International Journal of Trend in Scientific Research and Development (IJTSRD)
International Open Access Journal | www.ijtsrd.com
ISSN No: 2456 - 6470 | Volume - 2 | Issue – 6 | Sep – Oct 2018

Estimating of Willingness to Pay for Reducingthe Urban Congestionin the Tunisian Agglomeration

Mejri Henda[1], **Harizi Riadh**[2]
[1]Assistant Professor, [2]Associate Professor
[1]Dept of Economics & Transport Planning, Institute of Transport & Logistics, University of Sousse, Tunisia
[2]University of Bisha, College of Business, Department of Business Administration, BISHA, Saudi Arabia

ABSTRACT
Congestion of the urban traffic is growing in Tunisia, and the situation is likely to become critical in the near future. The aim of this paper is to determine the major characteristics of a solution to reduce congestion in the case of a developing country. We have developed a survey on the willingness to pay in Tunis City in order to evaluate their reaction using the Contingent Evaluation Method. The results show that Tunisians are reluctant to abandon the use of their private cars despite their awareness of the phenomenon of congestion, of its high costs and of its socio-economic and environmental constraints.

This paper constitutes a first attempt in Tunisia aiming to quantify, explain and determine the factors of the Willingness to Pay of the private car users in order to reduce the congestion problems and consequently to ensure a smooth flow.

Keyword: *externalities of transport; urban congestion; willingness to pay*

1. INTRODUCTION

The rapid development of the use of the private cars has led to several problems in terms of traffic, energy consumption, accidents and air pollution. Traffic congestion in urban areas is a general phenomenon that affects the developed countries as well as the third world countries. It is an expanding phenomenon in The Mediterranean cities, especially in the large Tunisian cities; it is likely to become critical and it can be justified by various factors:

- The increase in income per capita over a very long period, the rise of the middle class in particular over the last decades and the increase in daily mobility due to the spatial expansion of the economic activities and housing (Belhadi, 2007; Harizi, 2008; Hagui, 2012).
- Credit facilities for the acquisition of cars (popular cars in particular) excessively increasing the stock of vehicles. Consequently, the annual car ownership rate has increased from 1.7% in the period 1977-1985 to 2.9 in 1986-1996, to 4.3 in 1997-2006, to 4.5% in 2007-2014 (Chabbi and Abid, 2008; Municipalité de Tunis, 2012). However, this rate of growth is significantly higher than that of the population, which is around 1.4% per year (Institut National de la Statistique Tunisie [INS], 2016).
- The reduction of customs duties following the orientation of the authorities towards a policy of liberalization of trade and an integration of the country in the world economy (International Monetary Fund [IMF], 2012);
- The quasi-stagnation of the public transport supply, which becomes visible in the saturation of the tramway network and a tendency to the degradation of the performance of the bus network, the localization of several economic activities near the city center for reasons of expediency and / or cost and the increase in the rate of urbanization (Harizi et al., 2013).
- The maintenance of the fuel prices at a relatively low level until recently and the loss of attractiveness of non-motorized trips in these areas (Bouguerra and Rizet, 2013).

The congestion generates individual and collective costs such as the loss of time for the workers, tiredness, pressure, pollution, noise, the greenhouse effect ... etc. These externalities of the transport system escape to the mechanisms of the market. Indeed, in the presence of external factors (positive or negative), the competitive equilibrium is no longer an optimum in the Pareto sense. In terms of the theory of economic well-being, researchers express the cost of congestion through the loss of consumer surplus given that the increase in the number of the same network users decreases the effectiveness of the consumers. Thus, the congestion affects travelling in urban areas; the correction of this market failure requires the knowledge of the Willingness to pay (WTP) of the motorists to reduce the congestion.

One of the well-known methods to measure the population's sensitivity to the production of negative externalities is the Contingent Evaluation Method (CEM). This technique treats econometric survey data intended to reveal the value attributed to certain non-market goods or resources. Therefore, the CEM makes it possible to prioritize the WTP problem to avoid a phenomenon such as congestion, compared to others during building a hypothetical market (Cameron and Quiggin, 1998).

This type of evaluation may be useful in defining policy and priorities. Concerning the urban congestion, the method consists in asking people to evaluate the monetary value of the damage they undergo during receiving different levels of congestion. A contingent market is described to the interviewees (definition of some information about the asset to be evaluated, the variation in availability or quality of usage and the hypothetical payment terms) in which they are made to make a choice. This exercise of choice therefore requires the agent to solve two problems: (*i*) a problem of formulating value (choice under budget constraint) and (*ii*) a problem of revealing this value (opportunity and strategic behavior). These elements justify our choice of using the CEM to evaluate the WTP of Tunisian users to contribute to the reduction of urban congestion.

Consequently, the aim of this paper is to determine the best policies that could correct this situation of failure and to study the behavior of the users of private cars in relation to different measures and their willingness to reduce the use of their cars. The first section explains the discrepancies between private costs (endured by the motorist) and social costs, including private costs and costs supported by other users. The second section presents the various instruments adopted by the public authorities with the aim of internalizing the externalities linked to the use of means of transport. The international experience could be useful to find the best solutions, which we will use in the third section. The fourth section will be devoted to present our case study (the northern region of Tunis, the capital), the questionnaire and the CEM as a technique to measure the sensitivity of the population to the congestion production.. The fifth section presents our results and therefore the main factors determining the users' WTP. The last section concludes.

2. Divergence between "private costs" and "social costs" of urban transport in private vehicles

Generally, the driver chooses to move according to his / her private marginal cost (PMC) rather than depending on the social marginal cost (SMC):

$$PMC = TCT + FE \qquad (1)$$

$$SMC = PMC + CTE \qquad (2)$$

Where, TCT is the time cost of transport, FE is the fuel expenditure, and CTE represents the costs of transport externalities including the congestion imposed on other road users (Grant, 1999).

The driver compares the private costs with the satisfaction of traveling. He can also compare his private costs with the travel price of another mode of transport. The user does not directly presuppose the cost of the infrastructure and he perceives very little the influence of the external social costs related to the use of the automobile. These costs are essentially the loss of time, waste of energy, pollution of the environment and the degradation of space by multiplication of roads (Button, 1990; Arnott et al., 1993; Buckeridge et al. 2002; Rouwendal and Verhoef, 2006; Muthukrishnan, 2010; Cravioto et al., 2013).

The best use of a road depends on its characteristics and the demand for use. The optimal solution for society is the point of intersection between "the Social Trip Cost" and "the Off-peak demand" (O'Sullivan A., 2012; Figure 1). BeyondY vehicles, an additional motorist generates a higher social cost than the social benefit he creates. This situation should call for policies to reduce congestion. In addition, the optimal congestion level associated with optimal road use is an increasing function of demand for road use.

