

The effects of online shopping on the market for retail real estate

Dennis Coster

Faculty of TPM, Delft University of Technology, Netherlands

Student Number: 4186494

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Abstract

In the period following the start of the economic crisis retail vacancy has steadily increased in many countries around the world. A frequently mentioned cause of the increase in retail vacancy is the growing popularity of online shopping. In various scientific publications, scholars have addressed the possible future implications of online shopping. In this research an attempt is made to empirically examine the effects of online shopping on the demand for retail real estate. This is done, using a correlation analysis and a multiple regression analysis. The results show that the increase in online expenditures, between 2011 and 2016, is significantly associated with the decrease in the demand for retail real estate. Therefore, online shopping should be considered as a substitute for traditional in-store shopping. These insights are used to determine the broad implications for retail policy.

Keywords: retail vacancy, online shopping, demand for retail real estate, substitution

1. Introduction

In the years following the start of the economic crisis, in 2007, various countries experienced an increase in retail vacancy (Evers, Tennekes & Dongen, 2014; Zhang, Zhu & Ye, 2016, Colliers International, 2018; JLL Research Report, 2018). For example, in The Netherlands the retail vacancy rates increased from around five percent before the start of the crisis to more than ten percent in 2016 (PBL, 2016).

Increasing retail vacancy rates are regarded as undesirable, because the negative externalities associated with retail vacancy have the potential to seriously

harm the attractiveness of shopping areas (Detailhandel Nederland, 2017). According to Berwyn (2013) these negative externalities include a sense of unsafety, reduced vibrancy, decreased visual attractiveness, reduced ability to attract customers and investors, increased risk of blight and decline, reduced revenue generated by property owners and reduced tax-income for governments. These negative externalities indicate that the factors, affecting the market for retail real estate, should be addressed in order to keep shopping centres, the beating heart of many municipalities attractive and vibrant.

The ideas of how to address retail vacancy vary among different scholars (Van der Krabben, 2009; Burt, 2010; PBL, 2010; Evers et al., 2014; PBL, 2016). In general, two different policy approaches can be distinguished. The first policy approach is growth-oriented. This approach focusses on bringing balance to the demand and the supply of retail real estate, through attracting additional retailers to reoccupy part of the vacant retail real estate. The second policy approach is reduction-oriented. This approach focusses on bringing balance to the demand and supply of retail real estate, through reducing the stock of retail real estate. The nature of the increase in retail vacancy ultimately determines which type of policy approach is most effective in keeping shopping areas attractive in the long-term.

Initially the increasing retail vacancy rates were contributed to the nature of the market for retail real estate, in which high retail vacancy rates are no exception (Huizinga & Ossokina, 2014). Retail vacancy was considered to be related to the inability of the retail real estate market to adjust to the economic crisis (Locatus, 2012; Evers et al., 2014). Soon after, other causes for the increase in retail vacancy started to emerge. One of these causes is the growing popularity of online shopping (Tonn & Hemrick, 2004; Farag, Schwanen, Dijst, & Faber, 2007; Zhang et al., 2016).

The effects of online shopping on the market for retail real estate are the topic of many studies in the scientific literature. The majority of these studies focus on the future developments and implications of online shopping (Mokhtarian, 2002; Tonn & Hemrick, 2004; Farag et al., 2007). At the same time, except for Weltevreden (2007) and Weltevreden and Van Rietbergen (2009), little empirical research concerning

the effects of online shopping on the market for retail real estate is conducted. In this research we will try to fill part of this gap, through examining the effects of the increasing popularity of online shopping on the changing demand for retail real estate in 122 municipalities located in the western part of The Netherlands, while we control for sociodemographic and other consumer behavioural factors. Our hypothesis is that the increase in online shopping results in a decreasing demand for retail real estate. The results of this research are used to determine the broad implications for the two main policy approaches, in restoring the balance between the demand and the supply of retail real estate.

