

## Parking cash out study at academic institutes

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### ABSTRACT

The aim of this paper is to examine the applicability and success of parking cash-out schemes as a workplace parking management measure in the State of Kuwait. The investigation involves assessing attitudes and acceptability of introducing parking cash-out schemes at Kuwait University (KU) and Public Authority for Applied Education and Training (PAAET). A sample of the academic and non-academic employees of the KU and PAAET have been asked to express their opinions and attitudes towards this scheme, as well as on other relevant impacts and consequences of the scheme on the environment. A web-based survey conducted via a global web-link on line questionnaire has been used that includes questions on general opinions and attitudes, as well as six different parking cash-out scenarios with three different cash-out values and periods of cashing out. The results show that greater proportion of respondents expressed preferences of cashing out on monthly basis for their allocated parking permits. In the area of parking provision and improvement additional spaces and designated parking for car sharers disable employees are desirable to encourage ridesharing and subsequent reduction in driving to workplace by employees of KU and PAAET. Other improvements that would impact on the employees travel behaviour include improving safety and security at parking places as well as increasing parking places. The results also show that there is willingness to pay for parking up to the value of 3 KD if a safe and secured parking place is guaranteed.

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Date of Submission: 07-11-2019

Date of acceptance: 26-11-2019  
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### I. INTRODUCTION

Traffic congestion and traffic demand management are two terms that have been experienced and investigated in developing and developed countries alike. Similar traffic congestion issues have been experienced in many countries. In addition, there have been a huge number of policies and measures to tackle traffic congestions that have been adopted worldwide. Traffic growth has always been associated with economic growth. There is no surprise therefore to see major traffic problems in the wealthy countries. Kuwait situated in the northern edge of Eastern Arabia at the tip of the Arabian Gulf, is one of the richest countries in the world. Kuwait has a population of 4.5 million people: 1.3 million are Kuwaitis and 3.2 million are expatriates. Expatriates account for 70% of the population (AlSaeid et al., 2015). Figure 1 below shows a map of Kuwait and its location in the region.



**Figure 1:** Location of Kuwait in the region

Kuwait has an extensive and modern network of highways. A total of 5,749 km (3,572 mi), of roads including 4,887 km (3,037 mi) of paved roads. In terms of car ownership, statistics show that there are about two million passenger cars, 500,000 commercial taxis, buses, and trucks in the country. There is also an extensive bus network which is mostly used by workers. Parking is free in most places, however traffic problems are huge. Traffic demand management is a must therefore in such a country. Policies and measures include parking policies, public transportation measures, raising awareness and pricing.

The aim of this paper is to investigate the potential applicability and success of parking cash-out schemes as a parking management measure in the workplace in the State of Kuwait. This is achieved by investigating the potential impact of introducing parking cash-out scheme as an option for employees Kuwait University (KU) and Public Authority for Applied Education and Training (PAAET). The scheme has the potentials for reducing solo driving to workplace. It could reduce congestion, air and noise pollution and contribute to influencing modal shift as well as improving safety (see Al-Ghamdi (2002), WHO (2013) and Ziyab and Akhtar (2012)). To achieve this, a web-based survey conducted via a global web-link consists of questions on work trip travel, modes, attitudes and preferences, willingness to pay for parking, six different parking cash-out scenarios with three different cash-out values and period of cashing out.

### **Parking management**

With the increase adoption of ‘predict and manage’ as one of its driving principle as a transport policy for the objectives of accessibility, environment, economy, safety and integration, the Kuwaiti government has placed traffic demand management and specifically parking at the top of its transport policy agenda. One of such demand management tool is the parking management measure in the work place. It has been previously established that the decision to use a car for the journey to work is greatly influenced by the availability and cost of parking (Wilson and Shoup 1990). It has also been claimed that parking management measures can be more effective than many other traffic management measures in influencing mode choice. These parking management measures are usually implemented by local authorities, employers and or individual businesses in response to their specific parking and traffic problems. Any parking management measure that seeks to reduce parking requirement can influence modal shift and provide cost savings to the employer and increase consumer affordability, since user financial cost of transport may not be excessive because, parking constitutes one of the largest transportation cost (see discussions for example by Litman (2002) and Osmani (2016)). A comprehensive parking management program that includes several strategies like shared parking and parking cash-out schemes can often reduce parking requirements by 20-40% compared to generous minimum parking requirements, unpriced parking and when each space is allocated to an individual motorist (Shoup (1999)).