In all cases, the demand for transport always exceeds supply and as a result, the number of motorists at the social optimum is lower than the number of equilibrium motorists. This proves the social inefficiency of the behavior of individuals in the choice of the mode of transport and it implies an absolute necessity to "reorient" these behaviors towards the optimal social and more favorable modes. Authorities must act on the rush hours when demand for road use is high. Similarly, a modification in the price elasticity of demand leads to a change in the optimal congestion. Otherwise, an improvement or widening of the road, which will move the cost curves towards the right, will lead both to an increase in the optimum amount of use and to an augmentation in speed (in case of a stable demand). Therefore, a congestion pricing should take place and the pricing rule for congested goods has been updated (Inge et al., 1996; De Palma and Lindseym, 2009; Button, 2010; Eliasson, 2016).

Congestion pricing allows for efficient use of the road network. Thus, each user using the system will have a marginal utility equals to the marginal cost of production added to the marginal cost of congestion that it inflicts on others using the same system (Parry and Bento, 2000; Graham and Glaister, 2002; Rubin et al., 2003; Quinet, 2004; Arentze et al., 2004;Chen and Nozick, 2016; Foreman, 2016).

3. Main internalization tools for the external effects

In order to cope with the failure of the transport market, the public authorities have the possibility to use several instruments:

- Regulatory measures increasing costs for the agents responsible for negative transport externalities (setting emission standards, technical standards, products' standards);
- Economic measures based on eco-taxes (polluter-pays principle);
- Subsidies (the person responsible for the externality could receive a unitary subsidy below a reference congestion level);
- Pollution rights markets or the design of emissions permits (DEP) according to Coase's idea (1960), the optimal solution consists in allowing users to negotiate their pollution rights. In addition, they can adopt incentive measures to reduce the congestion problem (subsidy and / or improve the quality of public transport).

Finally, the literature shows that the consequences of these public instruments appear in some behaviors contributing to the solution of the congestion problem (car-pooling, park and ride, collective transport for workers, location of some economic activities far from the city center, etc.).

4. International experience to reduce congestion

There are two major categories of policies (regulatory and technical policies and tariff solutions):

4.1 Regulatory and Technical Policies

Economic literature distinguishes five types of policies:

- The first policy consists in regulating the use of the vehicle by setting up "selection" criteria upstream allowing selecting those which will be excluded from the traffic (socially optimal level of traffic for the community). However, this measure does not solve the problem of modal transfer; the cost of public transport users remains higher than the cost incurred by the motorists. For example, in France, since 1997, non-polluting vehicles identified by green pellets could be, by decision of the prefect, the only ones authorized to travel in urban areas during the pollution peaks. The selection criterion is the ability of vehicles to maintain air quality in the city (Rydin, 2010).
- Secondly, several countries have practiced a prohibition of circulation in the city center, the method is easily applicable in small and medium-sized cities, but it remains difficult in large metropolises. For example, Germany applied a variant of this measure in its plans for the partitioning of cities during the 1990s. The partitioning plans make it difficult to navigate from one place to another in the city and to some extent dissuade the use of car (Roth, 2011).
- Thirdly, the policy of control on urban fast lanes access: it consists in acting on traffic lights. The public authorities place traffic lights on the high-speed access ramps and the entrance will be in accordance with the traffic conditions on this lane (Tlig and Bhouri, 2011).
- Fourth, the policy of managing new infrastructure by improving road transport infrastructure: it saves time and the operating costs for the vehicles transporting goods. This policy has been widely applied in France, Belgium and Germany (highways, tunnels, high-speed bridges, etc.) and the users provide funding for these projects. However, this solution remains steady and cannot capture the general growth of private car travel at a time when environmental concerns (noise, pollution, insecurity) are being questioned (Buisson and Mignot, 1995).

- Lastly, the policy of the relay parks, which allows a better matching of space and means of transport and an amalgamation between individual modes and collective modes.

Finally, despite their effectiveness in terms of reducing the use of private cars, these regulatory policies have a major disadvantage: they do not always adapt supply to demand by satisfying the first occupants and not those who need it most.

4.2 Tariff solutions

4.2.1 Promotion of public transport:

There are five types of policies:

- First, the authorities may apply a tariff scale designed to favor public transport by reducing its relative price. In Germany, the authorities have developed public transport by means of a high-quality tramway network of high capacity and frequency, without waiting time. In China, several cities have been equipped with "Intelligent Transport Management System" to strengthen urban traffic management, increase system effectiveness and reduce traffic congestion. In the United States, the authorities have invested in public transport where roads and highways have almost reached their saturation threshold. The problem posed by this policy is the financing of subsidies necessary to motivate the users to abandon their cars in favor of the public transport.
- The second solution based on the Pigou tax principle (1920a and 1920b) is the urban toll by monetary evaluation of the advantages or disadvantages that do not have pecuniary compensation. Thus, the producer of the externality (congestion) will become aware of the nuisance he has caused to the community and he will be encouraged to reduce his travel according to the polluter-pays principle (Coase, 1960). In London, the urban toll system directly addresses four main transport priorities: reducing congestion, improving bus services, dependability of travel times for car users, making the distribution of goods and services more reliable, sustainable, and effective. In Singapore, the authorities have set up an urban toll and have adopted the same type of pricing to access the overcrowded business center during the peak periods. As a solution to the congestion, the toll is charming and attractive but it poses serious problems in its implementation and its consequences on the competitiveness of the central city compared to the rest of the territory.
- Third, there is the parking management. Its main objective is to reduce traffic in an area (downstream congestion toll) and parking difficulties in a sector, to enhance modal shift, to improve travel schedules and to generate the incomes. Several countries apply this solution such as Germany, France and the United States.
- Fourth, the "Pay As You Drive", in which the motorists pay either per kilometers traveled in the traffic zone and not at their entry into that area or for a given period of time. Switzerland is the first country introducing this solution in 2001 through a pricing system proportional to the total weight in load and the distance traveled by heavy goods vehicles. Thus, the paid price equals to the wear cost of the road added to the cost of pollution. This kilometric pricing system is smart but it would only partially reduce the congestion in the cities (Reymond, 2006). It would therefore be more interesting to create a spatial kilometer tax (reducing congestion in a given area) and temporal (distributing the motorists over time with higher taxation at peak times).
- Finally, the gasoline surtax solution that imposes a tax on carbon issuances or on fuel consumption in order to increase the cost of using the car. Several countries adopt this policy but this solution presents a disparity in taxation from one country to another. In France, the average share of the final price of fuel is 64%; in the United Kingdom, it is 80%; in Italy, it is 22% and in the United States (27%) (Reymond, 2006). Changes in the price of fuel thus induce changes in the behavior of the motorist (long and short term). The repercussions strongly affect fuel consumption and consequently the volume of traffic. As a result, users tend to use vehicles that use less taxed fuels.

4.2.2 Other technical instruments

These instruments include:

- Carpooling which allows at the same time to save on the transport costs (gasoline, tolls, parking, etc.) individually, to combat urban congestion and to limit the emission of pollutants due to cars (Jeribi et al., 2011a). The Montreal authorities practice this solution for several years.
- Tele-work, which is very effective in terms of reducing congestion: The worker no longer moves to perform work, he stays at home and

telecommunications replace travel. The mentioned solution saves for the worker (avoiding the private costs of using his car) and for the company (reducing the number of car parks, avoiding the loss of time caused by congestion, etc.).