The structure of this paper is as follows. The different effects of online shopping on the market for retail real estate are discussed in section two. Section three is used to introduce the independent and dependent variables. Additionally, in this section the factors are operationalised and the characteristics of the research sample are described. The results of both the correlation analysis and the multiple regression analysis are presented in section four. The results show the strong relationship between the increase in online expenditures and the change in the demand for retail real estate. The importance of our research, its relation to the existing literature and its implications on future retail policy are discussed in section five. This paper is rounded off with a conclusion in section six

2. Background: the effects of online shopping

The introduction of the internet led to the creation of the online shopping market parallel to the traditional in-store shopping market. The precise effects of online shopping, also referred to as 'e-commerce', on the market for retail real estate are the topic of an ongoing scientific debate. In the literature two dominant perspectives regarding the effects of online shopping on the retail real estate market can be observed; substitution and complementarity (Salomon, 1982; Gillespie, Marvin & Green, 2001; Mokhtarian, 2002; Boschma and Weltevreden, 2005). Two other, less frequently mentioned, perspectives are neutrality and modification (Mokhtarian, 2002; Ferrel, 2005).

2.1 Substitution

One speaks of substitution in case online shopping decreases the demand for retail real estate. A large number of scholars believe that the stock of retail real estate is (partly) reduced by the increasing popularity of online shopping (Weltevreden & Van Rietbergen, 2007). According to Baen (2000) the increase in the extent of online shopping results in a diminishing demand for retail real estate through a reduction in footfall, lower impulse purchases, greater competition and lower profit margins. Winograd, Conner, Liang and Whitaker (2000) add to this that traditional in-store retailers are losing their competitive edge, because they no longer possess locational advantages and they no longer sell unique products. Moreover, Luley, Bitzer and Lenz (2002) studied the impact of online shopping on shopping related travel trips. In all three scenarios

they examined, the number of shopping trips reduced significantly.

2.2 Complementarity

Other scholars argue that online shopping complements the demand for retail real estate (Salomon, 1986; Mokhtarian, 2003; Weltevreden & Van Rietbergen, 2007). The complementarity effect encompasses that the increase in the volume of online expenditures leads to an expansion of the stock of retail real estate. This is the case when online advertisements or online incentives strengthen traditional in-store retailing. Andersen and Rosen (2000) argue that online shopping has the potential to increase the demand for retail real estate. According to them retailers could use online shopping as an expansion of their business case. Winograd et al. (2000) argue that the adaptive qualities of retailers will lead them to direct their in-store activities towards niche-markets, which only suite traditional in-store retailing. On top of that, these retailers could offer their more basic products on the traditional in-store shopping market. In this way creating win-win situations that could result in a rising demand for retail real estate. To add to this, Farag et al. (2007) concluded in their research that the likelihood of Dutch consumers making in-store shopping trips increases in case they perform more online searches.

2.3 Neutrality and Modification

In the literature the neutrality and modification effect of online shopping on the market for retail real estate are also mentioned. Neutrality entails that the introduction of the online shopping market has no effect on the stock of retail real estate (Weltevreden & Rietbergen, 2007). According to Mokhtarian (2002) the effects

of online shopping on the demand for retail real estate vary for different types of products. She argues that the characteristics of certain products make that they are hardly purchased on the internet, and are therefore considered to have a neutral effect on the stock of retail real estate. Additionally, Ward (2001) concludes that online shopping is to a larger extent a substitute for catalogue shopping than for traditional in-store shopping.

Additionally, one speaks of a modification effect when the use of the internet alters the way consumers make traditional in-store purchases, but does not result in the alteration of the demand for retail real estate (Ferrel, 2005). This is the case when for example the internet is used to conduct research on products, without online purchases being made.

2.4 Summary

In short, the ideas regarding the effects of online shopping on the demand for retail real estate differ vastly among scholars. Studies conducted in various geographical locations and different time periods with the use of different variables and various methodologies provide different views on the effects of online shopping on the demand for retail real estate.

3. Data and Methodology

In order to gain more insight into the actual effects of the growing online shopping market on the market for retail real estate, correlation analysis and multiple regression analysis are conducted. With the use of multiple regression analysis, we are able to control for other factors expected to influence the demand for retail real estate.

These analyses are used to empirically examine the effects of the growing online expenditures, between 2011

and 2016, on the change in the demand for retail real estate. Other focus points of these analyses are examining the effects of sociodemographic and other consumer behavioural trends, between 2011 and 2016, on the change in the demand for retail real estate. Finally, we also examine whether the demand for retail real estate is affected differently in municipalities with a rural character compared to municipalities with an urban character.

