

# Determinants of the Occupancy Cost Ratio across retail branches

*An in-depth analysis of a key metric in real estate retail about the mall-specific and economic determinants of the Occupancy Cost Ratio explained across retail branches in seven European countries*

## MASTER THESIS



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## Determinants of the Occupancy Cost Ratio across retail branches

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*Master theses are preliminary materials to stimulate discussion and critical comment. The analysis and conclusions set forth are those of the author and do not indicate concurrence by the supervisor or research staff.*

# Preface

In front of you lies my master's thesis, "Determinants of the Occupancy Cost Ratio across retail branches". This thesis is the final proof of the master's Real Estate Studies at the University of Groningen. I have had a great time being educated at this university, which resulted in a graduate internship and finally a full time job at Unibail-Rodamco, a leading European listed commercial real estate company. In my opinion, this study is a valuable contribution to the understanding of the Occupancy Cost Ratio (OCR) within today's dynamics of the real estate retail market. Many areas of research on this topic have not been scientifically or quantitatively researched on this topic. This thesis contributes therefore to the early stages of the thorough discussion about real estate performance measurements between landlords and retailers.

First, I would like to thank my supervisors, Krzysztof Muzalewski and Hendrik-Jan ten Dam of Unibail-Rodamco, for their time, enthusiasm, guidance and thorough feedback during the graduation internship and, as result of it, this thesis. In addition, I would like to thank Unibail-Rodamco for this unique opportunity and the availability of such extensive data that was crucial for the continuation and completion of this research. Also, special thanks to all the colleagues at Unibail-Rodamco for their available time and help. Second, I would like to thank Dr. X. Liu and Prof. Dr. E.F. Nozeman of the University of Groningen for their ideas, guidance and feedback during the supervision of this thesis.

Last but not least, a special word of thanks to my girlfriend, Liza, who was always there to support me during day and night on this intensive route. Her support made it possible to complete the master's within the expected timeframe.

I hope you will enjoy reading this thesis.

Utrecht, October 12<sup>th</sup> 2016.

A handwritten signature in black ink, consisting of a large, stylized initial 'F' followed by several horizontal strokes that trail off to the right.

F.R. van Haaren

# Executive summary

The turmoil of recent years has set the retail market in motion. Changing customer behaviour, e-commerce and the economic recession paired with a declining consumer confidence necessitates changes within this sector. These changes are also being reflected in the relationship between landlords and retailers and the emergence of quantitative measurements as data availability arises. Both aspects call for a more thorough discussion of real estate performance indicators in order to better understand the retail market dynamics and for landlords to secure income. The Occupancy Cost Ratio (OCR) is one of the key measures for determining retailer performance and is an important indicator for the sustainability of tenant expenses (Gerbich, 1998; Wheaton, 2000; van Duijn et al., 2015; Braam-Mesken, 2015). The OCR is calculated as the ratio<sup>1</sup> of the total occupation costs of the retailer to its own sales. Judging the OCR differs for each type of retailer. There is no single average of OCR sustainable for all retailers, as it is directly linked with retailer margins.

The importance and growing relevance of the OCR has been stressed by van Duijn et al. (2015) and Braam-Mesken (2015). Publications on retail productivity measures and, in particular, the OCR are, however, limited (extensive searching in scientific databases notwithstanding). This is due to the historically minimal disclosure of confidential tenant sales, and the only recent interest in this ratio. This makes the knowledge of this topic is certainly not widespread. The occupation costs<sup>2</sup> (nominator of OCR) and tenant sales (denominator OCR) are, however, of interest in several academic studies (Benjamin et al., 1990; Chung, 2004; D'Arcy et al., 1997; Des Rosiers et al., 2009; Key et al., 1994; Sirmans & Guidry, 1993; Hendershott et al., 2009). The most important, positive determinants named in these articles are sales productivity, inclusion of food & leisure, footfall, accessibility, retail image/mix, gross domestic product (GDP), household spending, inflation rate, interest rate and performance of the stock market. The size of the unit (GLA), life cycle of the shopping mall, age, anchor tenants, competition, vacancy rates, mortgage rate, unemployment rate and labour costs are mentioned as negative determinants. As derived from the theoretical framework, success factors for managing the OCR are: insight in retailer turnover, ownership in the shopping area and knowledge of the retailer business model.

What is apparent in the scientific studies is that the determinants of the OCR (nor retail occupation costs or tenant sales) have not been subjected to an analysis across branches while this does contribute to the understanding of the OCR (Braam-Mesken, 2015). This research partly builds on the previously mentioned publications and adds a specific dimension by involving, alongside the hedonic characteristics, other mall-specific and economic variables that may influence the OCR. It is not clear to what extent these variables exert influence on the relative OCR or on either the nominator or denominator across retail branches. Overall, this thesis contributes to the existing literature (van Duijn et al., 2015; Braam-Mesken, 2015) on understanding the determinants of the explained OCR by

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<sup>1</sup> Occupancy Cost Ratio = *(rental charges + service charges including marketing costs for tenants – rent incentives) / (tenants' sales); VAT included* (Unibail-Rodamco, 2014).

<sup>2</sup> Retail occupation cost typically consists of rental charges, services charges including marketing costs for tenants, recharged maintenance CAPEX, recharged property taxes and the consideration of incentives.

performing an in-depth analysis. As the data availability on this topic in the market is rather scarce, this extensive analysis is made possible by Unibail-Rodamco, thanks to an extensive dataset. No publications were found that included such extensive data in an in-depth analysis of the OCR. Based on the findings in the literature review, and supplemented by eight meetings held with business decision makers<sup>3</sup>, this study's conceptual model was created. These meetings are used to obtain general knowledge and understanding of market relevance of the OCR. It is intended to support the theoretical framework.

This study's main question is: *Which mall-specific and economic determinants influence the relative Occupancy Cost Ratio separated per retail branch researched across seven European countries?* In order to examine the determinants of the Occupancy Cost Ratio per retail branch, an econometric panel data analysis with fixed effects (FE), based on Hausman (1978), is used to estimate an analysis that utilises a range of variables. The dependent variable estimated and predicted concerns the Occupancy Cost Ratio. The independent variables are based on mall-specific and economic variables that determine either retail occupation costs (nominator OCR) or tenant sales (denominator OCR). The data set consists of 7,647 unique retailers (N) tracked over a span of 24 quarterly observations (T) between 2010 and 2015, located in seven European countries. It can be classified as cross-sectional dominant. The econometric panel data analysis with FE equation of this research is therefore as follows:

$$\text{LogOCR}_{i,t} = \beta_1 X_{i,t} + \tau_x + \alpha_i + u_{i,t}$$

Here, the  $\text{LogOCR}_{i,t}$  is the Occupancy Cost Ratio (OCR) for the specific retailer  $i$  at time  $t$ .  $X_{i,t}$  represents the independent variable for retailer  $i$  at time  $t$ . Multiple independent variables are used in this research. The  $\tau$  is the dummy variable for the branch to which the information relates to time  $t$ . The  $\beta_1$  represents the influence of the independent variable on the dependent variable. The  $\alpha_i$  is the unknown intercept for each entity. The  $u_{i,t}$  is the error term and describes the unexplained variation of the OCR of retailer  $i$  at time  $t$ .

The findings regarding the determinants of the Occupancy Cost Ratio (OCR) found that the effect and significance of the variables found to be significant on the OCR differs across the thirteen researched retail branches. This stresses the importance to research the determinants per retail branch. The direction, however, rarely differs per branch. Generally, the Food branch (hypermarkets and daily goods) is the only branch deviating from other branches. Most of the effects on the OCR per branch are caused by a dominant significant effect of one of the two components of the OCR. In addition to the motivation and purpose of this study, country differences in OCR are researched. The results of this study show a significant difference in OCR between France, Spain, Sweden and Austria which are

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preliminary explained by institutional differences. Below table shows the direction of the effects of the independent variables found to be significant on the dependent variable. Also the significant effects on the separated components of the OCR are included.

**Table** Results of analysis model one and two

	<u>Mall-specific variables</u>		<u>Economic variables</u>	
	<i>Positive effects</i>	<i>Negative effects</i>	<i>Positive effects</i>	<i>Negative effects</i>
<b>Effects on OCR</b> <i>(model 1)</i>	Percentage of SSU Food & leisure in SC Shopping mall productivity Years since initial acquisition Life cycle of the shopping mall Share of large units/ units	Store productivity Number of footfall Years since last renovation Share of large units' size	GDP Inflation rate Stock market Long-term interest Household spending	Labour costs
<b>Effects on occupation costs per square meter</b> <i>(model 2)</i>	Store productivity Number of footfall Percentage of SSU Food & leisure in SC Shopping mall productivity Years since last renovation Years since initial acquisition	GLA of the unit Share of large units/ units Life cycle of the shopping mall	GDP Inflation rate Stock market Long-term interest	Labour costs Household spending
<b>Effects on tenants' sales per square meter</b> <i>(model 2)</i>	Store productivity Number of footfall Percentage of SSU Food & leisure in SC Shopping mall productivity Share of large units' size Years since initial acquisition	GLA of the unit Share of large units/ units Life cycle of the shopping mall	GDP Stock market	Inflation rate Labour costs Long-term interest

It would be interesting for further research to investigate specifically the effect of the inclusion of food & leisure in the shopping mall and the relationship with the OCR. Also, the period shortly following the renovation or development of a shopping mall needs to be studied to assess risk. This is of special interest to landlords. The add-on of tenant-specific variables could help in assessing the most sustainable OCR to a particular retailer, instead of branch wide standard, and could help in forecasting the future, and therefore the sustainability of the lease. For these studies, it is recommended to collect an extensive sample consisting of retailers that most likely are located in the shopping malls used in this research.

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# 1. Introduction

Recently, newspapers have been writing frequently about retailers experiencing turbulent economic times. Many retailers, mostly in the middle segment, went bankrupt, mainly in the Netherlands and Spain during the last financial reset. 2015, and the brink of 2016, were further years of turmoil for the retail market. Changing customer behaviour, e-commerce and the economic recession, paired with declining consumer confidence have set the retail market in motion (Cushman & Wakefield, 2015; CBRE, 2016). The changes within the retail sector are also being reflected in the relationship between landlords and retailers. The question arises of whether it is possible for landlords to actively monitor their tenants in order to secure income. This requires a more thorough discussion of real estate performance indicators in order to better understand the retail market dynamics. The Occupancy Cost Ratio (OCR) is one of the key measures for determining retailer performance and is an important indicator for the sustainability of tenant expenses (Gerbich, 1998; Wheaton, 2000; van Duijn et al., 2015; Braam-Mesken, 2015). The OCR is calculated as the ratio of the total occupation costs of the retailer to its own sales<sup>4</sup>. Hence, full disclosure of tenant sales is obviously crucial to effectively monitor this measure. By following the OCR, one often can judge whether the OCR is too high (risk) or too low (reversionary potential<sup>5</sup>). Refurbishing the store, a concept refresh or a marketing impulse should be considered when the OCR highlights risk (Ambagtsheer, 2016; Brenninkmeijer, 2016; Van Garderen, 2016). Judging the OCR differs for each type of retailer, however. There is no single average OCR sustainable for all retailers, as it links directly with retailer margins.

Publications on retail productivity measures, and in particular the OCR, are limited (van Duijn et al., 2015; Braam-Mesken, 2015). This is due to the historically minimal disclosure of confidential tenant sales and the only recent interest in this ratio. This makes the study of the OCR relatively new and means the knowledge of this topic is certainly not widespread. The occupation costs<sup>6</sup> (nominator of OCR) and tenant sales (denominator OCR) are of interest in several academic studies, however. The multitude of scientific publications on occupation costs (usually only rent (Tsolacos, 1995; Fraser, 1993; Hillier Parker, 1984, 1985, 1987; Hetherington, 1988)) predominantly shows motivated interest in relation with locational and economic factors, limited to the relationship with non-spatial, i.e. demographic and tenant-specific factors (van Duijn et al. 2015). What is apparent in these studies is that the determinants of the OCR (nor retail occupation costs or tenants' sales) have not been subjected to an analysis across retail branches while this will contribute to the understanding of the OCR (Braam-Mesken, 2015). This research partly builds on the previously mentioned publications and adds a specific dimension by involving, alongside the hedonic characteristics, other mall-specific variables that may influence the OCR. As researched in other studies, economic and spatial variables influence either the occupation costs or tenant sales (Sirmans & Guidry, 1993; Key et al., 1994; Tsolacos, 1995; Chung, 2004; D'Arcy et al., 1997; Hendershott et al., 2009). It is not clear to what extent these variables exert influence on the OCR across retail branches.

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<sup>4</sup> Sales and turnover refer to the same thing and are used interchangeably regarding the P&L account of the retailer.

<sup>5</sup> The reversionary potential is the net rental income divided by the current net rental value or vice versa (opportunity landlord).

<sup>6</sup> Retail occupation cost typically consists of rental charges, services charges including marketing costs for tenants, recharged maintenance CAPEX, recharged property taxes and the consideration of incentives.



Overall, this thesis contributes to the existing literature on understanding the determinants of the explained OCR, by performing an in-depth analysis. To be precise, the question is asked about whether the effect of the determinants of either retail occupation costs and retail sales exert influence on the relative OCR and what the effect is, separated per retail branch. The extensive data used for this research is provided by Unibail-Rodamco<sup>7</sup>. Along with the availability of this unique dataset, combining retail occupation costs and retail sales into one dependent variable, the OCR, this study adds new insights and additions to the understanding and knowledge on the OCR. In addition to the motivation and purpose of this study, country differences in OCR are researched and preliminary explained as this contributes to the understanding of the OCR. No publications were found that included such extensive data in an in-depth analysis of the OCR. The central research question for this thesis is:

*“Which mall-specific and economic determinants influence the Occupancy Cost Ratio per retail branch?”*

This research can be qualified as quantitative conducted using an econometric panel data analysis method with fixed effects (FE). In addition, eight meetings were held with business decision makers<sup>8</sup>, making it a mixed-method research. These meetings are used to obtain general knowledge and understanding of market relevance of the OCR. It is intended to support the theoretical framework.

No such extensive analysis on the OCR has been found in the literature. Therefore, no linkage can be made with the preliminary findings based on the determinants of the OCR. Due to the characteristics of this research, it is also classified as an exploratory research. It is not intended to provide conclusive evidence, but supports to have a better understanding of the OCR. No strong deviations were found comparing to the explanatory studies of van Duijn et al. (2015) and Braam-Mesken (2015) on the subject of OCR. From these studies it is expected that the significance of variables and the direction of it will differ per branch. The expected effects of the researched variables on the OCR based on these studies are named in the conceptual model in Chapter Two.

The rest of the paper is structured as follows. First, the theoretical framework shows the application of the OCR and its effectiveness in the retail real estate market, along with a description of the literature of retail tenant sales and retail occupation costs. From the literature framework, a number of variables are put forward in a conceptual model to test in the empirical section. The empirical section consists of data collection and descriptive statistics, followed by the methodology chapter. This is followed by the panel data analysis with FE to conduct the empirical analysis, concluding with a discussion of the results.

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<sup>7</sup> The data used in this research remain anonymous and therefore cannot be traced back to a specific tenant or shopping mall

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## 2. Theoretical framework

The theoretical framework contains two elements: an in-depth view into the Occupancy Cost Ratio (OCR) and a literature study. The in-depth view<sup>9</sup> provides an insight into the underlying thought of the OCR, the effectiveness of the OCR in the market and strategies to pursue. These meetings are used to obtain general knowledge and understanding of market relevance of the OCR. It is intended to support the theoretical framework. The framework is linked to previous studies of van Duijn et al. (2015) and Braam-Mesken (2015) on the OCR. To determine which determinants affect the OCR, previous academic research on the determinants of retail occupation costs and turnover was consulted as only limited publications of determinants of the OCR are to be found. The chapter ends with the conceptual model.

