

Bachelor Thesis

To what extent does Cashing Out Employer-Paid Parking help to reduce car use?

Erasmus University Rotterdam

Erasmus School of Economics

Department of Applied Economics

Supervisor: Giuliano Mingardo

Word Count: 15,916

Name: Samuel Jovanovic

Exam number: 370021

E-mail address: 370021sj@eur.nl

Table of Contents

Title Page.....	1
Table of Contents.....	2
Abstract.....	3
1. Introduction	4
1.1. Problem Statement.....	4
1.2. Aim and Research Question	6
1.3. Methodology	6
1.4. Structure of the Paper	6
2. Literature Review.....	7
2.1. Congestion Pricing	7
2.2. Carpooling.....	10
2.3. Employer-Paid Parking.....	14
2.3.1. The Concept of Employer-Paid Parking.....	15
2.3.2. Employer-Paid Parking Can Be Inefficient.....	15
2.4. Employer-Paid Parking Cashing Out Evaluation	18
2.4.1. The Concept of Employer-Paid Parking Cashing Out.....	19
2.4.2. The Benefits of Employer-Paid Parking Cashing Out.....	21
2.4.3. The Costs of Employer-Paid Parking Cashing Out.....	23
2.4.4. Employer-Paid Parking Cashing Out in Practice.....	24
3. Summary and Discussion of the Factors of the TDM Schemes Analysed.....	25
3.1. Congestion Pricing Summary Table	25
3.2. Carpooling Summary Table.....	27
3.3. Employer-Paid Parking Summary Table	28
3.4. Employer-Paid Parking Cashing Out Summary Table.....	30
3.5. Discussion on the Different TDM Measures.....	32
3.5.1. Discussion on Congestion Pricing.....	33
3.5.2. Discussion on Carpooling.....	34
3.5.3. Discussion on Employer-Paid Parking Cashing Out.....	36
3.5.4. Framework of the Most Important Factors of the Cashing Out Policy.....	38
4. Conclusion.....	41
Bibliography	44

Abstract:

The employer-paid parking cashing out policy has received numerous positive as well as negative results when assessing its efficiency at reducing congestion. This paper conducted a large qualitative research on previous works studying the effect of the cashing out policy. This research additionally studied the efficiency and effect of the congestion pricing scheme, as well as the carpooling scheme, in order to analyse the usefulness of combining these TDM measures. It was shown that, employer-paid parking cashing out is successful in reducing the amount of singular-vehicle used for work related purposes and could be used in combination with carpool to increase its efficiency even further. The main findings show that there are four important factors that need to be taken into account when implementing the cashing out policy. The factors are, (1) the location of the firm within the city, (2) the financial size of the firm, (3) a combined use of incentives and disincentives and lastly (4), the legal and fiscal policies of the country. With these factors in mind, the implementation of the cashing out policy could lead to a significant reduction in congestion in the morning rush hours and the negative externalities related to it.

1. Introduction

1.1. Problem Statement

The challenge most megacities face with regards to transportation is congestion. Congestion is one of the biggest negative externalities related to transportation. Congestion can lead to time, money, environmental and physical constraints that have an effect on daily activities. Although the growth of the automobile industry is declining, Europe remains the continent with the highest amount of passenger vehicles per 1000 inhabitants, reaching up to 676 cars in Luxemburg, in 2013 (AlixPartners, 2015) (OICA, 2016). In 2013, it was found that on average in Europe and the USA, drivers waste 111 hours per year in traffic jams, which roughly costs up to \$124 billion to the USA economy (INRIX, 2016).

Congestion is due partially to the fact that megacities keep on growing in population and that the mode in which the majority of the citizens travel nowadays is by way of single-occupancy vehicles. There are, therefore several reasons for congestion, where some causes are relevant to this paper. The first leading cause of congestion is related to the capacity of the road being maxed out (Xerox, 2016). In other words, when the amount of cars present on the road reaches its full capacity, the road faces congestion (Mallard & Glaister, 2008). It is important to understand that this lack of capacity for roads cannot be increased because it is simply not economically feasible since costs would be much higher than the potential benefits. The second main reason is in line with what was mentioned earlier. There is no real alternative to driving for transportation purposes, and hence most people use single-occupancy vehicles (Xerox, 2016). These are then the most relevant two reasons why cities face congestion.

Congestion does not occur at all times of the day in equal volumes. It is important to note that in mainstream economics, the factor of time is often removed for simplification reasons, however, for transport economics and congestion specifically, time plays a vital role (Mallard & Glaister, 2008). Since congestion does not occur at the same time and is not constant, there are periods of the day, week or year that are more congested than others (Mallard & Glaister, 2008). This is known as the problem of the peaks in the demand for road usage (Mallard & Glaister, 2008). One of the most common peaks in megacities is the morning rush hour peak to the central business district (CBD) area. Due to this increase in the quantity

of single-occupancy vehicles ownerships, going to work in the morning often relates to being caught in traffic congestions. It is, therefore, important to find measures that help re-mode, re-route, re-time or reduce the amount of traffic and therefore shave the peak demand. This shows the importance of transportation demand management (TDM) strategies.

A TDM is defined as various actions that help improve the efficiency of the transportation system by changing the demand for travel by reducing car use, trip time and encouraging off-peak travel (Arizona Department of Transportation Research Center, 2012). A TDM can be implemented through information, providing travel services/options and using price incentives, where the latter is the most common strategy (Arizona Department of Transportation Research Center, 2012).

The current challenge that economists face in regards to roads, is that drivers do not pay the full costs of driving, which does not cover the externalities and hence is thus overconsumed (Mallard & Glaister, 2008). In other words, drivers do not pay the costs that are related to driving, such as air and noise pollution, the use of the road, the maintenance of the roads and other negative externalities (Mallard & Glaister, 2008). A way to deal with this problem, is to impose the appropriate additional charges to the users, which was first proposed by Pigou and is known as the Pigouvian taxes (Mallard & Glaister, 2008). This idea was then applied to roads and one TDM strategy to charge drivers the costs of driving was implemented, congestion pricing.

Congestion pricing is sort of a road-user charging scheme that is often used nowadays to try to reasonably charge users for driving. Congestion pricing schemes charge vehicles in accordance with the level of congestion present in the area and therefore aim at reducing the congestion level (Mallard & Glaister, 2008). However, it was discovered that congestion pricing does not work as accurately as it was desired. This is mainly due to the public failing to accept and understand it in the form in which it is presented (DeCorla-Souza, 1994). These reasons will, however, be explained in more details in the later sections of this research. Since this congestion pricing is not the most efficient scheme, it is worth looking into different schemes. Another TDM strategy used to try and reduce congestion is the carpooling scheme. Carpool is however also somewhat ineffective and the reasons why will be explained later. It is hence worth investigating additional schemes that may be more effective.

A practice used by many large companies is to provide free parking spaces for their employees at work, which is known as employer-paid parking. This practice has many flaws that will be explained in detail, but it is important to note that according to Donald Shoup (1992) employer-paid parking increases the amount of trips generated to the CBD by single-occupancy vehicles. To try to reduce the amount of trip generated to the CBD for work reasons, Shoup (1992) proposed to give the employee an option between having the parking paid for by the employer or instead receive the cost of parking in cash as a subsidy. This is known as employer-paid parking cashing out (Shoup, 1992).

1.2. Aim and Research Question

This paper will, therefore, attempt to analyse whether this proposition is effective or not. In addition, a theoretical framework for an employer-paid parking cashing out scheme will be proposed, hence the research question: *To what extent does Cashing Out Employer-Paid Parking help to reduce car use?*

1.3. Methodology

To answer the above-mentioned research question, this paper will mainly be centred and based on desk research. A qualitative secondary research will be utilized in order to understand the process and the outcome of different TDM policies. This secondary research will therefore firstly able an evaluation of the works previously done and secondly, show the relationship between the various works. From this research, the literature review will relate to an overall Cashing Out Employer-Paid Parking measure that will be formulated.

1.4. Structure of the Paper

The outline of the research paper is as follows. Firstly, a literature review on the topic of congestion pricing will be performed. A description of the theory will be provided, along with an analysis of its effectiveness. Moreover, the carpool TDM strategy that aims at reducing work-related congestion will be defined and analysed. Secondly, an analysis of the employer-paid parking scheme will be performed, where the concept will initially be described, and its efficiency will be assessed. This will be followed by the concept of employer-paid parking cashing out and the benefits as well as the costs of the scheme will be enumerated. Additionally, a few examples of the cashing out option in real life practice will

be studied. The literature review will then be followed by tables that summarize the main outcomes of the papers used in this research, as well as a discussion of all the TDM measures debated in the research. Thereafter, a presentation of a framework for the most important factors for a successful implementation of the employer-paid parking cashing out scheme will be shown. This will then be followed by an overall conclusion.

2. Literature Review

Before fully tackling the topic of employer-paid parking cashing out, it may be interesting to understand why other TDM policies may be successful or unsuccessful. The following section of the paper will, therefore, address the topic of congestion pricing, one of the most used TDM measures. This will then be followed by an analysis of the carpool TDM policy, which is specifically targeted at reducing car use for work-related reasons in the morning rush hours. Once these TDM policies are analysed and understood, it will be easier to understand how employer-paid cashing out policies affect traffic demand.

2.1. Congestion Pricing

As previously explained, the morning traffic rush to the CBD is a large externality when it comes to transportation. A lot of different schemes that use price incentives, public transport and re-routing alternatives, are used to try to shave the peak demand in travel. One of these pricing systems is the congestion pricing scheme, which is defined as, a pricing scheme that charges vehicles in accordance with the level of congestion present in the area (Mallard & Glaister, 2008). Economists have been suggesting congestion pricing as a solution to solve some traffic and pollution problems in cities for an extended period of time. However, not the same enthusiasm has been shared amongst politicians and the public, for reasons explained at a later stage (Eliasson & Mattsson, 2006). The argument for is that congestion pricing encourages a more efficient use of the available road infrastructure and also can generate extra government revenue that could be used for investing in road and public transport systems (Eliasson & Mattsson, 2006).