### **Parking cash-out in the workplace**

The idea of parking cash-out schemes is comparatively new to other parking policies. It was initiated at the Institute of Transportation Studies at Los Angeles. Professor Shoup in 1980 argued against the apparent inequity exhibited in the provision of free parking space to motorists who drive to work in California. To him free parking space was a benefit to car users that other employees who cycled, walked or took public transport to workplace did not get. After about a decade of campaign, parking cash-out in California became law in 1992. The law requires all employers who offer free parking to their employees to eliminate the free benefit or offer cash equivalents to other employees who used other modes of transport to workplace. The policy was intended to reduce the incentive to drive to work and thereby influencing modal choice and reducing other environmental externalities.

Parking management and pricing are very powerful means of managing traffic in urban areas. Controlling parking either by restricting the number of spaces available or by charging motorists for parking has long been identified as one of the effective demand management techniques for reducing car use and congestion. Previous studies have shown that parking pricing is a significant determinant of travel behaviour. By increasing the cost of parking, greater impact would be noticed when compared to a similar monetary increase in other component of the total cost of a vehicle trip.

These measures are not very popular however with motorists. More appealing measures can be the cash out schemes where motorists can get cash back where they don't use their private cars i.e. paying in others to persuade them to use alternative modes of going to work. One application of this type of measures is the parking cash-out and is becoming increasingly common in the UK. No known applications of this scheme have been discussed in Kuwait.

Parking cash-out scheme in the workplace works on the principle of offering commuters financial incentives in order to persuade them to use alternative travel modes and reduce their use of parking facilities in the work place. This way parking management can be achieved, particularly the most busy parking spaces during peak periods. The scheme also has the advantage of being offered free or subsidised parking space or choice of having the taxable cash equivalent or public transport vouchers of their choice. Given a choice, many people would prefer to receive cash than having a parking space especially in areas like the US where free parking are usually provided to employees.

Parking cash-out scheme can encourage employees to accept additional taxable cash to spend on their public transport modes and pocket some savings, hence encourage more use of public transportation modes. It might also encourage other options of travel such as cycling, vanpooling, walking and carpooling. Parking cash-out as a management measure can only make sense if the employer has total control of the parking facility. This means that the employer must either own or lease the facility, the cost of which is built in to the employers building rent or by an arrangement where parking is paid separately from the building rent. The success or the effectiveness of the scheme depends to a larger extent on the parking demand and how the scheme is being organised. Parking cash-out schemes are more successful to employers that lease their parking facility separately from their building and can release the unused spaces without attracting any penalty from the landlord or lesser. The employer simply leases fewer parking spaces and then transfers the money to the employees who declined the parking subsidy.

Wilson and Shoup 1990, examines the impact of parking pricing when employers shifted from providing free parking facilities to charging for parking at rates ranging from £13 to £30 per month. The results showed a measure of price elasticity of demand with a decrease in the number of cars that have been driven to the workplace of between 15 and 38%. The result also shows a slight reduction in demand per a pound increase in monthly permit cost. This measure of price elasticity of demand will not only depend on the variability in the pricing but also on the availability and type of alternative modes. With good public transport option and significant priority, good cycle access, the price increase would likely to produce a larger shift than with fewer alternatives. It has also been shown that parking price increases in locations that are not along public transport corridors can reduce single occupant commuting and increase carpooling (Seigman 1995).

It is important to note however that parking demand at educational institutions is quite different from the business environment, where decision-makers are reluctant to charge their customers for parking because of fear of discouraging and driving them away, which may ultimately affect their businesses. Charging employees for parking is generally more politically acceptable. In the case of Kuwait University and Public Authority for Applied Education and Training, apart from the employees, the primary customers are the students who are unlikely to choose their school based on parking availability. However, in this study only academic staff members have been included in the survey. Obtaining the opinion of students is highly recommended for future research.

Finally, paying employees not to drive to work might be an easier option for employers because of the political difficulty associated with increasing the rate of parking price. A cash-out system may be particularly appealing if the employer currently offers free parking. In this circumstance a cash-out system can be based on

providing employees with a transportation allowance. Individual employees would then have a choice of keeping the allowance and choosing other alternatives of going to work, or continue driving and paying the allowance back to the employer. Impacts of parking cash out on equity, travel behaviour, frequency of trips are very important and very relevant.

