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## Urban Resilience: Store Location Dynamics and Cultural Heritage

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# Urban Resilience: Store Location Dynamics and Cultural Heritage

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**Abstract.** In this paper we study the relationship between cultural heritage and retail store dynamics at the neighbourhood level in the Netherlands. We analyze the total number of stores, number of vacant stores and number of stores by retail sub-industry in neighbourhoods, thereby focusing on the impact of cultural heritage, while controlling for many other factors. We test whether the presence of cultural heritage has a causal impact on the retail activity in neighbourhoods using an instrumental variables strategy for cross-section data. We also compare the development of the various indicators of retail activity over time in neighbourhoods with and without cultural heritage to investigate the existence of an impact of historical districts and buildings on urban resilience. We use a unique panel dataset from Locatus which has information on the location and type of stores in the Netherlands over a period of 7 years (2004-2010). The results show that the presence of cultural heritage increases the demand for shopping areas. Therefore, there are more stores in neighbourhoods where cultural heritage is present. We also show that the impact of cultural heritage and distance to the city centre for retail activity slowly changes over time, indicating a continuously changing urban environment. Furthermore, we provide evidence on the resilience of stores within cultural-rich neighbourhoods after the recession started in 2007 using a duration analysis.

**Key words:** Retail, store dynamics, cultural heritage, urban revival, vacancy rates, neighbourhood amenities, duration analysis

**JEL classifications:** L81, R12, R33, Z1

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<sup>1</sup> We advise you to not quote any of our (preliminary) results.

## 1 Introduction

Many stores have a difficult time to survive in the current economic situation. First, consumer spending is low due to the economic crisis. Second, there is increasing competition from online stores. To survive, shopping areas have to adapt to the changing circumstances.<sup>2</sup> This is true for the US and UK and similar trends can be observed in many other developed countries. For instance, in the Netherlands, demand for physical stores is declining and the number of vacant stores, especially in mid-sized cities, is growing. With the growth of online shopping and steady population growth projections (1% for the Netherlands between 2013 and 2050<sup>3</sup>), these problems are mainly structural.

It is not completely clear why some shopping areas are able to survive while others are less resilient. This is clearly a potentially relevant issue for local policy makers. One possibility is that the presence of an anchor store attracts customers to the other stores. This seems especially relevant for malls used for daily shopping, whereas the new developments discussed above – an ongoing recession and increasing competition from e-commerce – seem to have a relatively large impact on other segments of the retail market. Another relevant mechanism may be that vacant stores have an adverse impact on the attractiveness of shopping centres, which may result in a negative spiral. There is some literature that argues that vacant and abandoned properties lead to urban deprivation (Accordino & Johnson, 2002). On the other hand, shopping centres that have special advantages because of local amenities may be more resilient. For instance, monuments and attractive old buildings which are present in many European city centres help to provide an atmosphere that is appreciated by many fun shoppers and this effect is reinforced by the restaurants, cafés and other urban amenities that are often located in their vicinity.

A recent literature on urban economics (e.g. Brueckner, Thisse & Zenou, 1999; Carlinio & Coulson, 2004; Chen & Rosenthal, 2008; Cheshire & Sheppard, 1995; Ioannides, 2003) has emphasized the role of consumer amenities in cities and their influence of the revitalisation of the urban area. Brueckner et al. (1999) have argued that consumer amenities make the difference between the many European cities that have an attractive city centre, which often dates back to the Middle Ages, and American cities that lack such amenities. Consequently, higher income households prefer to live close to the city centre in European cities, whereas they rather prefer to live in the suburbs in American cities. Glaeser et al. (2001) have stressed the value that many inhabitants of urban areas attach to facilities, such as shops, restaurants

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<sup>2</sup> See for example, articles from the Economist ([www.economist.com/topics/retail-sales](http://www.economist.com/topics/retail-sales)) and the Huffington Post ([http://www.huffingtonpost.co.uk/2013/01/18/future-of-british-high-st\\_n\\_2505566.html](http://www.huffingtonpost.co.uk/2013/01/18/future-of-british-high-st_n_2505566.html)).

<sup>3</sup> See the report of the United Nations, Department of Economic and Social Affairs, Population Division (2013). *World Population Prospects: The 2012 Revision, Highlights and Advance Tables*. Working Paper No. ESA/P/WP.228.

and theatres, that depend on a high density of consumers in the vicinity. However, now that the demand for physical stores is declining due to the recession and the growth of online shopping, stores will disappear while the others will need to adapt to keep up with the changing environment. One possibility is that this decrease in consumer amenities has devastating consequences for old inner cities and that Europe's future downtowns will be poor?<sup>4</sup> However, there is also a real possibility that the demand for fun shopping is strong enough to let these inner cities survive after successful adaptation to the changing circumstances.

In this paper, we study store dynamics at the neighbourhood level in an attempt to shed some light on this question. We consider the total number of stores, the number of vacant stores, and of some specific store types on the neighbourhood level, while paying special attention to the possible role of cultural heritage. First, we compare neighbourhoods that are within and outside conservation areas to investigate whether shopping centres within conservation areas have more shops and which types of shops are especially attracted to locate within conservation areas. Second, we exploit the microdata on store locations to investigate the survivability of stores after the recession started in 2007 using a duration analysis. The results should gain more insight into the debate which types of stores are able to survive in the current economic situation and whether cultural heritage is an important factor for the survivability of specific stores.

The majority of empirical studies on store location and the dynamics of the retail trade industry are focused on the US. A study by Alwitt and Donley (1997), on retail stores in poor urban neighbourhoods, for the Chicago area, found that poor neighbourhoods had fewer and smaller retail outlets than non-poor areas. And, after controlling for purchasing power, this effect was smaller for banks and supermarkets. Chapple and Jacobus (2009) studied retail trade and neighbourhood revitalization and proposed that there are three types of neighbourhood revitalization from a resident's perspective: increased access to services and opportunities for low-income populations; changes from a low-income neighbourhood to a mixed income neighbourhood; and gentrification that gradually replaces existing low-income residents by richer newcomers. They find that retail changes are closely related to neighbourhood changes, with increases in middle-income residents most closely associated with retail revitalization. Although their study gives insight into what defines neighbourhood change and the factors that play a role, their methods leave out important controls for neighbourhood characteristics that might influence both retail and residential revitalization.