Around the 1990s in the USA, the interest for congestion pricing had grown for three main reasons (DeCorla-Souza, 1994). Firstly, it was recognized and understood that it would not be possible for cities to “build their way out of congestion” due to funding and

environmental limitations (DeCorla-Souza, 1994). Secondly, in 1990, a Clean Air Act Amendment was established in the USA, which led to an emphasis on reduction of vehicular travel demand, environmental and economic efficiency, had increased the interest in congestion pricing (DeCorla-Souza, 1994). This today would also be relevant to the 2015 Paris climate conference agreement. Thirdly, in the 1990s, they had recently invented the electronic toll collection technology (ETC), which replaced the need for human labour and did not require the traffic to stop in order to pay the tolls (DeCorla-Souza, 1994). These reasons did raise the interest for congestion pricing schemes within dense urban areas and hence these schemes were applied in certain cities. Today, congestion pricing is one of the most employed road-user charges in congested cities and this scheme, in theory, has four main types of direct effects on the society, two negative and two positive (Small, 1992). The two negative ones are the actual payments of the congestion pricing and the inconvenience of the people who do not wish to pay the fees (Small, 1992). In other words, the inconvenience means the change of transportation mode or re-routing in order to avoid the fee, and this inconvenience cost should not exceed the price of the fee (Small, 1992). The positive ones are the benefits for the drivers who encounter less congestion and the benefits from the revenue on the congestion pricing (Small, 1992).

However, in practice, this enthusiasm has not been shared with the public and the politicians as it has been revealed that congestion pricing is very tough for the public to accept when it is proposed in this particular form (DeCorla-Souza, 1994). There are a variety of reasons why the public fails to accept this road-user charging form. The first reason mentioned is that there is an abundance of people who feel themselves being losers under this road-user charge scheme (DeCorla-Souza, 1994). Secondly, congestion pricing is regarded as just another tax for some drivers, and only benefits the government and not the users (DeCorla-Souza, 1994). Thirdly, this congestion pricing can be perceived by some users as being unfair (DeCorla-Souza, 1994). It has been argued, within several works, that congestion pricing will affect people with higher income differently as compared to those with lower income. A few examples of inequality are that higher income users have a higher value of time and may feel that the time gain is worth the charges, as compared to the lower income users (Arnott, de Palma, & Lindsey, 1994). Additionally, the low-income drivers are more price sensitive and also have a lower value of time and may find it too expensive for the time gain

(Eliasson & Mattsson, 2006). Therefore, drivers with lower economic margins will suffer the most from congestion pricing (Eliasson & Mattsson, 2006). Moreover, lower income drivers usually have fewer possibilities when it comes to deciding at what time to go to work or with what mode of transportation and hence cannot avoid peak charging hours (Arnott, de Palma, & Lindsey, 1994). On the other hand, if the road and public transport investments are not fully financed by the congestion charges, they have to be financed by income taxes, and if a government uses a progressive tax scheme, then the higher income owners will be charged more and hence suffer the most (Arnott, de Palma, & Lindsey, 1994). It has also been discussed that the individuals who are driving the most frequently to the congestion charges locations are the ones who will be affected the most (Eliasson & Mattsson, 2006). Since high-income drivers will probably be making more trips to the CBD, it is still they who will reduce car trips the most, pay more fees and experience a higher net loss on average (Eliasson & Mattsson, 2006). However, this, in no way, should conceal the fact that low-income drivers that are in the same situation as high-income drivers, will be more affected by the charges (Eliasson & Mattsson, 2006). This shows the inequalities between low and high-income owners when it comes to congestion pricing. Lastly, it is often problematic to communicate to the drivers that they will have to start paying for something they already receive for free (DeCorla-Souza, 1994). It, therefore, can also be perceived as politically difficult, since political parties may be less inclined to ask drivers to pay for something that is supplied for free (Small, 1992). Likewise, it gets even more complicated if that particular driver made long-term decisions, such as where to live, what car to purchase on the basis of the current pricing for road usage (DeCorla-Souza, 1994). These are thus the main reasons why congestion pricing is often regarded as being unfair or inefficient at charging the correct prices for road-users.

However, the most significant finding of congestion pricing, is that, for this measure to be effective and somewhat accepted, it all depends on how and what the revenues will be spent (Eliasson & Mattsson, 2006). This is, therefore, a condition that the local policies will decide upon and that will affect the public's opinion. It is interesting to note that there may be difficulties for the public and the politicians to accept congestion pricing schemes, where the most influential factor is what the revenues will be spent upon. In other words, most drivers do not mind the actual pricing of certain roads, if the revenues acquired from the

congestion pricing are spent on matters they find acceptable and they are informed and aware of this information.

Since there are differences between theoretical applications and the real life outcomes of setting such a congestion pricing scheme, it may be interesting to analyse a real life example. A study on the cost and benefits of the congestion pricing scheme implemented in Stockholm, Sweden was performed and interesting results came to light. The main finding is that a real (and not theoretical) congestion pricing system, with practical and political limitations, will however in most cases not be able to cover investment and operating costs and hence will not be socially beneficial (Eliasson, 2009). However, when it comes to the case study of Stockholm, it was found that the congestion pricing system yields a large social surplus, enough to cover the operating and investment costs and recover the costs within four years (Eliasson, 2009). Additionally, the value of the time gained due to less congestion was found to be much higher as compared to the paid charges (Eliasson, 2009). This, therefore, shows that some time was indeed saved for the drivers and less congestion occurred in Stockholm. However this study did not ask the users for their satisfaction with the congestion pricing system and as stated earlier, what matters the most is what the revenues are spent upon. It is, therefore, difficult to properly assess the users' dis/satisfaction with the congestion pricing scheme.

2.2. Carpooling

Since it was shown that congestion pricing can somewhat be difficult to implement and does not yield the intended wanted results, it may be interesting to look at some other traffic management tools. Another TDM tool that is of relevance with traffic for work purposes is the carpooling scheme. Carpooling is defined as a situation when two or more trips are performed simultaneously in one vehicle and can often also be called carpooling, ridesharing or car-sharing interchangeably (Vanoutrive, et al., 2012). Carpooling is one of the many TDM tools used by transport policies that try to stimulate a reduction of the number of vehicles on the road (Vanoutrive, et al., 2012). This tool was first implemented during World War II, in order to cope with the oil and rubber shortages as well as during the 1970s oil crisis (Vanoutrive, et al., 2012). Recently, during the 2008 Beijing Olympics, carpooling was implemented in order to response to the driving restrictions imposed by the competition

(Wang, 2011). Today, carpooling is encouraged by mobility management policies in order to put more importance on the issue of sustainable transport (Vanoutrive, et al., 2012). The aim of carpooling is to create a reduction of transport-related pollution, a reduction of noise and a decrease in congestion levels (Vanoutrive, et al., 2012). The aims are therefore very similar to the previous TDM tools discussed. Carpooling is the second most used mode of traveling to work, but is, however, often the least understood (Teal, 1987). Moreover, there are a lot of different carpool strategies which can be classified into four broad categories, which are the following, firstly employer-based actions, secondly parking availability and cost, thirdly traffic regulation and control and lastly travel cost (Ben-Akiva & Atherton, 1977). However, for the purpose of this paper, there will be a closer focus on the employer-based actions category. It is, therefore, noticeable that carpooling can be considered a very interesting TDM tool since it did produce some reduction in the amount of single-occupancy vehicles in the past, especially when it was applied to employment centres where employees could converge to the same destination (Correia & Viegas, 2011). Hence, carpooling, in theory, could lead to a large reduction in the use of private vehicles, however, there are two main reasons why this scheme has obtained a limited success in practice (Correia & Viegas, 2011). These are, firstly the psychological barriers associated with riding with strangers and secondly, the inflexible schedules associated with carpooling (Correia & Viegas, 2011).

Since carpooling is an alternative mode of transportation and is usually compared to either driving alone or taking public transport, it may be interesting to look at the difference between these modes. Carpooling can be inferior to both driving alone and public transport riding as well as superior to both in other respects (Teal, 1987). Carpooling is inferior to driving alone because carpooling requires additional travel time due to the need to pick up and drop off the carpool passengers (Teal, 1987). More importantly, car-poolers are affected by a greater schedule rigidity and hence reduces convenience for carpool members (Teal, 1987). Additionally, carpool can create a more problematic social environment due to a lack of privacy (Teal, 1987). Moreover, when compared to public transit, carpooling can also be less convenient if there is a high quality public transport network that offers more frequent departures and hence a more flexible schedule than carpooling (Teal, 1987). Carpooling can also be more expensive than public transport if the destination of the carpool is the CBD of large cities where usual high parking fees apply, additionally, for a lot of commuters, the

anonymity of public transport traveling is more comfortable than the social environment of carpooling (Teal, 1987). On the other hand, carpool can have important advantages as compared to the two above mentioned transportation modes. Due to the cost sharing of carpooling, the car-poolers' personal commuting expenses are at least 50% cheaper than driving alone (Teal, 1987). Furthermore, carpooling can be vastly more spatially flexible than public transport if two co-workers live in proximity to each other in urban areas that are not very accessible by public transports for example (Teal, 1987). Also, carpooling can be more time saving than transit, as the average transit commuting trip required about 70% more time than the average carpool trip, although the carpool trip was somewhat longer in distance than the public transport (Fulton, 1979).

It was furthermore discovered that three different types of car-poolers could be compartmentalised into different categories (Teal, 1987). The first category is the household car-poolers, who are individuals that live in the same home and commute together and the second category is the external car-poolers, who are unrelated individuals that commute together and share the driving responsibilities and these were found to operate around 4-5 days per week (Teal, 1987). The last category is the carpool riders, who are individuals that commute with unrelated workers but who never provide a vehicle and hence are always passengers (Teal, 1987). In addition, it was also studied by Correia and Viegas (2011) that in general the most promising and most prompted car-poolers will be the young drivers who study or, if employed, do not have a managerial status or a liberal profession, with a low salary where the impact of carpooling can be seen on their monthly budget. It was also found that these low-income owners are the ones that are most likely to aim at reducing their commuting costs and hence use carpooling (Teal, 1987). The amount of vehicles available per household also has a strong influence on the probability of an individual being a car-pooler (Teal, 1987). Within the households that have fewer vehicles than workers, 38% of automobile commuters are car-poolers as compared to only 15% when there are equal or more amounts of vehicles than workers in a household (Teal, 1987). Additionally, nearly 60% of carpool commuters emerge from households that have less vehicles than workers (Teal, 1987). To summarize, the commuters who are the most likely to carpool are the ones that need to make long trips, those who have a relatively high cost of commuting if they drive alone and households with fewer vehicles per workers (Teal, 1987).

