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El Paso Parking Meter Demand

Edward Pallarez
University of Texas at El Paso, ajpallares@miners.utep.edu

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EDWARD PALLAREZ

Department of Economics and Finance

APPROVED:

Thomas M. Fullerton, Jr., Ph.D., Chair

Santiago Ibarreche, Ph.D.

Adam G. Walke, M.S.

Bess Sirmon-Taylor, Ph.D.
Interim Dean of the Graduate School

Dedication

This thesis is dedicated to my family, Bertha and Vianei. The past couple of years have been extremely difficult, but patience and understanding has carried us through the difficult times. I must also express my gratitude to the Grajeda Family – Ivan, Ericka, Erick, and Kevin – for opening their home to me the past two years. Erick and Kevin are the best two roommates a guy can ask for. I would also like to thank my bosses Dr. Lorenzo Reyes, Jr. and Dr. Teofilo Ugalde for never standing in the way of me completing this project. I would also like to thank my entire family for their love and support. I dedicate this project and degree to all of my family.

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Chapter 1: Introduction

Parking, whether free or not, impacts the behavior of travelers and consumers all over the world. The price of parking plays a major role in determining transportation choices – taxi, walking/biking, city transit, carpool, drive alone – to and from work, school, shopping, etc. Luxury and necessity shopping may also be impacted by the prices charged in order to park in a central business district (CBD). However, in some instances, use of a personal vehicle is not only the optimal method of transportation, but the most desired regardless of parking pricing policies. Paying for parking can also help alleviate traffic congestion and 'cruising for parking', which helps reduce carbon dioxide emissions. Cities may not impose paying for parking solely for the purpose of generating revenue.

Parking meters have the ability to generate large amounts of revenue quickly. In the United States, first-hour parking rates have reached as high as $16 in Century City, CA. Other cities that have first-hour parking rates greater than $10 are Pittsburgh, PA, Chicago, IL, Los Angeles, CA, New York City, NY, Boston, MA, and Brooklyn, NY (National Parking Association, 2008). Parking meters initially accepted only coins, but advancements in technology have allowed parking meters to accept payment via smartcards and credit cards.

This paper analyzes parking meter data for downtown El Paso, TX. Monthly parking meter revenue data are from the City of El Paso from January 2001 to December 2012. Parking meters alone in El Paso have generated more than $14.2 million in revenue since January 2001, averaging more than $98 thousand dollars per month (City of El Paso Data). Surface lots and parking garages also provide additional parking in downtown El Paso. Chapter 2 provides a literature review that examines empirical information on parking and commuting behavior. Chapter 3 describes the data and the methodology used to conduct the study. Chapter 4 reviews

the empirical results. Concluding remarks and possible topics for future study are addressed in the final chapter.

Chapter 2: Literature Review

The literature regarding parking behavior in this chapter dates back to at least 1977. Empirical studies have been conducted for Toronto (Canada); the Washington, DC metropolitan area; Los Angeles, Santa Monica, and West Hollywood (CA); Dublin (Ireland); Edinburgh (Scotland); Belgrade (Serbia); Mashhad City (Iran); and Athens (Greece). In these analyses, consumers and commuters have been found to react differently to parking rate increases.

Gillen (1977) estimates models utilizing binary logit analysis and data stratified by income class to examine modal switching in response to changes in parking costs in the Toronto central business district. A 1 percent increase in parking fees decreases auto trips by 0.38 percent. The aggregate elasticity of auto trips is estimated to be -0.31. The elasticity of mode choice with respect to parking costs decreases as income increases. The (bottom) income class of $4,000 – 5,999 has a demand elasticity of mode choice of -1.69. The top income class, $10,000 and up, has a demand elasticity of mode choice of -0.169. The estimates obtained indicate that individuals are more responsive to changes in parking costs than any other money costs. Individuals with higher incomes park closer to destination points.

Everett and Miller (1982) examine parking behavior for 15 federal government controlled parking lots in the Washington, DC metropolitan area. Of these 15 parking lots, 11 are in the Washington, DC central employment area and the remaining 4 are in suburban Maryland and Virginia. These parking sites are broken down in two types of parking, central area sites and suburban sites. Parking price increases for this study ranged from $10 to $32 per month. After parking prices increase, commuting to work alone decreases between 1 and 4 percentage points at eight of the eleven central area sites. Similarly, commuting to work alone decreases by 5 and 6 percentage points at three of the four suburban sites. However, in some locations, driving

alone increased in response to parking rate increases. Transit use also expanded in response to the parking price increases. Seven of the eleven central area parking sites and two central area sites observed increases in transit use by 1 to 4 percentage points and 7 to 11 percentage points, respectively. Parking price increases did not influence transit use very much at the four suburban sites. Surprisingly, transit use at two suburban area sites increased by 1 and 2 percentage points after parking price increases.

Feeney (1989) reviews modal choice and parking location studies in the United States, Canada, Australia, the United Kingdom, Sweden, Holland, and India for the 1970s and 1980s. One modal choice study for Vancouver Canada found that a hypothetical doubling of daily parking prices would lead to an estimated price elasticity of demand of -0.32. One parking location study in Chicago found that a 50 percent increase in parking costs decreases parking within one block of commuters destinations by 45 to 60 percent. The price elasticity for the 50 percent price increase is -0.43. A similar parking location study in Toronto has an estimated point elasticity of -0.33. One study in San Francisco found the overall price elasticity to be -0.25 for off-street parking lots and garages after a tax was levied on parking charges. Another study for downtown Chicago estimates a price elasticity of -1.2 for long term parking in response to a significant increase in municipal parking fees. Price elasticities range from -0.32 to 0.01 for 15 parking facilities after federal employees in Washington, DC were asked to pay a minimum of $10 for parking.

Willson and Shoup (1990) analyze commuter behavior after employee-paid parking is eliminated for four locations in or near downtown Los Angeles and for one downtown location in Ottawa, Canada. Solo driving at these five locations decreased 41 percent, on average. Price elasticities for solo drivers are found to be -0.68, -0.32, -0.29, and -0.1 at the four locations in

Los Angeles. The price elasticity for solo drivers in Ottawa is found to be -0.11. In addition to the decrease in solo drivers after employee-paid parking is waived, carpooling increased significantly at all Los Angeles locations. Transit use increased at two Los Angeles locations and in Ottawa in response to the elimination of employee-paid parking.

