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An Evaluation of Car-Ownership and Car-Usage Policies in Singapore

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AN EVALUATION OF CAR-OWNERSHIP AND CAR USAGE POLICIES IN SINGAPORE

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I. TRANSPORTATION POLICIES IN SINGAPORE: AN OVERVIEW

(1) *Impoverishment in Transport Policy in the 1960s*

During the 1960s, the government was more concerned with the pressing problems of housing and employment creation. Public transportation took a 'back seat', so to speak, and remained in the hands of the British-owned Singapore Traction Company Limited and the private sector, specifically eleven Chinese bus companies. The general standard of bus service was described by Rimmer as poor; speeds were low, schedules unreliable, and convenience and comfort minimal.[1] However, per capita incomes were very low as well.[2]

Partly as a result of the inadequacy of public transportation, private automobile and motorcycle ownership increased rapidly during the 1960s. There were 70,000 private motor cars in 1961 and by 1970, the number of motor cars more than *doubled* to 143,000 (see Table 1 [page B 114]). Over the same period, the number of public motor cars (mainly taxis) and buses increased by *64 percent.*

The total route kilometres of public roads increased by 35 percent over the same period. However, local and collector roads have much smaller capacities, and are, for the most part, rarely taxed even during peak demand periods. The expansion of effective highway capacity is dependent on the provision of major arterial roads and expressways which are geared to meet flow requirements. The construction of major arterial roads during the 1960s, however, lagged far behind the increase in motor vehicles. There existed 214 km of major arterial roads in 1961 and by 1970, the figure was 240 km, a meagre increase of only 26 kilometres or *12 percent*. The number of private cars per kilometre of arterial roads increased from 328 in 1961 to 594 in 1970. The result was serious traffic congestion, especially in the central area. With rapid relocation of the population to high-rise public housing estates in outlying areas and the concentration of employment in the central area, demand for adequate public transportation grew.

(2) *Transport Policy in the 1970s: An Integrated Approach*

In 1968, the Ministry of Communications was formed and a transport advisory committee appointed to review the public transport system. The government's first attempts to improve public transportation services included efforts to improve the efficiency of the private bus companies. The bus companies were merged into four regional companies in 1971, and in 1973, the surviving three companies were merged to create the Singapore Bus Service (SBS) Ltd. SBS was made a 'public' company in 1978 and CPF members were allowed to use up to $5000 from their CPF savings to buy SBS shares.[3]

At the same time a number of supplementary services was authorised. Under Scheme A, initiated in 1971, school buses (operated by individual operators), lorries, and private hire buses, were permitted to carry workers on a monthly

1 Rimmer, P.J., *Rikisha to Rapid Transit: Urban Public Transport System and Policy in Southeast Asia*, Pergamon Press Australia, 1986, at p. 120.

2 The per capita indigenous GNP was S$2,862 in 1966 as compared with S$5,092 in 1975 and S$9,895 in 1985 (income figures are in 1978 dollars).

3 See Rimmer, *supra*, note 2, pp. 107 to 151 for a detailed description of the incorporation process.

contract basis. Scheme B, introduced in 1974, allowed school buses to provide peak hour services.

As part of the strategy to alleviate central area congestion, road taxes and registration fees for private cars were progressively increased during the seventies in order to discourage car ownership (see Table 2 [page B 115]). Since December 1975, the additional registration fee, as a percentage of the market value of the car, has been increased twice: in February 1980 to 150 percent and in October 1983 to 175 percent.

As an incentive for motorists to replace old cars, preferential registration rates were introduced in 1975 for a new car which replaced an old one (see Table 3 [page B 115]). The engine capacity group of the new car must not exceed that of the car being replaced. Since 1 January 1981, in order to qualify for PARF, the old car which is replaced has to be not more than 10 years old. When the ARF was increased to 175 percent in October 1983, the PARF was raised by 10 percent (see Table 3 [page B 115]).

