UNDERSTANDING THE PERFORMANCE OF THE FIRST FIVE YEARS OF THE VALLETTA ROAD PRICING SCHEME

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ABSTRACT

Road pricing schemes have been implemented in a few cities around the world despite transport economists and planners advocating them as efficient means of managing traffic. Alongside these are cities that have tried to introduce such schemes, but failed, and others that are considering their introduction. The Valletta road pricing scheme was introduced in 2007 as part of a wider transport policy package that aimed at increasing accessibility to the capital. This paper seeks to understand the performance of the Valletta road pricing scheme after five years and provide some lessons on the sustainability of road pricing for cities considering the introduction of such schemes. To understand the performance of the Valletta road pricing scheme the paper seeks to analyze data from the system itself as well as a number of complementary surveys carried out pre and post implementation. Reference will also be made to the last two National Household Travel Surveys carried out in 1998 and 2010. Whilst a number of cities are considering the implementation of road pricing schemes, it is important to assess current schemes to ensure systems are sustainable and persist in the long-term. The rapid nature of change in cities, particularly those with a high car dependent population require measures which unless designed to be flexible (both physically and politically), become ineffective over time.

Keywords: Road Pricing, Valletta

1.0 INTRODUCTION

The Valletta road pricing scheme introduced in 2007 followed the success of cities like Singapore (1998), London (2003) and Stockholm (2006) in applying what economists have advocated for almost a century, as a socially beneficial policy. Pigou (1920) argued for a tax on congestion in his textbook *The Economics of Welfare*, whilst others raised concern over the details of its implementation given only a few cities around the world had been successful in adopting it (Lindsey, 2006). Indeed much literature has been written about public acceptability of such schemes, in an attempt to overcome implementation barriers (Kottenhoff and Brundell Freij, 2009; Attard and Ison, 2010; Schaller, 2010). In 1964 the UK Ministry for Transport went as far as publishing a seminal paper entitled 'Road Pricing: the Economic and Technical Possibilities' which later became known as the Smeed Report which details the important or desirable requirements for a road pricing system.

Congestion pricing has a big advantage over other transport demand management (TDM) measures because it encourages travellers to change different aspects of behaviour including the number of trips done, destination, mode, time and route selection as well as long term decisions related to residential location choice and land use patterns (De Palma and Lindsey, 2011).

This paper aims to understand the performance of the Controlled Vehicular Access (CVA) system in place in Valletta, Malta by assessing the changes to the traffic patterns of vehicles entering and exiting the charging zone and identifying any changes in behaviour (travel mode, choice and fleet) for those travelling to the city. This overall analysis has not yet been carried out, nor has Government commissioned and published any official report on the performance of the CVA. This has not been the case for many of the other schemes implemented elsewhere. Later on in the paper a selection of the official reports and academic papers covering the implementation and performance of each scheme will be reviewed. The paper also looks at the possible future for CVA both in terms of the findings discovered in the course of this research but also in terms of the recent changes in the political scene, which might play an important role for the scheme.

The research is primarily based on secondary sources and data collected prior to the introduction of the CVA system. Data collected by the system and surveys carried out by Government and independent bodies support the findings presented in this paper. The study is also based on an in-depth understanding by one of the authors who played a major role in the process of designing and implementing the road pricing scheme in Valletta. The author was involved in the team of experts appointed by a special Cabinet Committee of the Maltese Government dealing with National Projects and tasked with writing the policy, designing the scheme and subsequently implementing what would be later termed the Valletta projects.

The paper is structured as follows with Section 2 describing the literature, Section 3 presenting an overview of the development and implementation of road pricing in Valletta,

Section 4 discussing the impacts of the scheme on traffic, Section 5 outlining the impacts on travel behaviour, Section 6 looking at the future of CVA and Section 7 providing some conclusions.