Willson (1992) utilizes multinomial logit model methods to analyze the driving behaviors of employees who receive free parking and of employees who pay for parking in downtown Los Angeles. The first model uses a free-parking dummy variable to examine how modal choice – solo-driving, carpooling, or transit use – is affected by parking subsidies. The second model uses daily parking costs instead of the dummy variable to examine how modal choice is selected. Model 1 predicts that employees who receive free parking will choose to drive (solo) 72 percent of the time. Model 1 predicts employees who pay for parking will drive only 41 percent of the time. The price elasticity of demand for solo-driving in model 1 is estimated to be -0.27, and the cross-elasticity of demand for transit use is 0.35. In model 2, the percentage of solo-drivers decrease as daily parking cost increases by one dollar. As daily parking costs increase by one dollar, the elasticity of demand for solo-driving decreases from -0.03 to -0.7.

Shoup (1997) analyzes commuter behavior to work for eight firms with a total of 1,694 employees, in Los Angeles, Santa Monica, and West Hollywood (CA) after employees have been cashed-out. In a cashing-out program, which began in 1992, employers may offer free parking to employees, or the employers may offer the cash value of the parking to the employees. Results indicate that commuting behavior changes after employer-paid parking has been eliminated. Solo-driver commuting decreased 17 percent after cashing-out programs went into effect for the eight firms under review. Car-pooling increased by 64 percent, transit use increased by 50 percent, and walking to work increased by 50 percent. After cashing-out

programs went into effect, solo-driver commuting decreased at five of the eight firms. At one firm in downtown Los Angeles, solo-driver commuting decreased by 22 percent. Cashing-out programs are found to lead to decreases in gasoline consumption and harmful emissions.

Tsamboulas (2001) develops two sets of models to analyze consumer parking behavior in Athens. The first set of models examines parking location decisions. The second set of models analyzes mode of travel choices. Parking fare increases studied are (i) 50 percent or less, (ii) between 50 and 100 percent, and (iii) between 100 and 200 percent.

The dependent variable for the second set of models is the change of mode choice from private car use to another mode of travel. For an increase of parking fares up to 50 percent, the walking time (to and from parking locations) coefficient is positive. The positive coefficient suggests that car users will continue to use cars even if they change parking location. For the monthly-paying drivers, males are more likely than women to accept the increase in parking fares for increase between 100 and 200 percent. Also for monthly-paying drivers, a variable for 'return (home) trip stops' is used for increases of up to 50 percent and between 50 and 100 percent. The estimated coefficient for the up to 50 percent model is positive, and the estimated coefficient for the between 50 and 100 percent model is negative, implying changes in driver habits.

Hu and Saleh (2005) model trip generation/trip frequency for non-food shopping events into the city centre of Edinburgh utilizing logistic regression analysis. Survey responses indicate that out of 238 car users, 42.1 percent and 38.3 percent claim that current traffic levels in the city centre is a 'major problem' and 'something of a problem,' respectively. Consumers were asked what would further encourage them to shop in the city centre. Out of 1,199 consumers, 7.9 percent selected less traffic congestion. Out of 510 consumers who travel to the city centre by

bus, 8.8 percent claim that less traffic congestion will encourage future travel to the city centre. Out of 240 consumers who use a car, 7.1 percent claim that less traffic congestion would encourage future travel to the city centre. The regression estimates for 'all users' show that, as parking costs increases, the volume of infrequent (less than once a week) trips increases. The regression estimates for 'car users' show that, as parking cost increases, consumers tend to make less frequent trips.

Kelly and Clinch (2006) propose raising the initial price of parking from £1.5to £2, £4, and £7 per hour in order to gauge responsiveness of on-street parking behavior in Dublin by trip purpose: business or non-business. Other variables used to help explain sensitivity due to the increase in parking price include origin of the journey, Dublin County or outside Dublin County; parking frequency (heavy, medium); and engine size (below 1L, 1.1 – 1.2L, 1.3 – 1.4L, 1.5 – 1.6L, 1.7 – 1.8L, and 1.9 – 2L). For the £2 (33 percent price increase) scenario, the estimation results show almost no significant impacts. Even though the second hypothetical pricing scenario, £4, represents a 167 percent price increase, heavy users are less likely to cease all parking. Trips made for business purposes are far less likely to stop in response to the parking price increase. At the £4 per hour price scenario, the probability of stopping all parking activity is 20 percent lower for business users compared to non-business users. For the £7 pricing scenario, travelers from outside Dublin County are more likely to change their behavior. Finally, travelers who are making non-business trips are 22 percent more likely to cancel their trip at this new parking price.

Kelly and Clinch (2009) estimate parking elasticity demand in Dublin after a 50 percent nominal and 45.1 percent real increase for hourly on-street parking for 9AM, 12PM, 3PM, and 6PM time periods. For the 9AM period (the most sensitive time period to price changes),

parking price elasticity is -0.35 and -0.38 for the nominal increase and the real increase, respectively. The parking price elasticity values for the 12PM, 3PM, and 6PM nominal increase category are -0.01, -0.08, and -0.15, respectively. Elasticity values for the real price increase category are -0.02, -0.08, and -0.16 for 12PM, 3PM, and 6PM time periods, respectively. Saturday parking in Dublin is the most sensitive to parking price increases. After the nominal increase, parking price elasticity is -0.18. After the real increase, parking price elasticity is -0.19.