### In-depth view of the Occupancy Cost Ratio (OCR)

One of the industry standards to evaluate the performance of a shopping mall is the OCR of each of its retailers. In order to structure the best economic lease terms for both the landlord and the retailer, it is critical to understand occupation costs as they relate to the retailer's profitability. The OCR gives the ratio of these occupation costs of the retailer relative to turnover. To calculate the OCR, the occupation costs (numerator), including rental charges, and service charges including marketing contribution minus incentives, is divided by the tenants' sales (denominator). For all the components, VAT is included. The formula<sup>10</sup> is (Unibail-Rodamco, 2014):

$$\text{Occupancy Cost Ratio} = (\text{rental charges} + \text{service charges including marketing costs for tenants} - \text{rent incentives}) / (\text{tenants' sales}); \text{VAT included}$$

### *Occupancy Cost Ratio per type of retailer*

Occupancy Cost Ratio (OCR) varies by retail branch because each type of retailer has different profit margins (Braam-Mesken, 2015). Branches such as luxury, accessories, fashion and cosmetics usually have a higher mark-up and can therefore pay more rent, which raises the percentages of OCR. Supermarkets and large electronic stores tend to pay a lower rent level per square meter as their business is volume instead of profit through margins. Even within a single branch, however, different target OCRs exist per sub-branch. Even retailers selling their own products can pay up more compared to multi-brand stores (ten Dam, 2016). Also whether it is a franchisee or direct store makes a difference. The target OCR even differs by location: neighbourhood centres range an OCR average of between 7 - 10% of sales and super-regional shopping centres between 15 - 20% (Braam-Mesken, 2015). Obviously, the difference in these ranges is affected by the different rental levels and by the branch mix.

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<sup>9</sup> To better understand the application to the market, eight meetings were held with business decision makers (appendix 1). These decision makers were asked for their opinion about the turmoil in the retail market, what the future of retail is and how to deal with key performance indicators in the retail industry and, in particular, what the effectiveness of the OCR is in the market. These interviewees were guaranteed that they will not be quoted, but the information from the interviews may be used as raw material. Therefore, their views and opinions are used interchangeably throughout this chapter without direct quotation.

<sup>10</sup> Other components of occupation costs are not taken into account for this research.

### *Managing the Occupancy Cost Ratio*

Successful factors for managing the OCR are an insight into the retailer turnover, ownership in the shopping area and knowledge of the retailer business model. The rental income of the landlord is dependent on retailer turnover, which highlights the relevance of obtaining turnover figures. Crucial for managing this measure is having (mostly) solitary ownership of the shopping area. If this fact is not the case, it is difficult to get all retailers aligned to execute the necessary shopping mall strategy. If the landlord has full ownership, managing the shopping mall based on the data analyses becomes possible. A shopping mall with fragmented ownership is therefore limited in its ability to execute strategies. Khoshbakht (2015) investigated the effects of fragmented ownership and stresses the advantages of having (mostly) solitary ownership.

Often, it is said that shopping malls must have a least 15 – 20% OCR on average (Braam-Mesken, 2015). Instead of simply fixating on the highest possible OCR and on the ones who can afford it, however, the success of a mall stems from a combination of features and offerings. For a landlord it is also important to identify who the retailers are; whether they are part of a chain, or if it is a franchisee or an independent store. In fact, the landlord must obtain knowledge of the retailers and about the way they are organised. This is in order to assess what risk the tenant entails. It is therefore important for the landlord to put time and effort into investigating who the counterparty is – the 'know your tenant' principle. The landlord should also not be blinded by the OCR of one specific unit. The performance of that specific store does not directly represent the performance of the other stores in the same chain.

Excessively managing the OCR could be detrimental; a landlord should keep the full picture of the shopping mall in mind. All in all, maintaining a particular tenant mix is important for the performance and attractiveness of a shopping mall, even though this sometimes leads to a lower OCR. Anchor tenants often have a lower OCR, simply because they can negotiate lower rents per square metre because they are important for the area and attract footfall for the entire shopping mall. Also the life cycle of the shopping mall does influence the OCR. The OCR tends to be higher shortly after completion of the mall, compared with a more mature phase as the mall needs to establish itself in the area.

Online sales and the increasing share of sales, which is shifting more and more towards online, remain difficult for a landlord to deal with. This partially compresses the affordability of the physical store. With this trend, store sales will be lower and the retailer will indicate that the OCR becomes too high and that the rent should be reduced. In fact, this is not true, because sales are allocated online. If the traditional link between turnover and affordability of the store disappears within a few years because it is no longer linear, it could partly mean the end of the OCR as a useful performance measure. Whether it will lose its complete relevance, remains the question, but it will certainly change and eventually become less powerful as online sales increase. In case the retail market switches to largely turnover rents, the OCR will remain a crucial target number.

### *Palette of real estate retail measurements*

The OCR is one of the measurements for a landlord to use that mainly serves as an early warning, and to gain a sense of retailer performance. A different measure, often used by landlords, is the turnover per square metre of the store. The OCR provides a purer picture than the turnover per square metre because this links to the sustainability of the retailer. With both, a landlord is able to make a good branch benchmark and have the ability to raise rents. Another indicator is the number of footfall of the shopping area. The landlord needs to create an understanding of what the main entrances are, where they are, in which direction most people walk and how long they stay somewhere. A more financial indicator is the rental arrears. With this, the landlord can monitor the payment rhythm of the retailer. If the tenant suddenly pays a few days late or incomplete, they often do this for a reason. Payment behaviour differs by country and the attitude of the retailer, however, and therefore serves as an early warning. Nevertheless, there have been examples of retailers who paid on time and even ahead of time, but went unexpectedly bankrupt. Combining all the other measurements together with the OCR provides a full picture of the performance of a shopping area and specific tenant. Therefore, the OCR should be used in combination with others but can be a good takeaway as standalone. The landlord continuously wants to know the performance of the retailer; what the retailer is paying and when the retailer is paying.

### *Occupancy Cost Ratio strategy*

Choosing strategy and target OCRs differs according to the route the landlord wants to pursue and depends on the quality, size and footfall of the mall. Generally, rental income from a tenant with a relatively low OCR is considered sustainable and perhaps indicates reversionary potential for the landlord. On the contrary, if a tenant has a relatively high OCR, the landlord's ability to pass rent increases over time may be vastly diminished.

A landlord can roughly choose between two different strategies: a defensive one and a more aggressive one. The defensive strategy means keeping the OCR on an average, sustainable level to ensure the economic health of the retailer. This will create 'happy' tenants and protect the landlord from higher than average vacancy rates. Landlords can also pursue the opposite strategy, although pushing the OCR to the limit results in a higher percentage of turnover in retailers (re-tenanting). Investors watch the OCR (strategies) to decide whether they still see rental growth possibilities for landlords because the Net Rental Income growth is one of the most important indicators of performance for REITs<sup>11</sup>. This latter strategy can only be used if the offer is something attractive enough to have retailers queueing. Mostly, in secondary shopping centres, landlords fight against vacancy and therefore cannot push the OCR. In particular, the quality of the assets and the composition of the landlord's portfolio affects the OCR strategy. For example: retail parks with many supermarkets naturally have lower OCRs. When there is sufficient demand for the exclusive units, the landlord can boost the OCR.

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<sup>11</sup> A Real Estate Investment Trust (REIT) is a type of security that invests in real estate through property or mortgages and often trades on major exchanges like a stock. REITs provide investors with an extremely liquid stake in real estate. They receive special tax considerations and typically offer high dividend yields (Investopedia, 2016).

### *Partnership retailer and landlord*

It depends upon the country whether retailers are familiar with sharing their turnover figures with their landlord. In the Netherlands, the idea of sharing turnover figures is fairly new. In general, retailers are reluctant to share their turnover. This is not because they are afraid of higher rents but because it is commercially sensitive information. Sharing turnover figures could be the first step; some landlords even ask the retailer to open their P&L account, as this gives insight in the profitability.

Such turnover figures, however, do not say anything about margins and therefore the affordability of space. Furthermore, the figures of one specific store do not indicate the performance of the chain the store belongs to. It is therefore unclear why some retailers do not want to share this information, though it is starting to become a new market standard because landlords are pushing for turnover disclosure in new lease agreements. Also, more and more retailers accept it and understand its usefulness. Many landlords think about partnering with the retailer nowadays to support each other by exchanging information. The possession of retailers' performance figures is crucial. As well as receiving such information from the retailer, the landlord can also return useful information to the retailer. It enables the landlord to benchmark a certain retailer per branch or activity in particular which can be shared with the retailer to jointly search for turnover improvements. Ultimately, this has to result in increased retailer turnover, which will enable them to pay higher rents.

### **Literature study**

Due to a lack of reliable and available extensive sales data and occupation costs, the number of publications about the OCR is limited (extensive searching in scientific databases notwithstanding). Even extensive empirical work on the determination of retail rents (Benjamin et al., 1990; Chung, 2004; D'Arcy et al., 1997; Des Rosiers et al., 2009; Key et al., 1994; Sirmans & Guidry, 1993; Hendershott et al., 2009) is limited, relative to the corresponding research on office markets (Brennan et al., 1984; Colwell et al., 1998; Sivitanidou, 1995; Stevenson & McGarth, 2003). For Continental Europe, hardly any published studies on retail property market dynamics, other than market commentaries, exist. Therefore, this chapter initially discusses interchangeably the available literature on determinants of either occupation costs or tenant sales.

### *Retail rent levels*

Most publications on retail rent determinations employ both the demand and supply side influences. Generally, two theoretical approaches are used in specifying models of retail rent determination: the surplus theory and demand-supply interaction (Tsolacos, 1995). The surplus theory states that retail rents are determined by the turnover of retailers. Retailers assess the rent they can afford to pay by deducting operating costs from their revenues and therefore retail rent is a function of real retail profits (Tsolacos, 1995; Fraser, 1993; Hillier Parker, 1984, 1985, 1987; Hetherington, 1988). Key et al. (1994) examined the influence of both retail sales and retail profits as an alternative measure of demand for retail space. Tsolacos (1995) notes that this approach is more prevalent in prime locations. Hetherington (1988) also found that supply side variables were significant in explaining changes in

retail rental values and that the importance of retail sales in rent determination was inversely related to the size of market tested. The study of Key et al. (1994) was based on the stock of retail space and level of new construction as the most appropriate supply side variables.

#### *Mall-specific determinants*

The GLA of the store is the most important real estate specific variable that determines rent level (Des Rosiers et al. 2009; Mejia & Benjamin, 2002). Regarding Sirmans & Guirdy (1993), the size of the unit has a positive correlation with the value of the asset. In other studies, a negative relationship between shop size and rent level per square metre is shown (Des Rosiers et al., 2009; Shun-Te You et al., 2010). Sales per square metre effectively measure how efficient the store unit is at generating revenue. Sales productivity (sales/sqm) is important because it reduces the store's fixed costs as a proportion of total revenue and therefore increases store profitability (Stewart, 2015; Alexander & Muhlebach, 1992). This implies that the retailer can pay a higher percentage of costs as occupation costs as their sales per square metre increases (ten Dam, 2016). Shopping mall success stems from rental income generated by retailers in the shopping mall, which has an indirect relationship with retailers' sales as the rent level depends on it.

The purpose of shopping goes beyond product acquisition, as consumers also shop for experiential and emotional reasons (Jones, 1999; Bellenger & Korgaonkar, 1980). Empirical research by those researchers showed also that a large proportion of retail shoppers are recreational shoppers who look for recreation as the key takeaway. Hence, retailers and mall developers should attempt to make shopping an experience to differentiate them from the competition (Talmadge, 1995; Kim et al., 2005). A positive shopping experience leads to increased store liking, more time spent in store, larger ticket-size and higher incidence of unplanned purchases (Babin et al., 1994). Therefore, it is crucial to add elements that improve the experience quotient of shopping. To meet the diversity factor requested in shopping areas, shopping malls should have a variety of stores, food services, restaurants and entertainment. Studies have highlighted the importance of food courts and entertainment facilities (Sirpal & Peng, 1995). According to Wakefield & Baker (1998), diversity in food and leisure has a strong effect on the desire to stay. This is important because there is evidence that spending increases as consumers stay longer in a retail environment (Donovan et al. 1994).

Landlords keep on renovating their assets to make them future proof. The main development goal behind this is the potential to increase sales volume, according to Millar (1996). Shopping malls typically have (new) long-term leases at relatively high rental levels during the early stage following renovation (Lowry, 1997). Simultaneously, retailer sales tend to need to grow over time (Reikli, 2012) and therefore it is expected that the OCR is higher in the early stages following renovation. Renovation of the shopping mall is also necessary because the age of a shopping mall contributes to explaining its value. Most studies name age as a negative effect on the quality and value of the asset (Sirmans & Guirdy, 1993; Des Rosiers et al., 2009; Mejia & Benjamin, 2002). This explains how important renovation and image strategies are for landlords (Liang & Wilhelmsson, 2011; Hardin &

Wolveton, 2000), as well as the quality of the design (Mejia & Benjamin, 2002; Lea, 1989). An argument Sirmans & Guirdy (1993) attributed to the age of the building, focuses on newer and more modern facilities that have greater appeal to consumers. In contrast, Tay et al. (1999) name a positive correlation between age and rent levels of a shopping centre. This is due to customer fidelity, which tends to grow over time and continuous improvements to the building. It also suggests that while store rent is positively correlated with the size of a centre; it is inversely related to its own size. One way to measure the quality of an asset is via the vacancy rates in the area (Buvelot, 2007), where higher vacancy rates have a negative impact (Tsolacos, 1995; Sirmans & Guirdy, 1993). In contrast, Hui et al. (2007) show that vacancy has no significant relationship. The length of the contract is, according to Des Rosiers et al. (2009), a positive contribution to asset value also.

Composition, in terms of inhabitants in the asset environment, explains a significant part of the value of a retail real estate asset. An indication of this is that footfall has a positive effect according to Sirmans & Guirdy (1993). They emphasised the importance of the traffic, both pedestrian and vehicles, as prerequisite for the success of a store. Their study shows a correlation between the size of traffic and the level of rent in a mall. Increasing accessibility raises the value of a shopping mall (Roig-Tierno et al., 2013; Bolt, 2003; Tay et al., 1999). The image of a shopping mall may also affect sales levels (Brown, 1992; Kirkup & Rafiq, 1994; Anikeeff, 1996, in Benjamin, 1996). This comes from the consumer perception of major tenants (Nevin & Houston, 1980), mall size/configuration, as well as the quality of goods and services offered. In this respect, image is increasingly dependent on fashion (James et al., 1976; Mazursky & Jacoby, 1986). In addition, the attractiveness, visibility and reputation are also decisive (Lea, 1989; Roig-Tierno et al., 2013; Fowler, 2011; Mejia & Benjamin, 2002).

Sales potential in shopping malls is looked upon through the concepts of agglomeration economies and externalities derived from the presence of anchor tenants (Mulligan, 1983; Eppli & Benjamin, 1993; Des Rosiers et al., 2002; Mejia & Benjamin, 2002). Behind the concept of agglomeration economies lies the reduction of consumer search and uncertainty costs. Because of this, the presence of anchor tenants contributes positively to the appeal and attractiveness of a location (Sirmans & Guirdy, 1993; Eppli & Shilling, 1996). Such advantages allow anchor tenants to negotiate lower rents per square metre (Anderson, 1985) because their departure could cause rental income to drop by as much as 25% (Gatzlaff et al., 1994), greatly enhancing their bargaining power.

Another variable that has a positive effect on asset value is the total number of shops in the shopping centre (Sirmans & Guirdy, 1993; Hardin & Wolveton, 2000), with an additional positive effect through an improved tenant mix with a greater variety of shops (Pashigan & Gould, 1998; Ooi & Sim, 2007; Nase et al., 2013). The clustering of similar stores leads to an increase in total sales level, thereby contributing to the success of the mall (Nelson, 1958; Eppli & Shilling, 1996; Des Rosiers et al., 2002). Based on the literature, another determining factor is market competition. Competition translates into the number of competitors, the type of competitors and complementary activity in the area (Lea,

1989). In the study by Roig-Tierno et al. (2013), competition is divided into four variables: the distance to the competition, the number of competitors, the type of competition and brand recognition.