In a recent study Meltzer and Schuetz (2012) analysed how retail services vary over time and across New York City neighbourhoods by income and racial composition. They find that

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<sup>4</sup> In comparison to the RoES article: "Will America's future downtowns be rich?" (Brueckner & Rosenthal, 2009).

lower income and minority neighbourhoods have fewer retail establishments, smaller average establishments, a higher proportion of restaurant that serve ‘unhealthy’ food, and less diversity across retail subsectors in some cases. In addition to this, Schuetz et al. (2012) have studied the relationship between neighbourhood income and retail activities. They conclude that high poverty neighbourhoods have, overall, lower employment density for retail trade, and that average establishment size increases with median income for all types of retail trade. And neither income levels nor poverty rates consistently predict employment growth in the retail trade. But, their results do indicate that neighbourhoods that experience income upgrading have larger gains in retail employment, and thus increased retail activity. Schuetz et al. (2012) also include a variable for the percentage of the housing stock built before 1940. One can argue that this is a proxy for conservation areas, which are by definition areas with a large share of older houses.<sup>5</sup> Their results indicate that, if the percentage of housing stock built before 1940 is higher, there is, in general, lower retail employment per square metre of retail. This finding may therefore suggest that cultural heritage has little impact on the resilience of shopping areas.

As indicated above, our study focuses on the role of built cultural heritage in retail store dynamics in the Netherlands in the current era of recession and e-commerce by comparing the fate of various types of stores in heritage-rich and heritage-poor neighbourhoods. To anticipate, we find that growth rates of the total number of stores and vacant stores are not significantly different from zero. However, for different store types we do find significant results. For fashion (e.g. clothing) and culture (e.g. cinemas, musea, theatres) stores<sup>6</sup>, we find that the growth rates have been higher in neighbourhoods within conservation areas in the Netherlands between 2004 and 2010. For catering and antique & art stores, we find the opposite. This suggests that the resilience of stores depend on the industry. This suggests that there is a large amount of heterogeneity between different types of stores and that policy should take this heterogeneity into account.

This study is organised as follows. We devote the next section to discuss cultural heritage. In Section 3, we present and discuss the methodology used in this paper. In Section 4, we present our data and some descriptive statistics. Estimation results are reported and discussed in Section 5. Section 6 summarises and concludes.

## **2 Cultural heritage**

In this study, we look at the cultural heritage as one of the determinants of retail activity. Cultural heritage is a broad term. The definition of the United Nations Educational, Scientific

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<sup>5</sup> For example, a large part of the city centre of Amsterdam is built before the 17<sup>th</sup> Century.

<sup>6</sup> For simplicity, the term 'stores' is widely used. For example, certain urban amenities, such as bars, restaurants, musea, theatres, are also called stores (any other terminology is welcome).

and Cultural Organization (UNESCO, 1972) divides cultural heritage in three groups: (i) monuments, (ii) groups of buildings, and (iii) sites. In this study, we have information on the number of listed buildings (i) and the location and size of conservation areas (ii). The conservation areas are defined as *'groups of immovable objects which are of public interest because of their beauty, their spatial and structural coherence or their cultural and historical value and which include at least one monument'* (Monumentenwet 1988). These conservation areas are exactly those areas that provide a specific atmosphere that increases the quality of a city or neighbourhood. It seems reasonable to hypothesize that the quality has an influence on the location choice and survivability rate of retail stores. The influence of neighbourhood quality on household location choice seems reasonable giving the large stream of literature on this topic.<sup>7</sup> The influence of neighbourhood quality on the development of retail activity over time is not studied as much. In this paper, we provide a first step to study this relationship. We look whether retail stores are more resilient in urban areas within conservation areas compared to other urban areas. This provides us some basic understanding of the effects of neighbourhood quality on the survivability of retail stores in times of economic crisis.

Cultural heritage is a complicated amenity to consider. There is not an unambiguous indicator for the value of cultural heritage – as is the case with many nonmarket goods. This problem is reinforced by the fact that cultural heritage is highly heterogeneous. Cultural heritage often helps to determine the image and identity of a city or neighbourhood and provides a decor for shopping and other activities. The presence of cultural heritage provides a specific atmosphere and a sense of belonging that likely attracts many other (endogenous) amenities. In addition to these complications, we only have some crude indicators – for conservation areas and listed built monuments – at our disposal. The size of conservation areas and the number of listed built monuments do not fully capture the quality of cultural heritage of each urban area. This means that it is likely that there is some measurement error that we have to account for. Finally, there is also an endogeneity concern as municipalities may pay more attention to the maintenance and restoration of old buildings on sites where many stores are present, which may be reflected in our indicators.<sup>8</sup> Although, it is difficult, if not impossible, for local governments really to create cultural heritage, a difference in the propensity to keep it in good state may in the long run lead to an overrepresentation of this amenity in areas that are attractive for shopping for other reasons. To deal with these problems, we use instrumental variable techniques that are discussed in Section 4.

The main proxy that we use for the presence (and quality) of cultural heritage is the size of conservation area that (partly) covers the neighbourhood. We believe that this variable closely approximates the unique atmosphere that retailers experience when deciding to locate in a

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<sup>7</sup> See, for instance, Epple and Sieg (1999) and Bayer et al. (2007).

<sup>8</sup> This is also argued in Van Duijn & Rouwendal (2013).

particular neighbourhood within a conservation area. The other measures are used for the various sensitivity analyses.