- The management of work schedules which makes it possible to alleviate the level of congestion during rush hours.

Thus, the use of the regulation systems of the transport network and the passenger information systems could contribute to the fight against congestion (Jeribi et al., 2011b). The practices of this solution are particularly in developed countries since they require significant investments in road infrastructure.

5. Case study

Tunis is located in the heart of an urban area of 300,000 hectares; this capital is in a remarkable site with many constraints and fragilities. Its agglomerated perimeter covers today 1 / 10th of the surface of the Tunis agglomeration and the municipal authorities declare every year the urbanization of about 500 new hectares, which is excessive in a context of slowing population growth. This results in additional costs of servicing, transport and urban operation and a very low density of urbanization for a capital.

In 2014, the agglomeration of Tunis had the largest number of inhabitants (23.9%), students (37.4%), pupils (24.6%) and workers (34%).The supply of urban transport in Tunisia has the following characteristics: a quasi-stagnation especially for public transport, a saturation of the tramway network, a tendency to deteriorate the performance of the bus network and a limited capacity of the urban road network (continuous increase of congestion). Urban mobility is characterized by a modal split emphasizing an association between private cars and public transport (Chabbi and Abid, 2008; Municipalité de Tunis, 2012; Battegay, 2013).

In recent years, and in view of the demographic growth of the cities and the improvement of the living standard, Transport has evolved rapidly, the supply of public transport has become more and more reduced especially during the rush hours and the automobile has invaded all other modes of transport (**Table 1**). Public authorities thus encourage the means of tax exemptions, the purchase and use of private cars.

Some recent studies illustrate the negative environmental impacts of the rapid urbanization and the growth of motorization realized in recent years in some developing countries. In Tunisia, both phenomena have been coincided with an economic expansion and particularly an enhancement of the per capita GDP achieved throughout the three previous decades (M'raïhi et al., 2015).

5.1 Questionnaire based on the contingent valuation method

For a market in a situation of pure and perfect competition, when it is in equilibrium the price will be equal to the marginal cost of the good; the social value of a good will be measured by its price. In the case of environmental goods, there is neither a market nor a price system. However, the nonexistence of a price system does not mean that the environmental assets have no value.

We sought to collect information about the willingness of Tunisian users to contribute to the reduction of congestion. For this reason, we have designed a questionnaire administered to a sample of individuals using their own cars to travel or using public transport. We designed the questionnaire under the following hypothesis:

- H1: Motorists would be sensitive to the phenomenon of congestion and give great importance to its costs, especially the lost time (relevance of the problem posed).
- H2: The users of the other modes of transport would be sensitive to the problems of traffic jam and overcrowding even if they do not directly participate in its creation (negative externalities).
- H3: Tunisians would be willing to reduce the use of their private cars in their commuting journeys home-work (flexibility in the behavior of the users).
- H4: Users would perceive the importance of charging the motorists for the nuisances they generate (application of the polluter pays principle).

We have grouped all the questions asked under four main themes (**Appendix A**):

i. Socio-economic characteristics of the respondent (age, level of education, income, occupational category, etc.);
ii. Means and types of travel (private car, public transport, others);

iii. The mobility issue and the perception of traffic problems (determining the degree of sensitivity of users to environmental degradation caused by the use of the car mainly concerning overcrowding and congestion troubles); and

iv. WTP for individuals to reduce or not to use their own cars (or to accept a given level of congestion) is an identification of the willingness of the users to limit the phenomenon of congestion and their WTP for fluid circulation.

5.2 Measured and aggregated variables

It is not only necessary to look for a distribution of values, but also for the explanatory factors of this dispersion according to the different components of the population. To this purpose, some variables are of paramount importance and we must measure them more accurately (**Appendix B**):

- The effect of income may be ambiguous. On the one hand, for high incomes, one can expect an almost exclusive use of a private car (the use of the car is a luxury good). On the other hand, a high income could result in a high opportunity cost (in terms of lost time value) for the user. This implies that the high-income users may have a high WTP to reduce the nuisance caused by the congestion. Moreover, the measurement of this variable is quite difficult (measurement errors). For example, several questions are included in the questionnaire to determine the revenues of the users.
- The level of schooling could also constrain the users' decisions: the most educated people are generally the most sensitive to the costs and consequences of the congestion. The level of education concerns the level of study and its nature (specialty), complementary training and seniority in work. We assume that the distribution of the variables related to the level of schooling in the sample is more or less representative of the population as a whole.
- -The possession or access to private means of transport: We assume that people who have accumulated private means of transport would be less willing to change behavior to reduce congestion than those who are accustomed to public transport.
- The distance between the dwelling and the place of work is an important variable. It may not be significant in itself (except for fuel consumption). Therefore, the time lost to reach your destination might be more pertinent.
- The WTP consists of several components: monetary and non-monetary costs. It includes what the user is willing to do or pay, what the user wants his company to do and what he expects from the public authorities. Of course, the user could say, "that he is willing to do something if .... (Conditional)".

Finally, we sent the questionnaire to a sample of individuals potentially affected by this policy. It describes the expected changes and the contingent market. The initial population consists of all individuals with private car using it in their commuting journeys and by the users of other modes of transport experiencing by the congestion. Our sample consists of the users of the private automobile and the users of other modes of travel in the commute of Tunis. The survey involved a sample of individuals whose workplaces are located in or near the city center, where congestion and traffic jams are intensive. The sample size is 1228 active individuals moving in the eight delegations north of the capital Tunis. We stratified the sample to ensure sufficient variability for the respondent's social demographic variables (income, education, employment, household size, etc...).

Mobility household surveys provide interesting information about the individual behaviors, the households and the travels. For the individual, the surveys show how he organizes his mobility in the context of his household according to the activities; he carries out by choice or obligation. The analyses at the household level provide information on the means of travel available to the individuals (cars, bicycles, public transport) accessible from the place of residence. They make it possible to evaluate the constraints on the mobility of individuals in the household: finances, parking, the need to transport of the children, etc. The analysis of the displacements informs us about the conditions for achieving a journey between two places at a given time and by a given means of transport.

The intensity of traffic in the capital has assumed significant proportions and the signs of the infrastructures saturation are multiplying. This intensity is estimated at more than 550000 vehicles per day,60% of which take place in the northern part of the region (the delegation of Carthage, Medina, Bab-B'har, El-Menzeh, Ekkhadhra, La-Goulette, Le-Kram and La-Marsa) (Municipalitéde Tunis 2012).

The region of Tunis has an average annual rate of population growth of 2.7% (against a national average of 2.3% per year), its metropolitan spread is about 60 km, and the northern part of this agglomeration has a high concentration of commercial and tertiary activities. Thus, our survey concerns only the northern region of Tunis. We have selected 10% of the population aged 18 years and over, we carried out the investigation by direct way on the streets, at the time of the descent of buses, taxis, metros, in car parks or at the time of descent of the cars. Many respondents preferred to send it by post. It took six months to retrieve the answers and so the number of respondents was 1228 individuals.