Simićević, Milosavljević, Maletić, and Kaplanović (2012) examine potential parking price increases of the Central Business District in Belgrade, the capital of Serbia. The percentages of parking space users that will give up parking at given prices per hour are tabulated. Over 50 percent of users for work, business, and personal business would not give up parking because of price. Elasticity coefficients for possible parking price increases of RSD 40, 60, 80, and 100 are calculated for five purposes of traveling to Belgrade's CBD: work, business, personal business, leisure, and shopping. As the potential parking price per hour increases, demand for parking for all purposes of travel decreases. Traveling to Belgrade's CBD for leisure and shopping purposes is greatly impacted when increasing the parking price from RSD 40 to RSD 60. The elasticity coefficient range for five travel purposes are as follows: Work (-0.47 to -0.38), Business (-0.5 to -0.28), Personal Business (-0.56 to -0.37), leisure (-0.66 to -0.26), and shopping (-0.75 to -0.26).Survey responses indicate that 44% of passenger car users would give up going to Belgrade's CBD at some price above RSD 100.

Azari, Arintono, Hamid, and Rahmat (2013) examine the responsiveness of congestion pricing (cordon pricing) and parking pricing for travelers into the central business district (CBD) of Mashhad City (Iran). Travelers to the CBD were given two alternatives: CPi and CPo. CPi refers to the commuter using a private car and parking inside/close to the cordon zone and pay a

parking fee and a congestion fee. CPo refers to the commuter using a private car and parking outside/beyond the cordon zone. Results from a multinomial logit (MNL) model indicate that if the cordon zone fee increases by 1 percent, the demand for traveling by car and parking inside the cordon zone decreases by 1.145 percent, while demand for parking beyond the cordon area increases by 0.337 percent. If the parking fee inside the cordon zone increases by 1 percent, demand for parking inside the cordon zone will decrease by 0.197 percent and the demand for parking outside the cordon zone will increase by 0.062 percent. If the parking fee outside the cordon zone increases by 1 percent, the demand for parking outside the cordon zone will decrease by 0.218 percent and parking inside the cordon zone will increase by 0.154 percent.

The next chapter will introduce the model and framework that will allow estimating a parking space demand function for downtown El Paso. Monthly parking prices for parking lots and garages in downtown El Paso are used to estimate parking price elasticity. The surrounding parking lots and garages in downtown El Paso serve as substitutes to parking meters. The price elasticity of demand estimates will indicate how commuters' parking behavior will change in response to variations in parking meters fees. Variables used in the analysis include the real parking meter fee, real parking lot prices, the real exchange rate index for the United States and Mexico (pesos to one dollar), and real per capita personal income.

Chapter 3: Data and Methodology

The demand for parking meter purchases for downtown El Paso is estimated utilizing monthly data from January 2001 through December 2012. Independent variables include a real exchange rate index measured in pesos per dollar, real per capita personal income for El Paso County, and the real parking meter fee. In addition to these independent variables, a real substitute price is also included in the sample.

Data for parking meter revenue for downtown El Paso are from The City of El Paso International Bridges Department. The same department is also the source for the nominal parking meter fee. Monthly parking meter purchases are calculated by dividing monthly parking revenue by the monthly nominal parking meter fee. Per capita personal income for El Paso County is calculated by dividing personal income by population. Annual data for personal income and population are reported by the Bureau of Economic Analysis (BEA, 2013).

Monthly personal income and population are generated from annual data. In order to generate monthly personal income observations, percentage growth of income, *r*, from one year to the next is calculated. The personal income value for 2001 is used for January 2001. The formula below is used to generate monthly personal income:

(3.1) $$PERSONAL_t = PERSONAL_{t-1} * \left(1 + \frac{r}{100}\right)^{\frac{1}{12}}$$

The process is repeated through December 2012. Monthly population observations are derived using the following formula:

(3.2) $$N(t) = N_0 * e^{kt}$$

where $N_0$is the population for July of each year, *k* is the growth constant, and *t* is the time period. Each annual population value is used as the July monthly value. The values of *t* begin at zero for July. Each value of *t* increases by one as the month changes. In order to calculate *k*, the

population estimate for the year *t+1* is divided by year *t.* Next, take the natural logarithm of the value $\frac{t+1}{t}$, and divide by 12. The process is repeated until monthly population values are completed through December 2012.

The consumer price index (CPI) is obtained from the Bureau of Labor Statistics (BLS, 2013). All monthly observations of the CPI are divided by 100. The nominal parking meter fee divided by the CPI yields the real parking meter fee.

The real exchange rate index is obtained from the University of Texas at El Paso Border Region Modeling Project. The formula for the real exchange rate index is as follows:

(3.3)
$$XR_t = XR_{t-1} * \left(\frac{NX_t}{NX_{t-1}}\right) * \left(\frac{USCPI_t}{USCPI_{t-1}}\right) \Big/ \left(\frac{MXCPI_t}{MXCPI_{t-1}}\right)$$

where XR_t is the real exchange rate index, XR_{t-1} is the real exchange rate index one period before XR_t, $NX_t$is the nominal exchange rate, $NX_{t-1}$is the nominal exchange rate one period before NX_t, $USCPI_t$ is the CPI of the United States, $USCPI_{t-1}$ is the CPI of the United States one period before $USCPI_t$, $MXCPI_t$ is the CPI of Mexico, and $MXCPI_{t-1}$ is the CPI of Mexico one period before $MXCPI_t$. The nominal exchange rate and the CPI for Mexico are obtained from the Federal Reserve Economic Data of St. Louis (FRB, 2013).

Substitute parking price data are obtained using information from 15 parking garages in downtown El Paso (Norma Roa of Diversified Parking, 2013). The substitute price represents other parking purchases besides purchasing a parking meter. The substitute product consists of 15 additional parking garages in downtown El Paso. Each parking garage charges a different price depending on the length of time parked. Every month of the substitute price variable is calculated using the corresponding month for every parking garage. Some garages have as many as four or five different prices for the month. Dividing each substitute parking garage by the CPI

is used to convert the nominal substitute price to the real substitute price. The parking prices for the garages were provided by Diversified Parking of El Paso.

