gph saved)
. histogram lnERV, normal
(bin=17, start=4.1743875, width=.13014659)
. graph save Graph "/Users/Marieke/Documents/Masterthesis onderdelen/histrogram
lnERV.gph"
(file /Users/Marieke/Documents/Masterthesis onderdelen/histrogram lnERV.gph saved)
. histogram ERV, normal
(bin=17, start=65, width=31.117647)

correlate Ageofshoppingcentre Yearssincerennovation Costperhour paid_parking
ParkingGLA Urenopenperdag Drivetim
> ehighway_min walkingtime_min Internationalretailers HerfindahlDagelijks
HerfindahlMode Eigenaren lnERV lntotal_
> gla lnINW_05_KM lnPURCH_05_KM lnPURCH_10_KM lnINW_10_KM
lnINW_02_KM Zondaggeopend_dum1 Koopavond_dum1 lnPURCH_0
> 2_KM
| Ageofs~e Yearss~n Costpe~r paid_p~g Parkin~A Urenop~g Drivet~n walkin~n Intern~s
Herfin~s Herfin~e
Ageofshopp~e |   1.0000
```

Yearssince~n | 0.1105 1.0000
Costperhour | -0.1928 -0.0735 1.0000
paid_parking | 0.1334 0.0105 -0.8906 1.0000
ParkingGLA | 0.1031 0.0143 -0.1333 0.0606 1.0000
Urenopenpe~g | -0.0138 0.0792 -0.1868 0.1511 -0.1106 1.0000
Drivetimeh~n | -0.1330 0.1075 0.0213 0.0185 -0.0815 0.0152 1.0000
walkingtim~n | -0.0942 0.0518 0.1189 -0.1930 0.1996 -0.0600 0.0053 1.0000
Internatio~s | -0.0573 -0.1302 0.3379 -0.3155 0.0614 -0.1936 -0.0748 0.0745 1.0000
Herfindahl~s | -0.0499 0.0701 -0.0111 -0.0498 -0.0795 0.0009 -0.0927 0.1076 -0.1133
1.0000 Herfindahl~e | 0.0088 0.0287 -0.0539 0.1289 -0.2705 0.1381 -0.0284 -0.1212
-0.3639 0.3569 1.0000 Eigenaren | 0.0513 0.0568 -0.1169 0.0570 -0.0088 0.0186
0.0102 -0.1064 -0.1528 0.0036 0.0079 lnERV | -0.0813 -0.1035 0.0768 -0.1208
0.1289 -0.0098 -0.1513 0.0140 0.2754 -0.1912 -0.3318 lntotal_gla | 0.0202 -0.1715
0.4107 -0.4299 0.0399 -0.3366 -0.0341 0.1953 0.5599 -0.3029 -0.5719
lnINW_05_KM | 0.1796 -0.0537 0.0804 -0.0972 -0.0018 -0.0816 -0.3825 0.0947 -
0.0044 -0.1757 -0.1104 lnPURCH_05~M | 0.0578 -0.0611 -0.1626 0.1777 0.1406
0.0583 -0.2139 0.0100 0.0673 0.0625 0.0238 lnPURCH_10~M | 0.1070 -0.0369 -
0.1298 0.1332 0.1149 0.0212 -0.2905 0.0517 0.0201 -0.0308 0.0177 lnINW_10_KM
| 0.1338 -0.0362 -0.0289 0.0100 0.0456 -0.1071 -0.4574 0.1763 0.0184 -0.1618 -
0.1549 lnINW_02_KM | 0.1139 -0.0817 0.2110 -0.2210 0.0052 -0.0481 -0.2331
0.1462 -0.0525 -0.1375 -0.1079Zondaggeop~1 | 0.0790 -0.0815 0.2317 -0.2177 0.1129
0.0707 -0.2349 0.0016 0.3409 -0.0697 -0.1887
Koopavond_~1 | -0.0646 -0.0680 0.2399 -0.2694 0.1620 -0.1295 0.0916 -0.0012
0.1964 -0.0731 -0.3635 lnPURCH_02~M | -0.0192 -0.0723 -0.0832 0.1036 0.1544 -
0.0012 -0.1684 -0.0043 0.1408 0.1345 -0.0346
| Eigena~n lnERV lntota~a lnI~5_KM lnP~5_KM lnP~0_KM lnI~0_KM lnI~2_KM
Zondag~1 Koopav~1 lnP~2_KM
Eigenaren | 1.0000
lnERV | -0.1800 1.0000
lntotal_gla | -0.1106 0.4167 1.0000
lnINW_05_KM | -0.0863 0.3322 0.2645 1.0000
lnPURCH_05~M | -0.0321 0.0387 -0.0371 0.0248 1.0000
lnPURCH_10~M | 0.0565 0.1572 0.0189 0.2864 0.8250 1.0000
lnINW_10_KM | -0.1115 0.2851 0.2310 0.8475 0.2643 0.4828 1.0000
lnINW_02_KM | -0.0533 0.3271 0.2644 0.7696 -0.0384 0.1947 0.5357 1.0000
Zondaggeop~1 | 0.0061 0.2174 0.3483 0.2303 0.0974 0.1705 0.2361 0.1945
1.0000Koopavond_~1 | -0.0003 0.0433 0.2821 -0.0633 -0.1662 -0.1820 -0.0501 -
0.0397 0.2137 1.0000 lnPURCH_02~M | -0.0939 -0.0600 -0.0363 -0.0359 0.8314
0.6101 0.2220 -0.1829 0.1256 -0.0725 1.0000
. correlate Ageofshoppingcentre Yearssincerennovation Costperhour paid_parking
ParkingGLA Urenopenperdag Drivetim
> ehighway_min walkingtime_min Internationalretailers HerfindahlDagelijks
HerfindahlMode Eigenaren lntotal_gla ln

> INW_05_KM lnPURCH_05_KM lnPURCH_10_KM lnINW_10_KM lnINW_02_KM
Zondaggeopend_dum1 Koopavond_dum1 lnPURCH_02_KM
Ageofs~e Yearss~n Costpe~r paid_p~g Parkin~A Urenop~g Drivet~n walkin~n Intern~s
Herfin~s Herfin~e
Ageofshopp~e | 1.0000
Yearssince~n | 0.1105 1.0000
Costperhour | -0.1928 -0.0735 1.0000
paid_parking | 0.1334 0.0105 -0.8906 1.0000
ParkingGLA | 0.1031 0.0143 -0.1333 0.0606 1.0000
Urenopenpe~g | -0.0138 0.0792 -0.1868 0.1511 -0.1106 1.0000
Drivetimeh~n | -0.1330 0.1075 0.0213 0.0185 -0.0815 0.0152 1.0000
walkingtim~n | -0.0942 0.0518 0.1189 -0.1930 0.1996 -0.0600 0.0053 1.0000