6. Results

6.1 Statistical data description

6.1.1 Socio-economic characteristics of the respondents

Our sample shows a diversity of age distribution of the respondents: youth aged 18-30 represent almost 30%, more than half of the workforces are adults (31-50 years), and the age group of more than 50 years represents only 17%. This distribution helps to analyze to analyze the sensitivity of the different age categories to the problem of congestion. 63% are men versus 37% women, which mean the significant presence of Tunisian women in the labor market.

In 2015, the average size of a Tunisian household is around 4.5. We considered this characteristic in our sample, (the size of households of more than three individuals represents 65.3% of the respondents). Presumably, all other things being equal, the need for a car become more pressing as household size increases. For large households, the multiplication of individual interest's means that the presence of the car is necessary provide work-to-home travel and meet the other needs of household members.

68% of the respondents have a university level. This category of population is probably the most concerned with displacement and congestion. Indeed, the economic background indicates the existence of a strong correlation between education and income (**Appendix C**). With a high income, the opportunity cost of time increases. This should lead to a higher dependence of the car for the most educated people.

The individuals interviewed have different backgrounds. Normally, this difference should result in a difference in social status, preferences for housing, and choice of means of travel. Thus, time could have greater value for those holding important positions of responsibility. The latter would tend to live far from the city center while owning cars. The nature of the studies could therefore have an influence on the perception of the individuals of the phenomenon of congestion.

Households with a monthly wage exceeding 500 TND represent the majority of the sample. This figure is more or less representative of the level of the average monthly wage in Tunisia. Monthly salaries of less than 500 TND represent only about 27% of the workforce. Therefore, the sample reflects the middle class. We expect that (all other things being equal) car dependence will increase with the level of wages. In principle, there should be a positive association between the purchasing power of the households and the capacity to satisfy travel needs and the ownership of personal cars.

In our sample, over 60% of individuals own a dwelling. This characteristic well represents the Tunisian population. It is possible that the average Tunisian citizen seeks to own a house before acquiring a car (matter of national culture). In this case, there should be some positive association between the ownership of a dwelling and the probability of having a car. Individuals with cars and those without cars are almost equally represented (49% vs. 51%). This would allow us to test the hypothesis that those who have a car have an attitude and willingness to pay to solve the congestion problem different from those who do not own a car.

6.1.2 Identification of commuting journeys

The location of housing is one of the important indicators of the mobility of individuals within the city. More than 80% of the respondents are located outside the city center. Congestion costs would be different depending on the location of the individual's dwelling in relation to his / her place of work in the sense that those who live far away bear the highest costs and would therefore be willing to pay more to reduce congestion (Harizi et al., 2013).

To appreciate the path traveled by the user, we collected information on the distance between the place of work and the home. They may prove insufficient to appreciate the actual distance traveled during the day.Therefore, we need to collect other information regarding the number of roundtrip trips and the number of detours for non-work requirements. Thus, 47.4% of respondents consider that travel time is normal. Almost a quarter of the workforce thinks on the contrary (long or very long)**.**

6.1.3 Solutions to the problem of congestion

79.8% of the respondents use a single mode of transport. Thus, we must consider this information in the fight against congestion since it is easier to manage the movement of a population where three quarters of its population use a single means of transport. 44% of the respondents use the private car versus 37% using public transit.

6.1.4 Importance of the Congestion Costs

The majority of respondents put a great deal of emphasis on traffic congestion losses, particularly in terms of time lost during peak periods (98%). 87% of the respondents believe that the lack of parking is the major cause.

6.1.5 WTP associated with different measures to reduce congestion

A very high number of people confirm that they are not (and / or) will not be willing to reduce the use of the car especially in the commuting journeys since the car gives them advantages, these individuals believe that public transport in Tunis is of poor quality and that their companies do not encourage workers to use the public transport. The results show that the users are not at all willing to pay to gain the time they lose on their journeys (55% of the workforce) or they have a very low WTP, yet 39% of them claim that they come late to their work.

Similarly, if public authorities decide to tax vehicles according to their degree of nuisance, the WTP of these people always remains low. Only 25% of them are willing to pay for low prices, they have generally high-income.

People's willingness to pay for smooth traffic is not as important (60.5%). Those who are willing to pay are high-income individuals and represent only 13.5% of the respondents.

Our questionnaire has coincided with the period when public authorities increased fuel prices, which may influence the response of the respondents. Thus, the results show that if the public authorities further increase this price, only 50% of the respondents will no longer be willing to pay. In addition, if the authorities decide to reduce public transport fares by 50%, less than half will be willing to use them (43.85%) and almost 30% will refuse to abandon their cars. If the authorities decide to set up an urban toll in the congested areas, half of the respondents will no longer be willing to pay, even if they decide to pay this only for low prices that do not exceed half a TND.

In order to identify the means of transport that individuals will affect if they give up the use of their cars, we asked a specific question. Less than half confirm they will take the bus and / or the metro according to availability nearby home and / or work, 22.5% will no longer be willing to use public transport and would prefer to take other means such as Taxis, cycling or walking, the reason being always the poor quality of service of the public transport. The rest of the respondents (34.5%) will never be willing to give up their cars regardless of the conditions. Thus, the population surveyed is generally aware of the negative effects of congestion and its economic and social cost. However, the WTP for the congestion reduction is in average low. Theusers seem to prefer the involvement of public authorities to solve the problem, which implies indirect financing from the users through taxation. This solution may pose a problem of fairness insofar as it moves away from the "polluter pays" principle.

6.2 The explanatory factors of the WTP

In order to reduce congestion, we have set six WTP indicators (**Annex 1**):

- WTP for a higher fuel price (WTP_FUE);
- WTP for a smoother circulation (WTP_CIR);
- WTP to reduce the nuisance (WTP_NUI);
- WTP to recover lost time in circulation (WTP_TIM);
- WTP for the toll(WTP_TOL);
- WTP to reduce the use of the car during rush hour (WTP_CAR).

Reading the simple linear correlation coefficients shows the existence of some statistically significant association between the six indicators. For instance, a positive correlation between WTP_FUE and WTP_CIR, furthermore between WTP_NUI and WTP_TOLhas been detected. Yet, a negative correlation exists with the WTP_CAR, which is quite normal. The correlation between WTP_FUE and WTP_TIM is not statistically significant (**Table 2**).

6.2.1 Determinants of WTP- fuel

We have retained the income (INCOM), the distance traveled (DISTDT) and the delay (DELAY). The results of the regression show that the income positively influences the WTP for a higher fuel price but the coefficient of this variable is not statistically significant. The coefficient of the distance "home-work" shows a good sign (the greater the distance the lower the willingness to pay a higher price for fuel), but it is not statistically significant. The only variable that appears to have a statistically significant effect on the willingness to pay a higher fuel price is the DELAY variable. Finally, we find that the higher the number of delays, the higher the WTP_FUE (**Table 3**).

6.2.2 Determinants of the WTP-circulation

The willingness to pay to improve traffic depends in principle on income (in this case, the level of education is used as the income variable), the number of delays, and the judgment of the respondent on the state of traffic. The results show that all the coefficients of the explanatory variables have the correct sign but none is statistically significant except for the coefficient of the variable level of schooling, which is significant with a high risk of almost 17% (Table 4).