In order to estimate demand for parking meter purchase for downtown El Paso, a linear transfer function is utilized. The implicit linear transfer function is as follows:

(3.4) $$PMP_t = f\left(MTR_{t-f}, INC_{t-i}, LOT_{t-j}, XR_{t-r}\right)$$

where PMP_t represents parking meter purchases, MTR_t is for the real parking meter fee, INC_t is for lags real per capita personal income, LOT_t is the real substitute price, and XR_t is the real exchange rate index. The expected signs of the independent variables are as follows:

(3.5) $$\frac{\partial PMP}{\partial MTR} < 0, \frac{\partial PMP}{\partial INC} > 0, \frac{\partial PMP}{\partial LOT} > 0, \frac{\partial PMP}{\partial XR} < 0$$

Parking meter purchases are expected to decrease in response to an increase in the real parking meter fee. An increase in parking meter purchases is expected in response to an increase in real per capita personal income. An increase in parking meter purchases is expected in response to increases in both substitute parking prices. Parking meter purchases are expected to decrease in response to an increase in the real exchange rate.

Descriptive statistics for the variables are in the table below. In addition to these variables, population and income are included in the table. By virtue of the CPI, real per capita personal income, the real parking meter fee, and both substitute price variables are in 1982 – 1984 dollars.

Table 3.1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	No.
Parking Meter Purchases	184,556	34,203	104,965	273,575	144
Real Parking Meter Fee	0.27	0.05	0.14	0.35	144
Real Exchange Rate Index	94.256	6.236	81.92	115.1	144
Real Substitute Price; Average	1.37	0.068	1.27	1.51	144
Real Substitute Price; Median	1.26	0.09	1.1	1.38	144
Real Per Capita Personal Income	12,633	592	11,546	13,469	144
Population; thousands	754.057	47.466	685.420	842.337	144

Chapter 4: Empirical Analysis

The results for the linear transfer function are shown in Table 4.1. The data for the dependent variable and the four independent variables have been logarithmically transformed and differenced to ensure stationarity. Unlike most prior parking meter studies, monthly data are employed. Reaction times are very quick, only contemporaneous lags of the explanatory variables are included in the model specification. The signs for the four estimated slope parameters are as hypothesized.

The coefficient for the real parking meter fee is -1.02. This estimate may be interpreted as the own-price elasticity of demand for parking meters. A 1 percent increase in the real parking meter fee will result in an estimated 1.02 percent decrease in the demand for parking meter purchases. The estimation results for parking meter fees are similar to the results found for paid parking in the literature. The elasticity value of -1.02 in this study is close to the elasticity values of -0.68 (Willson and Shoup, 1990) and -0.7 (Willson, 1992). Both of those studies are for downtown Los Angeles.

The coefficient for the real exchange rate index is negative. A real depreciation in the exchange rate results in a loss of purchasing power for the Mexican consumer. Due to the loss of purchasing power, a decline in parking meter purchases is expected. The standard deviation for this coefficient is fairly large, implying a fairly wide range of uncertainty.

The estimated coefficient for the substitute price variable is positive. The substitute price variable coefficient may be interpreted as the cross-price elasticity of demand. Since this coefficient is positive, we conclude that the two goods, parking meter purchases and parking lot or garage purchases, are substitutes. The estimated coefficient of 0.52 indicates that parking lot spaces are imperfect substitutes for parking meter spaces. The parameter does not, however,

satisfy the 10-percent significance criterion. The cross-price elasticity for this study is similar to the cross-price elasticities found for two parking choices analyzed by Azari et al (2013).

The estimated coefficient for the per capita personal income variable is positive. For a 1 percent increase in per capita personal income, parking meter purchases are expected to increase by 0.72 percent. A positive coefficient for this set of results implies that parking meter purchases behave as normal goods in El Paso. This is in contrast to the range of inferior good outcomes reported by Gillen (1977).

Table 4.1: Linear Transfer Function Specification

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000516	0.005364	0.096114	0.9236
$Real\ Parking\ Meter\ Fee_t$	-1.026342	0.100291	-10.233660	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.259179	0.239028	-1.084302	0.2801
$Average\ \ Lot_t$	0.520829	0.603609	0.862858	0.3897
$Real\ Per\ Capita\ Personal\ Income_t$	0.720764	1.273891	0.565797	0.5725
MA_{t-1}	-0.796395	0.082925	-9.603801	0.0000
MA_{t-2}	0.277063	0.085638	3.235275	0.0015
R-Squared	0.573795		Mean Dependent Variable	-0.004274
Adjusted R-Squared	0.554992		S.D. Dependent Variable	0.155848
Standard Error of Regression	0.103965		Akaike Info Criterion	-1.641818
Sum of Squared Residuals	1.469978		Schwarz Criterion	-1.496784
Log-Likelihood	124.390000		Hannan-Quinn Criterion	-1.582883
F-Statistic	30.515910		Durbin-Watson Stat	1.999614
F-Statistic Probability	0.000000			

Strong correlation exists between the four explanatory variables in the model. Correlation among the explanatory variables does not imply that multicollinearity is a problem, but low t-statistics and a high F-statistic indicate that multicollinearity may be present. Auxiliary regressions were performed in an attempt to detect multicollinearity. Because multicollinearity was not detected, parking meter sales for El Paso are probably subject to a fairly wide range of

variability and obtaining lower parameter standard deviations will require a much larger sample size.

Chapter 5: Conclusion

This study analyzes metered parking demand in downtown El Paso, TX. The study takes into account meter prices, economic conditions, and the price for substitute good parking garages and parking lots. Per capita personal income and a real exchange rate index are both included in the data sample.

Results obtained for downtown El Paso are similar to many of those reported in other studies. An increase in the price of the parking meter leads to a decrease in parking meter purchases, while an increase in parking garage prices will raise parking meter sales. Another key finding in this study is that metered parking spaces are normal goods and parking meter purchases increase as per capita income increases. Furthermore, when the peso depreciates relative to the dollar, Mexican consumers lose purchasing power and therefore parking meter purchases decrease.

The sample size for this study is fairly small. Given that, it will be helpful to replicate the empirical analyses as more data become available. It would also be helpful to examine whether parking meter sales behave similarly in other border cities such as San Diego or Ciudad Juarez.