In 1975, Singapore initiated an Area Licensing Scheme to reduce peak-hour congestion. Private cars carrying fewer than four persons entering the restricted central area between 7.30 am and 10.15 am are required to pay a fee. The fees are $2 daily or $40 monthly for taxis, $10 daily or $200 monthly for company registered cars, and $5 daily or $100 monthly for other vehicles. Buses, motorcycles and goods vehicles are exempted from paying. In addition, the 'Park and Ride Scheme' was evolved which included the construction of fringe car parks and the inception of the City Shuttle Service (CSS), a bus service operating between the fringe car parks and the central restricted areas. Parking charges within the restricted zone were also increased.[4]

The abovementioned measures, together with steep increases in energy prices during the 1970s, *temporarily* slowed down the growth of private car ownership. The number of persons per private motor car remained constant (at about 16) from 1974 to 1980. This was despite substantial increases in per capita incomes and the rapid lateral expansion of the urban area during the same period. The number of private motor cars grew by only 7 percent between 1974 and 1980, while there was rapid growth in other categories of vehicles (see Table 1 [page B 114]).

(3) *Focus on Transport Infrastructure in the 1980s*

Measures to curb car-ownership, however, proved effective only in the short term. The number of private cars increased rapidly again in the early 1980s. Between 1980 and 1985, the number of persons per private motor car decreased from 15.8 to 11.6. The number of private motor cars increased by 45 percent during this five-year period, the growth rate being much higher than other categories of motor vehicles.

A major program of public roads construction and improvement was begun in 1979. Major arterial roads and expressways increased from 308 km in 1979 to 535

4 See Holland, E.P., and Watson, P.L., 'Relieving Traffic Congestion: The Singapore Area License Scheme', World Bank Staff Working Paper No. 281, June 1978 for evaluation of the scheme; and Wilson, P.W., 'Welfare Effects of Congestion Pricing in Singapore', *Transportation*, Vol. 15, No. 3, 1988, pp. 191 to 210.

km in 1986. The expressway network increased from 28 km in 1979 to 96 km in 1988. The rapid expansion of highway capacity in the 1980s thus more than kept pace with the growth of motor vehicle requirements. Extensive improvements in public roads, together with the Area Licensing Scheme (ALS) and fiscal measures to curb car ownership, has resulted in relatively congestion free streets.

In May 1982, a decision was made to begin building a $5 billion Mass Rapid Transit (MRT) system; actual construction of the system commenced in 1984. This was after a decade of studies and deliberation which involved consultants from the United Nations, World Bank, Wilbur Smith and Associates, as well as the MRT Review Team.[5] The Mass Rapid Transit Corporation (MRTC) was established as a statutory board to undertake the construction of the system.

On 3 April 1984, a new bus company, Trans Island Bus Service (TIBS) Private Ltd was authorised to progressively take over Singapore Bus Service routes between the Central Business District and new towns in the northern and northwestern parts of the island (Woodlands, Sembawang and Yishun). This is part of the overall restructuring of public transportation to take into account the anticipated changes in mode choices.

In August 1987, the government created a private company, the Singapore Mass Rapid Transit (SMRT) Limited, which is owned by the Mass Rapid Transit Corporation, and which has the responsibility of running the system. The SMRT has an authorised capital of $250 million and was incorporated with an initial paid-up capital of $10 million from Temasek Holdings, a government investment holding company. Part of the system began operation in November 1987, and the whole system, comprising 41 stations and a route length of some 66 km, is expected to be completed by December 1989. A private company, Transit Link, was set up in November 1987 to oversee the integration of the Mass Rapid Transit with existing bus services through the use of a common bus-rail ticket.[6]

In November 1988, with two-thirds of the MRT system already in operation, the government announced further increases in road taxes (see Table 2 [page B 115]) and issued a policy statement to the effect that no more major roads and expressways would be built in the future, except for a few in the outlying areas. Short term measures to curb car usage which are under consideration include increases in petrol taxes and parking charges. In order that petrol pricing would be effective in reducing car usage, Parliament passed the Customs (Amendment) Bill, otherwise known as the Half Tank Bill, in April 1989.[7] The Bill makes it an offence for any Singapore-registered vehicle to leave Singapore without at least half a tank of petrol, the objective being to prevent motorists from purchasing their petrol from across the causeway.