Internatio~s | -0.0573 -0.1302 0.3379 -0.3155 0.0614 -0.1936 -0.0748 0.0745 1.0000
Herfindahl~s | -0.0499 0.0701 -0.0111 -0.0498 -0.0795 0.0009 -0.0927 0.1076 -0.1133
1.0000 Herfindahl~e | 0.0088 0.0287 -0.0539 0.1289 -0.2705 0.1381 -0.0284 -0.1212
-0.3639 0.3569 1.0000 Eigenaren | 0.0513 0.0568 -0.1169 0.0570 -0.0088 0.0186
0.0102 -0.1064 -0.1528 0.0036 0.007 lntotal_gla | 0.0202 -0.1715 0.4107 -0.4299
0.0399 -0.3366 -0.0341 0.1953 0.5599 -0.3029 -0.5719
lnINW_05_KM | 0.1796 -0.0537 0.0804 -0.0972 -0.0018 -0.0816 -0.3825 0.0947 -
0.0044 -0.1757 -0.1104 lnPURCH_05~M | 0.0578 -0.0611 -0.1626 0.1777 0.1406
0.0583 -0.2139 0.0100 0.0673 0.0625 0.0238 lnPURCH_10~M | 0.1070 -0.0369 -
0.1298 0.1332 0.1149 0.0212 -0.2905 0.0517 0.0201 -0.0308 0.0177
lnINW_10_KM | 0.1338 -0.0362 -0.0289 0.0100 0.0456 -0.1071 -0.4574 0.1763
0.0184 -0.1618 -0.1549 lnINW_02_KM | 0.1139 -0.0817 0.2110 -0.2210 0.0052 -
0.0481 -0.2331 0.1462 -0.0525 -0.1375 -0.1079 Zondaggeop~1 | 0.0790 -0.0815
0.2317 -0.2177 0.1129 0.0707 -0.2349 0.0016 0.3409 -0.0697 -0.1887 Koopavond_~1
| -0.0646 -0.0680 0.2399 -0.2694 0.1620 -0.1295 0.0916 -0.0012 0.1964 -0.0731 -
0.3635 lnPURCH_02~M | -0.0192 -0.0723 -0.0832 0.1036 0.1544 -0.0012 -0.1684 -
0.0043 0.1408 0.1345 -0.0346
Eigena~n lntota~a lnI~5_KM lnP~5_KM lnP~0_KM lnI~0_KM lnI~2_KM Zondag~1
Koopav~1 lnP~2_KM
Eigenaren | 1.0000
lntotal_gla | -0.1106 1.0000
lnINW_05_KM | -0.0863 0.2645 1.0000
lnPURCH_05~M | -0.0321 -0.0371 0.0248 1.0000
lnPURCH_10~M | 0.0565 0.0189 0.2864 0.8250 1.0000
lnINW_10_KM | -0.1115 0.2310 0.8475 0.2643 0.4828 1.0000
lnINW_02_KM | -0.0533 0.2644 0.7696 -0.0384 0.1947 0.5357 1.0000
Zondaggeop~1 | 0.0061 0.3483 0.2303 0.0974 0.1705 0.2361 0.1945 1.0000
Koopavond_~1 | -0.0003 0.2821 -0.0633 -0.1662 -0.1820 -0.0501 -0.0397 0.2137
1.0000 lnPURCH_02~M | -0.0939 -0.0363 -0.0359 0.8314 0.6101 0.2220 -0.1829
0.1256 -0.0725 1.0000
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnINW_05_KM lnINW_10_KM lnPURCH_02_KM

lnPURCH_05_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_02_KM lnPURCH_02_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeop end_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_02_KM lnPURCH_02_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_02_KM lnPURCH_02_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren, robust
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_05_KM lnPURCH_05_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_05_KM lnPURCH_05_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren, robust
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_10_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren, robust
regress lnERV Eigenare paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_10_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode ParkingGLA, robust
regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Internationalretailers Eigenaren, robust
regress lnERV ParkingGLA Costperhour lnINW_02_KM lnINW_05_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Internationalretailers Eigenaren, robust
regress lnERV ParkingGLA Costperhour Drivetimehighway_min walkingtime_min lnINW_02_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Internationalre
tailers Eigenaren, robust
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_02_KM lnINW_05_KM lnINW_10_KM lnPURCH_02_KM lnPURCH_05_KM lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks HerfindahlMode Eigenaren

Source	SS	df	MS	Number of obs	=	202
Model	10.1141041	19	.532321267	F(19, 182)	=	5.49
				Prob > F	=	0.0000

Residual | 17.642874 182 .096938868 R-squared = 0.3644
Adj R-squared = 0.2980
Total | 27.7569781 201 .138094418 Root MSE = .31135
lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
ParkingGLA | 2.362799 1.158768 2.04 0.043 .0764519 4.649146
paid_parking | -.1496122 .1061598 -1.41 0.160 -.3590744 .05985
Costperhour | -.1280686 .064211 -1.99 0.048 -.2547622 -.0013749
Drivetimehighway_min | -.0042095 .0050875 -0.83 0.409 -.0142476 .0058286
walkingtime_min | -.0116942 .0082364 -1.42 0.157 -.0279453 .0045568
lnINW_02_KM | .1215196 .0769269 1.58 0.116 -.0302637 .2733028