### 3 Empirical strategy

#### 3.1 Identification and basic specification

The variable of interest is the number of stores (*#Stores*) – of a particular type  $j$ , and we regard vacant stores as one such type – that are located in neighbourhood  $i$  at time  $t$ . This number depends at any moment in time on the neighbourhood being partly or completely covered in a conservation area as indicated by  $C_i$ , the number of hectares (100 x 100 meter) in the neighbourhood in such a conservation area, on other observed neighbourhood characteristics  $X_i$ , such as population and distance to the city centre, and on (macroeconomic) characteristics that are invariant across neighbourhoods and will therefore be fully absorbed in a set of time dummies  $Y$ :

$$\#Stores_{ij} = f(C_i, X_i, Y). \quad (1)$$

We will start out analysis by using our data as a series of cross sections. We start by pooling all observation and estimating:

$$\#Stores_{ijt} = \alpha C_i + \beta X_{it} + \delta N_i + \sum_t \gamma_t Y_t + \varepsilon_{ijt} \quad (2)$$

The next step is to estimate for each year  $t$  the specification:

$$\#Stores_{ijt} = \alpha_t C_i + \beta_t X_{it} + \delta_t N_i + \gamma_t + \varepsilon_{ijt} \quad (3)$$

These regressions give us a picture of the relationship between stores in various sub-industries and cultural heritage in each period, and of their development over time. We expect that neighbourhoods with a lot of cultural heritage have more stores than otherwise comparable other neighbourhoods. We instrument cultural heritage in order to deal with the endogeneity concern discussed above. The instrument will be proposed in the next section.

#### 3.3 Duration analysis

We investigate the resilience of stores within conservation areas after the recession started in 2007 using a duration analysis. This should provide results that show whether stores within conservation areas have a higher chance to survive than similar stores that are outside conservation areas.

[WORK IN PROGRESS]

### *3.3 Control neighbourhoods*

The identification strategy is to compare neighbourhoods being partly or completely covered in a conservation area to neighbourhoods which are not. This implies that some neighbourhoods are treated – those who are within a conservation area – and the other neighbourhoods are in the control group. The idea is that both groups, treated and control, should have the same characteristics except for the presence of cultural heritage. However, neighbourhoods are unique and therefore it is difficult to identify neighbourhoods that are comparable with each other without using a solid methodology. Matching estimators, such as nearest neighbour matching and propensity score matching are often used in the literature to pair, in our case, treatment neighbourhoods with similar neighbourhoods from a control group (Rubin, 1973; Rosenbaum & Rubin, 1983; Abadie et al., 2004).

Nearest neighbour matching looks for control neighbourhoods that are ‘near’ the treated neighbourhood considering a range of neighbourhood characteristics where some norm of proximity is assumed. An alternative is the propensity score matching where matched pairs are based on propensity scores. The idea is that neighbourhoods that have similar observed neighbourhood characteristics have similar propensity scores (which are estimated by a probit or logit regression). A control neighbourhood is matched with a treated neighbourhood if their propensity scores are close to each other.

In this paper, we use the propensity score matching to pair neighbourhoods being partly or completely covered in a conservation area to other neighbourhoods which are similar in characteristics but are not within a conservation area. We do this as a robustness check for the basic specifications. If the results are very different from each other, this (type of) method is our preferred specification to recover the causal impact of the presence of cultural heritage on the resilience of shopping areas. The general idea is to compare two neighbourhoods that are identical to each other (and faced identical changes over time), except for the presence of cultural heritage. Using the panel nature of the data, we can then use fixed effects on the matched pairs to recover a consistent coefficient for the presence of cultural heritage. This does mean that our sample size decreases somewhat since only the matched pairs are included into the estimation. Results will be reported and discussed in Section 5.3.

### *3.4 More sensitivity analyses*

As mentioned before, the proxies for cultural heritage are crude indicators for the quality of cultural heritage in each neighbourhood. We choose to focus mainly on the size of conservation areas. However, there are some other measures available that can be used to check the sensitivity of the results that we find with our main proxy. For this reason, we also



use the number of listed built monuments and the presence of a conservation area.<sup>9</sup> For the number of listed built monuments, the number decides the quality of the cultural heritage. By using the presence of a conservation area, we assume that each neighbourhood within a conservation area is equally important. Again, both assumptions can lead to measurement error since cultural heritage is highly heterogeneous. We overcome this problem by using an IV strategy that deals with the endogeneity of the proxies of cultural heritage. The instrument will be discussed in the next Section.

As a robustness check, we also change the sample size. One could argue that only significant effects can be found due the largest (cultural) municipalities. Therefore, we decrease the sample size by excluding the four largest municipalities (Amsterdam, Rotterdam, The Hague and Utrecht). All, except Rotterdam, are known for their unique historic city centre. Another robustness check is to include only the twenty largest municipalities. This to check whether the results are different if we only include the largest city centres. Results will be reported and discussed in Section 5.3.

#### **4 Data and descriptive statistics**

Our data on retail stores is obtained from Locatus, and contains information about stores in the Netherlands in the period 2003-2012. This includes the type of store, the store space, vacancy rates, etc. For simplicity, we use a wide definition of stores, including bars, restaurants, musea, theatres, et cetera. We aggregate this information to the neighbourhood level. On average, neighbourhoods in the Netherlands have 1450 residents. Our sample includes an unbalanced panel dataset containing 5232 neighbourhoods. If we make the dataset balanced, we are left with 3790 neighbourhoods, which cover more than third of the area of the Netherlands and are spread out evenly across the country. These remaining neighbourhoods are mostly urbanized, since the average population of these neighbourhoods is around 2300 as is reported in Table 1.

Data on cultural heritage is made publicly available by the Netherlands Institute for Cultural Heritage (from now on, RCE<sup>10</sup>). This information covers more than 60,000 listed built monuments and more than 450 conservation areas. Conservation areas are designated by the national government for their architectural and historic value. The designation process started in the 1960 with the oldest (pre-1850) sites, currently the sites originating from the period 1850-1940 are under consideration,<sup>11</sup> while in the near future possible a small number

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<sup>9</sup> The results of the other proxies of cultural heritage are not reported in the paper but can be obtained from the author on request.

<sup>10</sup> 'Rijksdienst voor het Cultureel Erfgoed' (RCE) in Dutch. This Institute is part of the Ministry of Education, Culture and Science of the Netherlands.