This research is based on data retrieved from, on the one hand a comprehensive Dutch research report, called the KSO (I & O Research; 2011; I & O Research, 2016), and on the other hand on the database from Statistics Netherlands (CBS [C], 2017). The KSO bundles data retrieved from a consumer survey, conducted among more than 100.000 consumers, with data acquired by Locatus, a Dutch retail research company. The KSO contains information regarding the market for retail real estate, the online shopping market and the economic performance of municipalities. The data concerning the years 2011 and 2016 forms the basis of our research as it contains the most detailed information about the online shopping behaviour of consumers.

The database from Statistic Netherlands contains annual data about a wide variety of characteristics of municipalities and their corresponding inhabitants. For this research the interest lies with the data regarding sociodemographic factors.

3.1 Independent variables

Besides the effects of the growing popularity of online shopping on the demand for retail real estate as discussed in chapter 2, more factors are mentioned in the literature that are expected to affect the

demand for retail real estate. These factors are: retail revenue generated in municipalities (Brown, 1993; Weltevreden & Van Rietbergen, 2007), composition of the population (Zhang et al., 2016; CBS [A], 2017; CBS [B], 2017), the economic cycle (Burt, 2010; Teale, 2012; Evers et al., 2014; Zhang et al., 2016) and degree of urbanisation (Weltevreden & Van Rietbergen, 2009; DTNP, 2013; Dynamis; 2017).

The retail revenue generated in municipalities captures how well municipalities and their associated shopping areas perform economically (Brown, 1993). This is determined by a large variety of other aspect, such as: number of visitors, proportion of income spent on retail products, perceived attractiveness and accessibility (Jókövi & Lübke, 2004; Weltevreden & Van Rietbergen, 2007; Teale, 2012; Berwyn, 2013).

Another factor incorporated in this research is the changing composition of the population. According to Locatus (2012) it is not the growing online shopping market that causes problems on the retail real estate market, instead the demographic changes are the primary cause of these issues. The composition of the population is a wide ranging concept containing many different aspects. In general, it is expected that areas which experience demographic growth see the number of potential customers increase, which in its turn is expected to have a positive effect on the demand for retail real estate. The opposite holds for areas that experience demographic decline (Bureau Stedelijke Planning, 2012; Platform 31, 2014).

The fourth factor incorporated in this research is the economic cycle. In times of high conjuncture people generally earn more money and are inclined to spend a larger proportion of their money, which is expected to positively affect the demand for retail real estate (Evers et al., 2014). In times of low conjuncture people earn less money or are more inclined to save, which is expected to negatively affect the demand for retail real estate (Teale, 2012; Zhang et al., 2016).

Finally, the factor the degree of urbanisation is incorporated in this research. Different research reports DTNP (2013) and I & O Research (2016) indicate that stores selling non-daily products are affected the most by the changing consumer behaviour. These non-daily products are sold predominantly in municipalities with a more urban character (Weltevreden & Van Rietbergen, 2009; CPB; 2016, Dynamis; 2017). Therefore, part of the interest of this research lies with examining whether the demand for retail real estate is affected differently in rural municipalities compared to urban municipalities.

3.2 Dependent variables

In this research the dependent variables represent the change in the demand for retail real estate, between 2011 and 2016. Figure 1 shows a conceptual model in which all the factors that have been discussed above are displayed graphically. The demand for retail real estate is positioned in the centre, surrounded by the factors that are expected to affect the demand for retail real estate.