6.2.3 Determinants of the WTP- nuisance

In principle, the WTP to reduce nuisance depends mainly on income (INCOM), level of schooling (SCHO), car ownership (POSS) and the distance traveled (DISTDT). In addition, we obtained a strong correlation between income and level of educational attainment; therefore, these two variables should not be included in the same regression (multicollinearity problem). The results show that the possession of a car increases the likelihood of being willing to pay to reduce the nuisance; the coefficient of the POSS variable is statistically significant. The level of schooling also had a rather significant effect on the dependent variable (with a risk of 13.6%). The coefficient of the distance variable is not statistically significant (**Table 5**).

6.2.4 Determinants of WTP- To Save Time Wasted (WTP_TIM)

The WTP_TIM depends mainly on income or its "proxy" the level of schooling, the frequency of delays and the judgment of the respondent on the length of the journey (Judgment of Traffic Condition (JUGCIRC)**,** Judgment of Traffic Time (JUGTEMP)). There may also be a difference in behavior between the two sexes (SEX). The results of econometrics show that the coefficient of the education level has the good sign and this coefficient is statistically significant. We also notice a larger WTP_TIM for men than for women. The coefficients of the other variables of the model are not statistically significant (**Table 6**).

6.2.5 Determinants of the willingness to accept tolls (WTP_TOL)

The willingness to accept tolls is primarily a function of the income or level of schooling, the judgment of the respondent on the state of traffic (JUGCIRC) and the frequency of delays in getting to work. The results of the Logit model indicate that none of the coefficients of the explanatory variables is statistically significant, yet all the coefficients have a good sign. This confirms the idea of the reluctance of the users to bear a direct cost to improve the state of traffic (**Table 7**).

6.2.6 Determinants of willingness to reduce car use during rush hours (WTP_CAR)

Normally, the major determinants of the reduction in car use are income or its "proxy" level of schooling, the distance from home to work and the number of trips made by the user. Each of these variables should have a negative effect on the willingness to reduce the use of car. For example, when this distance increases, this should lead to a reduction in the probability of reducing the use of car. The results of the Logit model show that all the coefficients of the explanatory variables have the good sign and are statistically significant to various degrees (**Table 8**).

7. Conclusions

This study shows that all the surveyed users are aware of the problems and costs of urban transport congestion in the Tunisian urban area. However, their willingness to pay to reduce this congestion is likely low because they consider that the price paid for fuel is already high and that the level of congestion has not yet reached a critical level. The results give a strong correlation between the WTP of these users, their level of schooling and their income. Thus, the higher their incomes, the more the users will be willing to pay not to give up the use of their automobiles.

Despite the congestion and its costs, the users are not willing to reduce the use of car. Therefore, the private car is a luxury good whose consumption increases with income. Individuals who do not own a car are equally sensitive to the phenomenon of congestion, suggesting different solutions such as the institution of the toll and the improvement of public transport. Several factors explain the low willingness of the users to limit the use of car in order to ensure a smooth circulation: poor quality of public transport, multiplication of travel interests within the same household, lack of public transport stops nearby the workplaces.

An urban toll will therefore be the best resolution that offers individuals the choice of using their cars or not, on payment of the nuisance caused to the community. A spreading of the working hours during the sensitive period and the introduction of incentives (carpooling, public transport, etc.) could encourage workers to reduce car use are also recommended solutions in order to limit the phenomenon of congestion. Our results concern a sample of the northern part of the capital.

In order to generalize these results, we must realize a wider survey covering major Tunisian cities, requiring financial resources that exceed our individual capacities.

References

1. Arentze, T., Hofman, F., Timmermans, H., 2004. Ppredicting multi-faceted activity-travel adjustment strategies in response to possible congestion pricing scenarios using an Internet based stated adaptation experiment. Transport Policy, 11(1), 31-41.
2. Arnott, R., D E Palma, A., Lindsey, R., 1993. A structural model of peak period congestion: a traffic bottleneck with elastic demand. American Economics Review, 83(1), 161-179.
3. Battegay, A., 2013. Baduel Pierre Robert, La nouvelle scène urbaine (Maghreb, France USA), Khatahala, 2011, 252 p. Revue des Mondes Musulmans et de la Méditerranée, 133, juin 2013. http://remmm.revues.org/7739.
4. Belhadi, O., 2007. Le rayonnement spatial des villes tunisiennes à travers la diffusion des entreprises multi-établissements pour l'innovation. Revue Européenne de Géographie. Espace, Société, Territoire, 575-2011.
5. Buckeridge, D. L., Glazier, R., Harvey, B. J., Escobar, M., Amrhein, C., Frank, J, 2002. Effect of motor vehicle emissions on respiratory health in an urban area. Environmental Health Perspectives, 110(3): 293-300.
6. Buisson, M. A., Mignot, D., 1995. Evaluation des villes et politiques de transport. Les Cahiers Scientifiques du transport, 30/1995: 19-30.
7. Button, K., 1990. Environmental externalities and transport policy. *Oxford Review of Economic Policy*, 6(2): 61-75.
8. Button, K., 2010. Transport Economics. Third edition. Cheltenham Glos: Edward Elgar Publishing Ltd, 528 p.
9. Bouguerra, H., Rizet, C., 2013. Evolution des élasticités du transport routier de fret au prix du gazole. Les Cahiers Scientifiques du Transport, 64/2013: 119-142.
10. Cameron, T. A., Quiggin, J., 1998. Estimating using contingent valuation data from a "dichotomous choice with follow-up" Questionnaire: Replay. Journal of Environmental Economics and Management, 35(2): 195-199.
11. Chabbi, M., Abid, H., 2008. La mobilité urbaine dans le Grand Tunis: évolutions et perspectives. Plan Bleu, Rapport avec le support financier de l'Agence française de développement (AFD), 90 p.URL:https://planbleu.org/sites/default/files/publications/rapport_mobilite_urbaine_tunis.pdf.
12. Cravioto, J., Yamasue, E., Okumura, H., Ishihara, K. N., 2013. Road transport externalities in Mexico: Estimates and international comparisons. Transport Policy, 30: 63-76.
13. Coase, R. H., 1960. The problem of social cost. Journal of Law and Economics, 3(Oct. 1960): 1-44.
14. De Palma, A., Lindsey, R., 2009. Traffic Congestion Pricing Methods and Technologies. Cahier de recherche, 2009-31: 1-47.
15. Eliasson, J., 2016. Is congestion pricing fair? Consumer and citizen perspectives on equity effects. Transport Policy, 52: 1-15.
16. Foreman, K., 2016. Crossing the bridge: The effects of time-varying tolls on curbing congestion. Transportation Research Part A: Policy and Practice, 92: 76-94.
17. Graham, D. J., Glaister, S., 2002. The demand for automobile fuel: A survey of elasticities. Journal of Transport Economics and Policy, 36(1): 1-25.