Several studies have been performed on the topic of carpool where its effectiveness has been evaluated. According to Ben-Akiva and Atherton (1977), there are four main findings on the analysis of various carpool strategies. The first one being, that the carpooling incentives provided would most likely attract transit as well as drive-alone commuters that can lead to only a small increase in ride sharing, hence a small decrease of vehicle kilometre travelled (VKT) (Ben-Akiva & Atherton, 1977). Secondly, the “disincentives” (such as pricing) are far more effective than the carpooling “incentives” in decreasing singular-occupancy trips and increasing transit use, but often these “disincentives” are less accepted by the public and can be more difficult to implement (Ben-Akiva & Atherton, 1977). Thirdly, due to the above mentioned dilemma, a combined program of “incentives” and “disincentives” might prove to be more effective in increasing carpooling, reducing congestion as well as VKT and fuel consumption (Ben-Akiva & Atherton, 1977). This can be particularly interesting because, when significant parking “incentives” and “disincentives” are combined, they often appear to be the most effective way to encourage an increase in carpooling (Ben-Akiva & Atherton, 1977). Moving on, the last main finding explains that carpooling strategies that are related to work trips, actually result in an increase in travel for non-work purposes as there is a greater availability for non-members of a household during work hours since the vehicle is not used for work travels (Ben-Akiva & Atherton, 1977). This increase in non-work VKT can go as far as offsetting one third of the reduction in work VKT (Ben-Akiva & Atherton, 1977).

The problem with implementing such a scheme on a wider level is that the majority of commuters are not motivated to carpool due to relatively short trips, low cost for commuting and a high level of vehicle availability, as well as the very low flexibility involved in carpooling (Teal, 1987) (Correia & Viegas, 2011). It is only when the trips are long, when commuters have a lower economic status and commuting costs are high that the commuters will be most likely to engage into carpooling schemes without any organized assistance (Teal, 1987). This implies that the overall level of carpooling will not increase drastically, if left in a “natural” state, without a widespread formal organized nudge (Teal, 1987). It was even shown that in the Lisbon region, despite the simple concept of carpooling, which can seem effective in theory, carpooling has not been able to produce significant promising positive results in decreasing the amount of urban congestion in cities (Correia & Viegas, 2011). Even the carpool club, which was designed to facilitate the flexibility of the carpooling scheme, showed no additional

benefits of flexibility compared to the inconvenience of traveling with “random” commuters (Correia & Viegas, 2011). Nonetheless, this scheme still appears beneficial to a certain social group whose economic variables, mentioned earlier, make carpool a very appealing scheme (Correia & Viegas, 2011). Carpool is therefore still viewed as a realistic alternative for lower economic status commuters than for those who can easily afford the commuting trips (Correia & Viegas, 2011). It was additionally explained that the difficulty in parking plays a vital role in defining the carpool attractiveness (Correia & Viegas, 2011). It is therefore, as mentioned earlier, important to understand that such a scheme will not be very effective when applied on its own and not with the help of another “incentive” or “disincentive” scheme. This shows that carpooling can be an effective scheme when applied in an ideal setting with the help of some other TDM schemes.

2.3. Employer-Paid Parking

Now that the analysis on the congestion pricing scheme and the carpooling scheme is completed, a closer look at a different approach to tackle congestion can be performed. It is interesting to look at which side to involve with the TDM scheme. Most TDM are focused on the demand side of transportation, in this particular case the employees for example, either aiming at charging the commuters or at using disincentives to use their cars (Vanoutrive, et al., 2012). Consequently, an alternative view would be to involve the employers with such TDM schemes (Vanoutrive, et al., 2012). The reason is that employers have a privileged relationship with their employees and can be regarded as intermediaries between the government and the mass commuting population (Vanoutrive, et al., 2012). Additionally, involving the private sector can be less costly on the public budget than trying to involve the public sector (Vanoutrive, et al., 2012). Finally, employers are more efficiently organized to apply TDM schemes, such as parking restrictions or installing bicycle facilities, as compared to the general public (Vanoutrive, et al., 2012). This introduces adequately the next section of this research paper, which focuses on the employer side of implementing a TDM scheme to try to aim at reducing congestion in urban areas, more specifically, employer-paid parking and its alternative, the cashing out approach.

2.3.1. The Concept of Employer-Paid Parking

Since it is somehow difficult to accurately charge road-users with such schemes, it may be useful to investigate what creates such a peak amount of travels to the CBD, especially before and after business hours. It is interesting to look at one particular scheme that may affect travels, which is called employer-paid parking. Employer-paid parking is a scheme used often in the U.S.A. and elsewhere, which consists of the employers providing free parking to their employees at the work site (Shoup, 1992). In other words, employees are allowed to park their cars during office hours for free, which may seem as a generous act from the employer. However, according to several studies, this sort of free parking does generate extra travels (Shoup, 1992). It is thus important to understand how and why employer-paid parking generates extra trips to the CBD during the rush hours, which will be the focus of the next section of this research.

2.3.2. Employer-Paid Parking Can Be Inefficient

Employer-paid parking may seem like a generous benefit given by employers to their employees, however it has been observed that this scheme is also an invitation to drive to work alone and therefore often works against costly public policies that aim at reducing traffic congestion, pollution levels and energy consumptions (Willson & Shoup, 1990) (Shoup & Breinholt, 1997) (Shoup, 1992). The employers' offer to pay for parking will stimulate a change in behaviour for some drivers, for example from taking the public transport to using the car, since the employee only has to pay the cost of driving, but not the parking costs (Shoup, 1992). Moreover, employer-paid parking is said to be privately wasteful and publicly harmful (Shoup, 1992). If it is assumed that a parking spot at work is worth less to an employee than to an employer, for example the employer values the parking spot at \$100, hence pays it as a parking subsidy, and the employee values it at \$60, then it can be seen why it is privately wasteful (Shoup, 1992). Indeed, this represents a \$40 net loss of income to the employee, compared to the alternative of receiving a \$100 subsidy (Shoup, 1992). It is also publicly harmful, since it is thought that employer-paid parking is responsible for an increase in trip generation to work, and contributes to already serious traffic and air pollution related problems (Shoup, 1992). This section of the paper will therefore explain in detail where employer-paid parking fails to provide social and private benefits.

A survey performed in the USA during the 1990s, discovered that up to 9 out of 10 commuters who drive to work, pay nothing for parking their car all day at work, due to free parking or the employer paying for it (Willson & Shoup, 1990) (Shoup, 1992) (Shoup & Breinholt, 1997). In 1990, the Nationwide Personal Transportation Survey that was conducted found that 91% of trips generated to work were by car and these cars had, on average, an occupancy rate of 1.1 person per car (Shoup, 1992) (Shoup & Breinholt, 1997). This was compared to the 1983 survey and an increase in the percentage and a decrease in occupancy rate could be seen (Shoup, 1992). This then implied that around 83 vehicles were driven to work per 100 employees (Shoup, 1992) (Shoup & Breinholt, 1997). It was also shown that a total of 19.5 million parking spaces were offered for free to employees (Shoup & Breinholt, 1997). Out of those, 67% of the free parking, or approximately 13 million parking spaces, are leased by small firms, which seems reasonable since they do not own the property on which they are located (Shoup & Breinholt, 1997). Furthermore, 98% of firms that lease spaces offer them for free to their employees and 97% of firms that own spaces offer them for free too (Shoup & Breinholt, 1997). It is consequently worthy to note that this shows a large dependency for singular vehicle use in the USA and that these figures do not only represent the effect of employer-paid parking only, but instead represent the observation of all work-related trip generation.

According to another study performed on the commuters of Los Angeles (LA) more specifically, there are three ways to illustrate how and why employer-paid parking is a strong stimulus to drive to work alone (Shoup, 1992). It was additionally shown that there was 91% of employees that park for free at work in the Los Angeles region (Shoup & Willson, 1992). The first aspect is that, receiving a free parking spot at work is often worth more than receiving free gasoline for the trip to work (Shoup, 1992) (Shoup & Willson, 1992). It was indeed shown that, with an average round trip of 58 kilometres for commuters in LA, assuming their car mileage is 11 litres per 100km and the cost of one litre is \$0.4, then the cost of gas for an average round trip is \$2.70 (Shoup, 1992) (Shoup & Willson, 1992). This contrasts drastically with the amount of the subsidy received for the employer-paid parking scheme, when divided on a daily basis, which reaches up to \$3.87 or a 43% increase compared to gasoline (Shoup, 1992) (Shoup & Willson, 1992). There is therefore a financial incentive to take the car to work more often. Secondly, even if the tax on gasoline (a policy to discourage

driving) would increase by a large percentage, it would discourage solo driving to work much less than employer-paid parking already encourages it (Shoup, 1992). This indeed shows that employer-paid parking counteracts other policies that aim at reducing car use, such as the gasoline tax. Thirdly, a comparison between the employer-paid parking scheme and a hypothetical congestion toll can help illustrate the unwanted effect of employer-paid parking. If the earlier assumptions hold that the average round trip is 58 kilometres and the average parking subsidy is \$3.87 a day, then the subsidy is equal to \$0.07 per kilometre travelled (Shoup, 1992). If the hypothetical congestion toll charged 7 cents per kilometre travelled, the reduction of traffic would not exceed the amount that employer-paid parking encourages (Shoup, 1992) (Shoup & Willson, 1992). Due to the above mentioned illustrations, traffic in the rush hour increased much more than expected. Shoup (1992) showed that, in the CBD of LA, for every 100 employees, 51 employees had their parking fees paid for by the employers, and that employer-paid parking did increase the amount of vehicles driven to work by approximately 7 to 28 cars per 100 employees or on average stimulated the driving of an additional 19 cars to work, a 37% increase. More striking statistics show that, when asked, 48% of drivers stated that they would go to work alone if they had to pay for parking and on the other hand, 69% of drivers stated they would go alone to work if they were parking for free (Shoup, 1992). Moreover, it was shown that when drivers have to pay for parking, they use on average 874 litres of gasoline solely to get to work for one year (Shoup, 1992). On the other hand, drivers who receive free parking will use on average 1166 litres per year, where this increase can be represented as an additional 2110 VKT for work purposes (Shoup, 1992) (Shoup & Willson, 1992). Additionally, it was shown that drivers who pay to park at work create roughly 29.1 of VKT whereas drivers who have free parking use 38.8 VKT per day (Shoup, 1992) (Shoup & Willson, 1992). Employer-paid parking stimulates therefore an additional 9.7 VKT per day or a 33% increase for each employee because of the incentive to park for free at work (Shoup, 1992) (Shoup & Willson, 1992). Indeed, it is therefore clear that offering free parking does increase the amount of solo drivers as well as the amount of travels generated to the CBD for work-related reasons (Willson & Shoup, 1990). This increases all the negative externalities that are related to traffic, such as time loss, air pollution and additional consumption of resources.