lnINW_05_KM | .0036647 .0922176 0.04 0.968 -.1782883 .1856178
lnINW_10_KM | .0107886 .0669025 0.16 0.872 -.1212156 .1427928
lnPURCH_02_KM | -.7460994 .4229722 -1.76 0.079 -1.580659 .0884604
lnPURCH_05_KM | .3045956 .6981526 0.44 0.663 -1.072918 1.682109
lnPURCH_10_KM | .8885561 .6320377 1.41 0.161 -.3585075 2.13562
Ageofshoppingcentre | -.0058359 .0017091 -3.41 0.001 -.0092081 -.0024638
lntotal_gla | .1544835 .0550847 2.80 0.006 .0457968 .2631702
Urenopenperdag | .0140409 .033895 0.41 0.679 -.0528368 .0809187
Zondaggeopend_dum1 | -.0204106 .0534638 -0.38 0.703 -.1258992 .0850779
Internationalretailers | .902813 .5322857 1.70 0.092 -.1474314 1.953057
HerfindahlDagelijks | .1048223 .1634033 0.64 0.522 -.2175862 .4272308
HerfindahlMode | -.3244559 .2888691 -1.12 0.263 -.8944189 .245507
Eigenaren | -.1186202 .0482538 -2.46 0.015 -.2138291 -.0234114
cons | -1.484726 3.746541 -0.40 0.692 -8.876966 5.907514

. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnPURCH_02_K
> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeop end_dum1
Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren
Zondaggeop ambiguous abbreviation
r(111);
. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnPURCH_02_K
> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1
Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren
Source | SS df MS Number of obs = 202
F(15, 186) = 6.54
Model | 9.58621236 15 .639080824 Prob > F = 0.0000
Residual | 18.1707657 186 .097692289 R-squared = 0.3454
Adj R-squared = 0.2926
Total | 27.7569781 201 .138094418 Root MSE = .31256

lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
ParkingGLA | 2.322352 1.156927 2.01 0.046 .0399674 4.604737
paid_parking | -.1572419 .1057724 -1.49 0.139 -.3659097 .051426
Costperhour | -.1507661 .0629365 -2.40 0.018 -.2749273 -.026605
Drivetimehighway_min | -.005198 .0047951 -1.08 0.280 -.0146578 .0042617
walkingtime_min | -.0100712 .0081795 -1.23 0.220 -.0262077 .0060654
lnPURCH_02_KM | -.1689165 .2224231 -0.76 0.449 -.6077129 .2698799
Ageofshoppingcentre | -.0056982 .0016943 -3.36 0.001 -.0090408 -.0023557
lntotal_gla | .168997 .0544971 3.10 0.002 .0614851 .2765088
Urenopenperdag | .0158423 .0334914 0.47 0.637 -.0502296 .0819141
Zondaggeopend_dum1 | -.0179827 .05327 -0.34 0.736 -.1230738 .0871084
Internationalretailers | .8838125 .5333445 1.66 0.099 -.1683695 1.935995
HerfindahlDagelijks | .0744851 .1613644 0.46 0.645 -.2438546 .3928248
HerfindahlMode | -.207055 .2824389 -0.73 0.464 -.7642504 .3501405
Eigenaren | -.1027166 .0472586 -2.17 0.031 -.1959483 -.0094849
cons | 4.069112 2.462711 1.65 0.100 -.789325 8.927549
. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnPURCH_02_K
> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1
Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren, robust
Linear regression Number of obs = 202
F(15, 186) = 7.91
R-squared = 0.3454
Root MSE = .31256
Robust
lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
ParkingGLA | 2.322352 1.163813 2.00 0.047 .0263823 4.618322
paid_parking | -.1572419 .1096725 -1.43 0.153 -.3736039 .0591201
Costperhour | -.1507661 .0573454 -2.63 0.009 -.2638972 -.037635
Drivetimehighway_min | -.005198 .0038903 -1.34 0.183 -.0128728 .0024767
walkingtime_min | -.0100712 .0087028 -1.16 0.249 -.0272401 .0070977
lnINW_02_KM | .1718882 .0413894 4.15 0.000 .0902352 .2535412
lnPURCH_02_KM | -.1689165 .2230946 -0.76 0.450 -.6090375 .2712045
Ageofshoppingcentre | -.0056982 .0016491 -3.46 0.001 -.0089516 -.0024449
lntotal_gla | .168997 .0565149 2.99 0.003 .0575043 .2804896
Urenopenperdag | .0158423 .043908 0.36 0.719 -.0707795 .102464
Zondaggeopend_dum1 | -.0179827 .0513949 -0.35 0.727 -.1193746 .0834091
Internationalretailers | .8838125 .4296156 2.06 0.041 .0362669 1.731358
HerfindahlDagelijks | .0744851 .1358191 0.55 0.584 -.1934588 .3424291
HerfindahlMode | -.207055 .2893192 -0.72 0.475 -.7778239 .3637139
cons | 4.069112 2.597094 1.57 0.119 -1.054434 9.192659
. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_05_KM lnPURCH_05_K

> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren