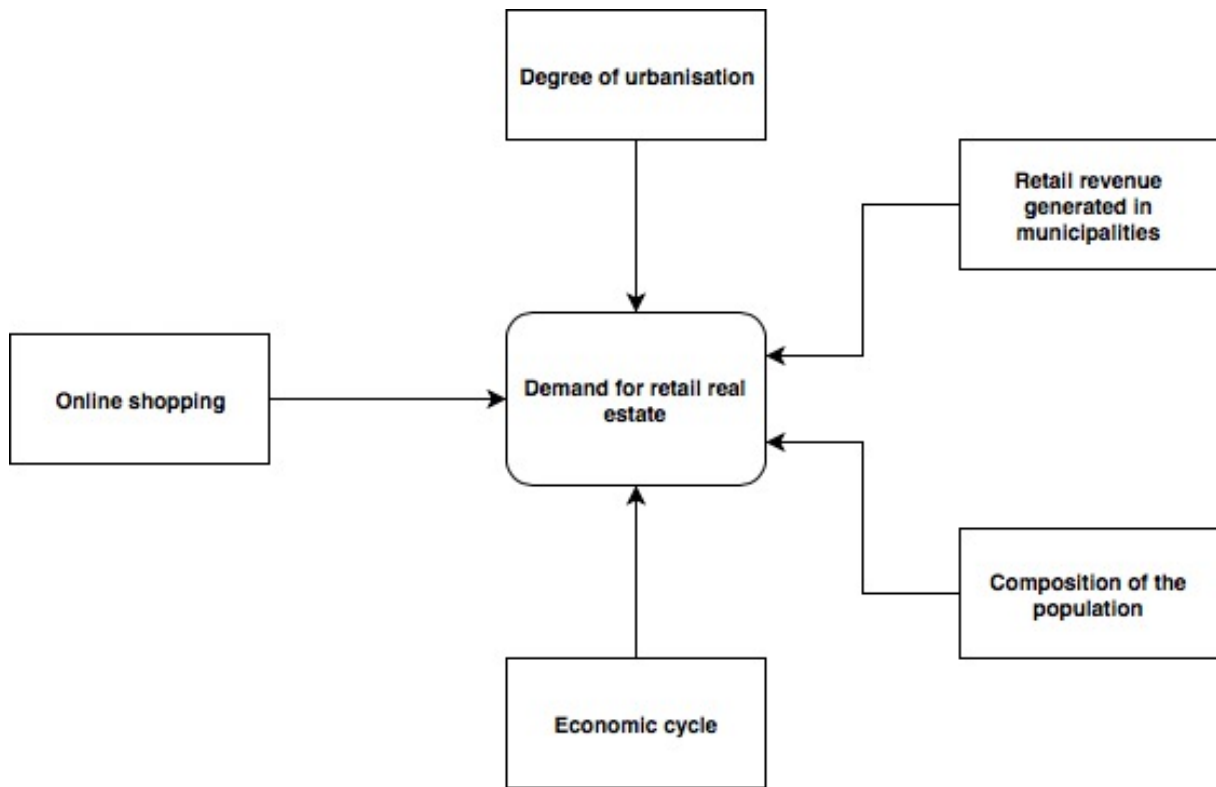


Figure 1: Overview of factors affecting the demand for retail real estate (Δ 2016- 2011)

3.3 Operationalisation

Table 1 shows that in this research the change in the demand for retail real estate is operationalised as both the change in the demand for occupied square meters of retail floor space as well as the change in the demand for retail stores. Moreover, the data sources contain data regarding the daily retail activity, the non-daily retail activity and the total retail activity. The level of specificity in the data allows for the use of a total of six different dependent variables. All of which contain their own unique piece of information.

On the other hand, most independent variables are operationalised fairly straightforward. There are two exceptions. The first one regards the change in the average income of inhabitants. This variable is measured between the years 2011 and 2015, because the data of 2016 is not accessible. Using data from the year 2015, is justified by the fact that no major

economic shocks occurred between 2015 and 2016 (CBS [D], 2017).

The dummy variable forms the second exception. This variable is used to incorporate the degree of urbanisation in municipalities at a particular moment in time, rather than the change in the municipality's degree of urbanisation between 2011 and 2016. The dummy variable divides the research sample into two groups. One group containing rural municipalities operationalised as municipalities with less than 35.000 inhabitants, and the other group containing urban municipalities operationalised as municipalities with more than 35.000 inhabitants. According to I & O research (2016) in general the mark for determining whether municipalities have a rural or an urban character, lies somewhere around 35.000 inhabitants.

3.4 Sample characteristics

This section outlines both the characteristics of the demand for retail real estate as well as the consumer behavioural and sociodemographic characteristics, of the municipalities used in the research sample. Of the 122 municipalities located in the geographical research area, data is available of a total of 110 municipalities.

Table 2 gives an overview of the minimum values, maximum values, means and standard deviations, all measured as the numeric change between the years 2011 and 2016. Moreover, the dummy variable is not displayed in this table, because their numeric values do not contain relevant information.