### *Economic variables*

Several macroeconomic variables can be used to capture either retail sales and/or retail rents. The impact of the supply of retail space on retail rents is dependent on how effectively the retail market responds to retail demand and price changes. Strengthening demand results in higher rents if the supply is unresponsive and thus rents will largely reflect demand changes. Different macroeconomic variables are identified that influence retail rent and therefore asset value (Sirmans & Guidry, 1993; Hetherington, 1988; Key et al., 1994; Tsolacos, 1995; Chung, 2004; D'Arcy et al., 1997; Buvelot, 2007; Des Rosiers et al., 2009; Hendershott et al., 2009). Positive determinants named for the variation in rent levels are: GDP, household spending, retail sales, inflation, interest rates and performance of the stock market. For Tsolacos (1995), the most important influencer on the value of a shopping centre is household spending. Mortgage rates, unemployment rates and labour costs are named as having a negative impact. Regarding retail sales, D'Arcy et al. (1997) names as major determinants: GDP, unemployment and interest rates, in addition to disposable income and household spending. A problem related to GDP is that it is not necessarily part of the household income on goods being spent in the retail sector. Purchasing power is therefore a more valid indicator of household spending (Hardin & Wolveton, 2000). Purchasing power, according to Buvelot (2007), is linked to consumer confidence. Consumer confidence is positively correlated with spending. In addition, inflation has an impact on household spending. With stable inflation, purchasing power does not change. If inflation rises or falls, however, purchasing power moves also (Des Rosiers et al., 2009).

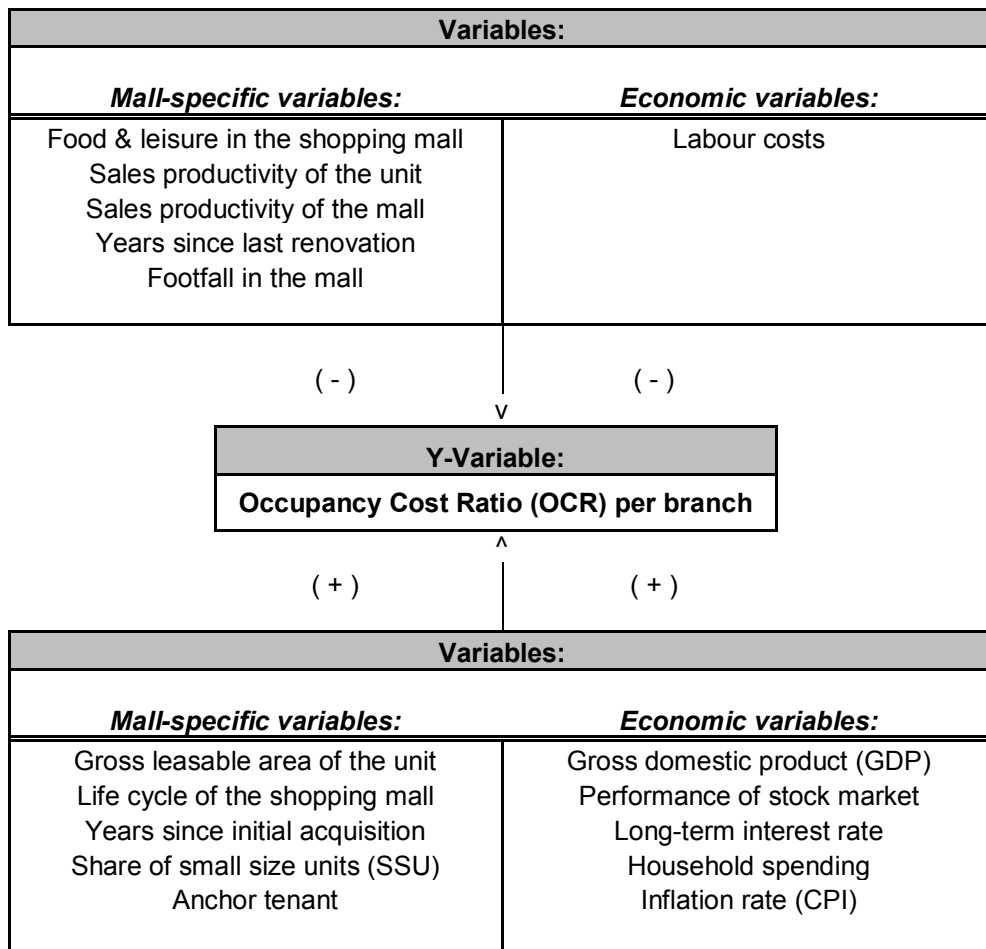
The literature review establishes important theoretical fundamentals for this study. Firstly, it reveals that real estate retail market performance is closely related to primarily micro-factors but also correlates with macroeconomic fundamentals. The movement of rent levels and sales performances should be correlated with movements of certain micro- and macro-market variables and the OCR. Therefore, this study focuses on the discussed variables in an attempt to examine the effect of each variable on the relative OCR. The examined literature suggests various variables influence rent levels, retailer sales or both on a micro-level. These mainly relate to **number of footfall, size, sales productivity, accessibility, competition, age, vacancy rates, life cycle, inclusion of food & leisure, retail image/mix** and **anchor tenants**. Commonly investigated macro-variables likely to affect either retail rents, retailer sales or both are **GDP, household spending, labour costs, inflation rate, interest rate, performance of the stock market, mortgage rate** and **unemployment rate**. Appendix 2 provides an overview of previous studies of the determinants of either retail rent or retail sales.



### Conceptual model

In order to explain the researched independent variables, a conceptual model of the research has been constructed. This is based upon the theoretical framework and data availability. The endogenous, or dependent variable of this research is the OCR per branch. This research distinguishes between mall-specific and economic variables as determinants of the OCR. This research seeks to involve the variables, with their expected relationship, as shown in Figure 1 as determinants of the OCR in different retail branches.

**Figure 1**      Conceptual model



### 3. Data

In the empirical analysis, the study makes use of a dataset of Unibail-Rodamco. Unibail-Rodamco is the leading listed commercial real estate company in Europe and the third-largest in the world by market capitalisation. Listed on the Paris stock exchange since 1972 and in Amsterdam since 1983, today the group owns an exceptional portfolio of prime commercial properties, to the value of €39.3 billion as of June 30, 2016, located in the largest, most prosperous cities across Continental Europe. Unibail-Rodamco's operations (80%) are deliberately focused on 72 large shopping centres in major European cities, out of which 97%, in terms of gross market value, receive more than 6 million visits per year. The shopping centres of Unibail-Rodamco welcome more than 777 million visits per year (Unibail-Rodamco, 2016).

The dataset contains extensive information on a cross-section of the shopping centre portfolio of Unibail-Rodamco. The data set consists of 7,647 unique retailers (N) tracked over a span of 24 quarterly observations (T) between 2010 and 2015. As the retail mix rotates, from time to time vacancy occurs, therefore the data set does have some gaps and are therefore unbalanced. The dataset possesses several unique and confidential attributes. First, it traces tenant-specific data such as occupation costs, retailer sales figures, unit size and branch type across the individual retailers<sup>12</sup>. Second, the dataset covers a substantial part of retailers located in the biggest shopping malls spread across Europe. Third, the dataset has extensive coverage of the characteristics of researched shopping malls. This contains attributes such as location information and building characteristics. Macroeconomic data was obtained from the OECD (OECD, 2016) and added to the dataset. These mainly relate to GDP, household spending, labour costs, inflation, stock market performance and interest rates. The accuracy of the turnover information provided by tenants to Unibail-Rodamco is certified by external accountants. The data used do not mention specific retailers or shopping centres by name<sup>12</sup>.

This research only consists of retailers located in the asset class shopping malls<sup>13</sup> with a strong regional function with a mix of different types of retailers across European countries. The research was conducted with the focus on the OCR of retailers in seven European countries with multiple assets per country, including Austria, the Czech Republic, Spain, France, the Netherlands, Poland and Sweden. An overview of the branch classification is attached in Appendix 3 (Unibail-Rodamco, 2016). Appendix 4 is a summary of the variables, including how these are operationalised, a description and origin of the data. No distinction is made for hypermarkets within the food branch.

During the period 2010 to 2015 a total of 88,647 quarterly observations were derived from the data set. By checking for outliers, four scatterplots (Appendix 5) were created to analyse the Z-scores of the OCRs per country, branch level, year quarter and location type to identify outliers and investigate

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<sup>12</sup> The data used in this research remain anonymous and therefore cannot be traced back to a specific tenant or shopping mall.

<sup>13</sup> The words shopping centre and shopping mall are used throughout this study. Originally the difference between shopping centres and shopping malls used to be the roof, as centres were open and malls were covered, and the scale of the concept. Nowadays, however, there is hardly any difference between shopping centres and shopping malls (Evers et al. 2011).

further. All observations with variable values beyond four standard deviations were removed from the dataset. This methodology was applied for year quarter (34), country (151), branch level (435) and location type (2) in order to avoid keeping unrealistic ratios per segment. As the *Other* branch consists of the residue of the branches, the branch has been deleted from the sample (179). After deleting the outliers and *Other* branch, 87,846 observations in thirteen different branches were retained to use in the analysis (Table 1). As seen in the table, the number of observations is strongly increasing over time. This is due to the fact that sharing turnover data by the retailer is becoming more and more market standard within the retail industry. The increase is also explained by the fact that Czech Republic and Poland only have data available since 2012. The data consists of observations of several shopping centres across time.

**Table 1** Frequencies of quarterly observations 2010 - 2015 by branch & year

Year	2010	2011	2012	2013	2014	2015	Total	Proportion
Bags & Footwear & Accessories	1,511	1,496	1,845	1,831	2,039	2,167	10,889	12.4%
Culture & Media & Technology	523	539	697	637	693	730	3,819	4.3%
Department Stores & Luxury	40	44	73	72	73	77	379	0.4%
Dining	2,211	2,148	2,488	2,625	2,936	3,172	15,580	17.7%
Entertainment	120	127	145	149	165	155	861	1.0%
Fashion apparel	4,096	4,027	4,997	5,139	5,730	6,141	30,130	34.3%
Food	99	100	113	111	122	144	689	0.8%
Gifts	372	328	407	397	473	512	2,489	2.8%
Health & Beauty	1,250	1,288	1,602	1,730	2,037	2,221	10,128	11.5%
Home	520	499	592	595	671	715	3,592	4.1%
Jewellery	652	685	800	830	936	985	4,888	5.6%
Services	346	332	373	365	368	353	2,137	2.4%
Sport	281	267	360	387	453	517	2,265	2.6%
<b>Total</b>	<b>12,021</b>	<b>11,880</b>	<b>14,492</b>	<b>14,868</b>	<b>16,696</b>	<b>17,889</b>	<b>87,846</b>	
<b>Proportion</b>	<b>13.7%</b>	<b>13.5%</b>	<b>16.5%</b>	<b>16.9%</b>	<b>19.0%</b>	<b>20.4%</b>		

Per variable, it was determined whether the data could be used as raw data, as log transformation or as a dummy variable. The variables that underwent log transformation (for normal distribution purposes) can be recognised by the “LOG” prefix. In some cases, the use of dummy variables delivered better results than the unedited sequence. This is particularly true when it was not expected to have a linear relationship or when the data could be characterised as an ordinal variable. The dummy variables can be recognised by the “D” prefix. Table 2 offers an overview of the summary statistics of the researched transformed variables<sup>14</sup>. Table 3 offers an overview of the summary statistics of the original variables. For every variable the number of observations, mean, standard deviations and minimum and maximum is shown, as well as a short description (detailed Appendix 4).

<sup>14</sup> The multicollinearity between the variables was checked and no mutual correlation found exceeding 0.7. The sample was checked for heteroscedasticity and the results were made robust by controlling for clustering against any kind of serial correlation and/or heteroscedasticity.

**Table 2** Summary statistics transformed variables

	Obs	Mean	Std. Dev	Minimum	Maximum	Short description ( <i>detailed Appendix 4</i> )
LOGocr_unit	87,846	██████	██████	██████	██████	Occupancy Cost Ratio (OCR)
LOGfoodleisprox_sc	87,846	-0.1501	0.5932	-2.9606	1.4338	Food & Leisure in shopping mall proxy
LOGgla_unit	87,846	5.0944	1.1274	0	10.2779	GLA of the unit
LOGsqmsalesprox_unit	87,846	-0.1237	0.5111	-4.9128	2.3896	Productivity of the unit proxy
LOGsqmsales_sc	87,846	██████	██████	██████	██████	Productivity of the shopping mall
LOGfoot_y	87,846	9.4692	0.5953	7.4281	10.7371	Footfall in the shopping mall (x1,000)
LOGssu_mgr	87,846	██████	██████	██████	█	% of small size units in the shopping mall (MGR)
LOGyears_acq	87,846	2.3735	0.6892	0	3.47	Years since acquisition
years_ren	87,846	6.5418	6.0095	0	25	Years since last renovation
LOGperf_stock	87,846	4.6340	0.1768	4.1651	5.1039	Performance stock market
lc_hw	87,846	105.3474	4.6045	100	116.1484	Labour cost
gdp	87,846	36.9721	5.8645	23.3102	48.4719	Gross domestic product (GDP)
cpi_tot	87,846	104.8909	2.7739	98.3642	111.1304	Consumer Price Index (CPI)
LOGlt_rate	87,846	-3.7614	0.6047	-5.6085	-2.7438	Long-term interest rate
hh_spen	87,846	55.0576	3.9098	44.4457	61.5510	Household spending
Dlycy_renoYES	29,604	0.337				<2 years after renovation
Dlycy_renoNO	58,242	0.663				>2 years after renovation
Dgla_anchorYES	44,793	0.510				>50% of <1.000 sqm units in mall (GLA)
Dgla_anchorNO	43,053	0.490				<50% of <1.000 sqm units in mall (GLA)
Dunit_anchorYES	72,706	0.828				>90% of <1.000 sqm units in mall (#units)
Dunit_anchorNO	15,140	0.172				<90% of <1.000 sqm units in mall (#units)
Dbl_bagfootacc	10,889	0.124				Branch level Bags & Footwear & Accessories
Dbl_culmedtec	3,819	0.043				Branch level Culture & Media & Technology
Dbl_depstolux	379	0.004				Branch level Department Stores & Luxury
Dbl_din	15,580	0.177				Branch level Dining
Dbl_enter	861	0.010				Branch level Entertainment
Dbl_fashapp	30,130	0.343				Branch level Fashion Apparel
Dbl_food	689	0.008				Branch level Food
Dbl_gift	2,489	0.028				Branch level Gifts
Dbl_healbea	10,128	0.115				Branch level Health & Beauty
Dbl_home	3,592	0.041				Branch level Home
Dbl_jewel	4,888	0.056				Branch level Jewellery
Dbl_service	2,137	0.024				Branch level Services
Dbl_sport	2,265	0.026				Branch level Sport

**Table 3** Summary statistics original variables

	Obs	Mean	Std. Dev	Minimum	Maximum	Short description ( <i>detailed Appendix 4</i> )
ocr_unit	87,846	█	█	█	█	Occupancy Cost Ratio (OCR)
foodleisprox_sc	87,846	1	0.5184	0.0518	4.1947	Food & Leisure in shopping mall proxy
gla_unit	87,846	396.15	1169.72	1	29,082	GLA of the unit
sqmsalesprox_unit	87,846	1	0.5585	0.0074	10.9087	Productivity of the unit proxy
sqmsales_sc	87,846	█	█	█	█	Productivity of the shopping mall
foot_y	87,846	15,497	10,092	1682.66	46,030	Footfall in the shopping mall (x1,000)
ssu_mgr	87,846	█	█	█	█	% of small size units in the shopping mall (MGR)
years_acq	87,846	12.8815	6.3771	1	32	Years since acquisition
years_ren	87,846	6.5418	6.0095	0	25	Years since last renovation
perf_stock	87,846	104.5533	18.7176	64.4009	164.6675	Performance stock market
lc_hw	87,846	105.3474	4.6045	100	116.1484	Labour cost
gdp	87,846	36.9721	5.8645	23.3102	48.4719	Gross domestic product (GDP)
cpi_tot	87,846	104.8909	2.7739	98.3642	111.1304	Consumer Price Index (CPI)
lt_rate	87,846	0.0273	0.1423	0.0037	0.0643	Long-term interest rate
hh_spen	87,846	55.0576	3.9098	44.4457	61.5510	Household spending
Dlycy_renoYES	29,604	0.337				<2 years after renovation
Dlycy_renoNO	58,242	0.663				>2 years after renovation
Dgla_anchorYES	44,793	0.510				>50% of <1.000 sqm units in mall (GLA)
Dgla_anchorNO	43,053	0.490				<50% of <1.000 sqm units in mall (GLA)
Dunit_anchorYES	72,706	0.828				>90% of <1.000 sqm units in mall (#units)
Dunit_anchorNO	15,140	0.172				<90% of <1.000 sqm units in mall (#units)
Dbl_bagfootacc	10,889	0.124				Branch level Bags & Footwear & Accessories
Dbl_culmedtec	3,819	0.043				Branch level Culture & Media & Technology
Dbl_depstolux	379	0.004				Branch level Department Stores & Luxury
Dbl_din	15,580	0.177				Branch level Dining
Dbl_enter	861	0.010				Branch level Entertainment
Dbl_fashapp	30,130	0.343				Branch level Fashion Apparel
Dbl_food	689	0.008				Branch level Food
Dbl_gift	2,489	0.028				Branch level Gifts
Dbl_healbea	10,128	0.115				Branch level Health & Beauty
Dbl_home	3,592	0.041				Branch level Home
Dbl_jewel	4,888	0.056				Branch level Jewellery
Dbl_service	2,137	0.024				Branch level Services
Dbl_sport	2,265	0.026				Branch level Sport

The table shows an average<sup>15</sup> OCR (*LOGocr\_unit*) of █████ during the period 2010 to 2015 for all branches. The highest OCR in this analysis was █████ for an observation in Spain in Q2 2010. The lowest OCR was close to █████ for an observation in France in Q2 2012, as the OCR formula includes the subtraction of incentives. The variable was transformed into a log variable.