<sup>11</sup> There is a shortlist containing 161 potential sites. Most of them have been designated, some are not and for other the procedure is still running.

of sites from the post World war II era will be designated. Especially the medieval and early modern inner cities have a special atmosphere that is attractive to visitors as well as specific groups residents, retailers, tourists and other economic agents. The designation procedure is long and complicated. The national agency for cultural heritage<sup>12</sup> controls the process. From the perspective of the retailers, the conservation areas in the Netherlands – certainly those originating from the first half of the 19<sup>th</sup> century or earlier for which the designation process has long been completed - are exogenously determined. The boundaries of the conservation areas do not correspond to the boundaries of the neighbourhoods. In the analyses presented below, we use the area in a neighbourhood that belongs to a conservation area as our indicator of cultural heritage. The other proxies for cultural heritage, the number of listed built monuments and the presence of conservation areas, are used for sensitivity analyses.<sup>13</sup>

As described in Section 2, one can argue that our proxies for cultural heritage are endogenous. Both measurement error and selective attention for heritage in particular neighbourhoods by municipalities may result in correlation between our heritage indicator and the error term in our estimation equations. We use a dummy for city rights as an instrument for the current size of conservation area or number of listed built monuments. City rights were special rights and privileges ascribed to certain towns during the Middle Ages. Indeed, the traditional definition of a ‘city’ in Europe was a town with city rights. In the UK, city rights were appointed by a royal charter. Typically, the cities had a larger population compared to other towns and some of them, but certainly not all, have grown over the centuries to become main cities. These large cities have a lot of cultural heritage, but the same is true for smaller cities that were more important in the past than nowadays. On the other hand there are also cities in the top of the current hierarchy that were virtually non-existent in the Middle Ages or the early modern period. This ensures that there is a positive correlation between this instrument and our proxies of cultural heritage, whereas the quality of the cultural heritage as perceived today and the maintenance efforts (or lack thereof) in more recent times are probably unrelated to this variable.

Other neighbourhood characteristics include data on residents, like income, age, sex, population size, and data on property values. A summary of the descriptive statistics on the variables can be found Table 1. Definitions and sources for each of the variables are reported in Appendix A.

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<sup>12</sup> In the US, these conservation areas are called historic districts. They are listed in the National Register of Historic Places under the authority of the National Park Service. Note that the criteria that have to be met before the designation of a conservation area may differ between countries.

<sup>13</sup> The results of the sensitivity analyses can be obtained from the author.

**Table 1.** Summary of the descriptive statistics at the neighbourhood level

Variables	Mean	Std. Dev.	Min.	Max.
Stores (#)	30.9	65.9	0	1318
Conservation areas (hectare=100x100m)	1.7	10	0	197
Listed built monuments (#)	9.2	45.7	1	1,347
Distance to main train station (meters)	12.861	9699	306	69230
Income (euros)	€ 18,255	€ 5,251	€ 1,100	€ 90,900
Low income households (%)	40.3	7.2	9	85
High income (%)	20.7	9.2	1	76
Population (#)	2,255	2,470	90	29,300
Single households (%)	30.9	13.9	3	90
Households without children (%)	31.8	6.5	5	66
Households with children (%)	37.3	11.7	0	83
Average household size (#)	2.3	0.6	0.2	4.2
Western migrants (%)	7.9	5	0	57
Non-Western migrants (%)	6.7	10.4	0	91
Property value (in thousands of euros)	€ 241.40	€ 117.40	€ 36	€ 2,019

Note: The descriptive statistics are based on 5232 neighbourhoods. The distance to the main train station is a proxy for the distance to the CBD (or city centre). The definitions and sources for each of these variables are reported in Appendix A.

**Table 2.** The number of physical stores per neighbourhood within and outside conservation areas over time

Year	Conservation area	Food stores	Fashion stores	Catering services	DIY	Antique & art stores	Sports & game stores	Flower & pet stores	Electronic stores	Furniture stores	Culture stores	Recreation facilities	Craft stores	Financial institutions	Private services stores	Vacant stores
2003	0	4.08	2.39	-	0.65	0.24	0.52	1.18	0.76	1.58	0.40	0.20	2.39	1.42	1.73	-
2004	0	4.01	2.43	5.23	0.63	0.22	0.52	1.15	0.76	1.55	0.46	0.20	2.52	1.22	1.74	1.66
2005	0	3.95	2.46	5.29	0.60	0.22	0.52	1.12	0.75	1.53	0.48	0.19	2.57	1.16	1.71	1.57
2006	0	3.93	2.49	5.34	0.58	0.21	0.52	1.13	0.75	1.50	0.50	0.19	2.62	1.14	1.71	1.56
2007	0	3.90	2.56	5.33	0.56	0.19	0.52	1.11	0.75	1.47	0.51	0.24	2.69	1.15	1.74	1.62
2008	0	3.85	2.63	5.32	0.54	0.19	0.52	1.08	0.76	1.46	0.52	0.26	2.75	1.15	1.77	1.67
2009	0	3.81	2.69	5.29	0.52	0.18	0.52	1.07	0.75	1.44	0.53	0.36	2.84	1.15	1.76	1.73
2010	0	3.74	2.68	5.28	0.50	0.17	0.53	1.06	0.74	1.43	0.54	0.45	2.90	1.08	1.70	1.88
2011	0	3.70	2.66	5.28	0.48	0.15	0.52	1.05	0.71	1.38	0.53	0.50	2.98	1.00	1.64	2.09
2012	0	3.68	2.63	5.32	0.47	0.14	0.52	1.03	0.67	1.35	0.54	0.54	3.03	0.97	1.58	2.18
2003	1	5.69	8.11	-	0.79	1.59	1.40	1.46	1.65	3.52	1.85	0.50	4.88	1.88	4.21	-
2004	1	5.72	8.28	15.61	0.75	1.53	1.47	1.43	1.68	3.40	2.03	0.51	5.06	1.67	4.17	4.35
2005	1	5.66	8.48	15.80	0.69	1.46	1.46	1.37	1.62	3.28	2.12	0.52	5.26	1.63	4.06	3.76
2006	1	5.64	8.58	15.85	0.67	1.43	1.48	1.36	1.63	3.18	2.10	0.51	5.38	1.61	4.05	3.62
2007	1	5.63	8.75	15.77	0.64	1.35	1.49	1.37	1.66	3.09	2.18	0.58	5.46	1.64	4.09	3.63
2008	1	5.54	8.99	15.73	0.61	1.28	1.48	1.35	1.73	3.11	2.23	0.59	5.60	1.71	4.15	3.95
2009	1	5.46	9.20	15.66	0.57	1.19	1.47	1.31	1.69	2.96	2.25	0.76	5.71	1.67	4.22	3.87
2010	1	5.42	9.27	15.58	0.57	1.11	1.50	1.27	1.67	2.82	2.25	0.86	5.80	1.55	4.05	4.34
2011	1	5.31	9.22	15.64	0.57	1.06	1.45	1.23	1.61	2.77	2.20	0.90	5.84	1.44	3.87	4.67
2012	1	5.29	9.19	15.83	0.53	1.02	1.41	1.18	1.50	2.67	2.16	0.94	5.99	1.33	3.72	4.80