Table 1: Sample characteristics

Variable label (Δ 2016-2011)	N	Minimum (Δ 2016- 2011)	Maximum (Δ 2016- 2011)	Mean (Δ 2016- 2011)	Std. Deviation (Δ 2016- 2011)
Dependent					
Demand for retail real estate					
Amount of occupied square meters of floor space (daily)	110	-0,825	42,796	2,097	5,026
Amount of occupied square meters of floor space (non-daily)	110	-39,793	32,066	-2,558	8,683
Amount of occupied square meters of floor space (total)	110	-25,724	59,007	-0,461	10,005
Number of occupied objects (daily)	110	-16	105	2,25	13,567
Number of occupied objects (non-daily)	110	-259	19	-27,87	44,057
Number of occupied objects (total)	110	-204	41	-25,71	36,527
independent					
Online shopping					
Online expenditures (daily) (x 1.000.000 euros)	110	-15,2	19,9	1,377	3,0642
Online expenditures (non-daily) (x 1.000.000 euros)	110	1,8	313,7	23,639	40,804
Online expenditures (total) (x 1.000.000 euros)	110	2,0	298,5	25,016	41,353
Retail revenue generated in municipalities					
Retail revenue generated in municipalities daily (x 1.000.000 euros)	110	-2,6	634,7	29,897	70,342
Retail revenue generated in municipalities non-daily (x 1.000.000 euros)	110	-25,4	824,4	25,145	87,057
Retail revenue generated in municipalities total (x 1.000.000 euros)	110	-15,0	1459,1	55,043	155,993
Composition of the population					
Average household size	110	-0,1	0,1	-0,041	0,054
Percentage of elderly citizens (percentage)	110	0,00	0,06	0,031	0,0108
Economic cycle					
Average income per inhabitant (x 1.000 euros)	110	1,0	5,8	1,802	0,659
Degree of urbanisation					
Number of inhabitants	110	-1.106	53.814	2026,84	6455,889

In this research sample the average total amount of retail real estate actually being occupied, has decreased between 2011 and 2016. This decrease is the result of the strong shrinkage of the average amount of retail real estate being occupied by stores selling non-daily products, which decreased on average by 2558 square meters of retail floor space per municipality and close to 28 stores per municipality. On the other hand, the average amount of retail real estate being occupied by stores selling daily products grew on average by 2097

square meters of retail floor space per municipality and close to 2 stores per municipality.

Furthermore, the increase in non-daily online expenditures, between 2011 and 2016, stands out from this research sample. The average increase in non-daily online expenditures is more than ten times larger than the average increase in the daily online expenditures. The total increase in online expenditures is on average approximately 25 million euros per municipality. Additionally, on average the

amount of retail revenue generated in municipalities by stores selling both daily and non-daily products increased between 2011 and 2016, by 55 million euros per municipality.

Moreover, between 2011 and 2016, on average in the municipalities in this research sample the average household size has decreased with 0,04 persons, the percentage of elderly citizens has increased with 3 percent, the average income of inhabitants has increased with 1800 euros and the number of inhabitants increased by more than 2000 per municipality.

3.5 Future of online shopping

According to I & O Research (2016) currently 12,5 percent of the products are purchased through online channels. ING Bank (2017) predicts that this percentage is likely to increase to 25 percent in the year 2025. Comarch (2017) predicts that the percentage of online purchases is likely to exceed the 30 percent mark around the year 2030.

4. Results

In this section, using statistical analysis, we explore the relationship between the increase in the online expenditures, between 2011 and 2016, and the change in the demand for retail real estate. Firstly, the Pearson correlation coefficient is used to analyse the strength and the direction of the relationship between the change in the online expenditures, between 2011 and 2016, and the change in the demand for

retail real estate. After which, multivariate regression analysis is used to examine the relationship between the change in online expenditures, between 2011 and 2016, and the change in the demand for retail real estate, while accounting for sociodemographic and other consumer behavioural variables.