When looking at a European country, it was moreover discovered that in the Netherlands, there are about 3 million employer-paid parking provided, which adds up to around 45% of all the Dutch employees that can park for free (van Ommeren & Wentink, 2012). It has additionally been argued that, since employer-paid parking is not a taxable benefit, such scheme can induce an overall welfare loss (van Ommeren & Wentink, 2012). It was shown, using Dutch data, that such tax policies induce welfare losses of around 10% of employer parking resource costs (van Ommeren & Wentink, 2012). When accounting for the amount of free parking provided in the Netherlands, this can accumulate up to a €230 million welfare loss to the society due to this subsidy not being taxable. (van Ommeren & Wentink, 2012). This small research shows that the problem of employer-paid parking is not only present in the USA but can also be found in European countries such as the Netherlands.

To summarize, this employer-paid parking study shows that firstly, most employers provide free parking to their employees and secondly, employer-paid parking greatly increases the number of cars driven to work (Shoup, 1992). This therefore shows that the parking subsidy offered by a majority of employers, counteracts many government policies that are aimed at reducing car use. Although this policy seems very kind towards employees, there are unwanted effects for the society that overshadow the positive effect of employer-paid parking. In other words, employer-paid parking may look generous at first glance and increase the benefits of workers, however this scheme does increase the amount of single-occupancy vehicle trip generation, which causes negative externalities (Shoup, 1992).

2.4. Employer-Paid Parking Cashing Out Evaluation

After this analysis of the employer-paid parking scheme, where the positive as well as the negative effects have been discussed, the evaluation of the employer-paid parking cashing out scheme will therefore be performed in the following section. The employer-paid parking cashing out scheme was an alternative to employer-paid parking, which was proposed by Donald Shoup, in order to try to reduce the unwanted effects of the earlier evaluated scheme. His attempt at explaining and analysing the employer-paid parking cashing out scheme can be retrieved in several of his academic works and will be the main focus of the sections to come.

2.4.1. The Concept of Employer-Paid Parking Cashing Out

In 1994 in the USA alone, more than 90% of work commuters received free or subsidized parking spaces from their employers at their work place (DeCorla-Souza, 1994). However, this policy was shown to lead to an increase in the amounts of trip generated to the CBD, and also increased the VKT, the congestion, the pollution and all the negative externalities that are related to congestion in general. Therefore, Donald Shoup proposed an alternative policy to cash out employer-paid parking subsidies, the employer-paid parking cashing out policy (DeCorla-Souza, 1994). If an employer offers a parking subsidy to his employees, the employer needs to propose an option to his employees, to receive the fair market value of the parking subsidy in cash, instead of the parking subsidy itself (DeCorla-Souza, 1994). Such a policy therefore aims at reducing the amount of vehicles that are used to go to work in big congested urban areas, and it is said to overcome the objections that congestion pricing creates and additionally can make pricing of commuter parking in general more acceptable due to the option to “cash out” the employer-paid parking subsidies (DeCorla-Souza, 1994). This cash option would be most effective in tempting commuters to carpool where the parking costs would be the highest, as compared to areas where parking costs would be lower (Shoup, 1992). Due to the fact that the areas where the parking costs would be at its utmost are usually the highly congested areas, the option to take cash instead of a parking subsidy would automatically be more effective in urban areas where reductions in congestion are the most needed, by for example pushing commuters to carpool (Shoup, 1992). Additionally, because an employee can always choose to use the cash for non-transportation costs, the choice to receive cash instead of a parking subsidy would also increase the incentive to use more environmentally friendly modes of commuting, such as walking, cycling or using the public transports instead of using the car (Shoup, 1992). This scheme proposed by Shoup would therefore not be very useful and effective if used on its own, that is without using other methods that would help reduce congestion and all of the negative externalities associated with it. Moreover, such a proposition to receive cash instead of a parking subsidy would also increase the incentive to use other TDM measures.

As a simple example, let's assume that the market price for a parking spot at one's work site is \$100 a month and that this worker would drive to work alone if the cost of parking would be less than \$60 a month (Shoup, 1992). However, if that worker would have to pay

anything more than \$60 a month to park at work, he would then instead choose to use a different mode of transportation, such as public transport, carpool or the bicycle (Shoup, 1992). Therefore, if the employer offers free parking to work, this worker would choose to drive to work, since the costs of parking would be \$0 (Shoup, 1992). But on the other hand, if the employer offers the choice between free parking space and receiving \$100 per month, the employee would prefer the cash since the parking is worth \$60 to him (Shoup, 1992). This simple example shows how, some individuals who value parking less than the subsidy provided, would be more inclined to switch to another transportation mode if they could receive this subsidy in cash.

Before analysing the benefits and the costs of employer-paid parking cashing out, it is important to understand the effect of suppressing the employer-paid parking in several firms. Some studies that were performed showed that parking subsidies are a very important factor when determining which mode of transport commuters use (Willson, 1992). It was predicted that in very large CBDs, on average 25% to 34% less cars would be driven to work if the employers needed to pay for their own parking at work, rather than parking there for free (Willson, 1992). It was also shown that the parking costs and the travel time would heavily influence the choice of which mode of transportation commuters use (Hess, 2001). Therefore, these free parking subsidies clearly work against some costly public policies that aim at reducing solo car use, as these statistics show, and thus increase the externalities associated with car use, such as traffic congestion and pollution (Willson, 1992) (Hess, 2001). It is very important for policy-makers to understand that employer-paid parking subsidies play an important role in choosing the mode of transportation for commuters in order to go to work (Willson, 1992). Moreover, it suggests that raising the cost of parking at work and decreasing the transit travel time by improving service and decreasing headways will indeed reduce the amount of commuters driving alone to work (Hess, 2001). In addition, it was explained that when employers reduce or remove parking subsidies, a decrease in solo driving, due to a shift to carpooling or public transport, can be seen and this conclusion was based upon several studies of parking subsidies in a variety of settings (Willson & Shoup, 1990). Results of studies show that urban planners will have the biggest success and effect in influencing the mode preference of commuters by charging them the true cost of parking or allowing them to “cash-out” that parking allowance and increase their income (Hess, 2001). It is thus valuable to

understand that, at least reducing the amount of subsidies offered, by giving the choice to have the subsidy or cash instead, can help reduce by a small amount the number of cars used to go to work.

2.4.2. The Benefits of Employer-Paid Parking Cashing Out

Now that the concept of employer-paid parking cashing out is adequately explained, it is worth investigating the benefits as well as the costs of such a scheme. There are several research papers that have analysed the benefits and the costs of employer-paid parking cashing out, which will be evaluated in this section, and the costs will be evaluated in the next section. The following section will therefore analyse the view of different authors with regards to the benefits of the cashing out option.

According to DeCorla-Souza (1994), there are several individuals that gain from the cashing out policy. Firstly, the employees who decide to switch to a carpool scheme can get the extra cash straight away in their pocket for additional spending (DeCorla-Souza, 1994). Secondly, employees who decide to switch to public transport will be able to finance their fares with the extra cash (DeCorla-Souza, 1994). Lastly, the government could also benefit from such scheme as the additional cash that employees receive from the employer is taxable as income, and the benefits for those who switch are progressive (DeCorla-Souza, 1994). In other words, the poorer benefit the most as they receive a larger percentage of their income (DeCorla-Souza, 1994).

It was furthermore shown that the employees are the ones that benefit the most from this scheme (Shoup, 1992). Most proposals that aim at causing some disincentives to solo drivers use parking prices, but on the other hand, the option to receive cash instead of the subsidy will not cause any discomfort to any commuters (Shoup, 1992). Rather than restricting the employee's options, cashing out adds a new option to the employee (Shoup, 1992). Thus, employees who prefer to rideshare, receive cash or use another mode of transportation are clearly better off as a result of this policy, whereas the employees who continue to take the tax-exempt subsidy are unaffected (Shoup, 1992). Shoup goes even as far as saying that the employees who continue to take the tax-exempt subsidy are also "better-off" due to the cleaner air and less congested roads while driving to work, as a result of this policy (Shoup, 1992). However, commuters who still decide to drive to work will "pay"

for their “free” parking, because commuters who forego the cash in favour of the parking are thus in fact spending that cash to pay for parking (Shoup, 1992). This shows that the employees who do choose the cash will be in most cases better off and the ones that still decide to drive will be somewhat unaffected by this policy. An additional feature of the cash option shows, in the USA, that due to the fact that low-income earners are in the lowest tax brackets, they would gain the most after-tax cash from the taxable allowance, which heavily contrasts with congestion pricing in general (Shoup, 1992). Moreover, the cash allowance would be much larger in proportion to a low-income earner, so this cash option would undoubtedly improve the relative well-being of the low-income earners (Shoup, 1992). What is more, some employees who are not able to benefit from the employer-paid parking subsidy, such as handicapped employees who cannot drive to work, will now be able to benefit from the cash in lieu of the parking subsidy, and can benefit to the same extent than non-handicapped employees would (Shoup, 1992). This contrasts drastically with congestion pricing schemes, who usually are harsher on low-income earners, and do not benefit commuters who have disabilities and restrictions when using the car. This is therefore a major additional positive feature as compared to congestion pricing.

It was interestingly found that cashing out can have very large positive welfare effects (De Borger & Wuyts, 2009). In a study performed in an experimental mathematical setting, where the cashing out scheme is compared to a congestion tax reform, some differences can be noted (De Borger & Wuyts, 2009). In that comparison, it was shown that with the cashing out option, the amount of employees commuting by car reduces from 66.67% to 61.01%, which can be seen as a significant change (De Borger & Wuyts, 2009). Additionally, with the cashing out scheme, the amount of public transport use rose from 33.33% to 38.99%, which once again can be seen as a significant improvement (De Borger & Wuyts, 2009). Consequently, congestion declined substantially as the average speed rose from roughly 40-43km/hr to almost 50km/hr and the marginal external cost of car use reduced by approximately half of what it used to be (De Borger & Wuyts, 2009). These are to most important and significant positive effects on the welfare that were discovered in this research. It is hence clear that this cashing out option can help reduce congestion and can even help to a certain extend the least favoured individuals in the society.