18. Grant, D., 1999. Recycling and market power: A more general model and re-evaluation of the evidence. International Journal of Industrial Organization, 17: 59-80.
19. Hagui, A., 2012. The process of creation of the new cities in Tunisia: Case of the city of the Lake of Tunis. Journal of Geography and Regional Planning, 5(15): 381-396.
20. Harizi, R., (2008). Transport, croissance et démographie. Une analysecliométrique. Economie& Société, 39: 1615-1644.
21. Harizi, R., M'raïhi, R., Zmemi, M., 2013. Rôle des infrastructures de transport dans la décision de localisation des firmes : cas de la région urbaine de Tunis. Anales des Sciences Economiques et de Gestion, 3(2012/2013). Faculté des Sciences Juridiques, Economiques et de Gestion de Jendouba.
22. International Monetary Fund, 2012. Tunisia: Proposed Reforms for a Simpler and More Equitable Tax System. Fiscal Affairs Department Report by Mario Mansour, Ernesto Crivelli, Gérard Chambas, and Alain Jousten. Washington, DC: International Monetary Fund.
23. Institut National de la Statistique Tunisie, 2016. Bulletin Mensuel de la Statistique, Août- 2016. http://www.ins.tn/fr/publication/bulletin-mensuel-de-la-statistique-juillet-2016.
24. Jeribi, K., Mejri, H, Zgaya, H., Hammadi, S., 2011a. Vehicle sharing services optimization based on multi-agent approach. 18th World Congress of the International Federation of Automatic Control (IFAC 2011), August 28-September 2, Milano, Italy.
25. Jeribi, K., Mejri, H, Zgaya, H., Hammadi, S., 2011b. Distributed graphs for solving co-modal transport problems. 14th International IEEE Conference on Intelligent Transportation Systems (ITSC'2011), October 5-7, Washington DC, USA.
26. Rubin, J., Leiby, P. N., Green, D. L., 2003. Effectiveness and efficiency of policies to promote alternative fuel vehicles. Transportation Research Record, 1750(1): 84-91.
27. Inge, M., Ochelen, S., Proost, S., 1996. The marginal external costs of urban transport. Transportation Research Part D, 1: 111-–130.
28. Municipalité de Tunis, 2012. Stratégie de développement de la ville de Tunis. Diagnostic stratégique et problématiques de développement, 90 p. http://mirror.unhabitat.org/downloads/docs/TunisCDS_ReportFrench.pdf.
29. Muthukrishnan S., 2010. Vehicle ownership and usage charges. Transport Policy, 17(6): 398-408.
30. M'raïhi R., Harizi R., M'raïhi T., Bouzidi M. T., 2015. Urban air pollution and urban daily mobility in large Tunisia's cities. Renewable & Sustainable Energy Reviews, 43: 315-320.
31. O'Sullivan, A., 2012. Urban economics. 8th edition, McGraw-Hill/Irwin (eds), 496 p. https://www.homeworkmarket.com/sites/default/files/q5/20/03/attachment_3.pdf.
32. Parry, I. W. H., Bento, A.M., 2000. Tax deductions, environmental policy, and the “double dividend” hypothesis.” Journal of Environmental Economics and Management, 39: 67-96.
33. Pigou, A. C., 1920a. Co-operative Societies and Income Tax. *Economic Journal, 30:* 156-62.
34. Pigou, A. C., 1920b. *The Economics of Welfare*. London: Macmillan. DOI: 10.2307/2224491.
35. Quinet, E., 2004. A meta-analysis of western European external costs estimates. Transportation Research Part D, 9: 465-476.
36. Reymond, M., 2006. L'internalisation de la congestion urbaine avec les instruments tarifaires : acceptabilité et décision. Cahiers de Recherche CREDEN, 06.02.62: 1-21.
37. Roth, H., 2011. Les villes rétrécissantes en Allemagne. Géocarrefour, 86(2): 75-80.
38. Rouwendal, J., Verhoef, E. T., 2006. Basic economic principles of road pricing: From theory to applications. Transport Policy, 13(2): 106-114.
39. Chenm R., Nozick, L., 2016. Integrating congestion pricing and transit investment planning. Transportation Research Part A: Policy and Practice, 89: 124-139.
40. Rydin, Y., 2010. Governing for sustainable Urban development. Routledge, 1 edition, 172 p. ISBN-10: 1844078191, ISBN-13: 978-1844078196172 p.
41. Tlig, M., Bhouri, N., 2011. A multi-agent system for urban traffic and buses regularity control. Procedia Social and Behavioral Sciences, 20: 896-905.

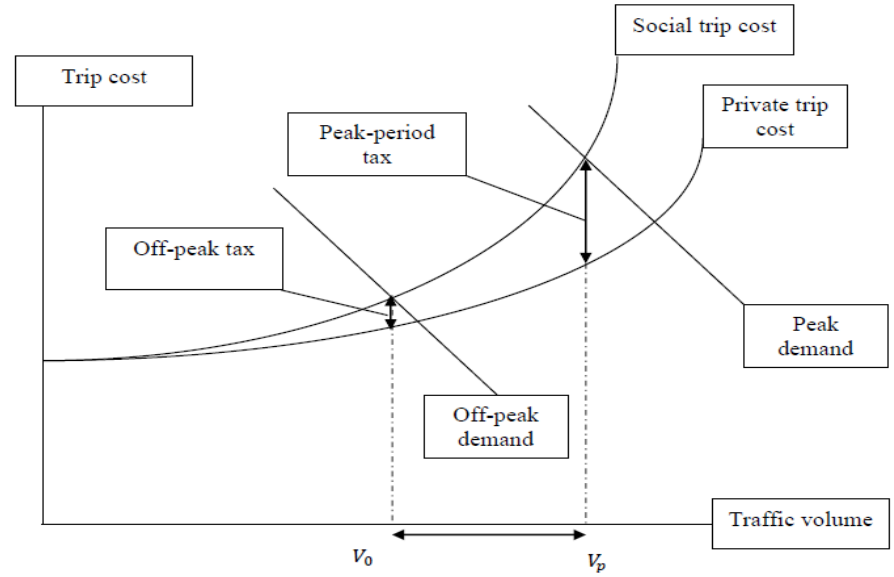

Figure1. Congestion Tax during peak and Off-Peak Periods.
Source: O'Sullivan(2012), p. 268.

Table1. Modal distribution of travel in major Tunisian cities

	Two wheels	Public Transport	Private Car	Source
Tunis	5.6%	57.9%	36.5%	RTPT 1997
Sousse	20.0%	31.0%	49.0%	RTPT 1995
Sfax	35.0%	30.0%	35.0%	RTPT 1993

Source: Belhareth, (2004)
RTPT = Road Trip Plan of Tunis.