Note: The figures are accounted for population and population density. Thus the descriptive statistics 'within and outside conservation areas', respectively 1 and 0, are comparable. The figures are the average number of stores per neighbourhood. An average neighbourhood in this particular sample counts 2500 inhabitants and it has a population density of around 4000 inhabitants per square kilometre (mostly urbanized neighbourhoods). We do not include neighbourhoods with a population below 100 and a population density below 500.

Source: Locatus 2003-2012; own calculations based on 5207 neighbourhoods in the Netherlands.

Table 2 shows an overview of different types of stores within and outside conservation areas over the time period between 2003 and 2012. There are, on average, more stores in conservation areas than outside conservation areas, even after accounting for population and population density. However, for most types of stores, we see a decline in recent years (inverted u-shaped if you plot the numbers of stores over the period between 2003 and 2012). To clearly see which types of stores can be found in conservation areas, Table 3 reports the ratio between the stores within and outside conservation areas. The higher the figure, the more prominent these types of stores are within conservation areas. It should not be surprising that antique & art stores, culture stores, fashion stores, and catering services have large ratios. An important factor why the number of these stores is higher within conservation areas is because of tourism. Tourism in the Netherlands is a relative small sector of the Dutch economy and only contributes 5.4% to the country's GDP and 9.6% to its employment (WTTC, 2013). Local tourism can have a large impact on the number of stores as is shown in Table 2 and 3. In the remainder of the paper we focus on a few specific types of stores: vacant stores, fashion stores and catering services.<sup>14</sup>

**Table 3.** Ratio of type of stores within and outside conservation areas for 2012

	Within conservation areas	Outside conservation areas	Ratio inside / outside
Food stores	5.29	3.68	1.44
Fashion stores	9.19	2.63	3.50
Catering services	15.83	5.32	2.98
DIY	0.53	0.47	1.13
Antique & art stores	1.02	0.14	7.20
Sports & game stores	1.41	0.52	2.73
Flower & pet stores	1.18	1.03	1.15
Electronic stores	1.50	0.67	2.23
Furniture stores	2.67	1.35	1.98
Culture stores	2.16	0.54	4.00
Recreation facilities	0.94	0.54	1.75
Craft stores	5.99	3.03	1.97
Financial institutions	1.33	0.97	1.38
Private services stores	3.72	1.58	2.36
Vacant stores	4.80	2.18	2.20

Note: The figures are accounted for population and population density. Thus the figures 'within and outside conservation areas' are comparable with each other. The figures are the average number of stores per neighbourhood. An average neighbourhood in this particular sample counts 2500 inhabitants and it has a population density of around 4000 inhabitants per square kilometre. We do not include neighbourhoods with a population below 100 and a population density below 500.

Source: Locatus 2003-2012; own calculations based on 5207 neighbourhoods in the Netherlands.

## 5 Results

### 5.1 Results from basic specifications

<sup>14</sup> These types of stores are prominently present in conservation areas and most interesting in our case. The regression results for the other type of stores can be obtained from the author.

We start with presenting and discussing the results of a series of cross sections where we pooled all observations (see specification (2) in Section 3). This specification reports estimation results that show the relation between the number of stores and neighbourhood characteristics that are based on the instrumental variable (IV) strategy where the city rights dummy is used as an instrument for conservation areas. Table 4 reports the estimation results for the total number of stores, the number of vacant stores, and the number of industry-specific stores. These results are obtained using the IV strategy.<sup>15</sup> We have included municipality and year dummies in the regressions to account for municipality and year specific (fixed) effects.

Our variable of interest, conservation areas, is positive and significant for each of the dependent variables. That implies we find a larger number of stores, in particular fashion stores (e.g. clothing) and catering services (e.g. bars and restaurants), in neighbourhoods within conservation areas compared to other neighbourhoods. This is not surprising given the fact that tourism increases the demand for these types of stores within areas that have an attractive city centre. It is more interesting, however, to look at the degree of the effects. In Table 4, estimation results report that there are almost 7 stores more in a neighbourhood if that neighbourhood is within a conservation area of one hectare (100x100m). In other words, for each hectare of conservation area there are, on average, 7 more stores compared to neighbourhoods without a conservation area. If we look at columns 3 and 4 of Table 5, results show that for each hectare of conservation area there is, on average, 1 more fashion store and 2 more stores related to catering services compared to neighbourhoods without a conservation area. Hence of these 7 stores (column 1), on average, 1 store is a fashion store (column 3) and 2 stores are related to catering services (column 4). Columns 5 to 7 of Table 5 show similar results for antique & art, sports & game (including toys), and culture stores (e.g. cinemas, musea, theatres) but the coefficients are somewhat lower.

Some special attention goes out to column 2 of Table 4 which reports that the number of vacant stores is also higher in neighbourhoods within conservation areas. For each hectare of conservation area there are, on average, 0.3 more vacant stores. It is likely that since there are more retail buildings in neighbourhoods within conservation areas, there are also more vacant stores. However, the number seems small.

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<sup>15</sup> Standard OLS regression results can be found in Appendix B. Using propensity score matching, the changes to the results of specification (2) and (3) are negligible and therefore not reported. These results can be obtained by the author upon request.