Source | SS df MS Number of obs = 202
F(15, 186) = 5.85
Model | 8.89681745 15 .593121163 Prob > F = 0.0000
Residual | 18.8601606 186 .101398713 R-squared = 0.3205
Adj R-squared = 0.2657
Total | 27.7569781 201 .138094418 Root MSE = .31843
lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
ParkingGLA | 2.580457 1.174883 2.20 0.029 .2626468 4.898267
paid_parking | -.1718526 .1077524 -1.59 0.112 -.3844265 .0407213
Costperhour | -.1299468 .0641417 -2.03 0.044 -.2564856 -.0034081
Drivetimehighway_min | -.0034203 .0051121 -0.67 0.504 -.0135054 .0066648
walkingtime_min | -.00963 .0083347 -1.16 0.249 -.0260728 .0068128
lnINW_05_KM | .1082497 .0402271 2.69 0.008 .0288897 .1876097
lnPURCH_05_KM | .0466408 .2928277 0.16 0.874 -.5310498 .6243314
Ageofshoppingcentre | -.0052509 .0017199 -3.05 0.003 -.0086439 -.001858
lntotal_gla | .186598 .0552075 3.38 0.001 .0776846 .2955113
Urenopenperdag | .0270767 .0340641 0.79 0.428 -.040125 .0942784
Zondaggeopend_dum1 | -.0297189 .0545424 -0.54 0.586 -.1373201 .0778822
Internationalretailers | .7408987 .5414023 1.37 0.173 -.3271799 1.808977
HerfindahlDagelijks | .0820859 .1647814 0.50 0.619 -.2429949 .4071666
HerfindahlMode | -.2148086 .2876603 -0.75 0.456 -.7823049 .3526877
Eigenaren | -.097111 .0484106 -2.01 0.046 -.1926153 -.0016066
cons | 2.196988 2.9925 0.73 0.464 -3.706616 8.100591

. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_05_KM lnPURCH_05_K
> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren, robust
Linear regression Number of obs = 202
F(15, 186) = 6.77
Prob > F = 0.0000
R-squared = 0.3205
Root MSE = .31843
Robust
lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
ParkingGLA | 2.580457 1.182698 2.18 0.030 .2472312 4.913683
paid_parking | -.1718526 .1085919 -1.58 0.115 -.3860828 .0423776
Costperhour | -.1299468 .0580373 -2.24 0.026 -.2444428 -.0154508
Drivetimehighway_min | -.0034203 .0043818 -0.78 0.436 -.0120648 .0052242
walkingtime_min | -.00963 .0088031 -1.09 0.275 -.0269967 .0077367

lnINW_05_KM | .1082497 .0439894 2.46 0.015 .0214673 .195032
Ageofshoppingcentre | -.0052509 .001631 -3.22 0.002 -.0084685 -.0020334
lntotal_gla | .186598 .057828 3.23 0.001 .0725148 .3006812
Urenopenperdag | .0270767 .0456618 0.59 0.554 -.063005 .1171584
Zondaggeopend_dum1 | -.0297189 .053296 -0.56 0.578 -.1348612 .0754233
Internationalretailers | .7408987 .4609258 1.61 0.110 -.1684157 1.650213
HerfindahlDagelijks | .0820859 .1370774 0.60 0.550 -.1883405 .3525122
HerfindahlMode | -.2148086 .280599 -0.77 0.445 -.7683743 .3387571
Eigenaren | -.097111 .0491532 -1.98 0.050 -.1940805 -.0001415
cons | 2.196988 3.07863 0.71 0.476 -3.876534 8.27051

. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min walkingtime_min lnINW_10_KM lnPURCH_10_K
> M Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers HerfindahlDagelijks
> HerfindahlMode Eigenaren, robust

Linear regression Number of obs = 202
F(15, 186) = 5.97
Prob > F = 0.0000
R-squared = 0.3125
Root MSE = .32031

| Robust
lnERV | Coef. Std. Err. t P>|t| [95% Conf. Interval]
---+---
ParkingGLA | 2.679457 1.203147 2.23 0.027 .3058881 5.053026
paid_parking | -.15949 .103613 -1.54 0.125 -.3638978 .0449177
Costperhour | -.1067499 .0559589 -1.91 0.058 -.2171455 .0036458
Drivetimehighway_min | -.0043892 .0045191 -0.97 0.333 -.0133045 .0045262
walkingtime_min | -.0103898 .0092773 -1.12 0.264 -.0286921 .0079126
lnINW_10_KM | .0521042 .0377583 1.38 0.169 -.0223854 .1265937
lnPURCH_10_KM | .4546887 .3452534 1.32 0.189 -.2264273 1.135805
Ageofshoppingcentre | -.0045061 .0015708 -2.87 0.005 -.0076049 -.0014073
lntotal_gla | .2029878 .0571321 3.55 0.000 .0902777 .315698
Urenopenperdag | .0292928 .0467174 0.63 0.531 -.0628713 .1214569
Zondaggeopend_dum1 | -.0276069 .0534763 -0.52 0.606 -.1331049 .0778911
Internationalretailers | .5998618 .497289 1.21 0.229 -.3811899 1.580914
HerfindahlDagelijks | .0720141 .1390736 0.52 0.605 -.2023504 .3463785
HerfindahlMode | -.1920478 .2719625 -0.71 0.481 -.7285754 .3444798
Eigenaren | -.1128109 .0493866 -2.28 0.023 -.2102407 -.0153811
_cons | -1.410591 3.375228 -0.42 0.676 -8.069241 5.248059