2.0 LITERATURE REVIEW

Road pricing has been advocated for many years now as a mechanism to make the best use of transport infrastructure, however for a variety of reasons, both practical and due to a lack of understanding by many of basic economic principles, roads are rarely priced in a way which optimizes their use (Button and Vega, 2008). It is also particularly relevant where demand far exceeds supply of (road) infrastructure, due to existing or historic urban fabric or simply space limitation. And therefore the low price attached to the use of the road leads to high usage, traffic delays and congestion. This has also other negative effects on the environment and quality of life of people living in or near urban areas.

Despite this only few examples of road pricing in various parts of the world exist. The earlier examples in Europe are found in Norway with the implementation of tolls. Bergen in 1986, Oslo in 1990 and Trondheim in 1991 are examples of cordon tolling aimed at funding new infrastructure for transport. Rome initially started a cordon based pricing scheme for its historic centre and switched to electronic pricing in 2001 with 21 toll points around the city. London eventually followed with congestion charging in 2003 and Stockholm introduced a trial cordon-based pricing scheme in 2006 which became permanent in 2007. This is also when Valletta changed to a road pricing scheme in May 2007. Following these cities, Milan introduced the Ecopass scheme, a road pricing scheme aimed to curb pollution in the city in 2008. Outside Europe Singapore lead the way with what was initially called an Area Licensing Scheme as early as 1975 with the aim of reducing the congestion in the island's central business district. This changed to electronic road pricing in 1998.

A good number of studies and reports have been published examining the potential effects of these schemes (see for example Willoughby, 2000; Santos, 2005; De Palma et al., 2007; Stockholmsforsöket, 2006). In many cases however problems exist in assessing the exact impact of road pricing since most of the schemes in existence to date have been introduced as part of wider strategies and alongside a number of measures aimed at tackling congestion or pollution. Singapore's Area Licensing Scheme was accompanied by additional bus capacity and park and ride facilities (Button and Vega, 2008), along with a quota system for the management of the vehicle fleet (Koh, 2003). London too rolled out additional buses when congestion charging was introduced. Valletta introduced the CVA at the same time as large scale pedestrianisation of the city centre and construction of park and ride facilities were under way (Attard and Ison, 2010).

Despite this some measure of impact has been recorded. Button and Vega (2008) summarized these effects for five cities and with the inclusion of Milan, the effects on six cities are highlighted in Table 1. It is evident from the results obtained through the various studies that road pricing schemes have influenced driver behaviour and congestion. Road

pricing has reduced the use of cars, improved traffic flows and led to a modal shift towards public transport during peak periods in the cities where it was introduced. Other secondary benefits of reduced pollution, lower accident costs and noise were also recorded in some cities.

Table 1. Summary of effects of road pricing. Source: Button and Vega (2008); Rotaris et al. (2010).

City	**Traffic effects**	**Public transport effects**
Singapore Area Licensing Scheme (1975)	-44%; -31% by 1998	Modal shift from 33% to 46% of commuter trips by bus, 69% by 1983
Singapore Electronic Road Pricing (1998)	-10% to -15%	Slight shift to city bus
Trondheim Toll Scheme (1991)	-10%	7% increase in bus patronage
London Congestion Charging (2003)	-18%	18% increase in bus patronage
Rome Limited Traffic Zone (2001)	-20%	6% increase in public transport use
Stockholm Congestion Tax (2006)	-30%	6% increase in public transport use
Milan Ecopass (2008)	-12%	9% increase in subway usage

Despite these results there are also a number of cities that did not manage to implement road pricing. And even here there is plenty of literature identifying some of the main difficulties of implementing road pricing. Ison (1998) describes the failed congestion metering in Cambridge, whilst Guant et al. (2006) describe the use of the referendum which led to the failure of the Edinburgh scheme. Hau (1990) described the attempts to implement Electronic Road Pricing in Hong Kong, and more recently Confessore (2008) and Schaller (2010) explain the reasons behind the failed attempt to introduce congestion pricing in New York.

Critical issues affecting implementation of road pricing schemes have been identified by Attard and Ison (2010) and point primarily to political and public acceptability, clear purpose and objectives and a scheme which is simple and fair, easy to understand and to manage. These issues are evident throughout the successful schemes despite their unique design characteristics, geographic location, historical transport infrastructures and policies, and cultural differences that exist between the cities that have managed to implement road pricing.