2.4.3. The Costs of Employer-Paid Parking Cashing Out

Now that the benefits of the cashing out option have been identified, a better picture of the scheme can be observed. However, there are always positives as well as negatives for every scheme or policy that is implemented. The following section will analyse the costs of the cashing out option with the help of several works that have criticised the employer-paid parking cashing out scheme and its effect on the society.

According to DeCorla-Souza (1994), there are several minor costs associated with implementing a parking cashing out option, but there are no major losers from such a policy. He claims that the employer will not have any extra costs than without the cashing out option, but that the employer will simply pay the employee that prefers to receive the cash, the amount that the employer would previously pay to the parking operator (DeCorla-Souza, 1994). Moreover, the employees that prefer to drive will not have to pay any more or any less than previously paid, so such a policy would not have some additional costs involved (DeCorla-Souza, 1994).

According to the USA law receiving a parking subsidy is exempt from taxes, however on the other hand, claiming cash instead of a subsidy would then be regarded as extra income and such amount should be taxed (Shoup, 1992). Therefore, according to Shoup (1992) as opposed to DeCorla-Souza, there are indeed extra costs that the employer has to incur. It would cost the employer, in the USA, an additional 4% to 12% to pay an employee that chooses the cash option in lieu of the tax-exempt parking subsidy (Shoup, 1992). Moreover, since the USA federal and state laws exclude the subsidy from taxable income, the favoured tax treatment makes it tax-efficient for employers to provide free parking to their employees rather than offering a cashing out option (Shoup, 1992). Here is an example of how much an employer would have to pay in California to offer the equivalent of a \$1 tax-exempt parking subsidy to an employee, assuming that this employee has an income that is above \$50,000 a year (Shoup, 1992). The employer would have to pay a payroll tax of 11.55% and the employee would have to pay a federal and state tax of 45% on every additional dollar of wages (Shoup, 1992). So for the \$1 additional income, the employer would have to pay \$1.12, before tax, for the employee to receive 55 cents after tax, therefore the employer would have to pay $\$1.12/\$0.55=\$2.03$ in taxable cash for the employee to receive, after tax, an amount of \$1

tax-exempt parking subsidy (Shoup, 1992). It is worth therefore twice as much for the employer to offer a cashing out option to its employee and offers a large incentive for the employer to subsidize employee parking (Shoup, 1992). Employers are therefore only doing what the USA law “tells” them to do (Shoup, 1992). It was additionally noted that there is an important implication of the cashing out parking policy, which is, due to these extra costs, the firms’ profits would decline (De Borger & Wuyts, 2009). These are the most important and significant negative effects on the welfare that were discovered in this research. It is clear that there are less costs than benefits and this could prove to be beneficial for the cashing out policy.

2.4.4. Employer-Paid Parking Cashing Out in Practice

Now that the analysis of the employer-paid cashing out scheme is completed and the benefits as well as the costs have been identified, it would be interesting to look at whether or not this policy has been successful in real life examples. The best city setting where such policy can be analysed is the city of Los Angeles in the USA. In 1989, the city of LA took a step in the right direction as they implemented an employee transit subsidy ordinance, which requires that each employer in the CBD that offers free parking, has the obligation to offer a \$15 per month public transport subsidy to every employee that doesn’t drive to work for their use in commuting to and back from work (Shoup, 1992). The ordinance did not receive any negative feedback nor opposition when it was implemented, and the figure of \$15 per month was chosen because this was the maximum transit subsidy amount that was exempt from taxes (Shoup, 1992). Following this law, in 1992, California converted the employer-paid parking from a matching grant to a block grant for commuting, and required many employers to offer a parking cashing out program if they previously subsidized commuter parking (Shoup, 1997). Following these laws, Donald C. Shoup studied 8 firms that applied the cashing out option and below are the following results of his study.

The report he performed presents a case study of 8 firms that have applied the California cash-out requirement (Shoup, 1997). The results for the 1,694 employees of these firms are as follows, the amount of single-occupancy vehicle drivers that commute to work fell by 17% after this cashing out policy has been applied (Shoup, 1997). Additionally, the number of carpool users has drastically increased by 64%, the amount of transit riders rose

by 50% and the users of bikes or employees that walk to work rose by 39% (Shoup, 1997). Due to this switch of mode of travelling, the VKT for these employees fell by 12%, which induced a reduction of 367 kilograms of carbon dioxide emission per employee per year (Shoup, 1997). On the other hand, the spending of the 8 firms for the commuting subsidy increased by \$2 per employee per month, which can be seen as a reduction of profit for these firms (Shoup, 1997). On a positive note, the USA federal and state income tax revenue rose by \$65 per employee per year due to the fact that many commuters voluntarily switched from a tax-exempt subsidy to a taxable cash allowance (Shoup, 1997). Finally, the employers praised the cashing out option as they claimed that its simplicity and fairness helped to recruit and retain employees (Shoup, 1997). In summary, the benefit/cost ratio for the 8 firms was at least 4/1 and they all show that the cashing out option can benefit commuters, employers to a certain extent, the government and additionally the environment (Shoup, 1997). This shows that there are positive notes to account from the implementation of the cashing out option in the state of California in the USA and once again this can show that the cashing out option could help tremendously to reduce congestion in big, crowded urban areas.

3. Summary and Discussion of the Factors of the TDM Schemes Analysed

Now that the literature review has been completed and all of the research papers have been analysed, the discussion of the main findings can be performed. Before starting with the discussion, tables will be created in order to summarize in a simple form the most important findings of the papers that have been analysed and their positive and negative effects with regards to the topic that was researched.

3.1. Congestion Pricing Summary Table

The following table will depict the main findings of the research papers that discussed the congestion pricing topic analysed above.

Topic of Paper	Author	Year	Main Outcomes
Revenues of congestion pricing	Small	1992	<p>Positive: Less congestion; Additional revenues.</p> <p>Negative: Payments of congestion pricing; Inconvenience for those who do not want to pay; Political difficulty.</p>

Applying cashing out to congestion pricing	DeCorla-Souza	1994	Negative: Difficult for the public to accept; People feeling being losers; Just another tax; Can be unfair.
Welfare effect of congestion pricing	Arnott et al.	1994	Positive: High-income users find time saving is worth the charges; Tax scheme fairer to high-income. Negative: Low-income users find time saving is not worth the charges; Low-income users cannot decide the time to travel and hence cannot avoid peak hours; Tax scheme unfair to low-income. Main result: High inequality between high and low-income users.
Study of Stockholm congestion pricing	Eliasson et al.	2006	Positive: High-income users are less price sensitive. Negative: Low-income users are price sensitive; Low-income drivers will suffer the most; High-income drivers drive more so they have to pay more and experience a higher net loss on average. Main result: High inequality between high and low-income users; Low-income users suffer more than high-income; High dependency of what the revenue are spent upon for public acceptance.
Cost-benefit analysis of Stockholm congestion pricing	Eliasson	2009	Positive: Real case Stockholm able to recover costs in 4 years; Time gain due to less congestion is higher than the paid charges. Negative: Can be difficult to cover investment and operating costs; Can be socially inefficient.

Table 1: Summary of Main Findings for Congestion Pricing

The above table shows that in a theoretical setting, there are supposedly more negative aspects than positive. It is often very unfair to low-income users as compared to high-income users, and the public satisfaction depends heavily on what the revenues gained from the congestion pricing are spent upon. However, in a practical setting, more specifically

in Stockholm, there has been a lot of positive feedback from such a scheme. There are therefore a lot of conflicting opinions that can arise from congestion pricing.

3.2. Carpooling Summary Table

Now that the summary table for congestion pricing was constructed, the next section of the research paper can be summarized. The following table will hence depict the main findings of the research papers that discussed the carpooling topic analysed above.

Topic of Paper	Author	Year	Main Outcomes
Study on who, how and why individuals carpool	Teal	1987	<p>Positive: Cheaper than solo driving; Can be more spatially flexible than public transport.</p> <p>Negative: Additional travel time compared to car use; Higher schedule rigidity hence reduction in convenience compared to car use; More problematic social environment (lack of privacy) than car use; Can be less convenient than public transport; Can be more expensive than public transport; Less comfortable social anonymity than public transport.</p> <p>Main result: Low-income owners most likely to carpool; If fewer cars than commuters, most likely to carpool; Commuters who have to do long trips most likely to carpool; Majority of commuters not motivated due to short trips, low cost and high vehicle availability; Carpool amount will not increase if not encouraged.</p>
Different ways to go to work	Fulton	1979	<p>Positive: Carpooling can be more time saving than using the public transport.</p> <p>Negative: More time consuming than solo driving.</p>
Carpooling in Lisbon	Correia et al.	2011	<p>Main result: Young drivers who study, with low-income most likely to carpool; Majority of commuters not motivated due to short trips, low cost and high vehicle availability; Shown that in practice, not able to</p>

			provide large positive results; Can still be beneficial to the above economic variables users; The difficulty to park plays an important role for carpool attractiveness.
Analysis of carpool incentives	Ben-Akiva et al.	1977	Negative: Disincentives (such as pricing) more effective than carpool incentives in decreasing solo driving; Carpool can result in increase in non-work travel since more vehicles available at home during work times, which can offset the reduction due to carpool. Main result: Carpooling incentives presented only increase carpool by a small amount; Combined program of incentive and disincentive can be more effective.

Table 2: Summary of Main Findings for Carpool

The above table shows that in a theoretical setting, carpool can seem like a good TDM measure to reduce congestion in morning rush hours. There are a lot of positive aspects that can arise from such a policy, however in practice it was shown that carpool can be less effective as there is a lack of motivation to carpool. It was interestingly shown that a combination of incentives to carpool and disincentives to solo car use could be much more effective in reducing congestion, than just providing incentives to carpool.

3.3. Employer-Paid Parking Summary Table

Now that the summary table for carpooling was constructed, the next section of the research paper can be summarized. The following table will hence depict the main findings of the research papers that discussed the employer-paid parking topic analysed above.