```
. regress lnERV Eigenare paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_10_KM lnPURCH_10_KM
> Ageofshoppingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1
Internationalretailers HerfindahlDagelijks He
> rfindahlMode ParkingGLA, robust

Linear regression                               Number of obs     =        202
                                                F(15, 186)        =       5.97
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3125
                                                Root MSE          =     .32031

|               Robust
          lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
Eigenaren |  -.1128109   .0493866    -2.28   0.023    -.2102407   -.0153811
       paid_parking |   -.15949   .103613    -1.54   0.125    -.3638978    .0449177
        Costperhour |  -.1067499   .0559589    -1.91   0.058    -.2171455    .0036458
 Drivetimehighway_min |  -.0043892   .0045191    -0.97   0.333    -.0133045    .0045262
    walkingtime_min |  -.0103898   .0092773    -1.12   0.264    -.0286921    .0079126
       lnINW_10_KM |   .0521042   .0377583     1.38   0.169    -.0223854    .1265937
     lnPURCH_10_KM |   .4546887   .3452534     1.32   0.189    -.2264273    1.135805
  Ageofshoppingcentre |  -.0045061   .0015708    -2.87   0.005    -.0076049   -.0014073
       lntotal_gla |   .2029878   .0571321     3.55   0.000     .0902777     .315698
     Urenopenperdag |   .0292928   .0467174     0.63   0.531    -.0628713    .1214569
   Zondaggeopend_dum1 |  -.0276069   .0534763    -0.52   0.606    -.1331049    .0778911
Internationalretailers |   .5998618    .497289     1.21   0.229    -.3811899    1.580914
  HerfindahlDagelijks |   .0720141   .1390736     0.52   0.605    -.2023504    .3463785
     HerfindahlMode |  -.1920478   .2719625    -0.71   0.481    -.7285754    .3444798
        ParkingGLA |   2.679457   1.203147     2.23   0.027     .3058881    5.053026
            _cons |  -1.410591   3.375228    -0.42   0.676    -8.069241    5.248059


. regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre lntotal_gla Internationalret
> ailers Eigenaren, robust

