

# **Effects of Parking Fees at Regional Shopping Centers on Parking Choice Behavior**

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**Abstract.** This paper reports the results of an empirical analysis into the effects of paid parking at a regional shopping center on parking choice behavior. The paper focuses on the relationship between changes in a car driver's parking choice, and changes in the car driver's shopping behavior. It appears that at conventional level, a change in parking choice is significantly related to changes in shopping duration for non-weekly purchases. A significant relation between a change in parking choice and changes in other aspects of shopping behavior is not found. In addition, the shopping behavior of car drivers who park their car at one of the official parking lots is compared with the behavior of car drivers who park their car in the neighborhoods surrounding the shopping center. The two groups of car drivers only differ at one aspect of shopping behavior, the visit frequency for weekly purchases.

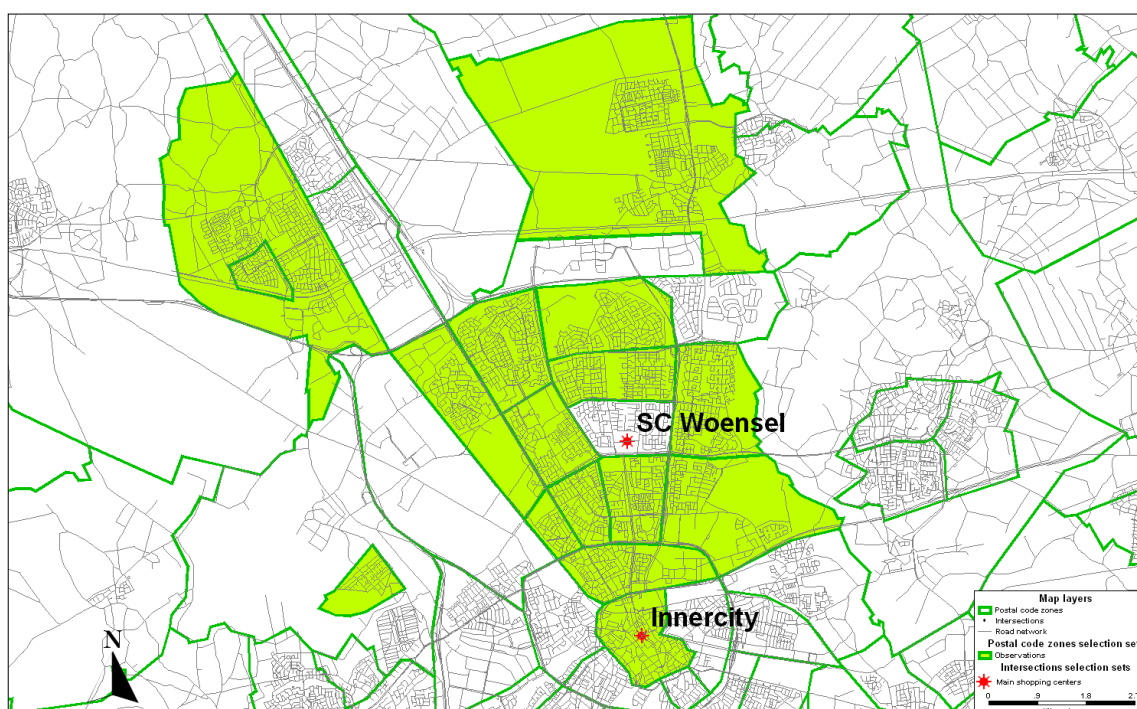
## **1. Introduction**

Paid parking in downtown areas and city centers has a long history. Although the majority of travelers often are annoyed about the high parking fees, it is accepted as a fact of life. Most have found a strategy to cope with the parking fees, regardless of whether fees are charged for commercial reasons or in the context of transportation management and environmental concerns (e.g., Marsden, 2006).

More recently, in several European cities, a discussion has emerged whether or not parking fees should be charged in other areas, such as regional shopping centers. This discussion is motivated by both retail policy and transportation policy. Because

retailers in city centers already face parking fees, it is felt that parking fees at regional centers would be fair and at the same time may partially protect local retailers in that a larger proportion of consumers may shop locally in response to parking fees (e.g., CROW 2001). In addition, transportation planners believe that parking fees induce more consumers to use alternative transportation modes to the car, reducing parking problems, emissions etc.

To the best of our knowledge, little is known about the effects of the introduction of parking fees in regional shopping centers. This paper therefore discusses the case of a regional shopping center in Eindhoven, The Netherlands. This center as many in Europe is located in the middle of the Northern part of the city (Figure 1). Consequently, if people would park their car in the adjacent neighborhood, the walking distance would still be limited. Hence, a key question is to what extent people decide to seek these alternative parking places in response to the introduced parking fees. Also factors that influence this response are relevant for additional policy measures. This paper reports the answers to these research questions.