3.0 DEVELOPMENT AND IMPLEMENTATION OF ROAD PRICING IN MALTA

Road pricing in Malta is not a new concept. Indeed in the 1960s, the Government had realised the space limitations of Valletta to support large scale vehicular traffic and introduced the requirement for a special police licence for access into Valletta (Government of Malta, 1960) which subsequently, in the mid-90s became a fixed annual charge of €46 (Government of Malta, 2001). This fee was available to all vehicle owners and paid with the annual road licence renewal. Motorists were given a licence disc to attach to the car windscreen which displayed a 'V'. This allowed all year round access and "free" parking into the city.

During the 1990s Malta experienced a sharp rise in private motorisation which was coupled with an equally high provision of road infrastructure by Government. So despite the increase in motorisation the number of vehicles per km of road remained relatively constant. This growth also reflected Malta's economic growth and decline in public transport patronage. By the turn of the century Malta joined the top ten countries in the world in terms of levels of motorisation and started to experience problems related to peak hour congestion, environmental degradation and declining public health. All this was documented in the 2004 White Paper for Sustainable Land Transport approved by the then Cabinet of Ministers (Government of Malta, 2004). The long term predict and provide approach to transport policy was evidently not sustainable. The White Paper also highlighted the fact that the V-licence was not achieving its objectives to restrict and manage effectively the amount of vehicular traffic entering the city and for the first time in history a measure was proposed to revise the scheme (Government of Malta, 2004).

Valletta, a walled city built by the Knights in the 1500s covers an area of 0.8km^2 and serves today as the main administrative and commercial centre for the islands. It is a daytime city with an average population of over 55,000 but with a night time (resident) population of just under 7,000. It is built on a peninsula with high fortification walls for defence purposes, however this makes the city accessible only through one main thoroughfare (St Anne Street) and two minor roads (Figure 1). Its suburb Floriana is also surrounded by fortification walls making the whole peninsula not particularly suited for large volumes of traffic.