### **Parking cash-out in the workplaces in Kuwait**

In most of developing countries there has been a massive increase in the level of vehicle ownership and use in recent years. This increase along with a distinct lack of coherent and efficient traffic management policies, has led to a situation arising where congestion levels increased dramatically and the level of awareness of implications of increasing driving behaviour has not improved. In this paper, an analysis and investigations of possible parking cash out scheme has been investigated in Kuwait.

A comprehensive parking cash out questionnaire has been designed and piloted in March 2016. Data on current travel patterns, driving behaviour, information on availability of parking places, explanation of parking cash out schemes, and investigation of their impacts on of travel and socio economic characteristics have been obtained. Information sought on the web-based survey includes socio-economic data like personal and household income to determine respondents income group, travel behaviour and pattern of respondents, type of mode used in travel to work; attitudinal responses to some transport issues like congestion, air pollution and journey delays, journey characteristics on both revealed and stated preferences regarding parking and commuter incentives in-lieu of parking spaces.

Parking information such as availability in all the major campuses locations were sought and analysed. Difficulties associated with finding spaces to park and the amount of parking search time spent in identifying parking spaces. Responses regarding off-site parking as a result of inadequate spaces on campus, amount of parking search time were cross tabulated with the type of employment and occupation of respondents. Information was also sought on the type of parking improvement in all the major campuses of the Kuwait University and Public Authority for Applied Education and Training . These improvement range from increasing the number of parking spaces to accommodate more vehicles, improving safety and security. Other type of improvement requested by the respondents and which have been analysed are better enforcement of permit, provision of real time feedback of available parking spaces on campuses and improvement of safety and security at parking spaces.

There are six campuses of the University of Kuwait and ten campuses of the Public authority for applied education and training (PAAET). The estimated number of employees is about 1100. The number of parking spaces is about 800 parking spaces available at all the campuses. However, there are a total of 780 parking permits that are issued annually The survey was conducted over a one-week period in February 2016. A total of about 350 responses to the survey were received. Microsoft excels and SPSS were used in comparing and analysing the generated data.

The on-line survey also includes six parking cash-out scenarios, bearing different cash values and cashing time frequencies. Stated preferences of the respondents were observed and evaluated against the given options and type of cashing-out. Multinomial logit (MNL) model was then used to determine the strength of the significance of the independent variables like value of cash-out, type of cash-out and the frequency of cashing-out and their relationship with the daily, monthly and yearly cash-out for allocated parking spaces. Because of the amount of data generated SPSS and excels spread sheet were used in interaction analysis and cross tabulations.

### **Results of the survey**

The survey data shows the result of the web-based survey and gives a comprehensive overview of socio-economic characteristics of the target audience i.e. staff members of Kuwait University and the PAAET. It also highlighted journey characteristics and general attitudinal behaviour regarding the respondents travel to work. Parking provision and management in the workplace can affect employee travel behaviour by encouraging solo driving to work. This increases congestion and air pollution and damage to the wider environment. Considerable amount of interest was placed on sourcing adequate information on parking in all the campus locations of Kuwait University and the PAAET.

The introduction of parking cash-out or any parking management technique in the workplace would require adequate information on the preferences of the employees to be able to measure their stated and revealed preferences and attitudes (see further discussions by Wang and Sharples (1999), Sharples 1992, 1995, 1997, 1999 & 2005). See also discussion on the topic by ICF (2003), ICLEI (1998), Pickett & Crowthorne (1995) and Rankin E (1995)). The survey included six different scenarios with a variety of dependent variables like daily, monthly and yearly and also independent variables such as value of cash-out, type of cash-out and frequency of cashing-out, were employed in determining employee preferences. Employees were also asked to state their level of agreement or disagreement on some transport related issues. Information were also sought on the level of



importance respondents attached to such issues like security of vehicles and personal safety while walking to and from parking space and also when using public transport mode.

Most of the respondents are employees of Kuwait University and the PAAET that are based in different campuses of the university. Most people did not want to state their personal income.