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Appendix 1: Monthly Data

Month	Year	PMP	EXR	INC	MTR	ALOT	MLOT
January	2001	250,794	91.0090	11,547	0.14	1.51	1.38
February	2001	238,713	90.7590	11,546	0.14	1.50	1.38
March	2001	259,170	89.4250	11,565	0.14	1.48	1.36
April	2001	246,600	86.7820	11,565	0.14	1.48	1.36
May	2001	273,575	85.2070	11,558	0.14	1.47	1.35
June	2001	232,043	84.6780	11,584	0.14	1.47	1.35
July	2001	242,479	85.3600	11,661	0.14	1.47	1.35
August	2001	266,337	84.5690	11,707	0.14	1.47	1.35
September	2001	104,965	86.8240	11,700	0.28	1.46	1.35
October	2001	126,551	85.4660	11,786	0.28	1.47	1.35
November	2001	118,125	83.8980	11,852	0.28	1.47	1.35
December	2001	126,197	82.8400	11,946	0.28	1.48	1.36
January	2002	119,992	82.3180	11,966	0.28	1.47	1.36
February	2002	118,381	82.1380	11,937	0.28	1.47	1.35
March	2002	128,191	81.9170	11,887	0.28	1.46	1.34
April	2002	135,261	82.7610	11,839	0.28	1.45	1.33
May	2002	130,703	85.8050	11,856	0.28	1.45	1.33
June	2002	120,252	87.6440	11,867	0.28	1.45	1.33
July	2002	131,190	87.6300	11,874	0.28	1.45	1.33
August	2002	129,397	88.1150	11,851	0.28	1.44	1.33
September	2002	116,366	89.8010	11,848	0.28	1.44	1.33
October	2002	232,346	89.7650	11,844	0.28	1.44	1.32
November	2002	184,091	89.9490	11,860	0.28	1.44	1.32
December	2002	221,859	89.6010	11,903	0.28	1.44	1.33
January	2003	207,036	93.1020	11,867	0.28	1.44	1.32
February	2003	194,182	96.3510	11,818	0.27	1.43	1.31
March	2003	201,557	96.1030	11,789	0.27	1.42	1.30
April	2003	222,199	92.9180	11,857	0.27	1.42	1.31
May	2003	207,862	90.0740	11,919	0.27	1.42	1.31
June	2003	228,464	92.3260	11,949	0.27	1.42	1.31

Month	Year	PMP	EXR	INC	MTR	ALOT	MLOT
July	2003	218,024	91.8140	11,972	0.27	1.45	1.33
August	2003	208,874	94.7980	11,963	0.27	1.45	1.32
September	2003	197,908	95.8210	11,961	0.27	1.44	1.32
October	2003	198,778	97.5320	12,011	0.27	1.44	1.32
November	2003	166,361	96.2100	12,080	0.27	1.45	1.32
December	2003	222,190	96.5840	12,131	0.27	1.45	1.32
January	2004	185,425	93.5970	12,108	0.27	1.44	1.32
February	2004	186,594	94.3920	12,095	0.27	1.43	1.31
March	2004	215,211	94.6380	12,069	0.27	1.45	1.30
April	2004	198,811	97.0860	12,082	0.27	1.44	1.30
May	2004	187,666	99.9600	12,063	0.26	1.44	1.29
June	2004	208,277	99.0470	12,076	0.26	1.43	1.29
July	2004	191,092	99.2740	12,153	0.26	1.43	1.29
August	2004	205,658	98.1200	12,199	0.26	1.43	1.29
September	2004	176,927	98.3100	12,227	0.26	1.43	1.28
October	2004	176,733	97.3950	12,216	0.26	1.42	1.28
November	2004	193,238	96.3660	12,263	0.26	1.42	1.28
December	2004	195,863	94.4320	12,362	0.26	1.43	1.28
January	2005	176,324	95.1050	12,390	0.26	1.42	1.28
February	2005	173,778	94.2860	12,378	0.26	1.42	1.27
March	2005	216,078	94.6480	12,340	0.26	1.40	1.26
April	2005	184,898	94.7220	12,316	0.26	1.40	1.25
May	2005	201,088	93.6430	12,388	0.26	1.40	1.26
June	2005	193,281	92.4950	12,440	0.26	1.32	1.21
July	2005	181,135	91.3230	12,437	0.26	1.31	1.20
August	2005	209,432	91.7670	12,431	0.25	1.30	1.20
September	2005	173,602	93.2910	12,339	0.25	1.29	1.18
October	2005	172,771	93.7250	12,371	0.25	1.29	1.18
November	2005	193,502	90.9110	12,530	0.25	1.30	1.19
December	2005	202,591	89.6610	12,639	0.25	1.30	1.19

Month	Year	PMP	EXR	INC	MTR	ALOT	MLOT
January	2006	204,087	89.1210	12,602	0.25	1.29	1.19
February	2006	183,824	88.6260	12,627	0.25	1.29	1.18
March	2006	204,863	91.2420	12,607	0.25	1.35	1.20
April	2006	191,477	94.4080	12,550	0.25	1.34	1.19
May	2006	207,041	95.7340	12,537	0.25	1.33	1.19
June	2006	187,414	98.4240	12,562	0.25	1.33	1.18
July	2006	179,872	94.9410	12,582	0.25	1.33	1.18
August	2006	207,179	93.6640	12,608	0.25	1.32	1.18
September	2006	173,072	93.2350	12,722	0.25	1.33	1.18
October	2006	209,749	91.5840	12,843	0.25	1.34	1.19
November	2006	193,194	91.1430	12,914	0.25	1.34	1.19
December	2006	218,630	90.1730	12,948	0.25	1.34	1.19
January	2007	194,797	90.8550	12,961	0.25	1.33	1.19
February	2007	193,016	91.4760	12,947	0.25	1.33	1.18
March	2007	208,850	93.0650	12,886	0.24	1.31	1.17
April	2007	205,342	92.6020	12,857	0.24	1.31	1.16
May	2007	231,036	92.2270	12,834	0.24	1.30	1.15
June	2007	199,086	92.4510	12,865	0.24	1.30	1.15
July	2007	220,492	91.8320	12,922	0.24	1.30	1.15
August	2007	212,020	93.2730	12,999	0.24	1.30	1.15
September	2007	178,211	92.6910	13,016	0.24	1.29	1.15
October	2007	218,203	90.7810	13,042	0.24	1.29	1.15
November	2007	195,398	91.2120	13,018	0.24	1.30	1.14
December	2007	217,571	90.4570	13,080	0.24	1.30	1.14
January	2008	200,590	91.0010	13,069	0.24	1.29	1.14
February	2008	197,070	89.7980	13,031	0.24	1.29	1.13
March	2008	200,313	89.6310	12,919	0.23	1.30	1.14
April	2008	223,335	88.1600	12,841	0.23	1.30	1.13
May	2008	204,967	88.3190	12,734	0.23	1.29	1.12
June	2008	212,811	87.9390	12,608	0.23	1.27	1.11