To measure the influence of the presence of food & leisure facilities<sup>16</sup> in the shopping centre, a proxy (*LOGfoodleisprox\_sc*) was created of the relative delta of the percentage of food & leisure in terms of GLA in the shopping mall, compared to the average percentage of its peers corrected for country, year quarter and location type. The average relative delta of food & leisure in this analysis for all shopping malls was 1.00, with a maximum of 4.19 for a mall in France and a minimum of 0.052 for a mall in France. The number 1.00 corresponds with meeting the average food & leisure facilities in the shopping mall compared to its peers. The variable was transformed into a log variable.

The used number of GLA (*LOGgla\_unit*) is the size measured per unit for the applicable retailer, including storage the retailer is paying for. The number varies in a widely between branches, as this includes very small units, most likely hand-food or photo booths, and obviously large hypermarkets. The average unit GLA in this analysis was 396.4 sqm. The maximum GLA of a unit in this analysis was 29,082 sqm for a hypermarket unit (food branch). The lowest GLA unit was 1.0 sqm for a photo booth (service branch). The variable was transformed into a log variable.

The variable sales per sqm (*LOGsqmsalesprox\_unit*) is the sales the retailer generates per square metre in their unit. This is calculated by dividing the total number of sales by the GLA of the unit. As this average would correlate with the OCR (denominator is sales), the relative delta of the average productivity is measured as proxy compared to the average productivity corrected for branch, country, year quarter and location type. This ratio indicates the performance of the specific retailer compared to his or her peers. The average relative delta sales per sqm in this analysis was 1.00, with a maximum of 10.91 for a unit in France and a minimum of 0.007 for an observation in France. The number 1.00 corresponds with meeting the average productivity. The variable was transformed into a log variable.

The total number of sales per sqm of the shopping mall (*LOGsqmsales\_sc*) is the total sales of the retailers in the specific mall divided by the total GLA of this mall in the sample. This can be considered as the measure of mall productivity. As the size and importance of the retailer and mall differs, the sales ranges from █████ to █████ per square metre with a mean of █████ for all retailers in all malls in the sample. The variable was transformed into a log variable.

The number of footfall (*LOGfoot\_y*) represent the total number of visitors (x1,000) in the shopping mall in a specific year. This number depends on the size and location of the shopping centre. A jumbo

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<sup>15</sup> This represents the simple mean of the OCR across time and all units and is in no way weighted by the volume of sales, therefore making it incomparable to the average OCR of the portfolio of Unibail-Rodamco.

<sup>16</sup> For measuring the food & leisure facilities in the shopping mall, food stores and hypermarkets (the Food branch) are excluded. The measure only includes parts of the branch classification Dining and the Entertainment branch, as seen in Appendix 2. The split in the Dining branch was made based on whether the food can be consumed directly in the shopping mall.

urban shopping mall in France had the highest yearly footfall (46,030), while a secondary, long distance shopping mall in Sweden had the lowest number of footfall (1,682). The average number of footfall per shopping mall was 15,485 per year. The variable was transformed into a log variable.

Also, the percentage of small size units (SSU) – less than 500 sqm – in terms of minimum guaranteed rent (MGR) was added as a variable (*LOGssu\_mgr*). On average, this was █████ of the whole sample. Small size units typically pay more rent per square metre, while large units contribute in terms of attracting footfall. The height of the percentages differs per lay-out and purpose of the shopping mall. The sample varies from █████ in a secondary suburban centre on minimum, to █████ in a suburban jumbo centre on maximum. The variable was transformed into a log variable.

The years since initial acquisition (*LOGyears\_acq*) give the number of years since the shopping mall was acquired by Unibail-Rodamco. It might be that Unibail-Rodamco acquired more ownership later on; however, the initial acquisition year is included because this represents the start of Unibail-Rodamco's strategy. The average length in the sample is 12.9 years. The minimum is 1, while the maximum is 32 years.

The years since the last renovation (*years\_ren*) were added as this might impact the performance of the shopping mall. As described in the life cycle dummy, the OCR might differ in the initial two years after a renovation. A long time since last renovation might also highlight the need to refurbish the shopping centre. The average length in the sample is 6.5 years. The minimum is 0, while the maximum is 25 years.

Several economic indicators were added to the sample. Share price indices (*LOGperf\_stock*) are calculated as index from the prices of common shares of companies traded on national or foreign stock exchanges. This variable was transformed into a log variable. The labour costs per hour worked (*lc\_hw*) is defined as compensation of employees in the country the retailer is located in divided by total hours worked by employees. This indicator is measured in terms of an index on a quarterly basis (2010 = 100). The *gdp* is measured per capita USD and seasonally adjusted. Note, this variable is inputted as x1,000. Inflation (*cpi\_tot*) is measured as the total CPI in terms of an index on a quarterly basis (2010 = 100). The long-term rate (*LOGlt\_rate*) refers to the government bond rate maturing in ten years of the country the store is located in. This interest indicator is measured in terms of annum percentage per quarter. The variable was transformed into a log variable. Household spending (*hh\_spen*) is the amount of final consumption expenditure made by resident households to meet their everyday needs. It is an essential variable for the economic analysis of demand. This indicator is measured in terms of annual rate.

A dummy variable to measure the life cycle phase of the shopping mall (*Dlycy\_reno*) was added to this research. The units are leased out at a market-rent level while the footfall might need to grow over time and, in turn, retailer turnover. It is not a given, however, that footfall will grow over time and

neither is the fact that, if footfall grows, retailer turnover will follow. This dummy variable includes whether the observation is within two years following renovation of the mall the retailer is located in. The dummy includes observations within two years following renovation (29,681) and of more than two years following renovation (58,344)<sup>17</sup>.

To investigate the influence of anchor tenants on the OCR, two dummy variables were created that can be considered as proxy for anchor tenants. The first dummy (*Dgla\_anchor*) is measured in terms of GLA, whether the percentage of <1,000 sqm units is more (Yes, 44,793) or less (No, 43,053) than 50% in the shopping mall the retailer is located in. This is measured as the percentage of the GLA of <1,000 sqm units compared to the entire GLA of the shopping mall. The other anchor dummy (*Dunit\_anchor*) distinguishes whether more (Yes, 72,706) or less (No, 15,140) than 90% of the absolute number of units consists of units smaller than 1,000 sqm. This is measured as the percentage of the number of units of <1,000 sqm retailers compared to the total number of shops in the shopping mall.

The study includes a dummy variable for the branch the retailer belongs to (*Dbl\_*). An overview of the branch classification, with a more detailed view, is attached in Appendix 3. As described in Chapter Four, the time dummy year quarter was added to the analysis to prevent a cluster effect within every single retailer. This time dummy was not reported in the data description and the analysis, however, because this is too confidential information to disclose by Unibail-Rodamco and does not add to this study.

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<sup>17</sup> In order to calculate the OCR, 12 months of sales information is needed (significant). Hereby, the sample automatically is skewed here. Stores often close for renovation (or sales are deemed as non-valid due to work in the shopping mall). After reopening, a whole year is needed to obtain a significant OCR number.



## 4. Methodology

This analysis focuses on panels with relatively few time periods (small  $T$ ) and many individuals (large  $N$ ). This panel data analysis is subject to the decision of whether to use the FE or RE model. This is done by applying the Hausman test (Hausman, 1978) on both of them. Typically, the RE model has a random nature, while the FE model considers the independent variables to have no random nature (Clarke et al., 2010). The result of the Hausman test was significant from zero and therefore rejected the null hypothesis, which indicates for the FE model to be more suitable. According to Nickell (1981) and Diggle et al. (2002), the FE model eliminates unobserved time-invariant of individual effects. A multivariate regression has been applied on the data. This research was therefore performed with an econometric panel data analysis with FE. The sample includes information with a cross-sectional and longitudinal component. As the number of observations ( $N = 7,647$ ) is relatively large compared to the number of time intervals ( $T = 24$ ), it can be classified as cross-sectional dominant. The panel model controls individual heterogeneity<sup>18</sup>.

In order to enhance the significance of the results, multi-year quarterly data from the past six years (2010 – 2015) were used. Due to the minimal disclosure of confidential tenant sales, the sample before 2010 would be very thin (except for France/Spain). Data for the Czech Republic and Poland only include 2012 – 2015 due to non-availability of tenant sales within the sample in the specific country before this timeframe. The OCR is calculated in this study on a quarterly basis on running 12 months' sales to preclude any strong deviations per month, e.g. due to one-off costs. Since branch type, country, year quarter and shopping mall belong to one retailer (individuals), these variables do not vary over time; as after subtracting the group mean from the variable, it will be equal to zero. To control these cluster effects within the year quarter variable, a time dummy variable was added. Hereby, the cluster effect of the individual retailer was adjusted in the FE analysis by the cluster function. The FE of the country and shopping mall are absorbed in the alpha of the individual retailer. The econometric panel data analysis with FE equation of this research is therefore as follows:

$$\text{LogOCR}_{i,t} = \beta_1 X_{i,t} + \tau_x + \alpha_i + u_{i,t}$$

Here the  $\text{LogOCR}_{i,t}$  is the OCR for the specific retailer  $i$  at time  $t$ .  $X_{i,t}$  represents the independent variable for retailer  $i$  at time  $t$ . Multiple independent variables are used in this research. The  $\tau$  is the dummy variable for the branch to which the information relates to time  $t$ . The  $\beta_1$  represents the influence of the independent variable on the dependent variable. The  $\alpha_i$  is the unknown intercept for each entity. The  $u_{i,t}$  is the error term and describes the unexplained variation of the OCR of retailer  $i$  at time  $t$ . For this research, panel data of individual retailers was used and the OCR data are subject to various mall-specific and economic z-variables, as described in Chapter Three. The regression analysis was performed in STATA.

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<sup>18</sup> The multicollinearity between the variables was checked and no mutual correlation found exceeding 0.7. The sample was checked for heteroscedasticity and the results were made robust by controlling for clustering against any kind of serial correlation and/or heteroscedasticity.

## 5. Analysis

The variables are subject to an analysis separated per branch to research the OCR. This is done because the OCR varies obviously per branch so no aggregate conclusion can be drawn about the determinants of the OCR if this separation is not made. To research the contribution of both the nominator (occupation costs) and denominator (tenant sales) of the OCR separately, the variables found to be significant on the OCR are researched in a second model on both components.

The output of analysis in the first model (table 4, p. 31) shows an adjusted  $R^2$  between 0.17 and 0.54. For the variables found to be significant the separated effects of either the occupation costs (nominator) and tenant sales (denominator) are analysed in the second model. This model (table 5, p. 32-33) shows an adjusted  $R^2$  between 0.12 and 0.55 for the occupation costs analysis and an adjusted  $R^2$  between 0.38 and 0.87 for the tenant sales analysis. The analyses of the first and second model are used interchangeably throughout the description per variable.

### ***Mall-specific variables***

Part of the independent variables are the mall-specific variables derived from the literature framework. The result and effect of the panel data analysis is discussed per mall-specific variable, below.

#### *Food & leisure in the shopping mall (LOGfoodleisprox\_sc)*

The impact of the percentage of food & leisure in the shopping mall was found to be significant in five of the thirteen researched branches. The effect is positive, which results in shopping malls with a higher than average food & leisure percentage to their peer shopping malls having a higher OCR in these five branches. On average, a percentage increase in the relative delta to its peer shopping malls results in a 0.053 percentage increase in OCR. This means that more food & leisure facilities in the shopping mall impact the OCR of individual retailers. This is not what was expected based on the results from previous studies by Babin et al. (1994), Sirpal & Peng (1995) and Donovan et al. (1994). They provided evidence that spending, and so retailer sales, increases as consumers stay longer in a retail environment that includes more food & leisure facilities. Therefore, you would have expected the OCR to go down as the denominator increases.

Looking at the results of model two, however, this expectation remains partly true because the variable has a predominantly positive impact on tenant sales per square metre (apart from the Culture & Media & Technology and Dining branch). As seen in model two, food & leisure facilities also have a significantly positive effect on the occupation costs per square metre. This is a new finding and not supported by the literature yet. The explanation for this effect could be due to the perceived increased attractiveness of the shopping mall that gives the landlord the ability to raise rents, though this is not equal with the growth in tenant sales. It was observed that tenant sales in the Dining branch reduce as greater competition arises with the growth of the relative delta, while in contrast, occupation costs are raised. It is notable that the food & leisure facilities apparently have zero effect on the OCR, or even one of the two components, in the Department Stores & Luxury branch.

#### *GLA of the unit (LOGgla\_unit)*

The impact of the GLA of the unit on the OCR is only found to be significant in the Food and Sport branch. This means that bigger units do not have a significantly different OCR than smaller units. It was observed that two significant branches have an opposite effect on the OCR. The GLA of the unit has a negative (-0.154) effect on the OCR, while the effect in the Sport branch is positive (0.743). This means that the recognisable, large hypermarkets have a significant lower OCR than smaller daily goods stores in the Food branch. This is strengthened by the fact that model two shows a strong negative effect on the occupation costs per square metre (-1.037) and tenant sales per square metre (-0.883) for bigger units in the Food branch. It is assumed that the effect on rent level is caused by the bargaining power just as Anderson (1985) and Gatzlaff et al. (1994) were reporting that in their study about anchor tenants. The effect of this variable shows, as expected, a negative effect on tenant sales per square metre, in this case, for the Sport branch. It is, however, remarkable that the effect is positive on the occupation costs per square metre. This means the occupation costs per square metre are higher when the unit is larger in the Sport branch, which shows no bargaining power for bigger tenants here, and a higher OCR. This could be related to the fact that some branches do not show a huge difference in unit size. It was observed that there is hardly an effect in the Department Stores & Luxury branch on the occupation costs per square metre ( $t=0.25$ ), as most of these stores are equally large and therefore pay roughly the same occupation costs per square metre.

Model two shows that in most of the branches a significant negative effect of the GLA of the unit on the occupation costs per square metre. This is in line with expectations as assumed in the literature framework (Des Rosiers et al. 2009; Mejia & Benjamin, 2002; Lea, 1989; Shun-Te You et al., 2010). An increase of one percentage of GLA of the unit results, on average, in a decrease of -0.482 percentage in occupation costs per square metre. There were no effects observed with a positive effect; however, six branches showed no significant effect. These branches therefore show no lower occupation costs per square metre for larger units than for smaller units. This is opposite to the negative effect of this variable on tenant sales per square metre in all researched branches (no significant effect in the Health & Beauty branch). This means that tenant sales per square metre for larger units are lower, while the occupation costs per square metre do not decline. As mentioned, this does not have a significant effect on the OCR, however.