**Table 4.** Relationship between cultural heritage and the number of stores by industry

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total stores	Vacant stores	Fashion stores	Catering services	Antique & art stores	Sports & game stores	Culture stores
Conservation area (hectare)	6.989*** (0.518)	0.361*** (0.0326)	1.105*** (0.0923)	2.015*** (0.146)	0.204*** (0.0180)	0.149*** (0.0130)	0.333*** (0.0223)
Log (Distance to main train station)	-13.60*** (2.874)	-0.670*** (0.246)	-0.0469 (0.484)	-5.04*** (0.738)	-0.269*** (0.0679)	-0.180** (0.0714)	-0.331*** (0.0975)
Log of Population (#)	34.58*** (1.570)	1.618*** (0.106)	3.183*** (0.297)	4.391*** (0.452)	0.227*** (0.0469)	0.527*** (0.0358)	0.529*** (0.0670)
Single households (%)	-0.471 (1.941)	0.139 (0.130)	-0.205 (0.322)	-0.679 (0.554)	-0.116** (0.0490)	-0.0143 (0.0435)	-0.165** (0.0742)
Households without children (%)	-0.961 (1.907)	0.0747 (0.130)	-0.229 (0.315)	-0.756 (0.542)	-0.111** (0.0469)	-0.0192 (0.0427)	-0.149** (0.0716)
Households with children (%)	-3.435* (1.933)	-0.0678 (0.131)	-0.655** (0.320)	-1.135** (0.551)	-0.129*** (0.0481)	-0.0854** (0.0433)	-0.192*** (0.0735)
Average household size (#)	7.225*** (2.520)	0.505** (0.205)	0.912** (0.387)	2.780*** (0.706)	0.149** (0.0665)	0.132** (0.0579)	0.169 (0.115)
Log of Income (euros)	-2.699 (2.187)	-0.0163 (0.159)	-0.276 (0.424)	-0.578 (0.489)	-0.186* (0.110)	-0.0691 (0.0613)	-0.221* (0.119)
Low income (%)	-0.184 (0.229)	-0.0333* (0.0171)	-0.181*** (0.0429)	0.170*** (0.0607)	0.00303 (0.00635)	-0.020*** (0.00572)	0.00743 (0.00820)
High income (%)	-0.583** (0.254)	0.0192 (0.0195)	-0.0703* (0.0423)	-0.111 (0.0700)	-0.00839 (0.00673)	-0.0132** (0.00638)	-0.00739 (0.00929)
Log of Property value (euros)	12.96 (11.67)	-1.176 (0.778)	0.254 (2.193)	-1.374 (3.242)	-0.0710 (0.300)	-0.374 (0.266)	-0.877* (0.480)
Western migrants (%/100)	-437.1*** (78.28)	-40.34*** (4.743)	-84.53*** (13.98)	-37.86 (23.25)	-2.097 (2.209)	-15.86*** (1.772)	-11.15*** (3.374)
Non-Western migrants (%/100)	21.50 (13.09)	6.378*** (1.068)	5.757** (2.265)	-3.443 (3.538)	-0.694** (0.340)	-1.065*** (0.300)	-1.954*** (0.516)
Constant	40.80 (222.0)	-0.977 (14.31)	25.63 (37.84)	103.0 (63.73)	14.11** (5.781)	6.197 (4.944)	21.20** (9.018)
Municipality fixed effects	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Conservation area instrumented	YES	YES	YES	YES	YES	YES	YES
Observations	26,530	26,530	26,530	26,530	26,530	26,530	26,530
[INCLUDE F-TEST!!!]							

Note: A dummy for city rights is used to instrument for conservation areas. Tests for weakness of the instruments are all rejected. All regressions are weighted with the population per neighbourhood. Robust standard errors are reported in parentheses. Significance at 90, 95, 99% level are, respectively, indicated as \*, \*\*, and \*\*\*. Regression results based on other proxies of cultural heritage or the first step results of the IV estimations can be obtained from the author.

Furthermore, we control for many other variables. For example, the distance to a main train station is negatively related to the number of stores in all four cases, but only significantly different from zero for the total number of stores and the number of catering services. This variable is a proxy for the distance to the central business district (CBD) or city centre, and the negative sign indicates that stores prefer to be located in or near the CBD or city centre, and especially catering services (e.g. bars and restaurants). Also, the parameters of the size of the neighbourhood population and the average household size are significant and positively related to the number of stores in a neighbourhood for all cases.

We continue by looking at the development of the parameters of conservation areas and the distance to the main train station over the years 2004 to 2010. For each year we estimated a separate regression using the specification that is also used in Table 4. This gives us an idea of the importance of the presence of a conservation area on retail activity over time.