Results show that the proportion of respondents by their gender indicates that the proportion of female respondents is slightly higher than their male counterpart. About 55.9% of respondents are female while 44.1% are male. This split in the male-female proportion is graphically representative. The age distribution of the respondents follows a pattern which indicates that about 76.4% of them are between the ages of 36 to 65 years, only a significant minority of about 22.6% fall under the age of 35 years.

Most of the employees who responded to the survey are academic as well as non-academic staff with a proportion of about 60% of the respondents. This category of respondents when combined with administrative staff who constituted 30.5% of the respondents are the target groups that usually drive to work on daily basis using their private cars. Their responses to the survey would be useful in determining the potentials of introducing parking management measure based on commuter incentive or cash-out. The remaining 9.5% of the respondents are technical staff and others. There are also about 70.7% of the respondents who stated that they are on full time and permanent employment. This fulltime permanent employees when combined with the proportion of other permanent staff but on part-time, constituted 86.7% of the respondents.

Responses received as to the type of travel mode from the on-line survey shows a greater majority of about 79% of employees travel to work by car. This proportion is twice the proportion of both who take public transport and those who walk because of their proximity to their workplace. Results show that about 50% of those who responded to the on-line questionnaire reside within five miles of their campus location. The distribution also shows that of the remaining half of the respondents, about 13.3% live between 6 to 10 miles of their workplaces and 36.7% are residing well beyond 10 miles of their workplace. This distance was cited as the reason for using car mode by almost 79.1% of the respondents. Results show the proportion of respondents by their travel time group. This distribution clearly indicates that only about 5.3% of the respondents spent 10 minutes or less travel time, the remaining larger majority of 94.7% can reasonably be said to be living beyond walking distance of their employment zones.

Results show the proportion and frequency distribution of respondents by walk time groups. It shows the time taken by respondents from their houses to public transport stations and stops and vice versa. About 18% of respondents indicated that they usually walk for about 5 minutes or less to get to the station or stop. Results show the frequency distribution of respondent's wait time by time band of 5 minutes. It is clearly shown that a larger majority of 79.1% of the respondents who stated that they use private car in travelling to work spent less than 3 minutes walking from car park to their final destination. The survey data revealed that greater proportion of respondents of about one-third presently belonged to the low income group of KD 800 or less per annum and also comes from household with low car ownership. The survey also revealed that majority of respondents is female within the middle age bracket of 46-55 years. Although about 90% of respondents have full time or permanent employment with the Kuwait university and PAAET, only about 60% are academic, the remaining 30% are administrative staff. In terms of journey to work, greater proportion of employees undertake their travel to work by car even though, majority of respondents live within 0-5 miles radius of their campus location and spent less than 30 minutes travel time to workplace.

Some of the reasons mentioned for choosing a particular mode in the survey can be categorised for ease of presentation. Most important amongst them are quickness and convenience of the trip. About 78.9% of the respondents stated quickness as the main reason for travelling to work by car as against other alternative modes. Also a similar proportion of 72.1% of respondents stated in the survey that convenience is the reason for travel to work by car. Results show the proportion of respondents by type of mode who stated cheapness and comfort as their reasons for travelling to work by such mode. The distribution shows that a significant minority of 47.5% said travelling by car is cheaper for them than other modes. While a large majority of about 86.8% indicated comfort as the reason for travelling by car. Other important reasons mentioned by a greater majority of the respondents were reliability, personal safety and availability of public transport links to the workplace. A large proportion of 80.6% of the respondents indicated reliability as one of the reasons for travelling to work by car. They also indicated personal safety as other reason for travelling by car, since sometimes travelling by alternative mode especially at night might be risky. The proportion of respondents who sited personal safety is 85.7%. This proportion is a reflection of the proportion of respondents who sited reliability as their reasons for travelling to work by car. Results show the distribution of the proportion of respondents by these stated reasons for using the car to travel to work. The figure also shows the proportion of respondents who stated lack of availability of public transport services as the reason for choosing car. Results of the survey indicated that in almost all the campuses of Kuwait University and PAAET not fewer than two third of the respondents said they usually park on-campus, while the remaining one-third parked either on-street or off-street free of charge. Results show that 97.7% of the respondents say in less than 5 minutes they would be able to secure a parking

space if searching for one. However, is only about 2.3% indicated spending more than 6mins searching for a parking space.