#### *Productivity of the unit (LOGsqmsalesprox\_unit)*

The impact of the productivity of the unit on the OCR was found to be significant in ten of the thirteen researched branches. It is worth mentioning that the branches Department Stores & Luxury, Entertainment, Entertainment and Food show no significant result. No explanation for this was found, apart from the equal effect on the nominator and denominator in model two. The effect in the other branches is predominantly negative in model one: an increase of one percentage in the relative delta sales per square metre of the retailer results in on average a -0.591 percentage decrease in OCR. This means for retailers who perform better than their peers, their OCR is significantly lower. This stems from the significantly positive effect on tenant sales, while the occupation costs per square

meter shows no significant effect in more than half of the researched branches. This remarkable observation compresses the OCR for retailers who perform better than their peers, while they actually should be able to sustain a higher OCR because their profitability increases through the declining percentage of fixed costs (ten Dam, 2016; Stewart, 2015; Alexander & Muhlebach, 1992). For the landlord, this leads to a strong reversionary potential for retailers in the branches where this effect occurs. No time lag effects in occupation costs were taken into account here<sup>19</sup>. Only the Food branch shows near equal growth in occupation costs (0.107) alongside growth in tenant sales (0.164) by a one percentage growth in productivity performance of the retailer compared to its peers.

#### *Productivity of the shopping mall (LOGsqmsales\_sc)*

The sales per square metre of the shopping mall, the productivity, was found to be significant in three of the researched branches. The effect is apart from the Department Store & Luxury branch (-0.733) positive: an increase of one percentage in productivity of the shopping mall, raises the OCR by 0.050 and 0.061 percentage respectively in the Bags & Footwear & Accessories and Dining branch. The effect of this variable is solely positive on both the occupation costs and tenant sales per square metre in the branches where the variable was found to be significant. This means that these branches benefit in sales performance from a more productive shopping mall. The landlord, however, alongside this, raises occupation costs per square metre because this effect is positive. No academic literature has been found on this topic, but personal communication from the meetings supports this finding. There are, however, branches, as seen in model two, where the occupation costs per square metre were raised, while the tenant sales did not grow due to the increased mall productivity. It is interesting to note that the Department Store & Luxury branch strongly benefited in their sales (0.822) from increased mall productivity, while the occupation costs were not significantly higher. This effect resulted in a declining effect on the OCR of this branch of -0.733 percentage through a one percentage increase in mall productivity. This highlights reversionary potential for the landlord; however, this could also be explained by the bargaining power of such anchor tenants, as explained by Anderson (1985) and Gatzlaff et al. (1994).

#### *Footfall in the shopping mall (LOGfoot\_y)*

Typically, retailers are willing to pay more rent at locations that attract the highest footfall numbers (Nelson, 1958; Eppli & Shilling, 1996). These locations generate higher tenant sales (Eppli & Shilling, 1996). Therefore, it was expected from the literature framework that footfall has a negative effect on the OCR assuming that the rental growth by the landlord was relatively lower than the sales growth due to the increased footfall. As expected, footfall shows a negative effect on the OCR in all five branches found to be significant. On average, an increase of one percentage of footfall results in a decrease of -0,339 percentage in OCR. This is caused by the fact that model two shows a dominant positive significant effect in eight of the researched branches on tenant sales per square metre. On the occupation costs per square metre, only two branches show a positive significant effect. One

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<sup>19</sup> No time lag was taken into account here for the occupation costs per square metre. Sampling the retailers by an autoregressive-moving-average model shows on average of 0.8, however, which means the relative delta is not, as expected, strongly fluctuating over time.

percentage increase in footfall results in an increase of respectively 0.157 and 0.242 percentage increase for the branches Dining and Fashion Apparel. The effects are less than the effects on tenant sales per square metre, however, which results in a negative effect on the OCR. This means that sales grew alongside increasing footfall, while the occupation costs did not. This highlights reversionary potential for the landlord to raise rents in locations with increasing footfall. This also strengthens the need for the landlord to research footfall data. The effect of footfall in the shopping mall is strongest on tenant sales in the entertainment branch. If footfall increases by one percentage, sales in this branch grow by 0.913 percentage. This means that 'extra' visitors, who are not part of the regular visitors, spend strongly in this branch. It is assumed that those visitors specifically come for those leisure facilities (e.g. cinema) and therefore always spend money.

#### *Share of small size units (SSU) (LOGssu\_mgr)*

It is assumed that SSU typically pay more rent per square metre, while large units contribute in terms of attracting footfall. This expectation from the literature framework (Des Rosiers et al., 2009; Shun-Te You et al., 2010; Sirmans & Guirdy, 1993; Eppli & Shilling, 1996) is confirmed by the results of the analysis. The share of SSU units in terms of MGR was found to be significant in two branches (part of the largest branches) as an independent variable of the OCR. This means the OCR is higher in the Bags & Footwear & Accessories and Fashion Apparel branch through a larger share of smaller units. For Bags & Footwear & Accessories (0.191) this effect is caused by the effect on occupation costs per square metre (0.121), while tenant sales per square metre effect is significantly negative (-0.070). The effect on Fashion Apparel (0.100) is caused by the positive effect on the occupation costs per square metre (0.140), while the effect on tenant sales per square metre is smaller (0.040). The reason for this could be that retailers within the fashion branch typically have smaller units and pay more rent per square metre, while tenant sales per square metre are more similar across unit sizes.

Model two particularly shows a significant, dominant positive effect on the occupation costs per square metre in five branches and confirms the contribution in occupation costs per square metre by a larger amount of SSU. The second model shows also six significant branches with a predominantly positive effect on tenant sales per square metre. Only the Bags & Footwear & Accessories branch shows a negative effect with a larger share of small size units.

**Table 4** Model one: panel data analysis with fixed effects by branch

Variable	Bags & Footwear & Accessories	Culture & Media & Technology	Department Stores & Luxury	Dining	Entertainment	Fashion apparel	Food	Gifts	Health & Beauty	Home	Jewellery	Services	Sport
LOGfoodleisprox_sc	0.034* (2.30)	0.068** (3.09)	-0.000 (0.00)	0.091** (4.49)	0.302 (0.77)	0.025* (2.37)	-0.006 (0.22)	-0.004 (0.23)	0.049** (2.77)	-0.003 (0.14)	0.033 (1.56)	0.063 (1.59)	0.004 (0.11)
LOGgla_unit	0.014 (0.06)	-0.131 (1.04)	-1.145 (1.19)	-0.144 (1.08)	-8.623 (1.30)	-0.166 (1.67)	-0.154** (3.17)	0.591 (1.76)	0.094 (0.62)	0.356 (1.47)	-0.251 (1.23)	-0.165 (0.84)	0.743** (3.15)
LOGsqmsalesprox_unit	-0.805** (27.09)	-0.417** (5.08)	-0.236 (1.61)	-0.544** (15.65)	-0.199 (0.87)	-0.842** (44.05)	-0.057 (0.99)	-0.528** (8.06)	-0.626** (11.72)	-0.586** (8.16)	-0.666** (14.54)	-0.532** (6.15)	-0.360** (6.55)
LOGsqmsales_sc	0.050** (3.19)	0.066 (1.92)	-0.733* (2.53)	0.061** (3.07)	-0.329 (0.68)	0.024 (1.77)	0.100 (1.11)	0.052 (1.44)	0.027 (1.22)	0.020 (0.50)	0.031 (1.11)	-0.028 (1.07)	-0.021 (0.57)
LOGfoot_y	-0.170* (2.54)	0.025 (0.15)	0.278 (0.35)	-0.124 (1.96)	-1.188 (1.20)	-0.030 (0.72)	0.011 (0.07)	-0.383** (3.06)	-0.031 (0.43)	-0.613** (3.73)	-0.219* (2.24)	0.011 (0.06)	-0.311* (2.03)
LOGssu_mgr	0.191** (4.17)	0.021 (0.30)	-0.489 (1.35)	-0.007 (0.15)	-0.203 (0.35)	0.100** (2.88)	-0.087 (0.89)	0.136 (1.18)	0.060 (0.89)	-0.226 (1.95)	0.068 (0.97)	0.064 (0.58)	0.139 (1.42)
LOGyears_acq	0.042 (1.56)	0.134* (2.35)	0.163 (0.74)	0.037 (1.39)	-0.133 (0.57)	0.057** (3.06)	-0.209 (1.62)	0.113* (2.17)	0.063 (1.59)	0.068 (0.90)	-0.053 (0.97)	0.194 (1.44)	0.092 (1.73)
years_ren	-0.002 (1.75)	0.004 (1.28)	0.016 (1.16)	-0.004** (2.72)	0.027 (1.39)	-0.003** (3.60)	0.006 (1.79)	0.007* (2.40)	-0.001 (1.02)	-0.009* (2.15)	-0.008** (3.25)	-0.001 (0.33)	0.001 (0.34)
LOGperf_stock	-0.092 (1.89)	0.008 (0.06)	-0.286 (0.57)	0.064 (1.16)	0.239 (0.48)	0.016 (0.39)	-0.262 (1.62)	0.041 (0.41)	0.030 (0.50)	0.077 (0.44)	0.217 (1.94)	0.415* (2.56)	-0.045 (0.32)
lc_hw	-0.004 (0.96)	0.013 (1.12)	-0.030 (1.11)	-0.002 (0.46)	-0.064 (1.19)	0.003 (1.41)	-0.038** (3.73)	0.010 (1.39)	-0.004 (1.35)	-0.002 (0.30)	-0.002 (0.29)	-0.043** (4.32)	-0.000 (0.04)
gdp	-0.023 (1.92)	0.006 (0.33)	-0.041 (0.74)	0.008 (0.82)	0.092 (1.14)	0.019* (2.51)	0.024 (1.01)	0.064* (2.27)	0.033* (2.46)	-0.023 (1.06)	-0.002 (0.14)	0.088** (4.30)	0.038* (2.16)
cpi_tot	0.026** (5.01)	0.022 (1.09)	0.013 (0.35)	0.030** (4.50)	0.030 (0.75)	0.018** (3.83)	-0.017 (1.23)	0.042** (3.34)	0.042** (6.08)	0.013 (0.83)	0.032** (3.27)	0.032* (2.57)	0.003 (0.33)
LOGit_rate	0.056** (3.30)	0.012 (0.18)	-0.259 (1.80)	0.053** (2.89)	0.086 (0.47)	0.061** (5.83)	-0.017 (0.42)	0.038 (0.93)	0.043* (2.31)	0.063 (1.85)	0.167** (4.27)	0.163** (3.61)	0.013 (0.39)
hh_spen	-0.012 (1.08)	0.015 (0.55)	-0.035 (0.36)	-0.016 (1.48)	0.253 (1.72)	0.013* (2.00)	-0.073* (2.20)	0.101** (4.94)	-0.020 (1.52)	0.031 (1.08)	0.023 (1.42)	0.010 (0.32)	-0.006 (0.23)
Dlycy_renoYES	-0.003 (0.27)	0.089** (2.87)	0.202 (1.55)	0.001 (0.13)	0.165 (1.06)	-0.008 (1.19)	0.020 (0.54)	0.085** (2.83)	0.024* (2.25)	-0.040 (1.90)	-0.073** (3.64)	0.073* (2.03)	0.049 (1.85)
Dgla_anchorYES	-0.033** (2.81)	-0.015 (0.93)	0.057 (1.14)	0.006 (0.59)	0.121 (1.20)	-0.024** (2.73)	-0.078 (1.29)	0.022 (0.98)	-0.019 (1.31)	-0.002 (0.10)	-0.042 (1.78)	-0.023 (0.61)	0.006 (0.31)
Dunit_anchorYES	0.047** (3.68)	0.041* (2.10)	-0.349 (0.35)	0.001 (0.07)	-0.023 (0.09)	-0.003 (0.24)	-0.153* (2.31)	0.056 (1.43)	0.054** (3.30)	0.027 (1.14)	0.082** (4.27)	-0.003 (0.07)	-0.034 (0.95)
Number of obs	10.889	3.819	379	15.580	861	30.130	689	2.489	10.128	3.592	4.888	2.137	2.265
R-squared	0,45	0,30	0,54	0,18	0,17	0,49	0,25	0,39	0,35	0,25	0,46	0,37	0,30

**Table 5a** Model two: panel data analysis with fixed effects by branch on numerator (occupation costs) and denominator (sales) separated

Variable	Bags & Footwear & Accessories		Culture & Media & Technology		Department Stores & Luxury		Dining		Entertainment		Fashion apparel	
	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm
LOGfoodleisprox_sc	0.056** (3.79)	0.022** (4.83)	0.045 (1.97)	-0.024* (2.56)	0.022 (0.19)	0.022 (0.37)	0.059** (3.44)	-0.033** (4.62)	0.406 (1.00)	0.105 (1.68)	0.040** (4.22)	0.015** (5.18)
LOGgla_unit	-0.236 (0.77)	-0.250* (2.09)	-0.548** (4.14)	-0.416** (4.09)	0.215 (0.25)	-0.930** (7.05)	-0.411* (2.27)	-0.267** (4.61)	7.707 (1.13)	-0.916* (2.23)	-0.270* (2.10)	-0.104** (2.59)
LOGsqmsalesprox_unit	0.015 (0.58)	0.820** (45.57)	-0.014 (0.39)	0.403** (5.07)	0.041 (0.44)	0.277** (3.10)	0.144** (4.02)	0.688** (33.57)	0.003 (0.01)	0.202* (2.52)	0.070** (4.46)	0.912** (91.07)
LOGsqmsales_sc	0.054** (3.75)	0.005 (0.60)	0.052* (2.06)	-0.014 (0.62)	0.088 (0.72)	0.822** (4.34)	0.034 (1.78)	-0.028** (2.69)	-0.091 (0.17)	0.238** (2.96)	0.052** (4.64)	0.028** (5.20)
LOGfoot_y	0.083 (1.34)	0.253** (7.12)	0.208 (1.45)	0.183* (2.10)	-0.023 (0.03)	-0.300 (0.92)	0.157** (2.75)	0.281** (7.48)	-0.275 (0.26)	0.913** (4.14)	0.242** (6.58)	0.273** (13.06)
LOGssu_mgr	0.121** (2.86)	-0.070** (2.94)	0.081 (1.56)	0.059 (1.14)	-0.005 (0.04)	0.484 (1.67)	0.081* (2.03)	0.088** (4.18)	0.018 (0.03)	0.222 (1.54)	0.140** (5.77)	0.040* (2.02)
LOGyears_acq	0.078** (3.31)	0.036** (2.70)	0.059 (1.12)	-0.075* (1.99)	0.237 (1.30)	0.074 (0.59)	0.046 (1.91)	0.009 (0.70)	-0.341 (1.37)	-0.207** (3.43)	0.063** (3.68)	0.006 (0.73)
years_ren	-0.001 (0.53)	0.001* (2.25)	0.000 (0.16)	-0.004* (2.09)	0.008 (0.82)	-0.009 (1.49)	-0.002 (1.33)	0.002** (3.15)	0.014 (0.72)	-0.013* (2.03)	0.000 (0.62)	0.004** (13.55)
LOGperf_stock	0.122** (2.82)	0.214** (7.02)	0.043 (0.36)	0.035 (0.29)	0.053 (0.17)	0.338 (1.25)	-0.015 (0.32)	-0.079* (2.56)	0.206 (0.57)	-0.032 (0.12)	0.080** (2.59)	0.064** (3.14)
lc_hw	-0.005 (1.39)	-0.001 (0.56)	-0.004 (0.37)	-0.016** (2.96)	-0.017 (1.04)	0.013 (0.84)	-0.000 (0.01)	0.002 (0.63)	-0.060 (1.11)	0.004 (0.32)	-0.002 (1.10)	-0.006** (5.11)
gdp	0.003 (0.37)	0.026** (5.38)	0.035* (2.05)	0.029** (3.43)	0.033 (0.99)	0.074* (2.11)	0.027** (3.28)	0.019** (5.70)	0.131 (1.70)	0.039* (2.03)	0.026** (4.51)	0.007** (2.94)
cpi_tot	0.010* (2.17)	-0.016** (5.37)	0.000 (0.00)	-0.022 (1.75)	0.024 (0.87)	0.012 (0.83)	0.006 (1.13)	-0.023** (5.89)	0.011 (0.34)	-0.019 (1.08)	0.012** (3.61)	-0.006* (2.41)
LOGlt_rate	0.048** (3.46)	-0.008 (0.86)	0.008 (0.14)	-0.003 (0.13)	-0.222 (1.81)	0.037 (0.66)	0.009 (0.55)	-0.044** (5.52)	0.041 (0.24)	-0.046 (0.62)	0.049** (5.82)	-0.013** (2.63)
hh_spen	-0.034** (3.47)	-0.023** (4.63)	0.018 (0.76)	0.003 (0.21)	-0.038 (0.50)	-0.002 (0.05)	0.021* (2.02)	0.037** (6.16)	0.217 (1.46)	-0.036 (1.10)	-0.009 (1.65)	-0.022** (8.59)
Dlcy_renoYES	-0.018 (1.87)	-0.016** (2.73)	0.019 (0.74)	-0.070** (3.87)	0.099 (1.21)	-0.103 (1.55)	0.003 (0.35)	0.002 (0.37)	0.148 (0.94)	-0.017 (0.61)	-0.011 (1.87)	-0.003 (1.34)
Dgla_anchorYES	-0.012 (1.11)	0.021** (4.20)	-0.007 (0.43)	0.008 (0.66)	-0.003 (0.06)	-0.060 (2.00)	0.000 (0.02)	-0.006 (1.31)	0.105 (1.04)	-0.015 (0.65)	-0.010 (1.31)	0.014** (4.08)
Dunit_anchorYES	0.016 (1.45)	-0.030** (3.11)	0.024 (0.96)	-0.017 (0.81)	-0.069 (0.08)	0.280 (2.02)	0.035 (1.89)	0.033** (4.22)	-0.093 (0.38)	-0.070 (1.41)	0.000 (0.05)	0.003 (0.51)
Number of obs	10.889	10.889	3.819	3.819	379	379	15.580	15.580	861	861	30.130	30.130
R-squared	0,21	0,79	0,16	0,41	0,25	0,80	0,15	0,67	0,14	0,38	0,22	0,87