Topic of Paper	Author	Year	Main Outcomes
Cashing out option for employer-paid parking analysis	Shoup	1992	Positive: Employer-paid parking is a generous benefit given to employees. Negative: Employer-paid parking is an invitation to drive to work alone; It stimulates a shift from public transport to car use; It can be privately wasteful and publicly harmful; Low occupancy rate per car;

			<p>Increase in traffic during rush hour; Increases the amount of vehicles driven to work by 37%; Increase in amount of gasoline used; Increases the amount of VKT; Counteracts many government policies aimed at reducing car use.</p> <p>Main result: In USA, 90% drivers pay nothing to park at work; Large vehicle dependency in USA; Receiving free parking is worth more than receiving free gasoline.</p>
Parking subsidy assessment	Willson et al.	1990	<p>Positive: Generous benefit given to employees.</p> <p>Negative: Is an invitation to drive to work alone; Increase amount of trip generated to CBDs; Increase amount of solo driving.</p> <p>Main result: In USA, 90% drivers pay nothing to park at work; Large vehicle dependency in USA.</p>
Survey of employer-paid parking	Shoup et al.	1997	<p>Positive: Generous benefit given to employees.</p> <p>Negative: Is an invitation to drive to work alone; Low occupancy rate per car; Large amount of parking for free in USA.</p> <p>Main result: In USA, 90% drivers pay nothing to park at work; Large vehicle dependency in USA.</p>
Employer-paid parking connection to commuting, congestion and pollution	Shoup et al.	1992	<p>Negative: Is an invitation to drive to work alone; Increase in amount of gasoline used; Increase the amount of VKT; Counteracts many government policies aimed at reducing car use.</p> <p>Main result: Receiving free parking is worth more than receiving free gasoline.</p>
Costs of employer-paid parking	van Ommeren et al.	2012	<p>Negative: Since parking subsidy is not taxable, it can create a welfare loss; Welfare loss in the Netherlands of €230 million.</p>

			Main result: Less than 50% Dutch employees park for free.
--	--	--	--

Table 3: Summary of Main Findings for Employer-Paid Parking

The above table shows that, although employer-paid parking can be a very generous and beneficial subsidy offered by the employers, it was revealed in multiple research papers that employer-paid parking actually increases the amount of trips generated to work. It was furthermore shown that employer-paid parking increases the gasoline consumption and hence other negative externalities that are related to additional traffic. There are hence many unintended effects related to employer-paid parking, which more often than not, counteracts costly public policies that aim at reducing traffic congestion.

3.4. Employer-Paid Parking Cashing Out Summary Table

Now that the summary table for employer-paid parking was constructed, the next section of the research paper can be summarized. The following table will hence depict the main findings of the research papers that discussed the employer-paid parking cashing out topic analysed above.

Topic of Paper	Author	Year	Main Outcomes
Cashing out option for employer-paid parking analysis	Shoup	1992	<p>Positive: Employees benefit the most; Since no one is charged, but instead cash is received, no discomfort for commuters; Cashing out adds an option rather than restricts choice; Commuters who choose not to change mode of transportation are unaffected; Individuals who still use the subsidy could be better off due to less congestion and hence less pollution; Low-income earners benefit the most from the extra cash and hence improve their relative well-being; Handicapped employees who could not benefit from the parking subsidy can now benefit from the cash.</p> <p>Negative: Extra costs due to taxable cash of 4%-12% for the employer; More cost efficient to give free parking than to give a subsidy; Employer may have to</p>

			<p>pay the double in order to give cash in lieu of the parking subsidy.</p> <p>Main result: Cashing out could be most effective in reducing traffic where parking is expensive; Since parking is more expensive in highly congested areas, cashing out could be effective where it is most needed;</p> <p>Cash could increase incentive to use more environmentally friendly modes of transportation.</p>
Estimating the effect of employer-paid parking	Willson	1992	<p>Positive: On average, 25%-34% less cars could be driven to work if parking was not free.</p> <p>Main result: Cost of parking has a big effect on commuting choice for workers.</p>
Analysis of the effect of free parking on commuting choice	Hess	2001	<p>Main result: Cost of parking has a big effect on commuting choice for workers; Travel time also heavily influences mode choice; Suggested that increasing parking cost and reducing travel time could reduce solo driving.</p>
Applying cashing out to congestion pricing	DeCorla -Souza	1994	<p>Positive: Additional cash for employees that decide to switch transport mode; Hence able to finance their other mode of transportation; Government could also benefit from additional income tax.</p> <p>Negative: Only minor extra costs associated with cashing out; Employer will have to pay a small additional amount in comparison to just offering parking subsidy due to a taxable income.</p>
Evaluation of the efficiency of the cashing out scheme	De Borger et al.	2009	<p>Positive: Could create positive welfare effects; In a mathematical setting, it was found that cashing out could reduce car use by 5%; Increase public transport use by 5%; Increase average speed by 8km/hr, hence reduce congestion.</p>

			Negative: Due to the additional costs involved with the taxable income, the firm's profits could decline which could make it less attractive to employers.
Case study of 8 firms that applied the cashing out approach	Shoup	1997	<p>Positive: In a real life setting, the cashing out scheme helped reduce solo driving by 17%; Increased carpool by 64%; Increased public transport use by 50%; Increased the amount of bikers and walkers by 39%; VKT reduced by 12%; Reduction of 367kg of carbon dioxide emission in the year; USA tax revenue rose by \$65 per employee per year.</p> <p>Negative: Spending of the firms increased by \$2 per employee per month; Reduction in firms' profits.</p> <p>Main result: Employers praised the cashing out option for its simplicity and claim that it helped keep and acquire employees.</p>

Table 4: Summary of Main Findings for Employer-Paid Parking Cashing Out

The above table shows that there are more positive outcomes than negative for the cashing out approach in theory. This scheme could benefit to a lot of commuters and, as opposed to other TDM strategies, can benefit individuals with different economic backgrounds. The problem with such a scheme is that it is dependent on the tax system of the country in which it is applied. It was furthermore shown that in practice, the cashing out option showed to have a higher positive effect on the society. This overall summary therefore efficiently summarizes the main findings of this research paper.

3.5. Discussion on the Different TDM Measures

Now that the summary tables have been performed and all of the TDM schemes discussed in the research papers have been analysed, it is imperative to consider a framework for a successful and efficient employer-paid parking cashing out option that should be provided by employers who provide free parking at work. The aim of this scheme is to reduce congestion in the morning traffic rush hour, and reduce pollution, VKT and the amount of solo driving to work. The importance of reducing pollution has never been as important as it is

today, with concerns about global warming and the 2015 Paris climate conference agreement, and hence this scheme could have a lot of impact in today's society. In the above literature review, two TDM policies have been analysed prior to investigating the benefits and costs of the cashing out scheme. These two policies are, respectively congestion pricing, which was followed by carpooling. There have been positive as well as negative views on both of these policies in different research papers analysed, and those will be examined in the latter sections. Additionally, a framework for a successful cashing out policy will be performed and the most crucial factors that have made cashing out successful or unsuccessful, which such a scheme should incorporate, will be listed. This framework will more importantly focus on the policy factors that will help reduce all the negative externalities that are associated with traffic congestion in the working hours of the day, which incorporate pollution, gasoline consumption, VKT, reduction in travelling speed and reduction in singular vehicle use. The first part of the discussion will hence tackle the congestion pricing scheme, where the most important positive and negative factors will be discussed.

3.5.1. Discussion on Congestion Pricing

Congestion pricing was found to be, in theory, an answer to the problem of free riding and that the drivers do not pay the full cost of driving their cars on the roads. It has been suggested by economists that the commuters should pay for the cost of driving, but it has always been hard to implement in practice. Due to the growing concern of congestion and the negative externalities that are related to it, congestion pricing schemes started to emerge. In theory, there are some costs as well as some benefits from such a scheme. The benefits that are encountered from such a scheme are the revenues that congestion pricing provides, due to the drivers having to pay a certain fee. Additionally, the drivers should in theory benefit from a reduced congestion in the area where the pricing is implemented. It was however shown that in practice, this pricing scheme was very hard to implement because it failed to attract the likings of both the public and the politicians. It is complicated to explain to the population that they suddenly will have to pay for something that has always been provided for free, and for a politician to do this, may reduce his popularity, which in turn will be negative for that politician. This scheme therefore has a bad perception to the public's eyes. Additionally, it was shown that congestion pricing can be unfair to low-income commuters, as those charges are relatively more expensive for them and hence take a higher proportion

of their income as compared to high-income drivers. Moreover, those high-income drivers may not be bothered by the congestion pricing fee and not change their behaviour at all. On the other hand, commuters who need to travel the most often to these priced areas will also be worse off, as they will have to pay the fee more often. Congestion pricing has been adopted by several congested urban areas and a prime example of the implementation of such a scheme is Stockholm. It was indeed shown that Stockholm successfully implemented this congestion scheme and that a reduction in congestion in the priced areas was seen. This reduction in congestion is a positive outcome of the congestion pricing, however, in these studies, the satisfaction of the population was not assessed and as mentioned earlier, the effectiveness and the acceptance of the scheme heavily depend on what the revenues will be spent upon. These results show that congestion pricing in theory is indeed an adequate pricing scheme, but that it is very hard for the public to accept. The aim of trying to push commuters to use other modes of transportation than the car is not to only annoy them and force them to use a different mode of transportation, but the aim is to educate drivers to the importance and the effect of reducing car use. Therefore, congestion pricing may seem too unfair and too harsh in discouraging commuters to use the car, and in addition, it does not provide incentives to use other modes of transportation but rather only provides disincentives to car use. This discussion should however in no way hide the fact that congestion pricing is successful and efficient at reducing congestion in dense urban areas, but however should raise the question to whether or not there can be a more publicly accepted, fairer and user friendly way to reduce congestion.