Linear regression                               Number of obs     =        288
                                                F(8, 279)         =      15.99
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3139
                                                Root MSE          =     .31146

lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
ParkingGLA |   1.554333   .9520223     1.63   0.104    -.3197254    3.428392
       Costperhour |  -.0317061   .0229223    -1.38   0.168    -.0768288    .0134165
       lnINW_02_KM |   .1734368   .0349588     4.96   0.000     .1046204    .2422532
     lnPURCH_10_KM |   .7064332   .2673024     2.64   0.009     .1802477    1.232619
 Ageofshoppingcentre |  -.0022324   .0012574    -1.78   0.077    -.0047076    .0002427
       lntotal_gla |   .1530411   .0374163     4.09   0.000      .079387    .2266951
Internationalretailers |   1.260393   .3625652     3.48   0.001     .5466826    1.974104
        Eigenaren |  -.0919977   .0383045    -2.40   0.017    -.1674003   -.0165951
            _cons |  -4.804952   2.622543    -1.83   0.068    -9.967436    .3575308

. regress lnERV ParkingGLA Costperhour lnINW_02_KM lnINW_05_KM
lnPURCH_10_KM Ageofshoppingcentre lntotal_gla Inte
> rnationalretailers Eigenaren, robust

Linear regression                               Number of obs     =        288
                                                F(9, 278)         =      14.15
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3145
                                                Root MSE          =     .31189
|               Robust
           lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
ParkingGLA |   1.525419   .9554619     1.60   0.112    -.3554406    3.406278
       Costperhour |  -.0339939   .0232421    -1.46   0.145    -.0797468    .0117591
       lnINW_02_KM |   .1957798   .0525729     3.72   0.000     .0922883    .2992713
       lnINW_05_KM |  -.0226402   .0444497    -0.51   0.611    -.1101409    .0648606
     lnPURCH_10_KM |   .7301884   .2651216     2.75   0.006     .2082875    1.252089
 Ageofshoppingcentre |   -.002166   .0012823    -1.69   0.092    -.0046902    .0003582
       lntotal_gla |   .1540958   .0372514     4.14   0.000     .0807651    .2274264
Internationalretailers |   1.257693   .3637752     3.46   0.001      .541589    1.973797
        Eigenaren |  -.0937469   .0394939    -2.37   0.018    -.1714919   -.0160018
            _cons |  -5.015905   2.589327    -1.94   0.054    -10.11308    .0812743

. regress lnERV ParkingGLA Costperhour Drivetimehighway_min walkingtime_min
lnINW_02_KM lnPURCH_10_KM Ageofshoppi
> ngcentre lntotal_gla Internationalretailers Eigenaren, robust

Linear regression                               Number of obs     =        288
                                                F(10, 277)        =      13.55
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3166
                                                Root MSE          =     .31196

lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------+------------------------------------------------------------------
```

```
        ParkingGLA |   1.571147   .9474308     1.66   0.098    -.2939326    3.436226
       Costperhour |   -.030258   .0232372    -1.30   0.194    -.0760019     .015486
 Drivetimehighway_min | -.0038017   .0030891    -1.23   0.219    -.0098828    .0022793
    walkingtime_min |  -.0024996   .0066766    -0.37   0.708     -.015643    .0106438
       lnINW_02_KM |   .1647261   .0372231     4.43   0.000     .0914501    .2380021
     lnPURCH_10_KM |    .654508   .2729193     2.40   0.017     .1172486    1.191767
  Ageofshoppingcentre |  -.0022738   .0012798    -1.78   0.077    -.0047932    .0002456
       lntotal_gla |   .1574565    .038898     4.05   0.000     .0808832    .2340299
Internationalretailers |   1.192857   .3778085     3.16   0.002     .4491165    1.936598
        Eigenaren |  -.0962334   .0382597    -2.52   0.012    -.1715502   -.0209167
            _cons |  -4.202403    2.69835    -1.56   0.121    -9.514281    1.109474

. regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre lntotal_gla Internationalret
> ailers Eigenaren, robust

Linear regression                               Number of obs     =        288
                                                F(8, 279)         =      15.99
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3139
                                                Root MSE          =     .31146
|               Robust
           lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

        ParkingGLA |   1.554333   .9520223     1.63   0.104    -.3197254    3.428392
       Costperhour |  -.0317061   .0229223    -1.38   0.168    -.0768288    .0134165
       lnINW_02_KM |   .1734368   .0349588     4.96   0.000     .1046204    .2422532
     lnPURCH_10_KM |   .7064332   .2673024     2.64   0.009     .1802477    1.232619
  Ageofshoppingcentre |  -.0022324   .0012574    -1.78   0.077    -.0047076    .0002427
       lntotal_gla |   .1530411   .0374163     4.09   0.000      .079387    .2266951
Internationalretailers |   1.260393   .3625652     3.48   0.001     .5466826    1.974104
        Eigenaren |  -.0919977   .0383045    -2.40   0.017    -.1674003   -.0165951
            _cons |  -4.804952   2.622543    -1.83   0.068    -9.967436    .3575308

. predict fit_hh
(option xb assumed; fitted values)
(13 missing values generated)
. scatter
__000000 not found
r(111);
. scatter hh
variable hh not found
r(111);
```