**Table 5b** Model two: panel data analysis with fixed effects by branch on numerator (occupation costs) and denominator (sales) separated

Variable	Food		Gifts		Health & Beauty		Home		Jewellery		Services		Sport	
	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm	Occupation costs/sqm	Tenants' sales/sqm
LOGfoodleisprox_sc	0.021 (0.70)	0.027 (1.49)	0.021 (1.30)	0.025* (2.52)	0.048** (3.00)	-0.001 (0.14)	0.010 (0.65)	0.013 (0.94)	0.026 (1.33)	-0.007 (1.02)	0.083* (2.56)	0.020 (1.27)	0.056 (1.79)	0.052** (3.26)
LOGgla_unit	-1.037** (22.27)	-0.883** (21.20)	0.217 (0.73)	-0.374** (3.64)	0.032 (0.39)	-0.062 (0.46)	-0.122 (0.59)	-0.478** (5.48)	-0.593** (4.16)	-0.342** (3.10)	-0.772** (2.77)	-0.607** (5.71)	0.260** (4.74)	-0.483* (2.26)
LOGsqmsalesprox_unit	0.107* (2.19)	0.164* (2.49)	-0.030 (0.65)	0.497** (13.67)	0.112** (3.84)	0.738** (19.71)	-0.071 (0.65)	0.514** (7.35)	0.094** (3.22)	0.760** (21.51)	-0.076 (1.50)	0.456** (7.74)	0.120** (3.60)	0.480** (8.49)
LOGsqmsales_sc	0.146 (1.32)	0.046 (1.35)	0.057 (1.95)	0.005 (0.24)	0.024 (1.43)	-0.003 (0.19)	0.029 (1.06)	0.008 (0.28)	-0.001 (0.07)	-0.033 (1.89)	0.042* (2.01)	0.070** (3.19)	0.071** (2.92)	0.092** (3.51)
LOGfoot_y	0.114 (0.67)	0.104 (0.92)	-0.020 (0.21)	0.363** (4.71)	0.064 (1.07)	0.095 (1.89)	-0.177 (1.29)	0.436** (4.84)	0.071 (0.86)	0.290** (4.32)	0.191 (1.77)	0.180 (1.33)	-0.162 (1.08)	0.149 (1.49)
LOGssu_mgr	0.112 (0.98)	0.199** (2.69)	0.082 (0.76)	-0.054 (0.85)	0.142** (2.82)	0.082* (1.97)	-0.008 (0.08)	0.219** (4.07)	0.032 (0.58)	-0.036 (0.70)	0.157* (2.41)	0.093 (1.08)	0.159* (2.38)	0.020 (0.22)
LOGyears_acq	-0.114 (1.73)	0.095 (0.82)	0.153** (3.64)	0.040 (1.17)	0.074* (2.34)	0.011 (0.55)	0.102 (1.62)	0.034 (0.85)	0.079* (2.19)	0.133** (3.67)	0.046 (0.59)	-0.148 (1.61)	0.206** (4.94)	0.114* (2.17)
years_ren	0.008* (2.20)	0.002 (0.76)	0.001 (0.76)	-0.005** (2.65)	-0.001 (0.88)	0.000 (0.44)	-0.004 (1.18)	0.004* (2.43)	-0.004 (1.74)	0.005** (4.07)	-0.002 (0.91)	-0.001 (0.48)	-0.000 (0.03)	-0.001 (0.41)
LOGperf_stock	-0.195 (1.10)	0.067 (0.51)	0.116 (1.39)	0.075 (1.19)	0.038 (0.83)	0.008 (0.14)	0.219 (1.76)	0.143 (1.25)	-0.099 (0.95)	-0.316** (4.50)	0.205 (1.82)	-0.210 (1.80)	0.206 (1.73)	0.252* (2.43)
lc_hw	-0.023* (2.06)	0.015 (1.80)	0.002 (0.33)	-0.008 (1.46)	-0.005 (1.58)	-0.000 (0.06)	-0.005 (0.88)	-0.003 (0.61)	-0.005 (0.97)	-0.003 (0.58)	-0.002 (0.25)	0.041** (5.25)	-0.000 (0.02)	0.000 (0.03)
gdp	0.033 (1.26)	0.009 (0.46)	0.037* (2.09)	-0.027 (1.79)	0.028** (2.61)	-0.005 (1.04)	0.037 (1.95)	0.060** (5.01)	0.022 (1.64)	0.024** (2.72)	0.052** (3.35)	-0.035* (2.36)	0.033** (2.69)	-0.006 (0.53)
cpi_tot	-0.017 (1.18)	-0.000 (0.00)	0.024** (2.75)	-0.019** (2.82)	0.018** (3.75)	-0.024** (5.80)	0.019* (2.03)	0.006 (0.53)	0.007 (0.90)	-0.024** (4.60)	0.028* (2.54)	-0.005 (0.51)	0.018* (2.30)	0.015 (1.96)
LOGlt_rate	0.025 (0.67)	0.042 (1.23)	0.062 (1.69)	0.024 (1.16)	0.020 (1.46)	-0.023 (1.63)	0.045 (1.53)	-0.019 (0.93)	0.024 (0.66)	-0.143** (5.62)	0.118** (3.11)	-0.045 (1.76)	0.053* (2.20)	0.040 (1.58)
hh_spen	0.003 (0.07)	0.076** (3.47)	0.016 (0.97)	-0.085** (5.96)	0.006 (0.57)	0.026** (3.40)	0.019 (0.76)	-0.012 (0.89)	-0.034** (2.63)	-0.057** (4.88)	-0.012 (0.45)	-0.022 (1.22)	-0.010 (0.62)	-0.005 (0.21)
Dlycy_renoYES	0.012 (0.41)	-0.008 (0.32)	0.021 (1.00)	-0.065** (3.88)	0.001 (0.15)	-0.023** (3.17)	-0.013 (0.72)	0.027 (1.78)	-0.055** (3.19)	0.018* (2.06)	-0.020 (0.73)	-0.092** (3.81)	0.013 (0.70)	-0.036 (1.44)
Dgla_anchorYES	-0.065 (0.93)	0.013 (0.83)	0.023 (1.10)	0.001 (0.08)	-0.003 (0.26)	0.015* (2.02)	0.037 (1.22)	0.039 (1.86)	0.009 (0.52)	0.051** (3.70)	-0.001 (0.04)	0.022 (0.98)	-0.017 (1.07)	-0.023 (1.48)
Dunit_anchorYES	-0.164* (2.54)	-0.011 (0.45)	0.045 (1.61)	-0.012 (0.40)	0.017 (1.22)	-0.036** (3.77)	0.042 (1.22)	0.016 (0.56)	0.020 (1.32)	-0.063** (6.12)	-0.019 (0.64)	-0.016 (0.58)	-0.086** (2.98)	-0.052 (1.97)
Number of obs	689	689	2.489	2.489	10.128	10.128	3.592	3.592	4.888	4.888	2.137	2.137	2.265	2.265
R-squared	0,55	0,78	0,16	0,58	0,23	0,70	0,12	0,52	0,21	0,74	0,29	0,51	0,22	0,46



#### *Years since initial acquisition (LOGyears\_acq)*

The amount of years since the initial acquisition was found to be significant in the first model in three of the researched branches (typically high margin branches), namely Culture & Media & Technology, Fashion Apparel and Gifts. The effect is positive: an increase of one percentage in the years since acquisition leads to respectively a 0.134, 0.057 and 0.113 percentage increase in OCR. No literature was found for this variable, but an increase was expected as Unibail-Rodamco has its strategy to create net rental income (NRI) growth through retensing, remarketing and repositioning. Also, success of retail units does pop up in the length of time. When looking at the second model, the effect in the Culture & Media & Technology branch was only found to be significant with a negative effect on the tenant sales per square metre. The Fashion Apparel and Gift branches showed a significant increase in occupation costs per square metre, while the tenant sales per square metre showed no significant effect. This strengthens the assumption that the landlord optimally raises the rental level and increases the OCR while tenant sales per square metre remain the same. The effect on the OCR is nearly one-to-one, caused by the significant increase in occupation costs per square metre in both branches. This is again explained by the value creation strategy of Unibail-Rodamco on rent levels and constant improvements to the retail mix on tenant sales. The entertainment branch is the only one that shows a negative effect (-0.208) on tenant sales per square metre in the second model by an increase of one percentage in the years since acquisition. No explanation was found for this deviating trend in tenant sales per square metre.

#### *Years since last renovation (years\_ren)*

Renovation of the shopping mall is crucial because age has a negative effect on the quality and value of the asset (Sirmans & Guirdy, 1993; Des Rosiers et al., 2009; Mejia & Benjamin, 2002). In contrast, Tay et al. (1999) actually identify a positive correlation between age and rent level due to customer fidelity. Neither assumption was supported by the results of the analysis in model two. The explanation for this could be that the effect is diminished as it is only within two years after renovation with no effect by age. The effect on tenant sales per square metre was rather diffuse (on average -0.00075). The Food branch was the only branch with a significant effect (0.008) on the occupation costs per square metre with more years since the last renovation. This is explained by the fact that hypermarkets seem to have constant sales over time, while occupation costs increase over time, although this has no significant effect on the OCR of the Food branch<sup>20</sup>. The effect in the significant branches in model one (on average -0.0034), is caused by the positive effect of this variable on tenant sales per square metre, while there is no significant effect on occupation costs per square metre. These effects result in a predominantly negative effect on the OCR in model one in the five branches found to be significant. This means that the nearer in time the renovation took place, the higher the OCR. This is in line with expectations assumed from the literature framework (Sirmans & Guirdy, 1993; Des Rosiers et al., 2009; Mejia & Benjamin, 2002; Reikli, 2012; ten Dam, 2016) and consistent with the results of the life cycle variable (*Dlycy\_reno*). The Gift branch was the only one out of the five significant branches in model one to show a positive effect (0.007) with years since last renovation.

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<sup>20</sup> No distinction is made for hypermarkets within the food branch.

#### *Life cycle of the shopping mall (Dlycy\_reno)*

As expected from the literature framework, the life cycle of the shopping centre impacts the level of OCR (Reikli, 2012; ten Dam, 2016). It is assumed that the OCR is higher in the first two years after renovation. This is due to the fact that footfall, and therefore sales, tend to grow over time, while units are leased out at market level. The analysis shows a positive, significant difference between the dummy <2 years after renovation compared with >2 years after renovation in the branches of Culture & Media & Technology (0.089 percentage higher within the first 2 years), Gifts (0.085) and Health & Beauty (0.024). The Jewellery branch was the only branch where the life cycle <2 years was found to be significant, with a negative effect (-0.073 percentage lower within first 2 years). This is caused by the significant effect on tenant sales per square metre (0.018) and occupation costs per square metre (-0.055). This was the only branch with a positive effect within the first two years after renovation. Other branches showed, as expected, a negative effect on tenant sales within the first two years. This confirms the assumption from the literature framework (Reikli, 2012) that tenant sales are lower for a retailer shortly after renovation, as the success of shopping centres over the length of time due to consumer fidelity. Apart from the Jewellery branch, no significant effects were found on occupation costs per square metre, while the effects on tenant sales were predominantly negative.

#### *Anchor tenant (Dgla\_anchor - Dunit\_anchor)*

As expected from the literature framework, the presence of anchor tenants contributes positively to the attractiveness of a shopping mall (Sirmans & Guirdy, 1993; Eppli & Shilling, 1996). Such advantages allow anchor tenants to negotiate lower rents with landlords (Anderson, 1985). Therefore, it should be expected that shopping malls with relatively more units, smaller than 1.000 sqm, pay higher rents. In terms of units, this was not confirmed because the effect was negative on occupation costs per square metre in the branches of Food (-0.164 percentage lower than less than 90%) and Sport (-0.086 percentage lower). The effect on tenant sales per square metre was rather negative, however. The branches found to be significant showed a positive effect on the OCR by a larger share than 90% of <1.000 sqm units. Although the effect on occupation costs per square metre in model two is not significant, this could probably be explained by the fact that smaller units contribute more in paying rents (as explained in the SSU variable). It can be concluded that this proxy is not a variable that measures the effect of anchor tenants.

In terms of GLA, shopping malls with more than 50% of <1.000 sqm units show a negative effect on the OCR for only the branches Bags & Footwear & Accessories (-0.033 percentage lower than in less than 50%) and Fashion Apparel (-0.024 lower). This is the result of the positive, significant effect on tenant sales per square metre in these branches (resp. 0.021 and 0.014 percentage higher). Next to these two branches, the effect of this variable was also found to be positively significant in model two, in the Health & Beauty branch (0.015 percentage higher), while there was no significant effect in model one for this branch. It can be concluded that this proxy is not a variable that measures the effect of anchor tenants, but shopping malls with more than 50% <1.000 sqm units in terms of GLA seem to have a lower OCR for some branches.

### ***Economic variables***

One part of the independent variables is the economic variables derived from the literature framework. The result and effect of the panel data analysis is discussed per economic variable below:

#### *Performance of the stock market (LOGperf\_stock)*

The effect of the performance of the stock market in model one on the OCR was only found to be significant in the Services branch. If the index of the stock market grows by one percentage, the OCR in this branch grows by 0.415 percentage. Despite this, there was no significant effect found on occupation costs or tenant sales per square metre for this branch.

The second model shows a positive effect on the occupation costs per square metre in the two branches found to be significant. This is in line with expectations from the literature framework (Des Rosiers et al., 2009; Chung, 2004). The effect on tenant sales per square metre is rather diffuse. It is interesting to observe that the Dining (-0.079) and Jewellery (-0.316) branch show a negative effect due to the performance of the stock market on tenants' sales per square metre. This is not in line with the rational expectation. It is expected that customers would spend more on secondary goods if they earn more on the stock market. As seen in model two, it seems that the Bags & Footwear & Accessories, Fashion Apparel and Sport branches benefit from the improved performance of the stock market. These effects are not strong enough, however, to cause a significant effect on the OCR in model one.