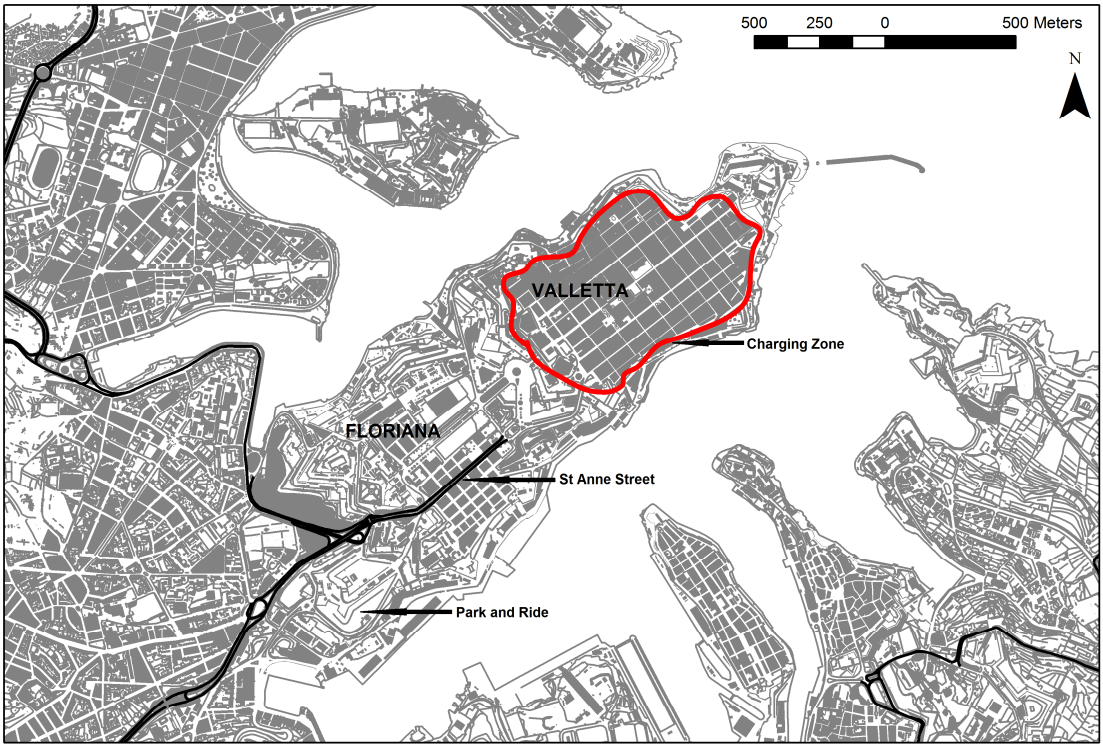

Figure 1 – The Harbour Region and the charging zone in Valletta. Drawn by author.

By 2004, 32,128 car owners paid the V-licence and had access to the city, excluding some 5,000 residents that were exempt. And with only 3,000 legal parking spaces available in the city, it was evident that most car owners paid the V-licence for occasional use. Despite this its contribution to the Government Consolidated Fund was considerable, rising up to €1.4million by 2004 (Attard & Ison, 2010).

In 2004, a Cabinet Committee responsible for the implementation of National Projects appointed a team of experts to develop a strategy which aimed at increasing accessibility to Valletta, and at the same time reduce congestion, improve the overall quality of the environment in and around Valletta and stimulate the regeneration of the city's residential and commercial areas. By 2005 the Cabinet Committee published a consultation document called Valletta and Floriana: A strategy to improve access (Cabinet Committee for National Project, 2005). The document included the views of the major stakeholders in accepting the problems of the city and its suburb Floriana and proposed a number of projects. The stakeholders that were consulted included the local councils, national authorities, merchant associations, local associations and general trade unions. Consultation was held on a number of projects proposed within the strategy, which included:

- a Park and Ride scheme in Floriana
- extension of the pedestrian area in Valletta's commercial centre
- a system for controlling access and parking in Valletta and Floriana by implementing an effective road user charging scheme (replacing the V-licence); and

- a number of smaller initiatives to provide alternative transport modes (electric minicabs, sea ferries).

After a year of public consultation the Cabinet Committee presented their final decisions which included the implementation of a free Park and Ride scheme in Floriana and the introduction of a road pricing scheme (CVA) that would replace the V-licence in Valletta only. Table 2 gives an overview of the scheme design. The key differences which sets the Valletta CVA scheme apart from other schemes around the world are the time-based charge, charging users on the time spent in the charging zone, the 30 minutes free access and free access during the evenings, public holidays and weekends (excluding shopping hours on saturdays).

Table 2. Principles of the Controlled Vehicular Access System. Adapted from http://www.cva.gov.mt/en/exemption_procedures.asp (accessed 21 February 2013)

Sponsor	Cabinet Committee for National Projects, Government of Malta
Regulator	Transport Malta
Contractor	CVA Technology Ltd
Entry/Exit points	11
Charging times	0800-1800 Weekdays; 0800-1300 Saturdays Free on Sundays and Public Holidays
Charges	Free first 30 minutes; €0.82 per hour up to a max of €6.52 per day.
Pre-payment	10% discount
Full exemption	Residents and their children; Service vehicles for works; police and emergency vehicles.
Technology	Automatic Number Plate Recognition (ANPR) for monitoring entrance and exit and calculating time spent in zone.
Billing	Monthly bills sent to vehicle owner.

For more information about the CVA, Attard and Ison (2010) discuss the system in detail and identify the factors that lead to the successful implementation of the road pricing scheme, whilst Attard and Enoch (2011) look at the role of policy transfer in the way road pricing was introduced in Valletta.

4.0 IMPACTS OF THE SCHEME ON TRAFFIC

The system recorded an initial decline in the number of vehicles entering the charging zone with seasonal patterns repeating themselves over the years with the highest access registered always towards the end of every year (Figure 2). These seasonal patterns reflect reduced activity during the summer months and the Christmas shopping during December. The number of vehicles entering the charging zone peaked in December 2009 where a 20 per cent increase over the initial numbers was recorded. This however did not persist with the numbers declining once again to 2008 levels by 2010. Vehicular access declined even further in 2011 with the start of major infrastructural and regeneration projects in Valletta, limiting further the circulation of vehicles in the city.