On 1 June 1989, the ALS scheme was extended to the evening-peak between 4.30 and 7.00 p.m. on weekdays.[8] At present an electronic road pricing system for

5 See Rimmer, *supra*, note 2, at pp. 141 to 142.
6 *The Straits Times*, January 23, 1989, p. 17.
7 See *The Straits Times*, 8 April 1989, pp. 1 and 17. In conjunction with the Customs (Amendment) Bill, the Road Traffic (Amendment) Bill, which makes it an offense to tamper with a fuel gauge or drive a vehicle with a faulty gauge, was passed on the same day.
8 See *The Straits Times*, 1 June 1989 for details.

more optimal pricing of congestion is in the planning stage. The system is expected to be operational 5 to 7 years from now.[9]

II. AN ANALYSIS OF CAR OWNERSHIP POLICIES

(1) *An Aggregate Model of Car Ownership*

Several variables have been identified to test their influence on car ownership. The motorcar is regarded as both a consumption and investment good. As such changes or expectations of changes in transport policy and other economic variables will affect levels of car ownership. The following OLS regression uses data from 1966 to 1987, the dependent variable is the log of number of cars per capita:

$$\begin{aligned} \text{LCARSPOPN} = {} & -4.93 + 1.93\,\text{LYD} - 1.07\,\text{LEXPGS} - 0.48\,\text{LCOST} + \\ & (-1.39)\quad (4.56)\quad (-3.80)\quad (-3.42) \\ & 2.01\,\text{LRDS} - 0.45\,\text{LPRICE} \\ & (2.98)\quad (-2.79) \end{aligned}$$

R-square = 0.8865 F-Value = 24.29

The independent variables are:

LYD = log of disposable income per capita:
(GDP-CPF/P-income tax/P)/population

LEXPGS = log of per capita expenditure on other goods and services

LCOST = log of cost of car ownership:
(car road tax + transfer fees + registration fees + motor vehicle special tax)

LRDS = log of total lengths of roads

LPRICE = log of average price of cars including import tax.

The coefficients of the independent variables in the above model have the correct signs and are all statistically significant. The model has a reasonably good fit (0.8865) and shows that price and cost elements exert marginal influences on car ownership as compared with other variables such as income.

A one percent increase in the price of cars (LPRICE) will lead to a decrease in car ownership per capita by 0.45 of 1 percent. A similar magnitude can be observed for increases in the costs of ownership (LCOST). Car ownership decreases by 0.48 of 1 percent for a 1 percent increase in the cost of car ownership.

In contrast, the magnitudes of influence of disposable income (LYD), total length of roads (LRDS) and expenditure on other goods and services (LEXPGS) are much larger. A one percent increase in LYD or LRDS will cause a rise in car ownership of almost 2 percent. A 1 percent increase in the expenditure on other goods and services will lead to a fall in ownership of at least 1 percent.

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9 See Sanford F. Borins, 'Electronic Road Pricing: An Idea Whose Time May Never Come', in *Transportation Research A*, Vol. 22A, No. 1, pp. 37–44, 1988, which describes Hong Kong's experiment with electronic road pricing.

The above results indicate that price measures have a smaller effect on car ownership as compared to other economic factors. This is confirmed through the small magnitude in the elasticity estimates of LCOST and LPRICE. Income effects and the impact of major roads and expressway construction feature significantly in the model. The latter result is one of the ironies of the new towns policy. The decentralization of the population to outlying new towns with the concentration of employment and retail outlets in the CBD has increased the need for commuting between the new towns and the CBD. The construction of an excellent network of roads and expressways to meet this need have resulted in a reduction of the generalised costs of travel.

The ownership of private cars increased by 15,314 in 1988 — a year that was characterised by increases in car prices as well as scrap car values. This has been a result of a number of factors:

(i) Income effects exert an important influence on car ownership. With the economic upswing, the number of higher income earners have increased. Increases in real incomes together with cheap and easy vehicle loans have resulted in rising car ownership.

(ii) The car is a prestige good in Singapore for many households. According to Scitovsky, 'Money income as a measure of one's success in life has the drawback that knowledge of it is seldom in the public domain. Therefore, to enjoy not only one's high income, but also the esteem it can secure, one must make it known through appropriate spending behavior.'[10] Housing consumption as a venue of 'appropriate spending behavior' is not available to 87 percent of the population which reside in public housing. Cars as well as maids become substitute status symbols for many households. Over time, these prestige goods can become established habits which are hard to break.

(iii) The car is both a consumption and investment good. The system of Preferential Additional Registration Fee implies a demand for scrap cars which have resulted in an artificially inflated second hand car market. This is further analysed in the next section.

(2) *Analysis of the PARF Scheme*

The PARF or discount scheme was introduced in 1976 with the dual objective of encouraging the replacement of old cars as well as controlling the car population. If an individual buys a new car and at the same time scraps an existing car (since 1981 the scrap car must not be more than 10 years old) he enjoys a discount on the ARF price.