Month	Year	PMP	EXR	INC	MTR	ALOT	MLOT
July	2008	212,342	86.9440	12,547	0.23	1.27	1.10
August	2008	196,041	85.2060	12,595	0.23	1.27	1.11
September	2008	197,646	88.9780	12,610	0.23	1.27	1.11
October	2008	209,338	103.8200	12,736	0.23	1.29	1.12
November	2008	172,132	104.5340	12,982	0.24	1.31	1.14
December	2008	234,768	105.1590	13,115	0.24	1.33	1.15
January	2009	179,166	109.0580	13,056	0.24	1.32	1.15
February	2009	189,983	114.9050	13,047	0.24	1.31	1.14
March	2009	215,719	115.0980	13,071	0.24	1.31	1.14
April	2009	207,636	105.3200	13,094	0.23	1.31	1.14
May	2009	190,069	103.7680	13,112	0.23	1.30	1.13
June	2009	211,271	105.8930	13,056	0.23	1.29	1.12
July	2009	210,699	105.6240	13,132	0.23	1.29	1.13
August	2009	202,095	102.7840	13,158	0.23	1.29	1.12
September	2009	231,298	105.5860	13,206	0.23	1.29	1.12
October	2009	163,455	103.8340	13,250	0.35	1.29	1.12
November	2009	145,043	102.4620	13,297	0.35	1.29	1.12
December	2009	190,788	99.9470	13,377	0.35	1.29	1.12
January	2010	136,659	98.7380	13,389	0.35	1.29	1.12
February	2010	154,240	99.2720	13,402	0.35	1.29	1.12
March	2010	178,286	96.1570	13,364	0.34	1.28	1.11
April	2010	173,804	93.9920	13,358	0.34	1.40	1.38
May	2010	153,005	98.6290	13,365	0.34	1.40	1.38
June	2010	171,256	98.3820	13,395	0.34	1.40	1.38
July	2010	166,045	98.9590	13,408	0.34	1.40	1.38
August	2010	168,321	98.4400	13,408	0.34	1.40	1.37
September	2010	155,376	98.2150	13,418	0.34	1.40	1.37
October	2010	151,432	94.9680	13,420	0.34	1.40	1.37
November	2010	160,422	93.5080	13,433	0.34	1.40	1.37
December	2010	183,027	93.5800	13,428	0.34	1.40	1.37

Month	Year	PMP	EXR	INC	MTR	ALOT	MLOT
January	2011	139,668	91.5840	13,383	0.34	1.39	1.36
February	2011	137,785	91.2730	13,341	0.34	1.36	1.36
March	2011	185,552	91.4450	13,236	0.34	1.35	1.34
April	2011	158,246	89.8880	13,175	0.33	1.34	1.33
May	2011	162,363	90.4750	13,137	0.33	1.33	1.33
June	2011	157,764	91.5670	13,175	0.33	1.33	1.33
July	2011	148,326	90.1800	13,183	0.33	1.33	1.33
August	2011	166,477	94.6120	13,173	0.33	1.33	1.32
September	2011	149,619	100.8030	13,180	0.33	1.33	1.32
October	2011	147,159	102.9120	13,233	0.33	1.33	1.32
November	2011	149,816	103.7270	13,271	0.33	1.33	1.33
December	2011	167,481	103.1490	13,330	0.33	1.33	1.33
January	2012	154,383	100.2510	13,299	0.33	1.33	1.32
February	2012	151,028	95.7350	13,272	0.33	1.32	1.32
March	2012	164,782	96.2080	13,203	0.33	1.31	1.31
April	2012	152,136	98.9760	13,194	0.33	1.31	1.30
May	2012	168,522	103.6780	13,241	0.33	1.31	1.31
June	2012	146,653	104.9800	13,292	0.33	1.31	1.31
July	2012	153,330	100.0820	13,340	0.33	1.31	1.31
August	2012	165,057	98.9750	13,297	0.33	1.31	1.30
September	2012	124,292	97.1400	13,270	0.32	1.30	1.30
October	2012	143,485	96.2520	13,306	0.32	1.30	1.30
November	2012	134,191	96.5050	13,401	0.33	1.31	1.30
December	2012	136,106	94.5250	13,469	0.33	1.31	1.31

Note: Parking Meter Fee, Average Lot, Median Lot, Per Capita Personal Income are in real terms; Employment is in thousands; Exchange Rate Index is real

Appendix 2: Alternative Specifications

#1

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.001238	0.005178	0.239063	0.8114
$Real\ Parking\ Meter\ Fee_t$	-1.052776	0.109026	-9.656158	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.140099	0.26271	-0.533284	0.5947
$Average\ \ Lot_t$	0.365286	0.634892	0.575352	0.5660
$Real\ Per\ Capita\ Personal\ Income_t$	0.509498	1.427659	0.356876	0.7217
AR_{t-1}	-0.680301	0.078486	-8.667762	0.0000
MA_{t-2}	-0.330267	0.102399	-3.225297	0.0016
R-Squared	0.550034		Mean Dependent Variable	-0.003957
Adjusted R-Squared	0.530035		S.D. Dependent Variable	0.156354
Standard Error of Regression	0.107187		Akaike Info Criterion	-1.580452
Sum of Squared Residuals	1.551010		Schwarz Criterion	-1.434742
Log-Likelihood	119.212100		Hannan-Quinn Criterion	-1.521241
F-Statistic	27.503730		Durbin-Watson Stat	2.227398
F-Statistic Probability	0.000000			