4.1 Correlation analysis

In table 2 the results of the correlation analysis are presented. The results point to the existence of a moderate negative relationship between the change in the total demand for retail stores, between 2011 and 2016, and the total online expenditures. Moreover, when considering that part of the retail market concerned with selling non-daily products, the Pearson correlation coefficient points to the existence of a significant negative relationship between the change in the demand for retail real estate, between 2011 and 2016, and the change in the online expenditures. This negative association is weak when the change in the demand is measured in square meters, and moderate when the change in the demand is measured in the actual number of stores. On the other hand, the results do not indicate that there is an association between the change in the demand for retail real estate related to the sale of daily products, between 2011 and 2016, and the change in online expenditures.

Table 2: Results correlation analysis

Variable (Δ 2016- 2011)		Total (non-daily + daily)		Non-daily		Daily	
		Demand for square meters of retail floor space	Demand for retail stores	Demand for square meters of retail floor space	Demand for retail stores	Demand for square meters of retail floor space	Demand for retail stores
Online expenditures total	Pearson Correlation Sig. (2-tailed)	-0,133 (0,179)	-0,608 (0,000)				
Online expenditures non-daily	Pearson Correlation Sig. (2-tailed)			-0,232 (0,018)	-0,625 (0,000)		
Online expenditures daily	Pearson Correlation Sig. (2-tailed)					0,145 (0,139)	0,013 (0,897)

4.2 Multivariate regression analysis

Table 3 gives an overview of the results of the six multiple regression models. Apart from the results regarding online shopping, the table also shows the other variables that are significantly related to the change in the demand for retail real estate, between 2011 and 2016. From the table it becomes evident that an increase in the total online expenditures, between 2011 and 2016, is significantly related to a decrease in the total demand for retail real estate. This negative association is primarily the result of the strong negative relation between the increase in online expenditures on non-daily products, between 2011 and 2016, and the change in demand for retail real estate. Additionally, do not indicate that the change in the online expenditures on daily products, between 2011 and 2016, is related to the change in the demand for retail real estate.

Furthermore, what stands out is that the effect of the growing popularity of online shopping, between 2011 and 2016, is stronger on the change in the demand for retail stores than on the change in the demand for square meters of retail floor space. This could mean that the increase in online expenditures is stronger related to the decrease in small-sized stores compared to

the decrease in large-sized stores. However, this difference could also be explained by the increase in the average store size. In the latter case, the association between the increase in online expenditures, between 2011 and 2016, and the change in the demand for square meters of retail floor space is partly cancelled out by the continuous tendency of retailers to scale up the surface areas of their stores (Evers et al., 2014). In this research data regarding economies of scale is not incorporated. Therefore, we are unable to elaborate further on what causes the difference between these effects.

Table 3 also shows that the change in the demand for retail real estate, between 2011 and 2016, is significantly positively related to the change in the total retail revenue generated in municipalities. This indicates that an increase in the total amount of retail revenue generated in municipalities is accompanied by the growth of both the demand for square meters of retail floor space as well as the demand for retail stores. Similarly, a decrease in retail revenue, between 2011 and 2016, corresponds with a decline in the demand for retail real estate. These same positive relationships are observed between the change in the amount of retail revenue generated by stores selling

non-daily products, between 2011 and 2016, and the demand for retail real estate concerned with selling non-daily products. Furthermore, the change in retail revenue generated by daily stores, between 2011 and 2016, is only positively related to the change in the demand for retail real estate when measured in square meters of retail floor space, but not when measured in the number of retail stores. I & O Research (2016) provides a plausible explanation. In their report they state that the desire of consumers to purchase daily products more locally has led to the expansion of already existing supermarkets, but not necessarily to the establishment of additional stores. This partly explains why the change in the demand for square meters of retail floor space is affected differently than the change in the demand for retail stores.

Moreover, the change in the percentage of elderly citizens, between 2011 and 2016, is positively related to the change in the demand for square meters of

retail real estate, while it is not associated with the change in the demand for retail stores. This is contradicting with previously published research reports (Bureau Stedelijke Planning, 2012; Platform 31; 2014). An explanation for this deviation from the expectations is simply not found in this research. Without being able to find a plausible explanation for this result, we regard it is inconclusive.

Several other sociodemographic and consumer behavioural factors that were also incorporated in this research are not significantly related to the change in the demand for retail real estate, between 2011 and 2016. These results indicate that the average household size, the change in the average income of inhabitants and the level of urbanisation in municipalities do not explain any additional proportion of the variance of the various dependent variables representing the change in the demand for retail real estate, between 2011 and 2016.