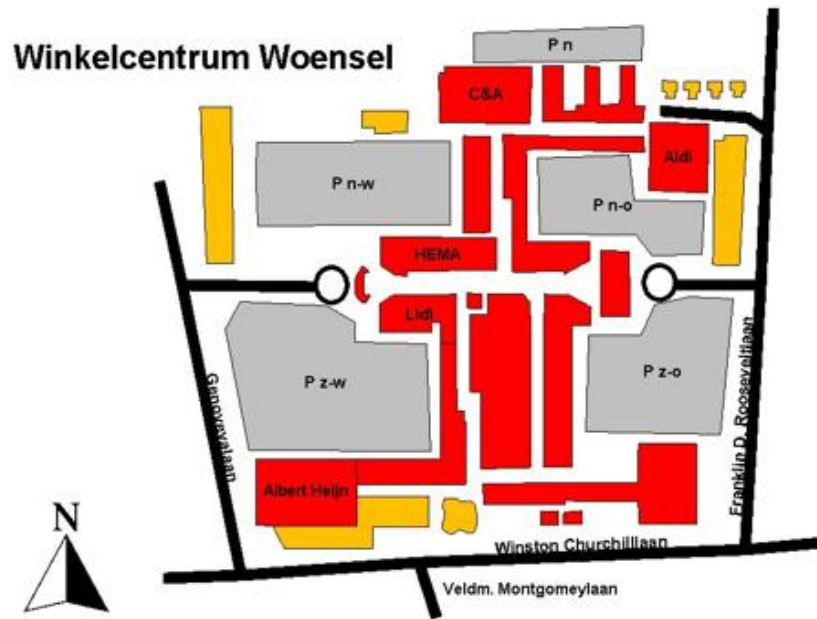
**Figure 1:** Location of shopping Centre Woensel in Eindhoven North

## 2. Data

The case study concerns Shopping centre Woensel, located in the northern part of Eindhoven, where on September 1<sup>st</sup>, 2007, the city of Eindhoven introduced paid parking. The shopping center consists of approximately 160 stores including local, national, and international operating stores. It serves an area of approximately 200,000 residents of Eindhoven and several surrounding towns. In comparison, Eindhoven inner city area consists of more than 500 stores that serve approximately 600,000 residents. The Shopping center Woensel is surrounded by several parking facilities, bike stand, and bus stops. Paid parking was introduced after a considerable extension and renovation of the shopping centre. The involved parties showed their concern about the introduction of paid parking. The parking charge was set to 0.50 euro for the first hour and 1.00 euro for every next hour with a maximum of 3.00 euro per day. These charges are comparable with the parking charges of the parking facilities in the Eindhoven inner city area.

Data were collected in November 2007, almost three months after the introduction of paid parking. In total, 6000 invitation cards were distributed across households in various neighborhoods in the northern part of Eindhoven. The neighborhoods adjacent to the shopping centre (Less than approximately 1 kilometer) were not included in this study because we expect residents living here mainly travel by foot or bike. Residents were invited to participate in an Internet questionnaire. There was no incentive to encourage residents to participate. In total 791 residents participated, which equals a response rate of 13.2 percent. This response rates is typical for the Netherlands for surveys without incentives and reminders.

The questionnaire consisted of four parts. The first part concerned respondents' shopping behavior for both weekly and non-weekly purchases. For both types of shopping behavior, respondents were asked questions related to their travel and shopping behavior before and after the introduction of paid parking in the Woensel shopping centre. In the second part of the questionnaire, respondents were asked to provide information about several personal characteristics, such as gender, age, education, and residential location). The third part focused on the evaluation of the accessibility of the Woensel shopping centre by different travel modes and different characteristics of the surrounding infrastructure. The final part of the questionnaire dealt with the respondents' choice of a car park out of the set of parking facilities available near the shopping center before and after the introduction of paid parking (see Figure 2).



**Figure 2:** Schematic representation of Shopping centre Woensel

**Table 1:** Personal characteristics of the sample

<i>Characteristic</i>	<i>Characteristic levels</i>	<i>Frequency</i>	<i>Percentage</i>
Gender	Female	201	55.1
	Male	164	44.9
Age	Younger than 40 years	157	43.0
	40 years and older	208	57.0
Education	Medium level	199	54.5
	High level	166	45.5
Residential location	More than 2 km from the Woensel shopping center	170	46.6
	1-2 kilometer from the Woensel shopping center	195	53.4
Family composition	Household with children	170	46.6
	Household without children	195	53.4
Car availability	More than 1 car	146	40.0
	1 car	219	60.0
Total		365	100.0

The data of 365 respondents could be used in this study. These respondents used the car to visit shopping center before and after the introduction of paid parking. Table 1 describes the composition of the sample. Slightly more females than males participated in the survey. Close to 60 percent of the respondents is 40 years or older. Respondents are well distributed across the educational levels, two concentric circles that we draw from the regional shopping center, and the separated types of families. As expected almost every respondent has a car at their disposal.