**Table 5.** The development of the conservation areas and distance to the nearest main train station coefficients

		2004	2005	2006	2007	2008	2009	2010
Total stores								
Conservation area (hectare)	co	6.909***	6.971***	6.976***	6.995***	7.104***	7.097***	6.979***
	se	(1.372)	(1.372)	(1.359)	(1.355)	(1.365)	(1.359)	(1.349)
ln(Distance to main train station)	co	-13.21*	-12.81*	-12.45*	-13.77*	-14.64*	-12.79*	-13.45*
	se	(7.529)	(7.281)	(7.436)	(7.616)	(7.653)	(7.573)	(7.542)
Vacant stores								
Conservation area (hectare)	co	0.382***	0.366***	0.366***	0.338***	0.360***	0.341***	0.376***
	se	(0.0850)	(0.0835)	(0.0914)	(0.0823)	(0.0899)	(0.0819)	(0.0843)
ln(Distance to main train station)	co	-0.395	-0.545	-0.551	-0.818	-0.862	-0.644	-0.578
	se	(0.577)	(0.524)	(0.589)	(0.663)	(0.695)	(0.711)	(0.672)
Fashion stores								
Conservation area (hectare)	co	1.026***	1.065***	1.063***	1.093***	1.138***	1.171***	1.197***
	se	(0.232)	(0.235)	(0.236)	(0.239)	(0.246)	(0.253)	(0.261)
ln(Distance to main train station)	co	-0.206	-0.0674	0.0408	0.0267	-0.0937	-0.0199	0.00713
	se	(1.199)	(1.181)	(1.211)	(1.276)	(1.313)	(1.331)	(1.367)
Catering services								
Conservation area (hectare)	co	2.036***	2.054***	2.044***	1.992***	2.015***	2.002***	1.992***
	se	(0.388)	(0.390)	(0.388)	(0.380)	(0.385)	(0.380)	(0.380)
ln(Distance to main train station)	co	-4.852**	-4.655**	-4.867**	-5.261***	-5.256***	-4.763**	-5.016***
	se	(1.923)	(1.871)	(1.938)	(1.989)	(1.978)	(1.921)	(1.931)
Antique & art stores								
Conservation area (hectare)	co	0.222***	0.212***	0.223***	0.216***	0.200***	0.184***	0.176***
	se	(0.0490)	(0.0493)	(0.0524)	(0.0496)	(0.0467)	(0.0438)	(0.0407)
ln(Distance to main train station)	co	-0.352*	-0.278	-0.248	-0.293	-0.261	-0.245	-0.268*
	se	(0.184)	(0.180)	(0.187)	(0.192)	(0.181)	(0.164)	(0.157)
Sports & game stores								
Conservation area (hectare)	co	0.145***	0.144***	0.148***	0.153***	0.150***	0.150***	0.153***
	se	(0.0328)	(0.0322)	(0.0326)	(0.0352)	(0.0354)	(0.0340)	(0.0363)
ln(Distance to main train station)	co	-0.195	-0.175	-0.114	-0.205	-0.131	-0.183	-0.196
	se	(0.174)	(0.172)	(0.187)	(0.196)	(0.199)	(0.188)	(0.195)
Culture stores								
Conservation area (hectare)	co	0.300***	0.332***	0.323***	0.344***	0.351***	0.349***	0.333***
	se	(0.0522)	(0.0599)	(0.0546)	(0.0593)	(0.0606)	(0.0623)	(0.0589)
ln(Distance to main train station)	co	-0.337	-0.276	-0.272	-0.372	-0.412	-0.324	-0.318
	se	(0.235)	(0.238)	(0.245)	(0.278)	(0.272)	(0.267)	(0.262)

Note: For each year, a separate regression was run. A dummy for city rights is used to instrument for conservation areas. Tests for weakness of the instruments are all rejected. All regressions are weighted with the population per neighbourhood. Robust standard errors are reported in parentheses. Significance at 90, 95, 99% level are, respectively, indicated as \*, \*\*, and \*\*\*. Regression results based on other proxies of cultural heritage can be obtained from the author.



Table 5 reports the development of the conservation area and distance to the main train station coefficients over time. The results show that there are some fluctuations in coefficients of the conservation area variable but that they are very small. Given the short time period, it should not be surprising to see these small effects. For the total number of stores, the coefficient of the conservation area variable seems very stable. It reaches its top in 2008 and decreases somewhat in later years. It is likely that the economic crisis that started in 2007 can explain this (small) decrease in the later years. For the number of vacant stores, the coefficient seems less stable. There seems to be a decrease in the conservation area coefficient for vacant stores, but increases again in 2008 and 2010. The conservation area coefficients for the different store types show their own trend. It should be noted that especially the conservation area coefficient for fashion stores and culture stores increased by around 10% between 2004 and 2010. For catering services and antique & art stores we see the opposite, a decrease over time. These results show that different types of stores show different trends over time. The results suggest that some types of stores within conservation areas flourished between 2004 and 2010, while others show the opposite effect.

The distance to the main train station coefficient shows a decrease in absolute value over time for the total number of stores. This implies that being close to the city centre is becoming less important for the retail industry. Although these results can be interpreted as marginal, to some extent they show the continued development of urban economies and the related increasing importance of sub-centres in urban areas.

### *5.2 Results from duration analysis*

[WORK IN PROGRESS]

### *5.3 Results from sensitivity analyses*

[Propensity score method to match pairs of neighbourhoods that are somewhat identical to each other, except for the presence of the cultural heritage.]

[Another robustness check is to exclude the four largest municipalities in the Netherlands from the sample size.]

[Another robustness check is to only include the ten / twenty largest municipalities in the Netherlands.]

## **6 Conclusions**

While it is evident that many physical stores are having an increasingly difficult time to survive in the current economic situation, there is, in our knowledge, no conclusive evidence which locations makes stores more resilient to these changes. In this empirical article, we investigate whether cultural heritage affects the store location dynamics on the neighbourhood level. We use a unique dataset that has information on the location and characteristics of stores in the Netherlands between 2004 and 2010. We aggregate these data on neighbourhood level and combine them with our proxies for cultural heritage, focussing on the size of conservation areas, and many other (control) neighbourhood characteristics, including distance to the nearest main train station, population, household composition, et cetera. We argue that our proxies for cultural heritage are likely to have some measurement error and are possibly endogenous. Therefore, we propose city rights as a viable instrument for the presence of cultural heritage. The results show that this instrumental variable (IV) strategy performs very well.

We start with comparing the absolute number of stores (by industry) in cultural-rich and cultural-poor neighbourhoods in the Netherlands between 2004 and 2010, while controlling for many relevant neighbourhood characteristics. We find that per hectare (100 x 100 meter) of conservation area there are, on average, 7 more stores in neighbourhoods that are partly or completely covered in a conservation area compared to other neighbourhoods in the Netherlands. Especially for specific store types, such as fashion (e.g. clothing), catering (e.g.

bars and restaurants), antique & art, sports & game (including toys), and culture (e.g. cinemas, musea, theatres) stores. Tourists that are attracted to historic city centres are likely to increase the demand for stores and therefore explains (partly) the higher number of stores in cultural-rich neighbourhoods. If we do separate regression for each year, we find that the cultural heritage variable changes slightly between 2004 and 2010, except for fashion stores, culture stores (increase) and antique & art stores (decrease). We also find that there are more vacant stores in neighbourhoods within conservation areas. This should not be surprising as there are, on average, also more stores in those neighbourhoods. Moreover, the effect is small compared to the other (types of) stores.