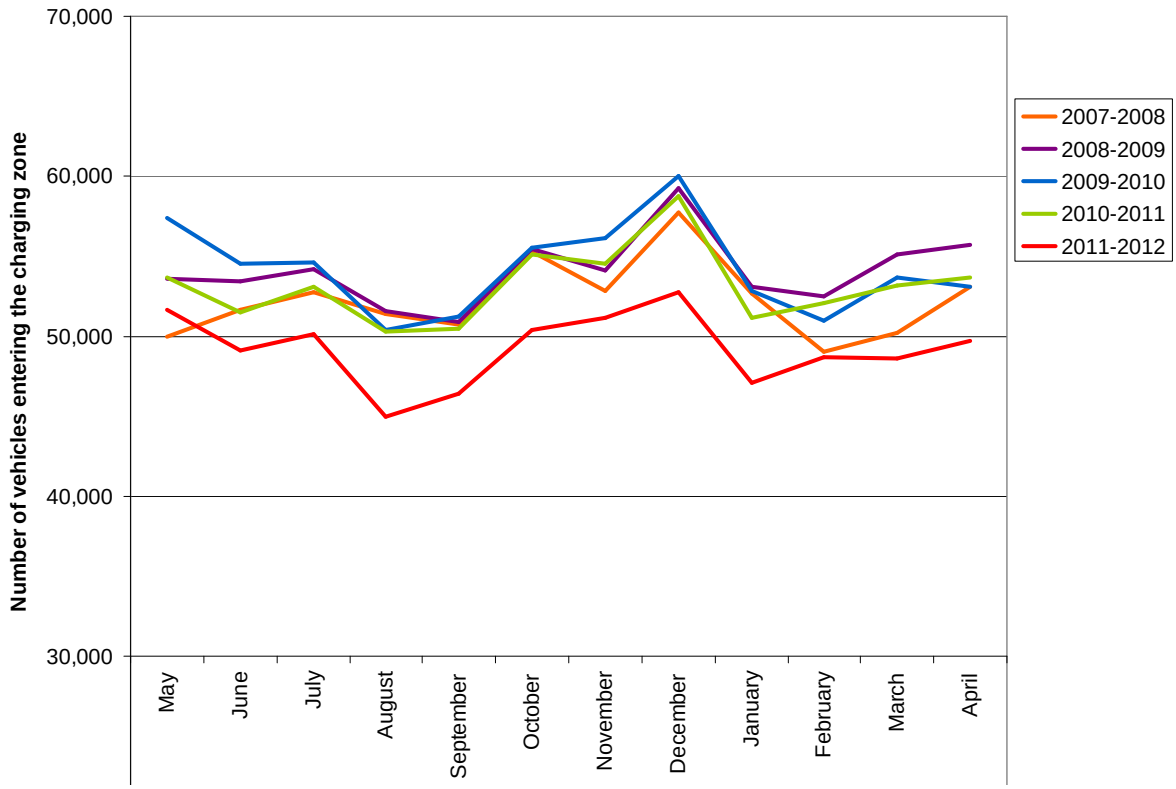

Figure 2 – Volume of traffic entering the charging zone between the period May 2007 and December 2011. Source: CVA Technology, 2013.

A hypothesis for the increase in the third year of operation could well be increased activity by car in and around the city and a wearing off of the effects of the charge. On average 10,000 vehicles accessed the charging zone on a daily basis in the period under review. It is interesting to note however, that 54 per cent of all entries represent vehicles staying 30 minutes or less in the charging zone. This represents a significant number of entries that can be reduced if the free 30 minutes which are currently provided by the system are removed or at least reduced.