#### *Labour costs (lc\_hw)*

The result of the analysis in model one shows a negative effect by the index of hourly labour costs on the OCR in the branches of Food (-0.038) and Services (-0.043). This is consistent with what was expected from the literature (van Duijn et al., 2015), although only two branches show this significant effect. The explanation for the negative effect lies in the fact that if labour costs rise, wage and salary costs in the P&L account of a retailer grows (ten Dam, 2016; van Duijn et al., 2015). This should have a direct effect on the ability of the retailer to pay their occupation costs. Therefore, if the index of hourly labour costs rises, the OCR lowers, as seen in model one.

In the second model, this variable shows a negative effect on tenant sales per square metre in the Culture & Media & Technology (-0.017) and Fashion Apparel (-0.006) branches, while the effect is positive in the Services branch (0.041). The Food branch is the only branch with a significant effect on occupation costs per square metre due to the labour costs. This effect is negative (-0.022) and directly affects the OCR in the same negative direction (-0.038).

#### *Gross domestic product (gdp)*

As expected from the literature framework (Chung, 2004; D'Arcy et al., 1997; Hetherington, 1998; Key et al., 1994), model two shows a dominant, positive effect on both occupation costs and tenant sales per square metre. The effect on occupation costs per square metre is, on average, 0.034, while the

effect on tenant sales per square metre is, on average, 0.027. The Services branch is the only branch that shows a negative effect on tenant sales per square metre. No explanation was found for this deviating trend in the effect on tenant sales per square metre. The effects in model two are dominated by the effect on occupation costs per square metre because the effect of the gross domestic product on the OCR is positive.

#### *Inflation rate (cpi\_tot)*

As seen in the analysis in model one, the inflation rate has a roughly constant positive effect on the OCR across the seven branches found to be significant (on average 0.032). What is interesting to observe is that the interest rate in model two is predominantly positive in all branches found to have a significant effect on occupation costs per square metre. This is consistent with what was expected based on the literature on the rental level (Chung, 2004; D'Arcy et al., 1997; Des Rosiers et al., 2009; Key et al., 1994; Sirmans & Guidry, 1993). The effect of the inflation rate is, however, predominantly negative in all branches where the inflation rate was found to be significant on tenant sales per square metre. These effects could be explained by the fact that occupation costs are indexed every year by the landlord, while tenant sales seem to suffer from a growth in inflation rate. This was not expected as the indexation is linked to the inflation, which is basically the increase of prices of goods and services. Therefore, it is interesting to see that retailers do not seem to index the goods and services they have sold (enough), while the landlord makes a guaranteed indexation on the occupation costs. Both the effects of the inflation rate on each of the components of the OCR result in a predominantly positive effect in the significant branches on the OCR. This is due to the growth in the nominator, while the denominator declines according to the growth of the inflation rate index.

#### *Interest rate (LOGIt\_rate)*

As seen in model one, the long-term interest rate has a positive effect on the OCR in six of the researched branches. This means, when the long-term rate grows by one percentage, the OCR increases by on average 0.091 percentage in the branches found to be significant. This is consistent with expectations based on the literature on occupation costs (D'Arcy, 1997; Hetherington, 1988; Key et al., 1994). What is interesting to observe in model two is that the interest rate shows a predominantly positive effect (average 0.067) on occupation costs per square metre, while the effect on tenant sales per square metre is negative (-0.061) in the branches found to be significant. For both the positive and negative effects, this means one percentage change in the interest rate results in the named change in terms of percentage. These effects in model two explain the predominantly positive effect of the interest rate on the OCR because either occupation costs per square metre grow or tenant sales per square metre decline by this variable.

#### *Household spending (hh\_spen)*

The effect of household spending in model one was found to be significant in the branches of Fashion Apparel (0.013), Food (-0.073) and Gifts (0.101). Apart from the Food branch, this shows a positive effect of household spending on the OCR. A closer look at model two shows a negative effect in the

Bags & Footwear & Accessories (-0.034) and Jewellery (-0.035) branches on occupation costs per square metre, while the Dining branch (0.021) shows a positive effect on occupation costs per square metre. These findings do not support the assumption from the literature framework that household spending has a positive effect on occupation costs (Des Rosiers et al., 2009; Sirmans & Guidry, 1993). The effect on tenant sales is diffuse, three branches show a positive effect and four a negative effect of the household spending. The diffuse effect of the household spending on tenant sales cannot be explained, while D'Arcy et al. (1997) stated a positive effect of household spending on tenant sales. It was observed that an increase in household spending tends to increase sales in the Food and Dining branch. This could be related to the fact that consumers tend to spend more money on secondary goods.

### **Country differences**

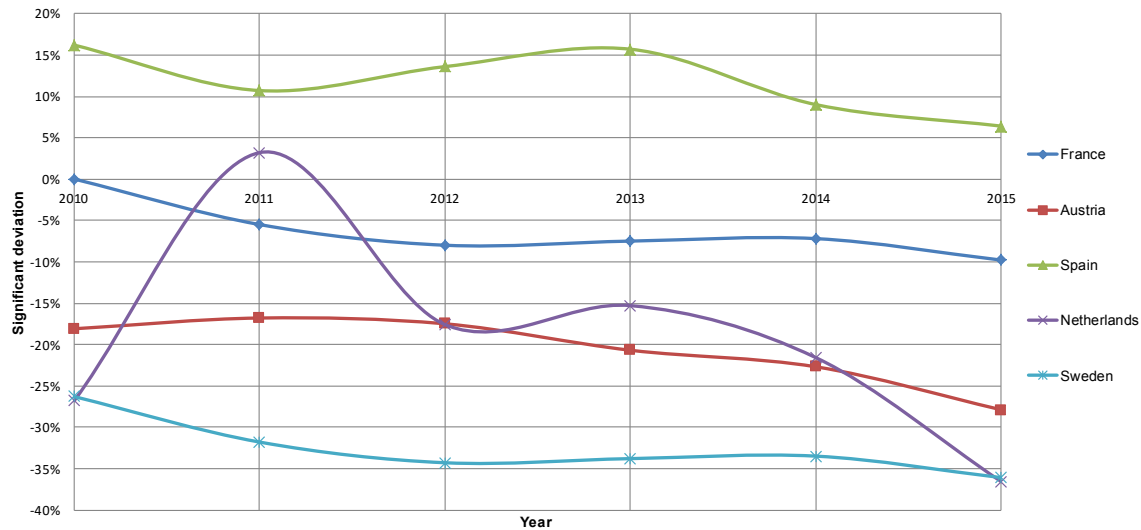
In addition to the motivation and purpose of this study, country differences in OCR are researched and preliminary explained as this contributes to the understanding of the OCR. To examine these effects, a pooled OLS regression was used to include country fixed effects and their time variations (interaction country \* year) in order to produce yearly change of average OCR. This to understand the existence of structural differences across various European countries. The initial panel data model, as described in Chapter Four, did not fit this purpose as time invariant variables were omitted by the FE model. The countries used for this additional research are Austria, Spain, France, the Netherlands and Sweden. Czech Republic and Poland were excluded as no data was available for 2010 and 2011 of both countries in the data set. In addition to the country and year dummies, the pooled OLS model is controlled for clustering in individuals and shopping mall.

As base observation for this additional study France (country) in 2010 (year) was used. Below table 6 and graph 1 show the differences per country (apart from France) compared to the year of observation of France. The percentage of change is measured as the sum of the coefficient of country dummy, coefficient of year dummy and coefficient of the interaction country\*year. For France, the yearly change in OCR represents the change compared to the observation of France in 2010 (coefficient of year dummy). Appendix 6 show the significant results of this model.

Table 6 **Country differences in OCR compared to France 2010**

	2010	2011	2012	2013	2014	2015
France	0,0%	-5,5%	-8,0%	-7,5%	-7,2%	-9,8%
Austria	-18,1%	-16,8%	-17,5%	-20,7%	-22,7%	-27,9%
Spain	16,2%	10,7%	13,6%	15,7%	9,0%	6,4%
Netherlands	-26,8%	3,2%	-17,6%	-15,3%	-21,6%	-36,6%
Sweden	-26,3%	-31,8%	-34,3%	-33,8%	-33,5%	-36,1%

Graph 1 Country differences in OCR compared to France 2010



As seen in the results above, the countries do significantly differ from each other compared to France. In general, the OCR has decreased over time for all the five researched countries within the timeframe. The results highlight a significant difference between Sweden (on average -32.6%), Austria (on average -20.6%) and Spain (on average +11.9%) compared to yearly observations in France. As the contractual agreed housing costs are usually fixed for a longer period, it is assumed that the tenants' sales have increased over the recent years which compresses the OCR. It is assumed that this is related to the increased macro economy and so the household spending by improved consumer confidence.

What stands out in the graph is that the Netherlands has a very different and fluctuating pattern compared to the other countries. This is explained by the fact that it is not market standard in the Netherlands to share turnover figures by the tenants. As the Netherlands only has a limited number of observations, the effect of single retailers reporting sales converts the stability under pressure and explains the fluctuating pattern. Therefore, no conclusion can be drawn about the Netherlands. The results for the other countries show a significantly higher OCR in Spain compared to France. The OCR in Austria and Sweden are significantly lower than in France.

The literature names some fundamental explanations for this caused by institutional differences. OCRs are typically lower in northern and western European markets compared to central and southern Europe. Regarding the literature (Braam-Mesken, 2015; van Duijn, 2015), these differences are largely caused by varying legal structures between countries. This is especially the case in markets where labour costs are higher and thus make up a greater proportion in tenants' total cost, which makes the acceptable OCR lower. Typically, France and Sweden have higher labour costs compared then in this case Spain (Eurostat, 2016), as seen in the graph. This is consistent with the results of model one in Chapter Five, which showed a negative effect on the OCR by a higher labour costs. More indirectly, factors that could impact OCR levels are lease structures and planning policies. For example, if planning and zoning policies are very strict in a market and new retail developments are limited, then retailers' sales are more protected and the OCR tends to be more stable (Braam-Mesken, 2015).

# 6. Conclusion & discussion

In this thesis the determinants of the Occupancy Cost Ratio (OCR) are analysed across retail branches. First, it is evaluated what the effects of the determinants are per each of the thirteen researched branches. Second, it is explored whether the effect of the variable on the occupation costs (numerator of OCR) or tenant's sales (denominator) is the driving factor causing this significant effect. Additionally, the existence of significant differences in OCR between European Countries is researched as this contributes to the understanding of the OCR. Based on an extensive data set of Unibail-Rodamco from 2010 to 2015, this study provide evidence that OCRs, separated per retail branch, are significantly influenced by several mall-specific and economic variables. The study also stresses the importance to research these determinants separated per retail branch. Furthermore, it is observed that European countries significantly differ from each other in terms of level of OCR.

With regard to this research's main focus, the analysis results show that all researched variables do have a significant effect in at least one of the thirteen researched branches at the required levels. Table 7 shows the direction of the effects of the independent variables found to be significant on the dependent variable. Also the significant effects on the separated components of the OCR are included.

**Table** Results of analysis model one and two

	<u>Mall-specific variables</u>		<u>Economic variables</u>	
	<i>Positive effects</i>	<i>Negative effects</i>	<i>Positive effects</i>	<i>Negative effects</i>
<b>Effects on OCR</b> <i>(model 1)</i>	Percentage of SSU Food & leisure in SC Shopping mall productivity Years since initial acquisition Life cycle of the shopping mall Share of large units/ units	Store productivity Number of footfall Years since last renovation Share of large units' size	GDP Inflation rate Stock market Long-term interest Household spending	Labour costs
<b>Effects on occupation costs per square meter</b> <i>(model 2)</i>	Store productivity Number of footfall Percentage of SSU Food & leisure in SC Shopping mall productivity Years since last renovation Years since initial acquisition	GLA of the unit Share of large units/ units Life cycle of the shopping mall	GDP Inflation rate Stock market Long-term interest	Labour costs Household spending
<b>Effects on tenants' sales per square meter</b> <i>(model 2)</i>	Store productivity Number of footfall Percentage of SSU Food & leisure in SC Shopping mall productivity Share of large units' size Years since initial acquisition	GLA of the unit Share of large units/ units Life cycle of the shopping mall	GDP Stock market	Inflation rate Labour costs Long-term interest

Also variables which are not significant, or have a diffuse outcome, on either the OCR or the occupation costs per square meter and tenants' sales per square meter are found in this study. Regarding the analysis on the OCR, the GLA does not have a clear effect, apart from in the Food and

Sport branches. The main effects are caused by either a significant effect of these variables on the numerator or denominator of the OCR. Regarding the analysis on the occupation costs per square meter, the variable share of large units in terms of surface was not found to be significant. It can be concluded that this proxy is not a variable that measures the effect of anchor tenants. Regarding the analysis on the tenants' sales per square meter, the variables years since last renovation and household spending show a diffuse outcome and strongly varies, for both seven branches where the variables were found to be significant, in direction.

It is still unclear which tenant specific variables are influencing the level of OCR. It is even more difficult to investigate this relation compared to a sustainable level of OCR for specific retailers. However, it is clear from this research that the OCR is affected by several mall-specific and economic variables and in addition, the effect differs per retail branch and differences between European countries in level of OCR exist. This is preliminarily explained by institutional differences. It is also still unclear what the effect is with regards to the influence of landlords' operating strategy. Especially for mall-specific variables, one would expect to have a strong relationship with the landlords' strategy.

The importance and growing relevance of the OCR has been stressed by van Duijn et al. (2015) and Braam-Mesken (2015). Publications on retail productivity measures and, in particular, the OCR are limited. This thesis therefore contributes to the existing literature (van Duijn et al., 2015; Braam-Mesken, 2015) on understanding the determinants of the explained OCR by performing an in-depth analysis. No such extensive analysis on the OCR has been found in the literature. Therefore, no linkage can be made with the existing literature based on the determinants of the OCR. No strong deviations were found comparing to the explanatory studies of van Duijn et al. (2015) and Braam-Mesken (2015) on the subject of OCR. The results of the additional analysis are in line with previous academic research on the matter of either retail occupation costs or retail sales determinants regarding mall-specific and economic variables included in this research (Chung, 2004; D'Arcy et al., 1997; Des Rosiers et al., 2009; Eppli & Shilling, 1996; Hetherington, 1988; Key et al., 1994; Tay et al., 1999; Sirmans & Guidry, 1993; Mejia & Benjamin, 2002). The results of this analysis, however, show a diffuse effect (more negative) of household spending on the tenant sales per square metre; while the literature stated a positive effect (D'Arcy et al., 1997; Chung, 2004). For real estate retail practitioners, this result contributes to the understanding of the OCR and the assessment of risk and the potential utilisation of reversionary potential.

### **Limitations**

It should be noted that, while this study finds interesting results, this study does have some limitations. Although the initial portfolio used in the data set consists of 72 shopping centres across Europe, which receive 777 million visits a year, the study is mainly limited to the data of Unibail-Rodamco. Also, out of the seven surveyed countries, the branches Department Store & Luxury (379, 0.4%), Entertainment (861, 1.0%) and Food (689, 0.8%) have a limited number of observations, as these particular branches generally consist of retailers with large units. Also, a component in the calculation of the



OCR is that VAT is included. There is a limitation, however, that the highest applicable VAT rate is used in each country. This means that for sectors where the low VAT rate applies (mainly goods and services), the OCR is actually lower. This is due to the disclosure of turnover including VAT by the retailer, which makes it impossible to distinguish the exact amount of VAT. This research takes into account the simple mean of the OCR across time and all units and it is therefore not a weighted average<sup>21</sup>. Also, the use of the effective OCR would provide a purer calculation of occupation cost relative to tenant turnover. This would include all components<sup>22</sup> that the retailer pays to the landlord. Since this would be a full disclosure of all financial agreements between landlord and retailer, this is too confidential to disclose. It also would be very time consuming to go through every lease agreement of every retail store separately. To obtain a smoother OCR number, instead of volatile, quarterly data was used, instead of monthly data. Otherwise the OCR would have fluctuated too much due to random effects, e.g. as one-off costs. This research also includes data from different external sources.

This study finds interesting results regarding the impact of several mall-specific and economic variables on the OCR of 7,647 retailers located in regional shopping malls across seven European countries.