### 3. Analyses and results

First, we calculated the percentage of customers using the car that continued using the same parking space as before the introduction of the parking fees. It appears that almost 70 percent of the car users choose the same car park before and after the introduction of paid parking (Table 2). Of the car drivers that change their parking choice, the majority might have chosen a car park that is more efficiently located vis-à-vis the shops the car drivers intend to visit. Only a limited number of car drivers park their car in the surrounding neighborhoods (at no costs). Despite the low number, it is remarkable that some car drivers indicated that they used to park in the neighborhoods and now park their car at one of the parking facilities of the shopping centre. This might be caused by an increased chance of finding a parking space.

**Table 2:** *Parking choice behavior before and after the introduction of paid parking*

<i>Parking before</i>	<i>Parking after</i>						Total
	<i>P n-w</i>	<i>P n-o</i>	<i>P z-w</i>	<i>P z-o</i>	<i>P n</i>	<i>Neighb.</i>	
P n-w	<b>43</b>	4	15	1	1	6	70
P n-o	2	<b>15</b>	6	4	1	2	30
P z-w	12	7	<b>153</b>	9	0	11	192
P z-o	5	5	19	<b>35</b>	0	4	68
P n	0	0	0	0	<b>2</b>	0	2
Neighb.	0	0	2	1	0	<b>0</b>	3
Total	62	31	195	50	4	23	365

The next step of the analyses consisted of a comparison of changes in shopping behavior and changes in parking choices. Car drivers are subdivided into two groups: car drivers who did not change their parking choice (Group I: 248 car drivers) and car drivers who changed their parking choice (Group II: 117 car drivers).

The characteristics of the car drivers' shopping behavior that are investigated are shopping frequency (per year) and shopping duration. A distinction is made between shopping visits for weekly (mainly supermarket visits) and non-weekly (visits for clothing, shoes, etc.) purchases. An independent samples t-test was used to compare the average changes in shopping frequency and duration. The results are presented in Table 3. It appears that at conventional level the relation between change in parking choice and change in visit duration for non-weekly purchases is significant.

**Table 3: Results of the independent samples t-test**

<i>Aspect</i>	<i>Group</i>	<i>Mean*</i>	<i>Mean Difference</i>	<i>Significance</i>
Shopping frequency, weekly	I	-32.24	-0.947	0.859
	II	-31.29		
Shopping frequency, non-weekly	I	-25.89	9.660	0.066
	II	-35.55		
Visit duration, weekly	I	-15.13	6.965	0.060
	II	-22.09		
Visit duration, non weekly	I	-24.60	9.968	0.041
	II	-32.57		

\* A negative mean indicates that on average the frequency/duration decreases after the introduction of paid parking

To see if car drivers who park their car in the surrounding neighborhoods (group b) behave differently from car drivers who park at one of the official parking lots (group a), Table 4 is created. The Table presents the average annual shopping frequency and shopping duration for both weekly and non weekly purchases. The averages hold for the situation after paid parking was introduced. The figures show that only in the case of visit frequency for weekly purchases, the means differ significantly. For all the other items the means of the separated groups of car drivers are equal.

**Table 4:** Results of the independent samples t-test

<i>Aspect</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>Significance</i>
Shopping frequency, weekly (visits per year)	a	218	59.43	0.023
	b	9	23.67	
Shopping frequency, non-weekly (visits per year)	a	285	39.58	0.316
	b	20	30.50	
Visit duration, weekly (minutes per visit)	a	218	42.19	0.165
	b	9	33.33	
Visit duration, non weekly (minutes per visit)	a	285	64.59	0.773
	b	20	62.50	

#### 4. Conclusions

This paper reports some empirical findings related to changes in parking choice behavior after the introduction of paid parking in the context of shopping trips. It appears that the majority of car drivers do not change parking choice after paid parking is introduced. In the paper a change in parking choice is compared with changes in shopping behavior, in particular shopping frequency and shopping duration. Also the shopping behavior of car drivers who uses an official parking is compared to the behavior of car drivers who park their car in the surrounding neighborhoods.

Taking into account that the results are based on a limited number of observations, still some useful conclusions can be drawn. First of all, a change in parking choice is not related to changes in shopping frequency or shopping duration. Second, when car drivers who visit a shopping center move from official parking lots to the surrounding neighborhoods they do not change shopping behavior. This holds at least for shopping frequency and shopping duration.

What are the policy implications? The introduction of paid parking at shopping centers is not a popular measure because retailers feel it was adversely affect shopping patterns, while residents of adjacent neighborhoods believe that paid parking will lead to a substantial proportion of people parking their vehicles in the neighborhood. The results of the present study however indicate that both fears may be unwarranted and that at the large scale although both effects do occur their impact is very small indeed.

## **5. References**

CROW (2001) *Effects of Parking Measures* (In Dutch), CROW, Ede, The Netherlands.

Marsden, G. (2006) The Evidence Base for Parking Policy – A Review, *Transport Policy* **13**, 447-457.