#2

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.001269	0.005131	0.247289	0.8051
$Real\ Parking\ Meter\ Fee_t$	-1.048944	0.109637	-9.567393	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.134063	0.267486	-0.501196	0.6171
$Average\ \ Lot_t$	0.396182	0.641936	0.617166	0.5382
$Real\ Per\ Capita\ Personal\ Income_t$	0.502254	1.449545	0.346491	0.7295
AR_{t-2}	0.159448	0.096833	1.646624	0.1020
MA_{t-1}	-0.681058	0.073141	-9.311560	0.0000
R-Squared	0.551064		Mean Dependent Variable	-0.004568
Adjusted R-Squared	0.530962		S.D. Dependent Variable	0.156741
Standard Error of Regression	0.107346		Akaike Info Criterion	-1.577150
Sum of Squared Residuals	1.544101		Schwarz Criterion	-1.430758
Log-Likelihood	118.189100		Hannan-Quinn Criterion	-1.517661
F-Statistic	27.413900		Durbin-Watson Stat	2.209401
F-Statistic Probability	0.000000			

#3

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.001537	0.00525	0.292684	0.7702
$Real\ Parking\ Meter\ Fee_t$	-1.041969	0.108179	-9.631917	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.115321	0.279954	-0.411927	0.6811
$Average\ \ Lot_t$	0.426694	0.621762	0.686266	0.4938
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.401211	1.398928	0.286799	0.7747
AR_{t-1}	-0.677502	0.079854	-8.484273	0.0000
MA_{t-2}	-0.331460	0.103235	-3.210738	0.0017
R-Squared	0.546603		Mean Dependent Variable	-0.003866
Adjusted R-Squared	0.525837		S.D. Dependent Variable	0.157535
Standard Error of Regression	0.108478		Akaike Info Criterion	-1.555144
Sum of Squared Residuals	1.541543		Schwarz Criterion	-1.406660
Log-Likelihood	114.304900		Hannan-Quinn Criterion	-1.494803
F-Statistic	26.321710		Durbin-Watson Stat	2.245056
F-Statistic Probability	0.000000			

#4

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.001566	0.005164	0.303325	0.7621
$Real\ Parking\ Meter\ Fee_t$	-1.038164	0.122364	-8.484205	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.110698	0.281536	-0.393194	0.6948
$Average\ \ Lot_t$	0.437248	0.623393	0.701400	0.4843
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.454348	1.422395	0.319425	0.7499
AR_{t-2}	0.152252	0.098147	1.551260	0.1233
MA_{t-1}	-0.679778	0.073966	-9.190398	0.0000
R-Squared	0.551388		Mean Dependent Variable	-0.004215
Adjusted R-Squared	0.530683		S.D. Dependent Variable	0.158060
Standard Error of Regression	0.108282		Akaike Info Criterion	-1.558419
Sum of Squared Residuals	1.524239		Schwarz Criterion	-1.409223
Log-Likelihood	113.751700		Hannan-Quinn Criterion	-1.497789
F-Statistic	26.630480		Durbin-Watson Stat	2.205731
F-Statistic Probability	0.000000			

#5

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.001330	0.005347	0.248768	0.8039
$Real\ Parking\ Meter\ Fee_t$	-1.015729	0.099455	-10.212920	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.231828	0.249192	-0.930317	0.3539
$Average\ \ Lot_t$	0.618729	0.587294	1.053525	0.2940
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.451427	1.220792	0.369782	0.7121
MA_{t-1}	-0.801695	0.083906	-9.554670	0.0000
MA_{t-2}	0.274959	0.086284	3.186666	0.0018
R-Squared	0.574085		Mean Dependent Variable	-0.005023
Adjusted R-Squared	0.554725		S.D. Dependent Variable	0.157555
Standard Error of Regression	0.105135		Akaike Info Criterion	-1.618101
Sum of Squared Residuals	1.459037		Schwarz Criterion	-1.470321
Log-Likelihood	119.458000		Hannan-Quinn Criterion	-1.558047
F-Statistic	29.653510		Durbin-Watson Stat	1.977327
F-Statistic Probability	0.000000			

#6

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000468	0.004976	0.093967	0.9253
$Real\ Parking\ Meter\ Fee_t$	-1.052867	0.109083	-9.651980	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.116942	0.260054	-0.449683	0.6537
$Median\ \ Lot_t$	0.076483	0.38429	0.199025	0.8425
$Real\ Per\ Capita\ Personal\ Income_t$	0.686412	1.395724	0.491797	0.6237
AR_{t-1}	-0.680710	0.078638	-8.656225	0.0000
MA_{t-2}	-0.331888	0.102923	-3.224611	0.0016
R-Squared	0.549061		Mean Dependent Variable	-0.003957
Adjusted R-Squared	0.529019		S.D. Dependent Variable	0.156354
Standard Error of Regression	0.107302		Akaike Info Criterion	-1.578292
Sum of Squared Residuals	1.554364		Schwarz Criterion	-1.432582
Log-Likelihood	119.058700		Hannan-Quinn Criterion	-1.519081
F-Statistic	27.395830		Durbin-Watson Stat	2.225769
F-Statistic Probability	0.000000			

#7

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000470	0.004933	0.095184	0.9243
$Real\ Parking\ Meter\ Fee_t$	-1.048676	0.109731	-9.556812	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.111378	0.265796	-0.419036	0.6759
$Median\ Lot_t$	0.090284	0.387958	0.232717	0.8163
$Real\ Per\ Capita\ Personal\ Income_t$	0.688223	1.417479	0.485526	0.6281
AR_{t-2}	0.157762	0.096835	1.629188	0.1056
MA_{t-1}	-0.681104	0.07345	-9.272981	0.0000
R-Squared	0.549964		Mean Dependent Variable	-0.004568
Adjusted R-Squared	0.529814		S.D. Dependent Variable	0.156741
Standard Error of Regression	0.107477		Akaike Info Criterion	-1.574704
Sum of Squared Residuals	1.547882		Schwarz Criterion	-1.428312
Log-Likelihood	118.016600		Hannan-Quinn Criterion	-1.515215
F-Statistic	27.292370		Durbin-Watson Stat	2.208509
F-Statistic Probability	0.000000			