```
. scatter lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre lntotal_gla Internationalret
> ailers Eigenaren || lfit lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre lntotal_gla
>  Internationalretailers Eigenaren
too many variables specified: lnERV ParkingGLA Costperhour lnINW_02_KM
lnPURCH_10_KM Ageofshoppingcentre
       lntotal_gla Internationalretailers Eigenaren r(103);
. predict yhat
(option xb assumed; fitted values)
(13 missing values generated)
.  graph twoway (scatter yhat lnERV, symbol(d)) (lfit yhat lnERV) (lfitci yhat lnERV),
title("Model Check")
. subtitle("Plot of Observed v Predicted") xlabel(1(1)6) ylabel(1(1)6) note("plot1.png",
size(vsmall))
command subtitle is unrecognized
r(199);
. graph twoway (scatter yhat lnERV, symbol(d)) (lfit yhat lnERV) (lfitci yhat lnERV),
title("Model Fit")
. graph save Graph "/Users/Marieke/Documents/Masterthesis onderdelen/model fit.gph"
(file /Users/Marieke/Documents/Masterthesis onderdelen/model fit.gph saved)
. graph twoway (scatter yhat lnERV, symbol(d)) (lfit yhat lnERV), title("Model Fit")
. graph twoway (scatter yhat lnERV, symbol(d)) (lpredict yhat lnERV), title("Model Fit")
lpredict is not a twoway plot type
r(198);
. graph twoway (scatter yhat lnERV, symbol(c)) (lfit yhat lnERV), title("Model Fit")
(note:  named style c not found in class symbol, default attributes used)
regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre Internationalretailers Eigen
> aren if Category==1

      Source |       SS       df       MS      Number of obs   =       127
F(7, 119)       =     11.29
       Model |  8.54707219         7  1.22101031   Prob > F        =    0.0000
    Residual |  12.8642323       119  .108102792   R-squared       =    0.3992
Adj R-squared   =    0.3638
       Total |  21.4113045       126  .169930988   Root MSE        =    .32879
lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
          ParkingGLA |   3.010239   1.488171     2.02   0.045     .0635116    5.956966
         Costperhour |  -.0308188   .0393029    -0.78   0.435    -.1086424    .0470049
         lnINW_02_KM |   .2986809   .0640163     4.67   0.000     .1719222    .4254395
       lnPURCH_10_KM |   .9739217   .4540975     2.14   0.034     .0747632     1.87308
  Ageofshoppingcentre |  -.0007854   .0022208    -0.35   0.724    -.0051828     .003612
Internationalretailers |   1.876977   .5463588     3.44   0.001     .7951321    2.958822
```

```
         Eigenaren |  -.0809221   .0636997    -1.27   0.206    -.2070539    .0452098
             _cons |  -7.384646   4.358611    -1.69   0.093    -16.01513    1.245839
. regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre Internationalretailers Eigen
> aren if Category==2

    Source |       SS       df       MS      Number of obs   =       162
F(7, 154)      =      3.48
     Model |  2.25399036         7  .321998623   Prob > F        =    0.0017
  Residual |  14.2665941       154  .092640222   R-squared       =    0.1364
Adj R-squared   =    0.0972
     Total |  16.5205845       161  .102612326   Root MSE        =    .30437

            lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
ParkingGLA |   .1495646   1.286347     0.12   0.908    -2.391599    2.690729
       Costperhour |  -.0653075   .0428956    -1.52   0.130    -.1500472    .0194322
       lnINW_02_KM |   .1609065   .0498613     3.23   0.002     .0624062    .2594069
     lnPURCH_10_KM |   .5268184   .3836316     1.37   0.172    -.2310411    1.284678
  Ageofshoppingcentre |  -.0019762   .0016991    -1.16   0.247    -.0053327    .0013803
Internationalretailers |   .9594355   .7505418     1.28   0.203    -.5232508    2.442122
         Eigenaren |   -.096462   .0514427    -1.88   0.063    -.1980864    .0051625
             _cons |  -1.487494   3.711335    -0.40   0.689    -8.819193    5.844205

. regress lnERV ParkingGLA Costperhour lnINW_02_KM lnPURCH_10_KM
Ageofshoppingcentre Internationalretailers Eigen
> aren

    Source |       SS       df       MS      Number of obs   =       289
F(7, 281)      =     14.87
     Model |  10.6644117         7  1.52348738   Prob > F        =    0.0000
  Residual |  28.7882225       281  .102449191   R-squared       =    0.2703
-------------+------------------------------   Adj R-squared   =    0.2521
     Total |  39.4526342       288  .136988313   Root MSE        =    .32008
lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
ParkingGLA |    1.72666   .9712883     1.78   0.077    -.1852648    3.638585
       Costperhour |  -.015873   .0259351    -0.61   0.541    -.0669247    .0351786
       lnINW_02_KM |   .2052424   .0385036     5.33   0.000     .1294503    .2810345
     lnPURCH_10_KM |   .7338203   .2917614     2.52   0.012     .1595049    1.308136
  Ageofshoppingcentre |  -.001226   .0013442    -0.91   0.362    -.0038719    .0014199
Internationalretailers |   2.158564   .4065521     5.31   0.000     1.358289    2.958838
         Eigenaren |  -.0914883      .0401    -2.28   0.023    -.1704228   -.0125539
             _cons |  -4.073077   2.810465    -1.45   0.148    -9.605314     1.45916
------------------------------------------------------------------------------
```