However, the effectiveness of the PARF scheme as a measure to control the car population is subject to demand for car ownership remaining constant over time. For the car population to remain constant, the number of first time car owners must equal the number of existing car owners wishing to scrap their cars. Increases in real incomes have rendered the scheme less effective as a car control measure. Table 4 [page B 116] shows the number of private motorcars purchased

10 Scitovsky, Tibor, *The Joyless Economy* Oxford University Press, 1976, p. 119.

by ARF and PARF between 1976 and 1988. As can be seen from the data, since 1981, the number of ARF cars exceed the number of PARF cars in 1982, 1983, 1984 and 1988.

The system of PARF have partly resulted in an artificially inflated second hand car market thus making the purchase of a car an investment decision as well. A first time car buyer wishing to purchase a new car and making a decision as to whether to scrap a car will compare prices under the two situations. He will scrap a car provided that:

$$P_N(1 + ARFR) > P_N(1 + PARFR) + P_S$$

where

P_N is the import price of the new car;

ARFR is the additional registration fee rate of 175%;

PARFR is the preferential registration fee rate which varies with engine capacity and

P_S is the scrap car value.

This implies that the maximum price that he is willing to pay for a scrap car is:

$$P_S < P_N \text{ (ARFR-PARFR)}.$$

If market prices for a scrap car, P_S^*, is such that

$$P_S^* > P_S$$

then the car buyer will be better off buying at the ARF rate.

Increases in scrap car values (and second hand car prices) over the years (see Table 5 [page B 116]) have resulted in the car being regarded as an investment good as well as a consumption good. The rise in prices have been due to the following factors:

(i) Increased demand for car ownership.

(ii) Since 1981, only motor cars which are not more than 10 years old are eligible for PARF. The supply of scrap cars since 1981 is therefore determined by the number of new cars purchased ten years ago. Draconian measures to curb car ownership were imposed from the mid 1970s. Between 1974 and 1980, private car ownership increased by a mere 6.9 percent (see Table 1 [page B 114]).

(iii) More than three quarters of motorcars in Singapore are imported from Japan. In 1985, the exchange rate was S$0.9275 per 100 yen. By 1988, the yen had appreciated to S$1.5713 per 100 yen. The maximum price that buyers of Japanese cars are willing to pay for a scrap car have increased correspondingly.

(iv) With increases in income, there has also been a shift in taste toward quality cars. The number of Alfa Romeos increased from 1,126 in 1987 to 1,743 in 1988. (The appreciation of the yen has also contributed to a shift from Japanese to European cars.) The price that purchasers are willing to pay for a scrap car increases with the price of the new car purchased.

(v) Since 1975, the ARF rate has been increased on two occasions: in 1980 to 150 percent and in 1983 to 175 percent — an increase of 75 percentage points. The PARF rate has only been increased once: by 10 percentage points in 1983. The effect of an increase in the difference between ARF and PARF rates is to result in a one time increase in scrap car values. During the early part of 1989, *expectations* of higher ARF rate or import taxes raised prices in the second hand car market. If the existing ARF-PARF system is retained, any increase in ARF rates should be accompanied by an equal or greater percentage point increase in PARF rates in order to reduce 'speculative' as well as investment demand for car ownership.

The present PARF system attaches a value to a 10 year old car which it would not have had in the absence of the discounts. If the PARF system is removed (i.e. PARFR = ARFR) the effect would be to wipe out the asset value of scrap cars. This would, however, cause government policy to be viewed as dynamically inconsistent. If the ARF rate remains the same, the removal of the PARF system would result in a reduction in second car prices. The overall effect would be to reduce car prices which may result in an increase in the number of cars demanded. The removal of the PARF system, therefore, must be accompanied by an increase in the ARF rate.

The removal of the PARF system, however, will discourage the scrapping of old cars. Car owners may hold on to their present car until it falls apart. An increase in the number of cars demanded will thus be offset by the inelastic nature of the supply schedule for second hand cars. The removal of the PARF system must thus be accompanied by its replacement with a system of progressive (with age) road taxes for cars above 10 years of age.