The apprehension by many that the effects of the charges would attenuate over time were made public when the Minister for Transport was quoted saying in 2010 that the CVA and Park and Ride are "*too cheap*" and are attracting too many cars to the city (Schembri, 2010). In his article Schembri (2010) quotes the Minister saying that "*this is a reflection of the pricing structure put in place in the peninsula."* References here were made to the free Park and Ride, relatively low charge and a free drop-off concession of 30 minutes, which was too long. This speech, delivered at a local Valletta conference was also pre-empting the introduction of a charge for the use of the Park and Ride which came into force later in July 2011.

In addition to this, morning peak hour traffic was monitored outside the city in the main road leading to Valletta (St Anne Street) with surveys carried out during a typical weekday in 2003, 2004, 2007 and 2008. A comparison of the recorded traffic volumes shows an initial decline of 25 per cent in traffic (Malta Transport Authority, 2008). The last recorded survey however, carried out in 2010 shows peak hour traffic in the same road decreasing by a further 40 per cent. This is an additional effect brought about by the regeneration works going on in Valletta and the closure of a main road, limiting traffic circulation in the city.

The charges in the case of Valletta did not change during the period under review therefore factors such as inflation would have automatically changed the real cost of the charge over time. According to Börjesson et al. (2012) the acclimatisation effect is important because it might affect travel choices based on the fact that people find it less difficult to pay the extra cost as it decreases over time. Travel choices and behaviour with respect to the Valletta scheme however will be discussed in more detail in the next section.

There are of course, other external factors that affect the impact of charges over time. It is also true that as time passes it becomes increasingly difficult to separate the effects of the charge from other external factors. The 2011 decrease is evidently due to major project works within the city walls, however the increased traffic observed over the first two years of operation, if it is attributed to the wearing off effect of charges over time, would constitute a problem for any price-based transport measure in other cities around the world (Börjesson et al., 2012).

An immediate secondary impact of the scheme and the changes to traffic was also reported in the media in January 2008 with the Communications Coordinator at the Ministry for Urban Development and Roads claiming that the fixed air quality monitoring station located just outside the peninsula reported a decline in the values for Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Benzene between the period March and July 2007 (Vella, 2008). No evidence of this decline in the long term however is available to claim environmental benefits brought about by the CVA. It is also difficult to attribute changes to air quality in the inner harbour region to transport alone due to the influence of various polluting activities in the harbour (including energy generation) and the effects of wind and the sea (Malta Environment and Planning Authority, 2006).

5.0 CHANGES IN TRAVEL BEHAVIOUR ASSOCIATED WITH CVA

In addition to the trends noted by the CVA system in terms of traffic entering the charging zone, there are other significant impacts which have been recorded and do show a positive change in the travel behaviour to and from Valletta.

The National Household Travel Surveys, carried out in Malta in 1989, 1998 and 2010 provide a good indication of the population travel behaviour over time, particularly with the introduction of the CVA in 2007. On a national level the private car is still the primary mode of travel, increasing from 54.7 per cent in 1989, to 70.2 per cent in 1998 and 74.6 per cent of all trips in 2010. Public transport use fell from 24.3 per cent in 1989 to 11.4 per cent in 1998 and 11.3 per cent in 2010 (Transport Malta, 2011). This pattern however is not reflected in the trends observed for trips to Valletta. Figure 3 shows the modal share of all trips ending in Valletta in 1998 and 2010. For this, trips by car as driver and passenger have declined by 10 per cent whilst public transport trips, including those carried out by private public transport services have increased by 10 per cent. Other modes including trips by motorcycle and on foot have decreased slightly.