However very often 18.3% of the respondents leave home early in order to guarantee a good and very convenient parking space, despite indications from the survey that greater proportion of respondents spent less time searching for a place to park. Responses from the survey indicated about 47.2% of respondents are currently holding Kuwait University and PAAET parking permit. Results show that a combined proportions of 46.3% of the respondents are willing to pay for on-street parking when no space is available on campus; however, their preparedness to pay for on-street parking is highly dependent on parking price, since 68% of this category indicated that they can only pay 1.0-3.0 KD for on-street parking. This demonstrates the sensitivity of drivers to parking price, even though the greater majority of about 53.7% indicated their unwillingness to pay for on-street parking.

Results show that 87.7% of the respondents to the on-line survey indicated that they would never change mode of travel to work because of difficulty in finding parking space. Only a minority of 2.2% said they very often change their mode of travel because of such problem. Results also show that a proportion of 19% of respondents who very often had to park off-campus because of lack of convenient parking space. This category of respondent may as well be those who are prepared to pay on-street when no extra space on campus. The distribution is graphically shown below.

The responses received from individual respondents on the type of improvement to parking facilities they would like to see at the university and PAAET, indicates several different types, ranging from increasing the number of parking spaces to accommodate more vehicles on campus to reducing the time and efforts spent to find a parking space at the campus grounds. Although, respondents were given alternatives of choosing three different types of improvement, a very large proportion of 57% stated that, parking space should be increased to accommodate more vehicles. Results show that a significant proportion of respondents of about 47.2% indicated the need for better enforcement of permit to prevent illegal parking and enhance proper management of scarce parking facility. In addition, a proportion of about 23% of the respondents say; they would like more parking spaces allocated to car sharers. These additional spaces for car sharers mean less car trips and hence, less congestion and air pollutions.

Responses from the on-line survey on how provision of parking would alter respondents travel pattern indicates 55% would continue to drive to work and park free elsewhere. By contrast only 12.4% of the respondents would continue to drive to work and park at a cost. Finally, significant minority of 32.6% indicated switching over to alternative mode of travel to work such as public transport, cycling and walking. Although, respondents were offered up to three different options for how their travel choices can be altered should free parking become not available, a significant proportion of respondents expressed possibility of working from home or considered looking for an alternative job. Results show that 88% of respondents say, the security of their vehicle parked at the workplace is very important to them. They also stated in the on-line survey that their personal safety while walking to and from the car park is equally important.

### **Parking cash-out scenarios**

In the on-line survey, six hypothetical parking cash-out scenarios were designed in such a way that employees who usually hold parking permit at Kuwait University and PAAET would be offered the opportunity to give up their parking permit on some occasions in return for some incentives or its cash equivalent. Each scenario provides three detailed options for cashing out on a daily, monthly or annual basis. Respondents were asked to read all the details for the scenarios and then to tick the option they would most likely choose for their journey to work. By giving up their parking spaces on some occasions, other users would be able to use the free spaces and hence, reduce the demand for scarce parking spaces. This is to express the concept of parking 'cash-out' schemes that have been implemented in parts of the UK and USA. They were explained to that as they would give up their parking spaces on some occasions, they are freeing up the space for other users, which means that there is less demand for parking spaces, thus more likelihood of always being able to find a parking space. Although an employee will still maintain his permit at a much lower cost because of the incentive or cash he will receive for not driving to work on these occasions. The responses of the employees on each of the six optional scenarios are further analysed below.

Respondents were asked to express their choices against six scenarios and to state their preference between daily cash payments of 1, 2, 3 or 5KD per day for a maximum of five days each month and 15, 25 or 40 KD equivalent value in vouchers of their choice on monthly basis for a maximum period of four months each year. The third option in this scenario is the payment of 200 KD equivalent value in vouchers of employee's choice once every year. The responses received show 34.7% would prefer a daily cash-out of 3KD per day for a maximum of five days in a month. The distribution of the proportions of respondents to this scenario also indicates 17.8% would prefer cashing out the equivalent value of 40 KD on monthly basis, four times a year.

Similarly, 18.8% would prefer the third option of cashing out the equivalent value of 200 KD per annum. By contrast 28.8% of the respondents say, they wouldn't have cash-out their parking permit.