Table 3: Results multiple regression analysis

Variable (Δ 2016- 2011)	Total (non-daily + daily)		Non-daily		Daily	
	Model 1 (occupied floor space Δ 2016- 2011)	Model 2 (occupied stores Δ 2016- 2011)	Model 3 (occupied floor space Δ 2016- 2011)	Model 4 (occupied stores Δ 2016- 2011)	Model 5 (occupied floor space Δ 2016- 2011)	Model 6 (occupied stores Δ 2016- 2011)
<i>Online shopping</i>						
Online expenditures total	-0,575 (0,000)	-1,006 (0,000)	-0,500 (0,000)	-0,990 (0,000)	-	-
<i>Municipal retail revenue</i>						
Retail revenue total	0,669 (0,000)	0,506 (0,007)	0,416 (0,000)	0,546 (0,000)	0,567 (0,000)	-
<i>Composition of the population</i>						
Percentage of elderly citizens	0,247 (0,009)	-	0,216 (0,022)	-	-	-
Number of cases	103	103	103	105	105	104
R	0,547	0,684	0,577	0,746	0,567	0
R square	0,300	0,468	0,333	0,556	0,321	0

4.3 Model justification

The four municipalities with the most inhabitants of the research sample: Amsterdam, Rotterdam, 's-Gravenhage and Utrecht are removed from all six regression models. Based on the following statistical criteria: Leverage values, Cook's distances and standardised residuals, these municipalities are regarded as too influential on the model outcomes. Throughout the six different models the municipalities of Amersfoort, Haarlem and Zaanstad are also occasionally considered to be too influential on the model outcomes. They are removed from the specific models in which their influence on the model outcomes is considered too large. To elaborate on this, these municipalities are most likely considered to be too influential, because they are part of the larger municipalities incorporated in the research sample. Consequently, they are not removed from the models because they perform significantly different than the other municipalities in the research sample.

5. Discussion

The results presented in the previous chapter reveal that the change in the overall demand for retail real estate, between 2011 and 2016, is significantly negatively related to the change in the online expenditures. More specifically, the findings of this research make clear that an increase in the online expenditures on non-daily products, between 2011 and 2016, is strongly associated with the decrease in demand for retail real estate. Contrary, according to our findings the change in the online expenditures on daily products, between 2011 and 2016, is not significantly related to the change in the demand for retail real estate.

In this way our research provides strong empirical evidence that supports the claims of those scholars who state that online shopping, and especially online shopping for non-daily products, substitutes part of the demand for retail real estate (Baen, 2000; Winograd, et al., 2000; Weltevreden & Van Rietbergen, 2007). Moreover, the results point to the absence of a relation between online shopping for daily products and the demand for retail real estate. Also, our findings provide proof that contradicts the claims of those scholars who argue that the effects of online shopping on the demand for retail real estate should be regarded as complementary or modifying (Salomon, 1986; Andersen & Rosen, 2000; Winograd et al., 2000; Mokhtarian, 2003; Ferrel, 2005; Weltevreden & Van Rietbergen, 2007).

Besides the effect of online shopping, our findings also indicate that municipalities of which the retail sector performed well, between 2011 and 2016, are likely to have experienced an increase in the demand for retail real estate, whereas municipalities of which the retail sector performed poorly, between 2011 and 2016, most likely saw the demand for retail real estate diminish. These findings are harmonious with previous findings (Weltevreden and Van Rietbergen, 2007; Cosmin, 2008).

Moreover, our findings do not support the statements made in previous studies that the sociodemographic and other consumer behavioural factors incorporated in this research did play a role in the changing demand for retail real estate, between 2011 and 2016 (Burt, 2010; Teale, 2012; DTNP; 2013; Evers et al., 2014; Zhang et al., 2016; CBS [A], 2017). To add to this, our findings are unable to confirm statements made by Weltevreden and Van

Rietbergen (2009) and Dynamis (2017) that the demand for retail real estate is affected differently in municipalities with a rural character compared to municipalities with an urban character.