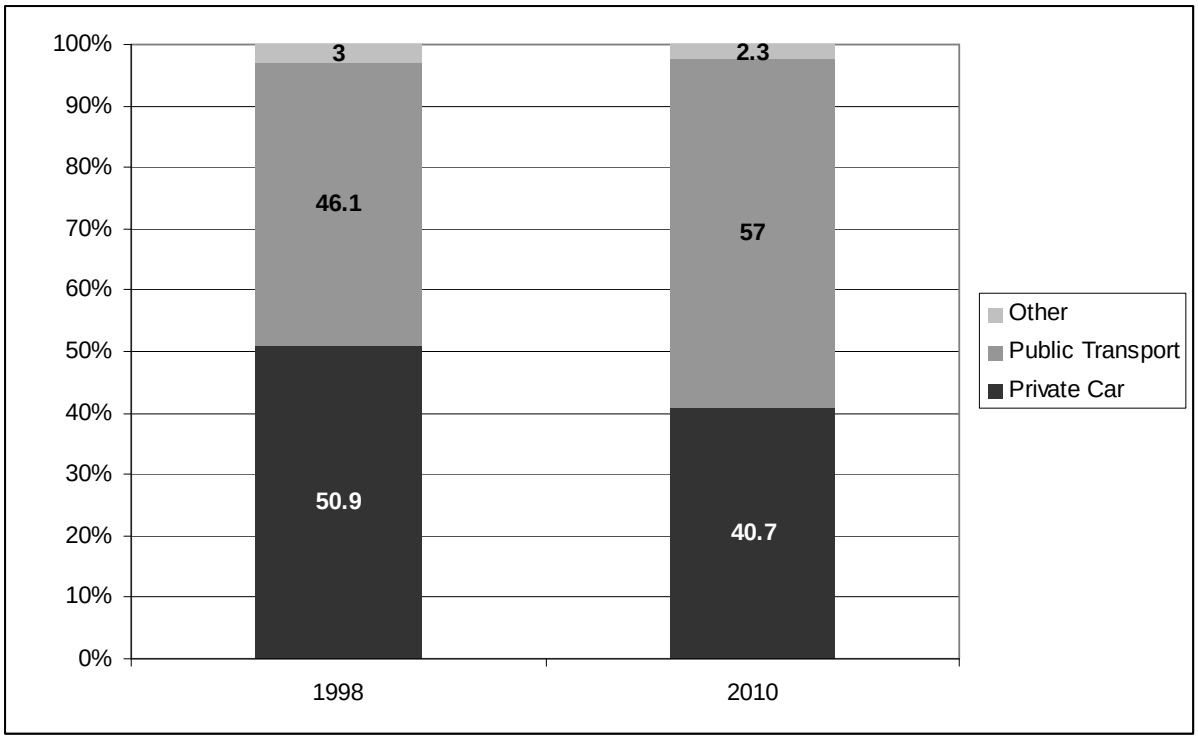

Figure 3 – Percentage modal split for all trips ending in Valletta for 1998 and 2010. Source: Transport Malta, 2011.

The decline in the use of motorcycles is relevant to note since these were exempt from the charge in an effort to increase their use. In contrast to this decline in mode choice for trips to Valletta, the period 2007 and 2008 registered an increase in 12 per cent in the number of motorcycles in the islands, the highest increase recorded over the period 2005-2010 (National Statistics Office, 2009; 2011). It would have been interesting to note an increase in the use of motorcycles given this national increase in the fleet and the exemption from the charge. Also, unlike Stockholm (and as reported in Börjesson et al., 2012), the exemption for electric vehicles did not encourage their sale and use, with registrations of electric vehicles remaining very low (0.013% of the total passenger car fleet) in the islands between the period 2008 and 2010 (National Statistics Office, 2010).

Despite all this, the shift from private to public transport modes for trips to Valletta as captured by the Household Travel Surveys are substantial and very positive. How much can these be attributed to the CVA or the reduction of circulation and parking space in the city or the overall rise of congestion in and around the city is more difficult to ascertain.

Another important indicator which was recorded in surveys before and after the implementation of the CVA was the reduction in the number of cars parked in the charging zone between the hours of 6:00am and 9:00pm, which reduced by 25 per cent over the period October 2006 and October 2007 (Informa, 2006; 2007). In the same surveys, the duration of parking within the charging zone reduced by 20 per cent increasing the turnover of parking spaces within the city. Data extracted from the CVA system show that the duration of stay of vehicles went down from an average of 3.5 hours in May 2007 to 2.58 hours by December 2008 (Mamo and Dalli, 2009).