A further cross tabulations of the employee choices on this scenario reveals the indifference of daily cash-out option to income groups, although it was more attractive to the employees as can be seen from the proportions of respondents who would have cash-out on daily basis rather than monthly or yearly. It is worth stressing here that a slight increase in the proportion of respondents can be seen with the increased personal income groups. The summary of respondent's choices by their gender, type of occupation and personal income is presented in the following table.

**Table 1:** Summary of employee choice in one example scenarios

Example Scenario No.	Choice	Daily (%)	Monthly (%)	Yearly (%)
Sc. 1.0	Gender:			
	Male	28.5	61.1	73.6
Sc. 3.0	Female	18.5	65.7	15.8
	Type of employment:			
Sc. 5.0	Academic	19.0	31.7	17.5
	Administrative	15.50	36.4	6.0
Sc. 5.0	Income group:			
	<800 KD	28.0	52.0	19.0
	800-1200 KD	50.0	8.3	16.6
	1200-1800 KD	34.8	17.4	21.7
	1800-3000 KD	22.9	42.8	34.3

**Modelling Parking cash-out**

In modelling the parking cash-out choices using logistic regression analysis, results obtained from the web-based survey using six different scenarios were applied with various dependent and independent. The list of variables names, definition and values that are included in the model are presented in Table 2 below.

**Table 2:** Variables names, definition and values

Variable name abbreviation in the model	Meaning of variable	Values used in generation the scenarios	How the variable is included in the model
D <sub>co</sub>	Daily Cash-out	1, 2, 3 & 5KD for a maximum of five days	Dependent variable
M <sub>co</sub>	Monthly Cash-out	15, 20 & 40 KD maximum of four months per year	Dependent variable
A <sub>co</sub>	Annual Cash-out	200 KD Based on once per year	Dependent variable
V <sub>co</sub> (V <sub>Dco</sub> , V <sub>Mco</sub> , V <sub>Aco</sub> )	Value of Cash-out	Coefficient to be estimated	Independent variables for daily, monthly or annually
T <sub>co</sub> (T <sub>Dco</sub> , T <sub>Mco</sub> , T <sub>Aco</sub> )	Type of Cash-out	Coefficient to be estimated	Independent variables for daily, monthly or annually
F <sub>co</sub> (F <sub>Dco</sub> , F <sub>Mco</sub> , F <sub>Aco</sub> )	Frequency of Cash-out	Coefficient to be estimated	Independent variables for daily, monthly or annually
C <sub>1</sub>	Constant 1	Coefficient to be estimated	Specific constant
C <sub>2</sub>	Constant 2	Coefficient to be estimated	Specific constant

Three utility functions were used in modelling the employee parking choices, these equations are:

$$U_{Dco} = a_1 * VDco + a_2 * T_{Dco} + a_3 * F_{Dco} \dots \dots \dots \text{equation} \dots \dots 1$$

$$U_{Mco} = b_1 * V_{Mco} + b_2 * T_{Mco} + b_3 * F_{Mco} \dots \dots \dots \text{equation} \dots \dots 2$$

$$U_{Aco} = C_1 * V_{Aco} + c_2 * T_{Aco} + c_3 * F_{Aco} \dots \dots \dots \text{equation} \dots \dots 3$$

The first equation represents the utility for the Daily cash-out, V<sub>co</sub> is the value of cash-out, T<sub>co</sub> is the type of cash-out and F<sub>co</sub> represents the frequency of cashing out for parking spaces. The second and third utility functions are for Monthly and Annual cash-out respectively. The output of the multinomial logit (MNL) model for the parking cash-out choices is presented in the following summary table 3 below.

**Table 3:** Cash-out parking model results

Dependent variable	Independent variable	MNL model (t-ratio)
Daily Cash-out	VDco	-0.53 (-1.98)
	T <sub>Dco</sub>	-0.67 (-2.8)
	F <sub>Dco</sub>	-1.21 (-3.4)
Monthly cash-out	VMco	0.48(2.7)
	T <sub>Mco</sub>	0.72(2.3)
	F <sub>Mco</sub>	1.12 (3.4)
Annually cash-out	V <sub>Aco</sub>	-1.38 (-2.6)
	T <sub>Aco</sub>	-1.79 (-3.0)
	F <sub>Aco</sub>	
Constants	C1(daily)	0.56 (2.3)
	C2 (monthly)	1.18 (3.1)
Initial likelihood		-864.6079
Final likelihood		-795.879
p2(0)		0.0795
p2(c)		0.0022
n		350

In the model above the possibility of employees cashing out on daily, monthly or yearly basis is modelled as a function of three independent variables as presented above. The variables used in the model are VDco, T<sub>Dco</sub>, F<sub>Dco</sub>, VMco, T<sub>Mco</sub>, F<sub>Mco</sub>, V<sub>Aco</sub>, T<sub>Aco</sub>, F<sub>Aco</sub> as discussed above. In the model all the coefficients are statistically significant at 95% level and with logical signs.