Table2. Simple linear regression matrix between the WTP indicators

	WTP_FUE	WTP_CIR	WTP_NUI	WTP_TIM	WTP_CAR	WTP_TOL
WTP_FUE	1.000000	0.045518	0.030945	-0.017750	-0.058621	0.068049
WTP_CIR	0.045518	1.000000	0.194027	0.034088	0.047431	-0.021186
WTP_NUI	0.030945	0.194027	1.000000	0.251979	0.071335	0.014295
WTP_TIM	-0.017750	0.034088	0.251979	1.000000	-0.017672	0.169337
WTP_CAR	-0.058621	0.047431	0.071335	-0.017672	1.000000	-0.063348
WTP_TOL	0.068049	-0.021186	0.014295	0.169337	-0.063348	1.000000

Table3. Econometric regression of the explanatory variables of the WTP_FUE indicator

Dependent Variable: WTP_FUE				
Method: Least Squares				
Sample: 1 1228				
Included observations: 1228				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.389762	0.201610	6.893314	0.0000
DISTDT	-0.038355	0.034870	-1.099944	0.2725
DELAY	0.095250	0.051169	1.861488	0.0640
INCOM	0.020605	0.043708	0.471437	0.6378
R-squared	0.018643	Mean dependent var		1.592105
Adjusted R-squared	0.005500	S. D. dependent var		0.693157
S.E. of regression	0.691248	Akaike info criterion		2.116751
Sum squared resid	107.0325	Schwarz criterion		2.176915
Log likelihood	-237.3096	F-statistic		1.418473
Durbin- Watson stat	2.184112	Prob(F-statistic)		0.238183

Table4. Logistic regression of the explanatory variables of the WTP_CIR indicator (LOGIT model)

Dependent Variable: WTP_CIR				
Method: ML - Binary Logit				
Sample: 1 1228				
Included observations: 1228				
Convergence achieved after 4 iterations				
Covariance matrix computed using second derivatives				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-1.622475	1.065480	-1.522765	0.1278
DELAY	0.077934	0.151610	0.514045	0.6072
SCHO	0.163014	0.118306	1.377904	0.1682
JUGCIRC	0.112476	0.247707	0.454068	0.6498
Mean dependent var	0.381579	S.D. dependent var		0.486843
S.E. of regression	0.487582	Akaike info criterion		1.354182
Sum squared resid	53.25291	Schwarz criterion		1.414346
Log likelihood	-150.3768	Hannan-Quinn criter.		1.378457
Restr. log likelihood	-151.5817	Avg. log likelihood		-0.659547
LR statistic (3 df)	2.409742	McFadden R-squared		0.007949
Probability(LR stat)	0.491824			
Obs with Dep=1	141	Total obs		228
Obs with Dep=0	87			

Table5. Logistic regression of the explanatory variables of the WTP_NUI indicator (LOGIT model)

Dependent Variable: WTP_NUI				
Method: ML - Binary Logit				
Sample: 1 1228				
Included observations: 1225				
Excluded observations: 3				
Convergence achieved after 4 iterations				
Covariance matrix computed using second derivatives				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-2.086892	0.584698	-3.569177	0.0004
POSS	0.855845	0.316828	2.701297	0.0069
SCHO	0.198976	0.133321	1.492458	0.1356
DISTDT	-0.039328	0.116501	-0.337579	0.7357
Mean dependent var	0.257778	S.D. dependent var		0.438386
S.E. of regression	0.431805	Akaike info criterion		1.133593
Sum squared resid	41.20659	Schwarz criterion		1.194323
Log likelihood	-123.5292	Hannan-Quinn criter.		1.158104
Restr. log likelihood	-128.4119	Avg. log likelihood		-0.549018
LR statistic (3 df)	9.765542	McFadden R-squared		0.038024
Probability(LR stat)	0.020668			
Obs with Dep=1	167	Total obs		225
Obs with Dep=0	58			

Table6. Econometric regression of the explanatory variables of the WTP_TIM indicator

Dependent Variable: WTP_TIM				
Method: Least Squares				
Sample: 1 1228				
Included observations: 1228				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.370139	0.242067	5.660173	0.0000
JUGTEMP	0.030740	0.053951	0.569769	0.5694
DELAY	-0.071619	0.060969	-1.174668	0.2414
SCHO	0.076988	0.046002	1.673559	0.0956
SEX	0.200856	0.111859	1.795610	0.0739
R-squared	0.030732	Mean dependent var		1.631579
Adjusted R-squared	0.013347	S.D. dependent var		0.810321
S.E. of regression	0.804895	Akaike info criterion		2.425476
Sum squared resid	144.4719	Schwarz criterion		2.500681
Log likelihood	-271.5042	F-statistic		1.767660
Durbin- Watson stat	1.531467	Prob(F-statistic)		0.136316

Table7. Logistic regression of the explanatory variables of the WTP_TOL indicator (LOGIT model)

Dependent Variable: WTP_TOL				
Method: ML - Binary Logit				
Sample: 1 1228				
Included observations: 1228				
Convergence achieved after 4 iterations				
Covariance matrix computed using second derivatives				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-0.980676	1.067420	-0.918735	0.3582
DELAY	0.096629	0.147608	0.654636	0.5127
INCOM	0.088431	0.128058	0.690556	0.4898
JUGCIRC	0.168641	0.240888	0.700080	0.4839
Mean dependent var	0.530702	S.D. dependent var		0.500155
S.E. of regression	0.502144	Akaike info criterion		1.412191
Sum squared resid	56.48137	Schwarz criterion		1.472355
Log likelihood	-156.9898	Hannan-Quinn criter.		1.436466
Restr. log likelihood	-157.6075	Avg. log likelihood		-0.688552
LR statistic (3 df)	1.235334	McFadden R-squared		0.003919
Probability(LR stat)	0.744543			
Obs with Dep=1	107	Total obs		228
Obs with Dep=0	121			

Table8. Logistic regression of the explanatory variables of the WTP_CAR indicator (LOGIT model)

DependentVariable:WTP_CAR				
Method: ML - Binary Logit				
Sample: 1 1228				
Included observations: 1228				
Convergence achieved after 5 iterations				
Covariance matrix computed using second derivatives				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.918043	0.844475	1.087117	0.2770
SCHO	-0.269803	0.188763	-1.429316	0.1529
DISTDT	-0.642819	0.207317	-3.100661	0.0019
NDEPLAC	-0.372776	0.233114	-1.599115	0.1098
Mean dependent var	0.118421	S.D. dependent var		0.323817
S.E. of regression	0.312236	Akaike info criterion		0.688164
Sum squared resid	21.83803	Schwarz criterion		0.748328
Log likelihood	-74.45069	Hannan-Quinn criter.		0.712438
Restr. log likelihood	-82.93892	Avg. log likelihood		-0.326538
LR statistic (3 df)	16.97647	McFadden R-squared		0.102343
Probability(LR stat)	0.000715			
Obs with Dep=1	201	Total obs		228
Obs with Dep=0	27			

Appendix A. Types of WTP

Nature of the WTP	Abreviation	Codification
WTP- fuel	WTP_FUE	Willingness to pay a higher price than the market price per liter of fuel. A variable that takes values ranging from 1 to 3 on an increasing scale.
WTP- circulation	WTP_CIR	Willingness to pay for a more fluid circulation. Binary variable that takes 1 if the answer is positive and otherwise zero.
WTP- nuisance	WTP_NUI	Willingness to pay to reduce the nuisance. A Binary variable that takes 1 if the answer is positive and zero if not.
WTP to gain the lost time	WTP_TIM	Willingness to pay to recover the lost time during traffic. Variable coded according to an increasing scale that takes values in 1 and 4 where a higher value corresponds to a greater WTP.
WTP- toll	WTP_TOL	Binary variable, which takes 1 if the individual is disposed for the toll and zero if not.
Reduce the use of the car during rush hours	WTP_CAR	Binary variable that takes 1 if the answer is positive and zero otherwise.