As mentioned in the introduction of this research, the nature of the increase in retail vacancy ultimately determines the type of policy approach that is most effective in keeping shopping areas attractive in the long-term. Therefore, our findings also have implications on retail policy. The confirmation of the existence of a substitution effect, suggests that a large portion of the vacant retail real estate that originated between 2011 and 2016, is the direct result of the increasing popularity of online shopping. To add to this, forecasts indicate that this substitution effect is structural in nature and most likely going to expand in the future (Comarch, 2017; ING Bank, 2017). Consequently, the previous levels of demand for retail real estate are unlikely to be restored.

This entails that in areas where this substitution effect forms the basis for the mismatch between the demand and the supply of retail real estate, policy approaches need to be primarily reduction-oriented. Through the reduction of the stock for retail real estate policy makers are able to reduce the amount of retail vacancy and minimise the associated negative externalities. Thereby, keeping municipalities liveable for its inhabitants and attractive to its visitors. Furthermore, the purpose of the growth-oriented policy approach needs to change partially. Instead of directing its focus on the expansion of the market for retail real estate, this policy approach needs to be used to stop the deflation of the market for retail real estate. Combining these two policy approaches gives policy makers the means to deal with

the structural reduction in the demand for retail real estate, caused primarily by the growing popularity of online shopping.

In short, through providing empirical evidence that online shopping has substituted part of the demand for retail real estate, we were able to fill part of the gap in the existing scientific literature. More specifically, we were able to determine that the reduction in the demand for retail real estate, between 2011 and 2016, is mainly caused by the increase in online expenditures on non-daily products. Simultaneously, we were able to contradict that the increase in online expenditures, between 2011 and 2016, has a complementary effect on the demand for retail real estate.

Despite the strong aspects of this research, there are also a number of limitations attributed to our research. Firstly, due to data constraints, this research is limited to performing an analysis on the municipal level, which is a relatively high level of aggregation. Performing an analysis on a lower level of aggregation would allow us to more specifically pinpoint the effects of online shopping on the demand for retail real estate. To add to this, differentiating between the degree of urbanisation in municipalities did not result in significant differences between various types of municipalities. This either suggests that there are no differences between municipalities and the effects of online shopping are uniformly spread across the research sample, that the differentiation made in this research is irrelevant or that the municipal level of aggregation is not the right level to make these differentiations.

Next, the supply side of the retail real estate market is not incorporated in this research, which entails that this research is limited to investigating the factors on the

demand side of the market only. Accordingly, statements about retail vacancy rates are made under the assumption that the supply of retail real estate is fixed.

6. Conclusion

In this research we studied the effects of the growing online expenditures, between 2011 and 2016, on the changes in the demand for retail real estate, while controlling for a number of sociodemographic and other behavioural factors. The hypothesis of this research is that the increase in online shopping results in a decreasing demand for retail real estate. Using both a correlation analysis and a multiple regression analysis on data regarding a total of 110 municipalities located in the western part of The Netherlands, we were able to establish that the increase in online expenditures, between 2011 and 2016, is related to a decrease in the demand for retail real estate. These findings are consistent with our hypothesis.

Our research contributes to the scientific debate regarding the effects of online shopping, by providing empirical evidence that online shopping substitutes part of the demand for retail real estate. From these findings it is concluded that, in order to restore the balance between the demand and the supply of retail real estate, reduction-oriented policy approaches are required. Moreover, we conclude that the growth-oriented policy approach should be used as a means to stop the deflation of the

market for retail real estate, rather than as a means to expand the retail real estate market.

Looking beyond the boundaries of this research, our findings could also have consequences for the theories on retail locations, which explain the spatial component of the market for retail real estate as we currently know it. The substitution effect of online shopping on the demand for retail real estate, suggests that certain underlying concepts of these locational theories might be susceptible to change in the future.

To be able to examine in more detail the influences of the growing popularity of online shopping on the underlying concepts of the retail location theories, we recommend additional research to focus on the relation between online shopping and the market for retail real estate at the shopping centre level of aggregation. Most retail locational theories, focus on retail activities in shopping centres. Consequently, additional information on the shopping centre level of aggregation provides better grounds for investigating the retail locational theories.

Closing off, we recommend future research to, besides the demand side, also examine the factors on the supply side of the retail real estate market. In this way the effects of online shopping on the market for retail real estate are also controlled for by factors on the supply side of the market. This paints a more complete picture of the factors contributing to the problems on the market for retail real estate.

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