3.5.2. Discussion on Carpooling

Since it was discussed that congestion pricing can be an efficient way of reducing congestion, but on the other hand can be hard for the public to accept, the discussion on carpooling can be performed. Carpooling as opposed to congestion pricing, does not impose the public to pay a certain fee to drive in congested areas. Therefore, for economists, this scheme may not seem to provide a solution to the fact that commuters do not pay the full cost of commuting. However, this scheme does in theory, allow for a reduction in traffic in congested areas and a reduction in solo driving, which for the purpose of this paper would seem successful. It was shown, in theory that carpooling could seem like a positive scheme due to the fact that the cost of driving for commuters would reduce and hence would serve

as an incentive for commuters to carpool. It was additionally shown that carpool can be more spatially flexible than public transport as some commuters, where public transport is not available, could still opt for the choice to carpool. It was additionally shown that carpool could be more time saving than public transportation, although carpooling covers more distance. These therefore would seem good incentives for commuters to carpool rather than using their personal car or taking the public transports. There are, however, a number of problems that are related to carpool. It was indeed shown that carpool would take more time than single car use to travel as well as have a lower flexibility, as different individuals need to be picked up and dropped off. The main issue that is related to carpooling is the lack of privacy due to the fact that the car is shared with either strangers or other none-family related individuals, which can be difficult to accept for certain commuters. It was also shown that carpooling could reduce the amount of vehicles used for work purposes, but due to the availability of a car around the household during office hours, the reduced amount of trips generated for work purpose could be replaced in other locations and hence counteract these positive results. This therefore shows that there are a lot of disincentives to carpooling and carpool was shown to be dependent on the amount of vehicles available in the household more than anything else. It is therefore without surprise that, this scheme did not manage to have significant positive results in practice. It was discovered that in Lisbon, the carpool incentives did not prove as successful as the disincentives to car use such as pricing. Commuters were simply not motivated enough to carpool and there were no real changes observed in the amount of vehicles used for work-related purposes. This scheme was seen as less successful and less efficient than congestion pricing, due to the fact that these incentives to reduce car use are less efficient than disincentives to car use. This could suggest that using a combination of incentives as well as disincentives could prove to be the most efficient and most successful way to discourage singular car use in congested urban areas. This discussion shows that carpooling on its own will not have a large impact on the reduction of traffic and therefore may not seem successful in reducing the negative externalities related to congestion. Carpooling therefore, could be a successful scheme if it was used with another TDM measure, which will be the topic of the next discussion section.

3.5.3. Discussion on Employer-Paid Parking Cashing Out

Since it was discussed that carpool can be a smart concept to help reduce congestion, but on the other hand was found to create not enough motivation for the general public, the discussion on employer-paid parking cashing out can be performed. Firstly, it is worth noting again that employer-paid parking can seem beneficial and generous to employees, but has a lot of unintended negative effects. It was shown that employer-paid parking actually increases the amount of solo driving for work-related purposes, due to parking being offered for free to employees. This hence creates a lot of negative externalities that is related to an increase in traffic. More gasoline is therefore used, which creates more air pollution and CBDs are often extremely congested during the morning rush hours. This therefore works most often than not against those costly public policies, such as carpooling or other TDM schemes that aim at reducing car use, and hence may seem very redundant. So why parking spaces should still be subsidized if it creates more problems than benefits?

An alternative option to the parking subsidy has hence been proposed, the cashing out option, which imposes the employer who offers free parking, to offer in lieu of the subsidy, the equivalent amount in cash to employees who wish to use other modes of transportation than the car. This scheme, in both theory and practice, was found to be very efficient in reducing the amount of car use, and in addition an incentive to use another mode of transportation was created. Since some employees would perceive cash as being more valuable than parking, it is hence seen that there would be a reduction in singular car use. This reduction of traffic would therefore reduce negative externalities that are related to congestion, which would coincide with the aim of costly public policies. It was moreover shown that cashing out is more user friendly than congestion pricing, since it does not impose an extra cost to commuters, but on the other hand, creates another option for the commuter to choose from. This can hence be beneficial to politicians as compared to congestion pricing, and additionally, can create more revenue for the government because this additional cash is taxable. Another positive aspect is that, as compared to many other TDM schemes, this measure benefits the lower tier of the society. Indeed, the additional cash is relatively more beneficial to low-income owners, and hence could increase their overall well-being. Additionally, users that usually do not benefit from the free parking, such as handicapped employees, can now benefit from the additional cash allowance. This proves therefore that

the cashing out option is more user friendly than other traditional TDM measures. There are however some costs associated with this additional option. Since the extra income is taxable, this implies that employers will have to spend more money to provide the same amount in cash than to provide a free parking space for their employees. The reason being, the provision of the subsidy for parking is tax-exempt according to the USA law for example, and therefore makes it more efficient for employers rather than providing additional cash. It is therefore unattractive for employers to offer a cash out option to their employees. This additional cost therefore can be responsible for reducing the profits of the company. Furthermore, in practice, it was shown that the cash out option did reduce traffic congestion drastically, as well as increase the use of other modes of transportation, which is the aim of most TDM measures. It however did raise the cost of certain employers and hence reduced their profit, but showed to have worked in general.

This discussion hence becomes interesting. The main problem with the cashing out option is the tax scheme that does not allow for the additional income to be tax-exempt. Additionally, every country is different in their tax system and hence every country would differ in the effect that this policy would have on the profit of the company. The success of this scheme is therefore dependent on the tax system for such a scheme to be implemented in different parts of the world. In short, it depends on the politics of the country in which it is implemented. The main concern posed within this discussion is hence, why should parking spaces be subsidized, and not the citizens? Subsidizing citizens rather than parking spaces would seem even more generous and would increase public acceptance for such a scheme. This scheme is particularly aimed at facilitating “the life” of the commuters rather than making it more complicated for them by charging them for using their car. This policy offers more incentives to use other modes of transportation rather than using disincentives and penalizing commuters. Additionally, this scheme aims directly at educating commuters to use other modes of transportation by tackling the problem from another angle. Traditional TDM measures aim at charging the commuters directly, whereas the cashing out scheme, aims at pushing employers, to directly influence commuters to use different modes of transportation. This subtle difference can prove to be important in trying to reduce the amount of traffic, especially the traffic related to work purposes. To continue even further, such a scheme would prove to be even more effective if another TDM measure, such as carpooling, was used

alongside the cashing out option. A combination of incentives to using other modes of transportation, as well as, disincentives, would prove to affect the commuters in a more user friendly, fair and effective way than to just penalize commuters. However, this scheme will not be put in place on its own, since employers may be hurt by such a policy. It would be the role of policy makers to change certain aspects in the government, which would in turn create additional incentives for employers to use such a scheme. This discussion hence shows that there are friendlier, yet still effective, ways to reduce traffic congestion in dense urban areas. This reduction of traffic can additionally be much more beneficial to the society, as less air pollution and less gasoline consumption can result from such a policy. It is therefore vital that policy makers start to look at ways to reward commuters that wish to reduce congestion, rather than to simply price and hurt commuters who wish to travel to dense urban areas for work-related purposes.

3.5.4. Framework of the Most Important Factors of the Cashing Out Policy

Now that the discussion summary of all of the TDM measures debated in this research paper has been performed, a framework with the most important factors for a successful implementation of the parking cashing out policy will be presented. This framework is constructed with the help of the literature review performed in this research paper and aims at giving a framework that will help implement the cashing out option as well as reduce the negative externalities of traffic in dense urban areas. The first factor that will be discussed is the location factor of the firm within the city and its surroundings.

The location within the city is an important factor in determining the successfulness of such a scheme. From this literature review, it is understandable that such a scheme should be implemented in dense urban areas where there is a traffic problem to solve. The CBD is often where most of the businesses are located within a city, and during the rush hours related to work, these city areas are often the most congested. It is at this area that most of the congestion reduction scheme should be applied. Additionally, the centre of the city is where the parking costs are usually the highest, this would therefore render this scheme more efficient in discouraging commuters to use the car or encourage them to carpool for example. If parking is expensive, commuters will be more inclined not to use the car if they have to pay

for parking at work, and this would help reduce traffic and the negative externalities related to it. It is also important to make sure that there are enough facilities that can replace the car within these city areas. Facilities such as public transport, or some carpooling system are very important as they replace the usage of cars. It is indeed pointless to ask a firm to implement a cashing out option when there are no alternatives to car use available, as it would make the scheme inefficient and useless. From the above mentioned important factors, it can be seen that the firms that are located in the CBD would be the most suited candidates for the implementation of the cashing out option. This is due to the facts that the CBD is the urban area that needs to implement TDM measures the most. It is additionally the area where the parking costs are the highest and also the location where accessibility by other means than the car are very abundant. Therefore, the location of the firm should be centred in the vicinity of the CBD to render this policy even more effective in reducing traffic and hence reducing all the negative externalities related to it.

Now that the location of the firm as an important factor has been identified, the next factor that will be examined will be the size of the firm. It was shown that most of the firms that provide free parking in LA are the small firms. It would make sense to push small firms to implement the cash out policy since they are the ones that provide free parking the most. However, it was also discovered that, applying such a scheme can have a negative effect on the profits of a company since the costs involved will be higher. It is therefore more complicated for small firms to implement such a policy as it is relatively more expensive for a small firm, and this will affect their profits more than a large firm. Additionally, large firms are also more likely to own their parking spaces as opposed to small companies, leasing their parking space. The debate between small or big firm is as a result complicated, and may not prove to be such an important factor. It is however a factor that needs to be taken into account, as small firms might be the ones suffering the most from the cashing out policy, but at the same time are the ones that provide free parking the most. The size, or in other words, the profit that these companies make is an important factor, not as important as location, but still a factor that needs to be considered for the cashing out policy to be implemented in a successful way.

Another important factor to consider, is related to incentives and disincentives. The research examined the fact that disincentives, such as pricing in parking, as compared to

giving the commuter an incentive to use another mode of transportation, are far more efficient at reducing the traffic and its negative externalities. It makes sense that pricing a commuter for parking or entering a congestion pricing area, is more effective at reducing the amount of vehicles in the CBD, but these sort of schemes can sometimes be unfair. However, only giving an incentive to commuters to use another mode of transportation, such as encouragement to carpool, is not as efficient at reducing traffic congestion due to a lack of motivation. It is therefore important to consider using both incentives and disincentives within the policy in order to have a positive as well as an efficient effect on congestion. As for cashing out, it would create a more efficient outcome to implement it alongside another TDM measure such as carpool. Giving a cashing out option gives an incentive to use another mode of transportation and a disincentive to use the car, since now the cost of parking is the forgone cash out option. So if the employer additionally promotes carpooling, both TDM would benefit and the disincentives will not seem very unfair due to the additional incentives given. The combination of both incentives as well as disincentives is an important factor when trying to implement the cashing out policy, as it may more efficiently reduce the amount of congestion and its negative externalities.