It can be seen from the output model that the of monthly cash out option is the most preferred option for the respondents indicated by the positive sign of the coefficients with the monthly variables relative to those of daily and annually. The specific constant of the model which is associated with monthly option is higher than that of the daily option.

## II. RESULTS AND DISCUSSIONS

Parking cash-out schemes are new policies which have been tested in a number of western countries. The results show positiveness and potential for further applications. IN Kuwait there are big problems of congestion and high use of car ownership. Parking cash out schemes have been proposed in this study for academic and non-academic staff at Kuwait University and PAAET where they were asked to report on their travel characteristics and express their attitudes and acceptance to some hypothetical cash out scenarios. The analysis of the investigation carried out on the employee travel behaviour responses and the potential willingness to cash-out for allocated parking space are presented. There is an apparent quest among employees for improvements to parking provision. These improvements include additional spaces to accommodate more vehicles especially, where there is high parking demand like in this case. Other improvements include improving security and safety of the parking places.

Although, free parking is attractive to drivers and could influence solo driving to workplace, greater proportion of employees are willing to pay for parking spaces on campus if charges are applied on daily or monthly basis or elsewhere regardless of its availability on the campus. This is in sharp contrast to the willingness of the employees in lower income groups to cash-out their allocated parking permit on daily basis. It seems from the results that the monthly cash out options are the most preferred, maybe this is due to the relatively high value of monthly cash out option and its frequency.

The outcome of the study clearly indicates that, of the three independent variables in the choice model, the value of cash-out that would be given to Kuwait University and PAAET permit holders on daily basis and the value of cash-out on yearly basis both have negative effect on the employee choice of monthly cash-out. Hence, if Kuwait University and PAAET were to introduce cash-out as a parking management measure in the workplace, monthly cash-out option should be given more preference as this is a better choice to the employees as can be seen from the output of the MNL model. Apart from being the preferred option, greater proportion of respondents chose monthly option and belongs to the high income group range.

One of the underlying problem associated with the implementation of parking cash-out for employees who choose not to drive to work is that, employees may claim to commute by alternative modes but actually drive and use off-site parking space, thereby creating spill-over parking problems to the neighbourhood. This undermines the applicability of cash-out as a parking management measure. In such cases, some other complementary measures as well as enforcement will be critically important. Some other related issues need to be addressed in future studies such as the influence of site specific variables including available alternative



parking and public transport mode and rideshare capacities. Parking management measures such as cash-out schemes or parking pricing when implemented singly or as part of employer travel plan in the workplace could have a positive influence on employee travel behaviour. These commute trip reduction programmes have proven to be successful parking measures especially in reducing single occupant vehicles, congestion and by extension vehicular emissions. There is a growing demand for the effective management of employee parking in the workplace and this cannot be achieved by unrestrained provision of parking. As globalisation continues so are the world economy and the attendant use of the car for commuting to and from the workplace. The increasing cost of the provision of parking facilities mandate urgent actions.

The analysis revealed that greater proportion of respondents of about one-third of sample size prefers cashing out on monthly basis for their allocated parking permits. This was made possible from the outcome of the web-based survey conducted via a global web-link which was mailed to all members of staff. A gradual or graded increase on the value of daily cash-out also resulted in a proportional increase in the choice of monthly option. This is an indication that, with higher values of daily cash-out, much impact would be noticed on employee travel behaviour as a result of the introduction of parking cash-out scheme. In the area of parking provision and improvement additional spaces and designated parking for car sharers disable employees are desirable to encourage ridesharing and subsequent reduction in driving to workplace by employees of Kuwait University and PAAET

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Dr. Hana Alsaeid "Parking cash out study at academic institutes" International Journal of Modern Engineering Research (IJMER), vol. 09, no. 5, 2019, pp 20-28