Appendix B. Explanatory variables of the WTP

Explanatory Variables	Abreviations	Measures
Distance home/ work	DISTDT	from 1 to 5
Schooling level	SCHO	from 1 to 5
Judgment of Traffic Condition	JUGCIRC	from 1 to 4
Judgment of Traffic Time	JUGTEMP	from 1 to 4
Number of travels	NDEPLAC	from 1 to 4
Number of detours	NDETOUR	from 1 to 4
Available mode of transport	NMOD	from 1 to 2
Car possession	POSS	from 1 to 2
Frequency of delays for work	DELAY	from 1 to 4
Annual househ old income Revenue	REVAN	from 0 to 8
Respondent'smonthly net salary	INCOM	from 0 to 5
Size Of the household	TAIL	from 1 to 4
Sex	SEX	0 or 1

Appendix C. Correlation Matrix of the determinants of the WTP

	DAPCARB	DAPCIRC	WTP_NUI	WTP_TIM	DISTDT	SCHO	JUGCIRC	JUGTEMP	NDEPLAC
WTP_FUE	1.000000	0.047660	0.027811	-0.022305	-0.051887	0.058268	-0.027234	-0.018644	0.064959
WTP_CIR	0.047660	1.000000	0.199315	0.040254	-0.088614	0.094619	0.027878	-0.075526	-0.032485
WTP_NUI	0.027811	0.199315	1.000000	0.245042	-0.008398	0.096748	-0.144243	-0.011527	0.028732
WTP_TIM	-0.022305	0.040254	0.245042	1.000000	-0.033221	0.094868	-0.037613	0.014701	0.051698
DISTDT	-0.051887	-0.088614	-0.008398	-0.033221	1.000000	0.025593	-0.015568	0.356904	-0.021938
SCHO	0.058268	0.094619	0.096748	0.094868	0.025593	1.000000	-0.046631	0.043326	-0.044487
JUGCIRC	-0.027234	0.027878	-0.144243	-0.037613	-0.015568	-0.046631	1.000000	-0.029224	-0.281709
JUGTEMP	-0.018644	-0.075526	-0.011527	0.014701	0.356904	0.043326	-0.029224	1.000000	0.064016
NDEPLAC	0.064959	-0.032485	0.028732	0.051698	-0.021938	-0.044487	-0.281709	0.064016	1.000000
NDETOUR	-0.058572	-0.028185	0.003322	-0.018342	0.150269	0.021954	0.058381	0.009695	-0.141700
NMODE	0.018262	0.014200	0.069986	-0.043890	-0.038634	-0.111086	-0.088118	-0.132820	-0.023527
WTP_TOL	0.065784	-0.017992	0.009161	0.163679	-0.095906	-0.022747	0.037998	-0.097613	0.018569
POSS	0.018777	-0.009822	0.208270	0.082786	0.048573	-0.001732	-0.073165	-0.087808	0.033588
WTP_CAR	-0.057730	0.046239	0.073631	-0.015039	-0.217927	-0.097204	0.024819	-0.177171	-0.096064
DELAY	0.117772	0.033229	-0.040515	-0.062542	0.127688	0.062194	-0.020019	0.247247	0.071026
REVAN	0.013606	0.002786	0.099120	0.087701	0.029950	0.383911	-0.097873	0.094211	0.018016
INCOM	0.017786	-0.077981	0.055703	0.171717	0.071144	0.306299	-0.091840	-0.010088	0.080338
TAIL	0.021448	-0.054283	-0.028077	-0.039134	-0.013305	-0.004932	0.026840	-0.011114	-0.092752
SEX	0.007718	-0.052663	-0.003373	0.108175	0.030258	-0.079036	0.075968	-0.125516	-0.116864

	NDETOUR	NMODE	WTP_TOL	POSS	WTP_CAR	DELAY	REVAN	INCOM	TAIL	SEX
WTP_FUE	-0.058572	0.018262	0.065784	0.018777	-0.057730	0.117772	0.013606	0.017786	0.021448	0.007718
WTP_CIR	-0.028185	0.014200	-0.017992	-0.009822	0.046239	0.033229	0.002786	-0.077981	-0.054283	-0.052663
WTP_NUI	0.003322	0.069986	0.009161	0.208270	0.073631	-0.040515	0.099120	0.055703	-0.028077	-0.003373
WTP_TIM	-0.018342	-0.043890	0.163679	0.082786	-0.015039	-0.062542	0.087701	0.171717	-0.039134	0.108175
DISTDT	0.150269	-0.038634	-0.095906	0.048573	-0.217927	0.127688	0.029950	0.071144	-0.013305	0.030258
SCHO	0.021954	-0.111086	-0.022747	-0.001732	-0.097204	0.062194	0.383911	0.306299	-0.004932	-0.079036
JUGCIRC	0.058381	-0.088118	0.037998	-0.073165	0.024819	-0.020019	-0.097873	-0.091840	0.026840	0.075968
JUGTEMP	0.009695	-0.132820	-0.097613	-0.087808	-0.177171	0.247247	0.094211	-0.010088	-0.011114	-0.125516
NDEPLAC	-0.141700	-0.023527	0.018569	0.033588	-0.096064	0.071026	0.018016	0.080338	-0.092752	-0.116864
NDETOUR	1.000000	-0.023672	-0.036922	-0.124752	-0.077009	-0.035270	-0.157528	-0.160127	0.032545	0.049302
NMODE	-0.023672	1.000000	0.050873	0.230056	-0.085605	0.037675	0.056483	0.082928	0.013888	0.090295
WTP_TOL	-0.036922	0.050873	1.000000	0.005677	-0.061968	0.046326	0.064041	0.038822	0.006762	-0.065705
POSS	-0.124752	0.230056	0.005677	1.000000	0.076153	-0.065884	0.234426	0.262547	-0.053130	0.074378
WTP_CAR	-0.077009	-0.085605	-0.061968	0.076153	1.000000	-0.144198	-0.073363	-0.095476	-0.021713	0.168863
DELAY	-0.035270	0.037675	0.046326	-0.065884	-0.144198	1.000000	0.001171	-0.067032	-0.093045	-0.079039
REVAN	-0.157528	0.056483	0.064041	0.234426	-0.073363	0.001171	1.000000	0.478789	0.095382	-0.086823
INCOM	-0.160127	0.082928	0.038822	0.262547	-0.095476	-0.067032	0.478789	1.000000	-0.066279	0.001295
TAIL	0.032545	0.013888	0.006762	-0.053130	-0.021713	-0.093045	0.095382	-0.066279	1.000000	0.057888
SEX	0.049302	0.090295	-0.065705	0.074378	0.168863	-0.079039	-0.086823	0.001295	0.057888	1.000000