The last important factor that will be discussed may probably be the most important one, the fiscal and legal policy of the country where the implementation occurs. This is particularly important, because this can be different in each country where the cashing out policy is implemented. Moreover, this is a country wide policy so it can only be affected at national level, and not at a city level for example. As explained in an example in the research paper, a parking subsidy is tax-exempt in the USA and additional income was taxable by around 12% in the 1990s, which made it more expensive for an American employer to pay the cashing out fee. On the other hand, in the Netherlands today, employers are taxed roughly 80% for additional income which makes it even more expensive for Dutch employers, and the policy would be less effective. The fiscal and legal policies that are in place in a different country may even differ from the two previous ones and make it favourable to implement cashing out in that particular country. This means that the fiscal and legal policies of the country will heavily influence the success or failure of the implementation of the parking cashing out scheme. This cannot be resolved at a city level or state level, this will directly be dependent at a country level which makes it more complicated to change or influence. To

summarize, the most important factors for a successful implementation of the employer-paid parking cashing out TDM measure is as follows. The firm that implements the cashing out policy should be located in the CBD vicinity, where there is a high accessibility with the public transports and high parking, and the firm should be profitable. Moreover, the implementation should be more successful if a combination of both incentives as well as disincentives is used and lastly, the successfulness of the implementation will depend on the legal and fiscal policies of the country in which the cashing out is implemented. This therefore gives an overall framework to a successful implementation of the cashing out policy and a reduction in traffic, which leads to a reduction in negative externalities such as air pollution, noise and energy waste.

4. Conclusion

In conclusion, this paper aimed at analysing to what extent does employer-paid parking cashing out help reduce the amount of vehicles used in the morning rush hour, and the negative related externalities to congestion and car use and thereafter present a framework for the most important factors when implementing this policy. The main part of this research consisted in examining different TDM measure works from different countries. The first part of this research paper consisted with the analysis of the most used TDM measure, congestion pricing. Congestion pricing was found to be a possible solution to the problem that drivers do not pay the full cost of commuting. In theory, congestion pricing seemed to be efficient, but it was found to be somewhat problematic in practice. Congestion pricing did help reduce congestion in the priced areas, but congestion pricing has been difficult for the public to accept. It is indeed hard to convey to the commuters that they will have to pay for something that has always been provided for free. Moreover, congestion pricing may seem too severe as it does not encourage the use of different modes of transportation, but rather discourages car use, and therefore another TDM measure was analysed. The second section of this paper studied the carpool TDM measure, which in theory may seem to be an efficient way to reduce singular vehicle use. Carpool can be seen as an incentive to rideshare rather than a disincentive to car use. It was, however in practice, exposed that commuters are simply not motivated enough to share their cars with “strangers” or none-family members. It is indeed, for some commuters, sensitive to be driving with different individuals that may not have any relation to this person. Therefore, carpooling

did not show a significant reduction in car use in practice, and it was established that such incentive to use different transportation mode did not have as strong of an impact that a disincentive to car use had. The idea of using both incentives as well as disincentives to car use, consequently seemed to be the best option. The following section of the research paper discussed the problems related to employer-paid parking. This scheme may seem generous to employees, but it was proven to have a negative impact on commuting as it increased the amount of solo driving and subsequently, worked against some costly public policies that are aimed at reducing car use. The cashing out option was therefore introduced by Shoup, and the next part of this research paper aimed at analysing its effectiveness at reducing car use. It was discovered that in theory, cashing out can be very effective at reducing the amount of solo car use. Moreover, cashing out benefited a different social class than most congestion pricing schemes, namely the low-income and the handicapped owners. With the cash received, the low-income commuters are relatively better-off, and the handicapped commuters can now benefit from the cash whereas they could not benefit from the free parking space previously. The negative aspect that is related to cashing out, is that the employers do have to spend more money to provide the same amount of taxable cash than the tax-exempt subsidy, and as a result can have a reduction in profits. Following the literature review analysis, several summary tables have been performed on the different TDM measures examined. The summaries were then followed by a discussion of all the TDM measures proposed, and finally a framework for the successful implementation of the cashing out policy was performed. It was concluded that the most important factors were the location of the firm within the city, the financial size of the firm, a combined use of incentives and disincentives and lastly, the legal and fiscal policies of the country. This therefore tackles the aim of this paper and the research question: ***To what extent does Cashing Out Employer-Paid Parking help to reduce car use?*** is answered.

Furthermore, this research paper conducted had several limitations which were identified. Most of the papers used in this research were focused on different countries and cities, and since the laws and policies in each country slightly differs, some findings were diverse in different countries, even if the policy was used in the same way. This made it therefore more difficult to interpret the results effectively. Moreover, some papers used were performed in the 1990s, and these experiment results may be different today since the

automobile industry greatly evolved since. Most of the experiments were additionally performed in only one city, and the results of the effectiveness of the policy may differ if implemented elsewhere. Likewise, at a country level, the policies may also differ enough to affect the effectiveness of the cashing out policy. This may affect the external validity of this research and hence affect the results. In order to overcome these limitations, a more focused look at the effect of the implementation of a cashing out policy and experiments in different city should be performed. Additionally, a more lenient view on subsidizing people and helping the traffic solution at a country level, would positively help the integration of the cashing out policy in urban areas. This would allow for the correct policies to be implemented in helping making the employer-paid parking cashing out policy a successful TDM measure to help reduce traffic congestion and its externalities.

Bibliography

- AlixPartners. (2015, June 23). *The Worldwide Automotive Growth Is Slowing Down, Particularly in the BRICS. At the Same Time, the Industry Face Huge Technological Challenges*. Retrieved from AlixPartners: <http://www.alixpartners.com/en/MediaCenter/PressReleases/tabid/821/articleType/ArticleView/articleId/1690/The-Worldwide-Automotive-Growth-Is-Slowing-Down-Particularly-in-the-BRICS-At-the-Same-Time-the-Industry-Face-Huge-Technological-Challenges-CASE.aspx#>
- Arizona Department of Transportation Research Center. (2012). *Travel Demand Management: A Toolbox of Strategies to Reduce Single-Occupant Vehicle Trips and Increase Alternate Mode Usage in Arizona*. Denver: UrbanTrans Consultants.
- Arnott, R., de Palma, A., & Lindsey, R. (1994). The Welfare Effects of Congestion Tolls with Heterogeneous Commuters. *Journal of Transport Economics and Policy*, 28(2), 139-161.
- Ben-Akiva, M., & Atherton, T. J. (1977). Methodology for Short-Range Travel Demand Predictions: Analysis of Carpooling Incentives. *Journal of Transport Economics and Policy*, 224-261.
- Correia, G., & Viegas, J. M. (2011). Carpooling and carpool clubs: Clarifying concepts and assessing value enhancement possibilities through a Stated Preference web survey in Lisbon, Portugal. *Transportation Research Part A*, 81–90.
- De Borger, B., & Wuyts, B. (2009). Commuting, Transport Tax Reform and the Labour Market: Employer-paid Parking and the Relative Efficiency of Revenue Recycling Instruments. *Urban Studies*, 213–233.
- DeCorla-Souza, P. (1994). Applying the Cashing Out Approach to Congestion Pricing. *Transportation Research Record*, 34-37.
- Eliasson, J. (2009). A cost–benefit analysis of the Stockholm congestion charging system. *Transportation Research Part A*, 468–480.
- Eliasson, J., & Mattsson, L.-G. (2006). Equity effects of congestion pricing: Quantitative methodology and a case study for Stockholm. *Transportation Research Part A: Policy and Practice*, 40(7), 602–620.
- Fulton, P. N. (1979). *The journey to work in the United States, 1975*. Washington: U.S. Department of Commerce Bureau of the Census.
- Hess, D. B. (2001). Effect of Free Parking on Commuter Mode Choice: Evidence from Travel Diary Data. *Journal of the Transportation Research Board*, 35-42.
- INRIX. (2016, March 29). *Economic & Environmental Impact of Traffic Congestion in Europe & the US*. Retrieved from INRIX: <http://inrix.com/economic-environment-cost-congestion/>
- Mallard, G., & Glaister, S. (2008). *Transport Economics*. Hampshire: Palgrave Macmillan.
- OICA. (2016, March 29). *Passenger Car Fleet Per Capita*. Retrieved from European Automobile Manufacturers Association: <http://www.acea.be/statistics/tag/category/passenger-car-fleet-per-capita>
- Shoup, D. C. (1992). *Cashing Out Employer-Paid Parking*. Berkeley: University of California.

- Shoup, D. C. (1997). Evaluating the effects of cashing out employer-paid parking: Eight case studies. *Transport Policy*, 201–216.
- Shoup, D. C., & Breinholt, M. J. (1997). Employer-Paid Parking: A Nationwide Survey of Employers' Parking Subsidy Policies. In D. L. Greene, D. W. Jones, & M. A. Delucchi, *The Full Costs and Benefits of Transportation* (pp. 371-385). Heidelberg: Springer Berlin Heidelberg.
- Shoup, D. C., & Willson, R. W. (1992). *Commuting, Congestion and Pollution: The Employer-Paid Parking Connection*. Berkeley: The University of California.
- Small, K. A. (1992). Using the Revenues from Congestion Pricing. *Transportation*, 19(4), 359-381.
- Teal, R. F. (1987). Carpooling: Who, How and Why? *Transportation Research Part A: General*, 203-214.
- van Ommeren, J., & Wentink, D. (2012). The (Hidden) Cost of Employer Parking Policies. *International Economic Review*, 965-977.
- Vanoutrive, T., Van De Vijver, E., Van Malderen, L., Jourquin, B., Thomas, I., Verhetsel, A., & Witlox, F. (2012). What determines carpooling to workplaces in Belgium: location, organisation, or promotion? *Journal of Transport Geography*, 77–86.
- Wang, R. (2011). Shaping carpool policies under rapid motorization: the case of Chinese cities. *Transport Policy*, 631–635.
- Willson, R. W. (1992). Estimating the travel and parking demand effects of employer-paid parking. *Regional Science and Urban Economics*, 133-145.
- Willson, R. W., & Shoup, D. C. (1990). Parking subsidies and travel choices: Assessing the evidence. *Transportation*, 141–157.
- Xerox. (2016, January 1). Make Your City Flow. Norwalk, Connecticut, USA.