### **Recommendations**

It would be interesting for further research to investigate specifically the effect of the inclusion of food & leisure in the shopping mall and the relationship with the OCR. Also, the period shortly after renovation or development of a shopping mall to assess risk is of special interest of landlords. The add-on of tenant-specific variables could help in assessing the most sustainable OCR to a particular retailer, instead of branch wide standard, and could help in forecasting the future, and therefore the sustainability of the lease. For these studies, it is recommended to collect an extensive sample consisting of retailers that most likely are located in the shopping malls used in this research.

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<sup>21</sup> It is the simple mean of the OCR across time and all units, and is in no way weighted by the volume of sales, therefore making it incomparable to the average OCR of the portfolio of Unibail-Rodamco.

<sup>22</sup> Retail occupation costs typically consist of rental charges, service charges including marketing costs for tenants, recharged maintenance CAPEX, recharged property taxes with the consideration of incentives.

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### **Meetings:**

Chris van Kaam – Head of Retail JLL Netherlands (10-02-2016)

Mathijs Pouw – Retail Agent Cushman & Wakefield (10-02-2016)

Clemens Brenninkmeijer – Managing Director Redevco Netherlands (17-02-2016)

Evert Jan van Garderen – CFO Eurocommercial Properties (23-02-2016)

Marie Caniac – Head of Asset Management Klepierre & Maarten Oosterveld – Financial Leasing Officer Klepierre (24-02-2016)

Marije Braam – Head of EMEA Retail Strategy & Research CBRE Global Investors (22-03-2016)

Hendrik-Jan ten Dam – Head of Operations Netherlands Unibail-Rodamco (via personal communications)

Otto Ambagtsheer – Managing Director Benelux Unibail-Rodamco (via personal communications)

- Chris van Kaam – Head of Retail JLL Netherlands (10-02-2016) // Amsterdam office
- Mathijs Pouw – Retail Agent Cushman & Wakefield (10-02-2016) // Amsterdam office
- Clemens Brenninkmeijer – Managing Director Redevco Netherlands (17-02-2016) // Amsterdam office
- Evert Jan van Garderen – CFO Eurocommercial Properties (23-02-2016) // Amsterdam office
- Marie Caniac – Head of Asset Management Klépierre & Maarten Oosterveld – Financial Leasing Officer Klépierre (24-02-2016) // Utrecht office
- Marije Braam – Head of EMEA Retail Strategy & Research CBRE Global Investors (22-03-2016) // Schiphol office

### Questionnaire<sup>23</sup>:

1. Newspapers have been writing frequently about retailers experiencing turbulent economic times. Some touched bankruptcy, other are provisionally rescued or gone into receivership. Can you share your opinion on this subject and a possible explanation?
2. Which retail concepts or trends are among the winners and which are among the losers for the future of retail?
3. How do retailers deal with the fact that landlords require insight in their performance e.g. turnover figures? And what could a landlord put opposite to it in order to enhance retailers' performance?
4. Is the OCR representing the full story of a retailers' performance and can you use this as a solid KPI? Which other measurements can you choose in other to monitor retailer's performance?
5. How to deal with the turnover of a retailer of a chain (mostly) selling online? Are there any solutions or best practices for this?
6. What are success factors for managing the OCR and what are the threats?
7. Regarding the literature different lease structures, planning policies and differences in labour cost (related to margin) are mentioned as explanatory factors for differences in OCR height between countries. What are in your opinion and experience causing this difference?

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<sup>23</sup> Information regarding the interviews is available upon request. The content of the interviews has been made available to the thesis supervisor. The interviewees were guaranteed that they will not be quoted, but the information from the interviews may be used as raw material.





## Appendix 3

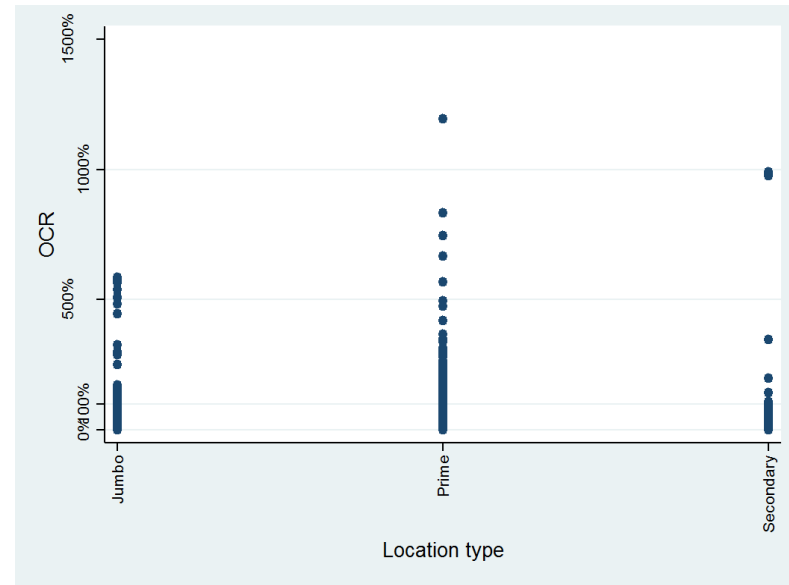
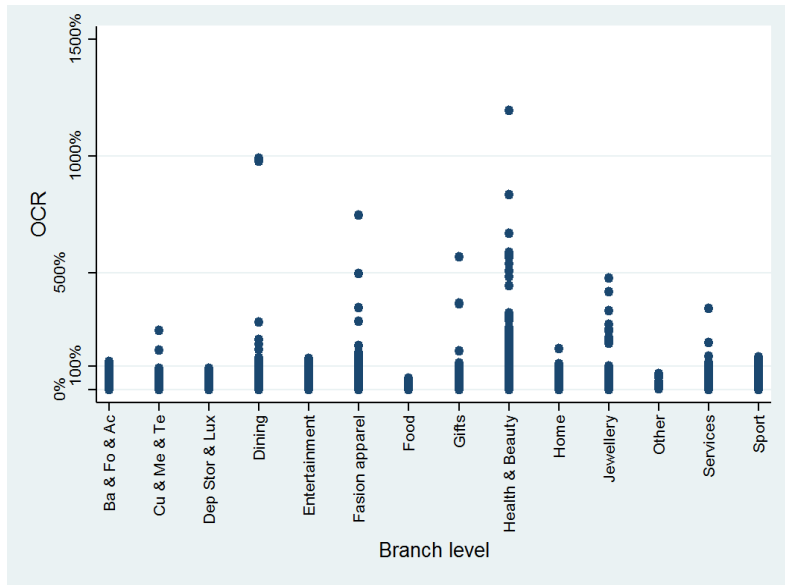
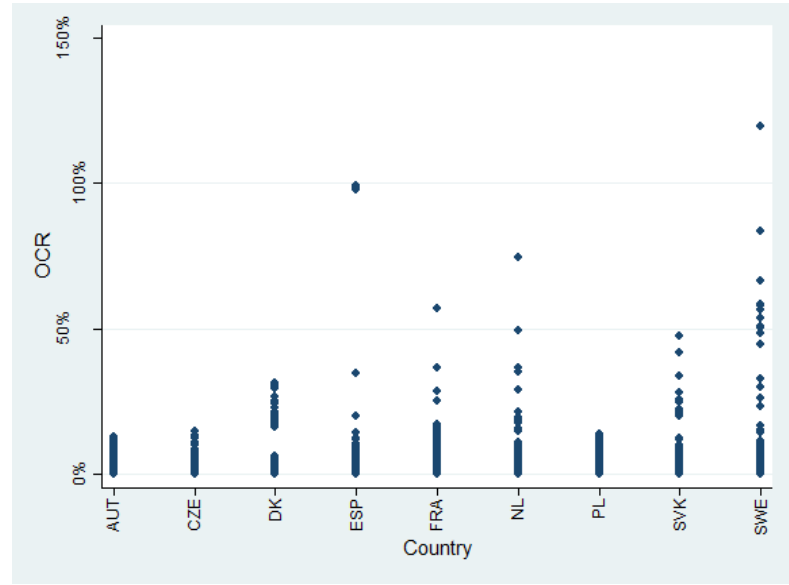
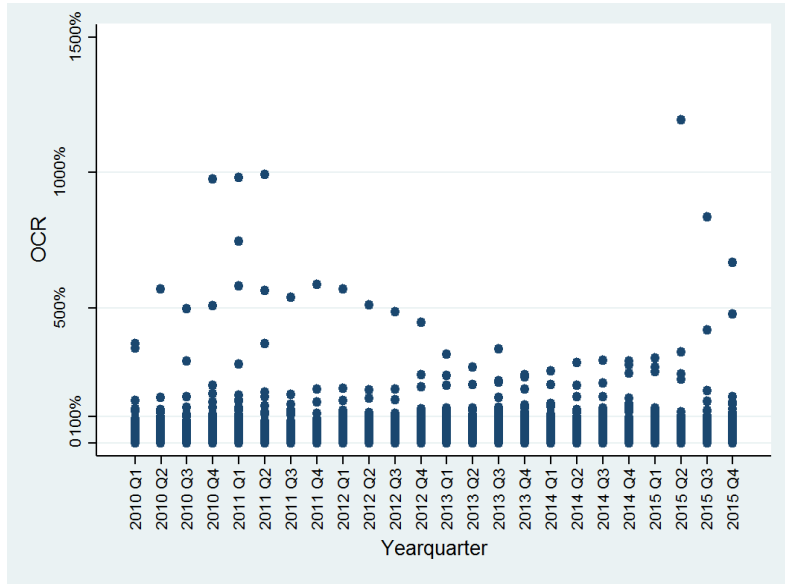
Overview branch classification (Unibail-Rodamco, 2016)

BRANCH LEVEL	DETAILED
<b>Bags &amp; Footwear &amp; Accessories</b>	Footwear
	Leath. Bags/Luggage
	Accessories
<b>Culture &amp; Media &amp; Technology</b>	Electronics and household appliances
	Books, Music & Multimedia
	Computer Products & Electronics games
	General Culture & Media & Technology
<b>Department Stores &amp; Luxury</b>	Department Stores
<b>Dining</b>	Service to table restaurants
	Fast Meal
	Gourmet Food Products
	Bars, Coffee and Tea breaks
	Sweet moments
<b>Entertainment</b>	Entertainment
<b>Fashion apparel</b>	Family Fashion
	Matern./Childr. Fash.
	Women's Fashion
	Men's Fashion
	Lingerie & Underwear
<b>Food</b>	Food anchor
	Food Stores
<b>Gifts</b>	Toys
	Themed Gift
	Cards & Gadgets
	Florists
<b>Health &amp; Beauty</b>	Perfumery, beautycare & parapharmacy
	Optician
	Hair & Body
<b>Home</b>	Furniture & Interior Design
	DIY, gardening, animals
<b>Jewellery</b>	Jewellery & Watches
<b>Services</b>	Other product-related services
	Clothing-related services
	Photo services
	Multiservices shops
	Non-clothes repairs
<b>Sport</b>	Sport Clothes & Equipment

## Appendix 4

Operationalization per variable

Variable	Renamed variable	Type	Description	Expected relation	Data source
Occupation Cost Ratio (OCR)	LOGocr_unit	Log	Log of relative ratio between tenants' occupation cost and turnover by quarter		Unibail-Rodamco
Leisure & food in SC	LOGfoodleisprox_sc	Log	Log of relative delta GLA food & leisure in SC compared to peer SC	( - )	Unibail-Rodamco
Gross Leasable Area (GLA) unit	LOGgla_unit	Log	Log of square meters of units' GLA including storage	( + )	Unibail-Rodamco
Productivity of the unit	LOGsqmsalesprox_unit	Log	Log of relative delta sales per square meter of the unit compared to peers	( - )	Unibail-Rodamco
Productivity of the SC	LOGsqmsales_sc	Log	Log of total sales per sqm of the SC (productivity)	( + )	Unibail-Rodamco
Footfall	LOGfoot_y	Log	Log of visitors in the shopping center (annual)	( - )	Unibail-Rodamco
Share of SSU MGR	LOGssu_mgr	Log	Log of share small size units in the shopping center in terms of MGR	( + )	Unibail-Rodamco
Years since acquisition	LOGyears_acq	Log	Log of years since initial acquisition of the SC	( + )	Unibail-Rodamco
Year of last renovation	years_ren	Number	Number of years since last renovation of the SC	( - )	Unibail-Rodamco
Performance of stock market	LOGperf_stock	Log	Log of index share price change (2010 = 100, quarterly)	( + )	OECD
Labor costs per hour worked	lc_hw	Number	Index of wage per worked hour (2010 = 100, quarterly)	( - )	OECD
Gross domestic product (GDP)	gdp	Number	Number of GDP per capita USD (/1000, yearly)	( + )	OECD
Inflation rate (CPI)	cpi_tot	Number	Index of CPI inflation rate (2010 = 100, quarterly)	( + )	OECD
Long term interest rate	LOGit_rate	Log	Log of 10Y Government Bond rate percentage of annum (quarterly)	( + )	OECD
Household spending	hh_spen	Number	Percentage of household spending as percentage of GDP (yearly)	( + )	OECD
Life cycle renovation	Dlycy_reno	Dummy	Yes = Within <2 years, No = not.	( + )	Unibail-Rodamco
Anchor tenant	Danchor	Dummy	In terms of GLA: Yes = percentage of <1.000 sqm units >50%. In terms of units: Yes = percentage of <1.000 sqm units >90%	( - )	Unibail-Rodamco



# Appendix 6

# Country differences

Pooled OLS model analysis

Variable

Dcountry_AUT	-0.181** (-3.02)	Dyearcountry_2013FRA	-0.052** (3.88)
Dcountry_CZE	0.027 (-0.30)	Dyearcountry_2013NL	0.190** (3.15)
Dcountry_ESP	0.162** (-5.21)	Dyearcountry_2013PL	-0.037* (2.03)
Dcountry_NL	-0.268* (-2.52)	Dyearcountry_2013SWE	0.078 (1.91)
Dcountry_PL	0.353** (-3.50)	Dyearcountry_2014AUT	0.026* (2.24)
Dcountry_SWE	-0.263** (-3.50)	Dyearcountry_2014CZE	0.122** (9.38)
Dyear_2011	-0.055** (-4.93)	Dyearcountry_2014ESP	0.003 (0.13)
Dyear_2012	0.080** (-4.39)	Dyearcountry_2014FRA	-0.012 (0.78)
Dyear_2013	-0.075** (-3.07)	Dyearcountry_2014NL	0.124* (2.23)
Dyear_2014	-0.072** (-2.69)	Dyearcountry_2014PL	-0.032* (2.56)
Dyear_2015	-0.098** (-3.49)	Dyearcountry_2014SWE	0.021 (0.50)
Dyearcountry_2010AUT	-0.155 (4.06)	Dyearcountry_2015AUT	
Dyearcountry_2010ESP	0.045 (2.10)	Dyearcountry_2015CZE	
Dyearcountry_2010NL	0.427** (3.33)	Dyearcountry_2015ESP	-0.034 (1.77)
Dyearcountry_2010SWE	0.148** (3.51)	Dyearcountry_2015FRA	-0.026 (1.60)
Dyearcountry_2011AUT	0.068* (2.56)	Dyearcountry_2015NL	0.067 (1.24)
Dyearcountry_2011ESP	0.034 (1.60)	Dyearcountry_2015PL	
Dyearcountry_2011FRA	-0.041 (4.87)	Dyearcountry_2015SWE	-0.054 (1.18)
Dyearcountry_2011NL	0.355** (3.85)		
Dyearcountry_2011SWE	0.066 (1.54)	Number of obs	87.846
Dyearcountry_2012AUT	0.086** (3.98)	R-squared	0,38
Dyearcountry_2012CZE	-0.006 (0.17)		
Dyearcountry_2012ESP	0.054* (2.42)		
Dyearcountry_2012FRA	-0.066** (5.98)		
Dyearcountry_2012NL	0.172* (2.20)		
Dyearcountry_2012PL	-0.165** (6.69)		
Dyearcountry_2012SWE	0.062 (1.47)		
Dyearcountry_2013AUT	0.049** (2.85)		
Dyearcountry_2013CZE	0.015 (0.50)		
Dyearcountry_2013ESP	0.070** (3.39)		