[Results duration analysis]

To conclude, in this paper we have taken the first steps to determine the role of cultural heritage in store dynamics. We have shown that store owners are generally more attracted to heritage-rich locations as places to do business. If local authorities want to encourage more retail activity, then they should preserve and maintain their cultural heritage. Policy makers should incorporate the role of cultural heritage when developing zoning plans, and should also consider the negative externalities associated with more retail activities, such as more wear and tear on the cultural heritage that is not benefitting from investments made by retail entrepreneurs, and increased noise, pollution and traffic pressure on the neighbourhood's residents. We hope at least that the figures presented in this paper contribute to an efficient allocation of future shopping areas in which policy makers consider cultural heritage as one of its important determinants.

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## Appendix A. Definitions and sources

**Table A.1.** Variable definitions and sources

Variable	Definition	Source
Conservation areas	Surface of conservation areas in hectare (100x100 meters)	RCE
Listed built monuments	Number of listed built monuments	RCE
Distance to main train station	The weighted Euclidian distance to the nearest intercity train station in meters (used as a proxy for the distance to the central business district or city centre)	PBL
Total stores	Number of occupied stores	Locatus
Vacant stores	Number of vacant stores	Locatus
Fashion stores	Number of clothing and fashion stores	Locatus
Catering services	Number of restaurants, bars, cafés, etc.	Locatus
Antique & art stores	Number of antique and art stores	Locatus
Sports & game stores	Number of sports, game and toy stores	Locatus
Culture stores	Number of cinemas, musea, theatres, libraries, etc.	Locatus
Income	Median disposable household income	RIO-CBS
% Low income	Percentage of income recipients who earn below €14,000	RIO-CBS
% High income	Percentage of income recipients who earn above €25,000	RIO-CBS
Population	Number of inhabitants in neighbourhood	kwb-CBS
% Single households	Percentage of single households	kwb-CBS
% Households no kids	Percentage of households without kids	kwb-CBS
% Households with kids	Percentage of households with kids	kwb-CBS
Average household size	The average size of the household	kwb-CBS
Property value	Average neighbourhood property value	kwb-CBS
% Western immigrants	Percentage of population who are western immigrants	kwb-CBS
% Non-western immigrants	Percentage of population who are non-western immigrants	kwb-CBS

## Appendix B. OLS results

**Table B1.** OLS: Relationship between cultural heritage and the number of stores by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Total stores	Vacant stores	Fashion stores	Catering services	Antique & art stores	Sports & game stores	Culture stores
Conservation area (hectare)	1.851*** (0.211)	0.0559*** (0.00969)	0.243*** (0.0359)	0.591*** (0.0676)	0.0897*** (0.0106)	0.0326*** (0.00446)	0.131*** (0.0142)
Log (Distance to main train station)	-16.13*** (2.540)	-0.821*** (0.236)	-0.472 (0.426)	-5.74*** (0.642)	-0.325*** (0.0534)	-0.237*** (0.0648)	-0.43*** (0.0750)
Log of Population (#)	39.79*** (1.298)	1.928*** (0.0856)	4.057*** (0.238)	5.835*** (0.365)	0.343*** (0.0453)	0.645*** (0.0307)	0.734*** (0.0597)
Single households (%)	1.947 (1.510)	0.283** (0.110)	0.201 (0.246)	-0.00868 (0.437)	-0.0617 (0.0396)	0.0404 (0.0339)	-0.0696 (0.0580)
Households without children (%)	-0.999 (1.512)	0.0724 (0.111)	-0.236 (0.246)	-0.766* (0.437)	-0.112*** (0.0395)	-0.0200 (0.0338)	-0.15*** (0.0584)
Households with children (%)	-2.265 (1.518)	0.00174 (0.111)	-0.459* (0.248)	-0.811* (0.437)	-0.102*** (0.0394)	-0.0589* (0.0340)	-0.146** (0.0579)
Average household size (#)	7.342*** (1.741)	0.512*** (0.177)	0.931*** (0.247)	2.813*** (0.442)	0.151*** (0.0420)	0.135*** (0.0430)	0.173** (0.0708)
Log of Income (euros)	-3.303 (2.499)	-0.0522 (0.136)	-0.377 (0.431)	-0.745 (0.582)	-0.199 (0.126)	-0.0827 (0.0656)	-0.245 (0.151)
Low income (%)	0.302 (0.208)	-0.00444 (0.0158)	-0.0993** (0.0421)	0.304*** (0.0530)	0.0138** (0.00626)	-0.00904* (0.00520)	0.027*** (0.00721)
High income (%)	-0.275 (0.217)	0.0375** (0.0179)	-0.0187 (0.0350)	-0.0260 (0.0604)	-0.00153 (0.00587)	-0.00627 (0.00563)	0.00470 (0.00752)
Log of Property value (euros)	70.72*** (6.442)	2.255*** (0.472)	9.942*** (1.415)	14.62*** (1.602)	1.215*** (0.182)	0.932*** (0.145)	1.390*** (0.230)
Western migrants (%)	12.11 (41.88)	-13.65*** (2.371)	-9.184 (8.668)	86.55*** (13.28)	7.905*** (1.426)	-5.704*** (0.926)	6.490*** (1.586)
Non-Western migrants (%)	-4.891 (12.68)	4.809*** (0.981)	1.329 (2.031)	-10.8*** (3.477)	-1.282*** (0.394)	-1.662*** (0.276)	-2.99*** (0.639)
Constant	-387.9** (157.5)	-26.45** (11.29)	-46.28* (27.08)	-15.72 (45.07)	4.562 (4.076)	-3.498 (3.496)	4.367 (6.065)
Municipality fixed effects	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Conservation area instrumented	NO	NO	NO	NO	NO	NO	NO
Observations	26,530	26,530	26,530	26,530	26,530	26,530	26,530
R-squared	0.499	0.366	0.293	0.464	0.316	0.329	0.449

Note: OLS variant of Table 4. All regressions are weighted with the population per neighbourhood. Robust standard errors are reported in parentheses. Significance at 90, 95, 99% level are, respectively, indicated as \*, \*\*, and \*\*\*. Regression results based on other proxies of cultural heritage can be obtained from the author.