6.0 THE FUTURE OF THE CVA SCHEME

The possible attenuation of the effects of the CVA system on the number of vehicles entering and exiting the charging zone and the surrounding impact on the network and the environment will require attention in the near future in order for the scheme to remain effective. Following the completion of the regeneration projects underway in Valletta a revision of the scheme, both in terms of access and charging will be required. Looking at other schemes and the changes implemented over their lifetime, it might be too early to establish the most effective way forward. Changes for example, have been affected in London since the implementation of the Congestion Charge, both in terms of area and charge. But very little has changed in the other European schemes in Durham, Stockholm and Milan.

The current contract with the operator in Valletta provides for the extension of the scheme to the neighbouring town of Floriana. However there have been no indications of such changes announced since the inception of the scheme. Also, in the meantime Floriana introduced a residential parking scheme which in Malta represents a time-restricting parking policy for

visitors whilst providing, and to a certain extent protecting, parking for residents. This has further affected the potential extension of the road pricing scheme to Floriana.

More importantly, the results of the March 2013 elections have seen the coming to power of a Labour Government and their electoral manifesto does not augur well for the future of road pricing in Malta. In the run up to the elections, the Labour party promised to "reform [the CVA system] and make it easier and less prohibitive for people to access the city [by car]" (Partit Laburista, 2013). As part of this reform the Party is proposing to reduce the charging times from 6:00pm to 2:00pm during the week and making access into Valletta completely free on Saturday. This is an increase of 15 per cent in the time during which access to Valletta is free (over and above the evening and night times). In addition to this, the Labour Party promised to increase parking capacity in strategic locations, including Valletta and guaranteed to keep public on-street and off-street parking free of charge.

If the Labour Party goes ahead with the promised changes to the CVA, at least as written in the electoral programme, the future of the scheme looks very bleak, as does the future of sustainable mobility for the islands in general. The electoral programme however does not give any details as to the way the changes will be affected and whether charges will increase or decrease. It might therefore be too early to foresee what the new Government will actually do to the scheme and the impact of such changes on the traffic to and around the city.

7.0 CONCLUSIONS

There is evidence of positive effects on traffic and behaviour when the Controlled Vehicular Access system was introduced in Valletta, in 2007. The concern now is whether those effects have worn off over time, as drivers become used to paying the charge and the implications that this has on the sustainability of the scheme. In this paper it was shown that the effects of the road pricing scheme had a short term effect on traffic. Even more when the 30-minute free access is taken into consideration, given that over 50 per cent of all entries into the city occur within this time period. There was also a longer term effect on travel behaviour with a substantial shift to public transport. Other observed impacts include the reduction in parking duration in the charging zone, the reduction of cars parked in the zone and the insignificant modal shift to exempt vehicles, such as electric vehicles and motorcycles.

These findings must also be interpreted within the wider context of change that is happening in Valletta since the introduction of the charge. Major project works linked to the regeneration of particular areas of Valletta have significantly reduced traffic circulation in the city and opened up public spaces and squares by removing parking. All this in addition to the transport measures such as pedestrianisation and park and ride which in themselves have had an impact on the accessibility of Valletta by car. It is therefore difficult to assign specific effects to one measure alone.

Then again, cities are in themselves very dynamic places and traffic growth takes place over time given particular land use activities and demographic changes occur. Consequently, there is the need for the level of charge, and maybe the structure of the scheme in place at any particular location to change with circumstances. In addition to this, it is evident from Valletta that politics will play an important role in the future of the scheme. It is surprising in fact to contextualise the new Government's plans for the scheme given the lack of resistance towards its introduction in 2007 and no subsequent criticism of the system over the years. It is obvious that the CVA did not experience problems related to public acceptability. This was not the case in some other cities like Stockholm where the public acceptability and political acceptability were a key issue.

The Valletta case has a number of policy implications that may be useful for other cities considering road pricing. The effects that have been presented in this paper show that long term effects are hard to retain, unless of course other measures are put into place. The charge in itself is required to change to reflect real costs, and given some of the long term behavioural changes observed with the CVA in Valletta, it might be easier to justify the extension of the scheme to a larger area within the Harbour Region.

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