```
regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnPURCH_02_KM Ageofshop
> pingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers
Eigenaren if Category==1

      Source |       SS       df       MS      Number of obs   =       127
-------------+------------------------------   F(13, 113)     =      8.04
       Model |  10.2857476        13  .791211354   Prob > F      =    0.0000
    Residual |  11.1255568       113  .098456255   R-squared     =    0.4804
-------------+------------------------------   Adj R-squared   =    0.4206
       Total |  21.4113045       126  .169930988   Root MSE      =    .31378

------------------------------------------------------------------------------
ParkingGLA |   4.066426   1.521063     2.67   0.009     1.052926    7.079926
paid_parking |  -.3270062   .1124806    -2.91   0.004    -.5498505   -.1041618
Costperhour |   -.226519   .0664429    -3.41   0.001    -.3581544   -.0948837
Drivetimehighway_min |  -.0066835   .0066295    -1.01   0.316    -.0198178    .0064508
walkingtime_min |   -.012369   .0092144    -1.34   0.182    -.0306244    .0058863
lnINW_02_KM |    .247696    .069982     3.54   0.001     .109049    .3863431
lnPURCH_02_KM |   .1799566   .2877844     0.63   0.533    -.3901962    .7501093
Ageofshoppingcentre |  -.0050546   .0023254    -2.17   0.032    -.0096616   -.0004475
lntotal_gla |   .1525718   .0530132     2.88   0.005     .047543    .2576006
Urenopenperdag |  -.0550248   .0428492    -1.28   0.202    -.1399168    .0298672
Zondaggeopend_dum1 |  -.0369725   .0716706    -0.52   0.607    -.1789648    .1050197
Internationalretailers |   1.020826   .6045987     1.69   0.094    -.1769934    2.218645
Eigenaren |  -.0780004   .0632879    -1.23   0.220    -.2033851    .0473844
_cons |   .8757555   3.195226     0.27   0.785    -5.454563    7.206074
------------------------------------------------------------------------------

. regress lnERV ParkingGLA paid_parking Costperhour Drivetimehighway_min
walkingtime_min lnINW_02_KM lnPURCH_02_KM Ageofshop
> pingcentre lntotal_gla Urenopenperdag Zondaggeopend_dum1 Internationalretailers
Eigenaren if Category==2

      Source |       SS       df       MS      Number of obs   =       161
-------------+------------------------------   F(13, 147)     =      2.51
       Model |  3.00578156        13  .231213966   Prob > F      =    0.0039
    Residual |   13.514802       147  .091937429   R-squared     =    0.1819
-------------+------------------------------   Adj R-squared   =    0.1096
       Total |  16.5205836       160  .103253647   Root MSE      =    .30321

------------------------------------------------------------------------------
lnERV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ParkingGLA |   .3134044   1.307439     0.24   0.811     -2.2704    2.897208
paid_parking |    .428387   .2073211     2.07   0.041     .0186722    .8381018
```

```
        Costperhour |   .1502564   .1103062     1.36   0.175    -.0677344    .3682471
 Drivetimehighway_min |  -.0030366   .0048126    -0.63   0.529    -.0125474    .0064742
    walkingtime_min |   .0085348   .0115193     0.74   0.460      -.01423    .0312996
       lnINW_02_KM |   .1547385   .0530341     2.92   0.004     .0499307    .2595464
     lnPURCH_02_KM |   .0251571   .2554014     0.10   0.922    -.4795757    .5298899
 Ageofshoppingcentre |  -.0017722   .0017524    -1.01   0.314    -.0052354     .001691
       lntotal_gla |   .1368732   .0667699     2.05   0.042     .0049203     .268826
     Urenopenperdag |  -.0147838   .0310726    -0.48   0.635    -.0761904    .0466228
  Zondaggeopend_dum1 |  -.0441912   .0559742    -0.79   0.431    -.1548092    .0664269
Internationalretailers |   .3554009   .8518267     0.42   0.677    -1.328007    2.038809
         Eigenaren |  -.1019454   .0528337    -1.93   0.056    -.2063572    .0024663
             _cons |   1.571696   2.725636     0.58   0.565    -3.814797    6.958189
------------------------------------------------------------------------------
predict r, resid
(99 missing values generated)

. kdensity r, normal
. pnorm r
. qnorm r
. iqr r
command iqr is unrecognized
r(199);
. swilk r
 Shapiro-Wilk W test for normal data
    Variable |        Obs       W           V        z       Prob>z
-------------+--------------------------------------------------------
           r |        202    0.98425      2.371     1.987    0.02347

. rvfplot, yline(0)
. graph save Graph "/Users/Marieke/Documents/Masterthesis onderdelen/homo scatter.gph"
(file /Users/Marieke/Documents/Masterthesis onderdelen/homo scatter.gph saved)
. estat imtest
Cameron & Trivedi's decomposition of IM-test
---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |     124.81    132    0.6590
            Skewness |      17.17     15    0.3086
```