Under conditions of fairly constant demand for car-ownership, the price discounts available under the existing PARF system is such that its effect on car ownership is similar to a quota system under which a car is scrapped for every new car purchased. These conditions prevailed in the late 1970s and during the recession years of 1986 and 1987. However, under conditions of rising incomes and therefore increasing demand for car ownership, a direct quota on demand would be necessary *if* the objective is to contain the car population at some pre-determined level. The economic (equity) and political implications of imposing any quota system, however, requires further study.

III. ANALYSIS OF CAR USAGE POLICIES

The effectiveness of various measures to curb car usage is briefly analysed in this section using the results of a binomial logit model of journey to work mode choice. The model uses data from 6,500 work trips obtained from a 1981 Origin and Destination Survey conducted by the MRTC. The two alternatives were *automobile* (which includes drive alone, ride-sharing and trips by taxi) and *bus* (which excludes trips by company bus). Since the choice of journey to work by automobile

may not be available to non-vehicle owning households, the sample was stratified by automobile ownership status.

Tables 6 and 7 [page B 117] present the elasticities of demand for travel modes of auto-owning households which were generated by the binomial logit model. For automobile owning households, travel behavior was inelastic with respect to changes in auto operating expenses (−0.278) and parking costs (−0.002). The demand elasticities for auto with respect to bus transit times and bus fares were greater than unity (2.9 and 1.3, respectively). The income elasticity for journey to work by bus was −3.562 for workers from auto-owning households.

Mode choice for workers from auto-owning households is elastic with respect to income and public transport times and costs, but inelastic with respect to auto operating costs. With rising incomes, measures to curb car usage by increasing auto operating costs will therefore not be effective without complementary policies to curb car ownership.

The elasticity of mode choice with regard to public transport times indicates that policy measures for decreasing car usage should focus on improving the efficiency of the public tansport system. Measures to improve the efficiency of the public transport system (some of which are currently being undertaken) include:

(1) the provision of feeder services to MRT stations;

(2) reduction in the uncertainty of waiting times for public transport;

(3) reduction of in-vehicle times for buses through more point to point services;

(4) increasing the comfort level of public buses through the use of air-conditioned buses.

Table 1: *Motor Vehicle Growth and Road Construction, 1961 to 1988*

	1961	1965	1970	1973†	1974†	1980	1985	1988
Private Motor Cars	70,108	104,729	142,568	187,972	142,674	152,574	221,279	237,801
Public Motor Cars	3,493	3,621	5,048	6,326	6,306	11,922	14,971	13,613
Buses	1,375	1,617	2,942	4,775	4,779	6,512	8,717	8,924
Goods Vehicles	14,613	21,365	34,119	41,805	36,424	78,020	109,596	108,477
Motor Cycles and Scooters	28,205	60,838	105,214	122,714	84,849	118,345	127,564	117,570
Total Motor Vehicle Registration	117,936	192,322	290,423	367,541	276,866	371,341	486,760	491,808
Expressways	—	—	—	—	—	39	73	96
Major Arterial Roads	214	222	240	248	250	313	435	500
Collector Roads	109	109	113	114	115	157	202	238
Local Roads	1,114	1,430	1,585	1,777	1,790	1,847	1,935	1,891
Total Public Roads (Route Km.)	1,437	1,761	1,938	2,139	2,155	2,356	2,644	2,810
PERCENTAGE INCREASE OVER PREVIOUS DATE								
Private Motor Cars		49.4	36.1	31.8	†	6.9	45.0	7.5
Public Motor Cars		3.7	39.4	25.3	†	89.1	25.6	−9.1
Buses		17.6	81.9	62.3	†	36.3	33.9	2.4
Goods Vehicles		46.2	59.7	22.5	†	114.2	40.5	−1.0
Motor Cycles and Scooters		115.7	72.9	16.6	†	39.5	7.8	−7.8
Major Arterial Roads and Expressways		3.7	8.1	3.3	0.8	40.8	44.3	13.6
Total Public Roads		22.5	10.1	10.4	0.7	9.3	12.2	6.3
Population (thousands)	1,702.4	1,886.9	2,074.5	2,193.0	2,229.8	2,413.9	2,558.0	2,586.2
TRANSPORT INDICATORS								
Persons per private motor car	24.3	18.0	14.6	11.7	15.6	15.8	11.6	10.9
Persons per public motor car	487.4	521.1	411.0	346.7	353.6	202.5	170.9	190.0
Persons per bus	1,238.1	1,166.9	705.1	459.3	466.6	370.7	293.4	289.8
Private cars per km of public road	48.8	59.5	73.6	87.9	66.2	64.8	83.7	84.6
Private cars per km of major arterial road and expressways	327.6	471.8	594.0	758.0	570.7	433.4	435.6	399.0
Public cars per km of major arterial road and expressways	16.3	16.3	21.0	25.5	25.2	33.9	29.5	22.8
Buses per km of major arterial road and expressways	6.4	7.3	12.3	19.3	19.1	18.5	17.2	15.0

Notes:

†From January 1974, the records on motor vehicles were computerised. The number of private vehicles was found to be considerably over-estimated. This accounts for the discrepancies in data before and after 1974.

Source: Singapore Department of Statistics, Yearbook of Statistics, various years.

Table 2: *Taxes on Motor Cars in Singapore, 1970–1989*

Item	Before Oct 72	Oct 72 Dec 73	Jan 74 Mar 75	Mar 75 Dec 75	Dec 75 Feb 80	Feb 80 Oct 83	Oct 83 Oct 84	Oct 84 1989
Import duty (%)	30	45	45	45	45	45	45	45
Registration Fee	$15	$15	$15	$15	$15	$1,000	$1,000	$1,000
Additional Registration Fee (% of market value)	15	25	55	55	100	150	175	175
Annual Road Tax for private cars (cents per cc)								
— up to 1000 cc	10	10	14	20	35	40	52	60
— 1000 to 1600 cc	10	12	15	25	40	50	65	75
— 1601 to 2000 cc	10	15	22	30	45	60	78	90
— 2001 to 3000 cc	10	20	25	40	50	70	91	105
— above 3000 cc	10	30	60	65	80	100	130	150
(as from 4 March 1975, company registered cars pay double these rates)								

Source: ROV Annual Reports, various years.

Table 3: *Preferential Additional Registration Fee Rates*

Engine Capacity	31 Dec 75 to 16 Oct 76	17 Oct 83 to present
up to 1000 cc	35%	45%
1001 to 1600 cc	40%	50%
1601 to 2000 cc	45%	55%
2001 to 3000 cc	50%	60%
Above 3000 cc	55%	65%

Source: ROV Annual Report, 1975 and 1983.

Table 4: *Registration of Motorcars by ARF and PARF (Individual Names) 1976–1968*

Year	ARF	PARF	Total
1976	694	6,561	7,255
1977	729	13,451	14,180
1978	1,143	15,429	16,572
1979	4,709	16,309	21,018
1980	7,004	21,206	28,210
1981	7,553	13,427	20,980
1982	15,021	13,405	28,426
1983	19,935	8,312	28,247
1984	13,992	6,390	20,382
1985	6,256	6,625	12,881
1986	558	6,964	7,522
1987	2,052	9,374	11,426
1988	13,844	10,403	24,247

Table 5: *Factors Affecting Scrap Car Values*

Year	Average Scrap Car Price	S$ per 100 yen	1001–1600 cc ARFR — PARFR	Registration of 10 years ago	New Motor Cars Current year
1981	5,000	0.9581	110	16,544	20,980
1982	5,500	0.8618	110	16,197	28,426
1983	5,800	0.8903	110	22,095	28,247
1984	6,000	0.8987	125	11,510	20,382
1985	7,000	0.9275	125	6,262	12,881
1986	9,300	1.3010	125	7,255	7,522
1987	11,000	1.4595	125	14,180	11,426
1988	11,500	1.5713	125	16,572	24,247

Table 6: *Aggregate Demand Elasticities for Travel Modes for Auto Owning Households*

Explanatory Variable	Auto	Bus
Auto in-vehicle time	−0.077	1.226
Bus transit time	2.884	−0.299
Auto expense	−0.278	0.625
Bus fare	1.275	−0.179
Auto parking cost	−0.002	0.020
Income	0.181	−3.562

Table 7: *Predicted Changes in Market Shares of Travel Modes for Auto Owning Households (in percentage points)*

	Auto	Bus
Sample Frequencies	57.8	40.3
Change in Explanatory Variable		
(1) 1 minute decrease in auto in-vehicle time	0.3	−2.9
(2) 1 minute decrease in bus transit time	−3.9	0.3
(3) 10 cents increase in auto expenses	−1.1	1.7
(4) 10 cents increase in bus fares	10.4	−1.0
(5) 10 cents increase in parking costs	0.0	0.1
(6) $100 increase in monthly income	0.8	−11.2