#8

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	-0.000421	0.005191	-0.081154	0.9354
$Real\ Parking\ Meter\ Fee_t$	-1.027337	0.100522	-10.220010	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.225150	0.235885	-0.954492	0.3415
$Median\ Lot_t$	0.171918	0.360645	0.476697	0.6343
$Real\ Per\ Capita\ Personal\ Income_t$	0.918823	1.247797	0.736356	0.4628
MA_{t-1}	-0.795487	0.083185	-9.562879	0.0000
MA_{t-2}	0.272365	0.085759	3.175931	0.0018
R-Squared	0.572181		Mean Dependent Variable	-0.004274
Adjusted R-Squared	0.553307		S.D. Dependent Variable	0.155848
Standard Error of Regression	0.104161		Akaike Info Criterion	-1.638038
Sum of Squared Residuals	1.475545		Schwarz Criterion	-1.493003
Log-Likelihood	124.119700		Hannan-Quinn Criterion	-1.579103
F-Statistic	30.315230		Durbin-Watson Stat	2.000813
F-Statistic Probability	0.000000			

#9

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000284	0.005228	0.054379	0.9567
$Real\ Parking\ Meter\ Fee_t$	-1.033289	0.107415	-9.619592	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.078819	0.272507	0.289236	0.7729
$Average\ \ Lot_{t-3}$	-0.027195	0.634708	-0.042846	0.9659
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.662018	1.395812	0.474288	0.6361
AR_{t-1}	-0.683643	0.079194	-8.632491	0.0000
MA_{t-2}	-0.345715	0.102326	-3.378562	0.0010
R-Squared	0.544998		Mean Dependent Variable	-0.003866
Adjusted R-Squared	0.524158		S.D. Dependent Variable	0.157535
Standard Error of Regression	0.108670		Akaike Info Criterion	-1.551609
Sum of Squared Residuals	1.547001		Schwarz Criterion	-1.403125
Log-Likelihood	114.061000		Hannan-Quinn Criterion	-1.491269
F-Statistic	26.151790		Durbin-Watson Stat	2.235162
F-Statistic Probability	0.000000			

#10

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000209	0.005129	0.040704	0.9676
$Real\ Parking\ Meter\ Fee_t$	-1.028189	0.122039	-8.425083	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.100770	0.274096	0.367646	0.7137
$Average\ \ Lot_{t-3}$	-0.029981	0.635498	-0.047178	0.9624
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.742747	1.413376	0.525513	0.6001
AR_{t-2}	0.149649	0.098416	1.520578	0.1308
MA_{t-1}	-0.686471	0.0733	-9.365276	0.0000
R-Squared	0.549903		Mean Dependent Variable	-0.004215
Adjusted R-Squared	0.529130		S.D. Dependent Variable	0.158060
Standard Error of Regression	0.108461		Akaike Info Criterion	-1.555114
Sum of Squared Residuals	1.529284		Schwarz Criterion	-1.405918
Log-Likelihood	113.525300		Hannan-Quinn Criterion	-1.494484
F-Statistic	26.471140		Durbin-Watson Stat	2.196788
F-Statistic Probability	0.000000			

#11

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	-0.000114	0.005298	-0.021512	0.9829
$Real\ Parking\ Meter\ Fee_t$	-1.010791	0.099506	-10.158050	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.018554	0.24613	0.075381	0.9400
$Average\ \ Lot_{t-3}$	-0.054313	0.599129	-0.090653	0.9279
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.725762	1.245601	0.582660	0.5611
MA_{t-1}	-0.798344	0.084655	-9.430587	0.0000
MA_{t-2}	0.248298	0.085544	2.902591	0.0043
R-Squared	0.569067		Mean Dependent Variable	-0.005023
Adjusted R-Squared	0.549479		S.D. Dependent Variable	0.157555
Standard Error of Regression	0.105752		Akaike Info Criterion	-1.606387
Sum of Squared Residuals	1.476228		Schwarz Criterion	-1.458608
Log-Likelihood	118.643900		Hannan-Quinn Criterion	-1.546333
F-Statistic	29.051990		Durbin-Watson Stat	1.983651
F-Statistic Probability	0.000000			

#12

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000339	0.00503	0.067461	0.9463
$Real\ Parking\ Meter\ Fee_t$	-1.033237	0.107426	-9.618139	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.077079	0.269314	0.286206	0.7752
$Median\ \ Lot_{t-2}$	-0.007264	0.384049	-0.018915	0.9849
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.649518	1.35647	0.478829	0.6329
AR_{t-1}	-0.683563	0.079183	-8.632757	0.0000
MA_{t-2}	-0.345424	0.102434	-3.372161	0.0010
R-Squared	0.544993		Mean Dependent Variable	-0.003866
Adjusted R-Squared	0.524153		S.D. Dependent Variable	0.157535
Standard Error of Regression	0.108671		Akaike Info Criterion	-1.551598
Sum of Squared Residuals	1.547019		Schwarz Criterion	-1.403114
Log-Likelihood	114.060200		Hannan-Quinn Criterion	-1.491257
F-Statistic	26.151260		Durbin-Watson Stat	2.235007
F-Statistic Probability	0.000000			

#13

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000273	0.00494	0.055251	0.9560
$Real\ Parking\ Meter\ Fee_t$	-1.028316	0.12209	-8.422629	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.098577	0.271117	0.363595	0.7168
$Median\ Lot_{t-2}$	-0.003555	0.38338	-0.009274	0.9926
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.728056	1.377983	0.528349	0.5982
AR_{t-2}	0.149907	0.098381	1.523749	0.1300
MA_{t-1}	-0.686398	0.073318	-9.361947	0.0000
R-Squared	0.549896		Mean Dependent Variable	-0.004215
Adjusted R-Squared	0.529122		S.D. Dependent Variable	0.158060
Standard Error of Regression	0.108462		Akaike Info Criterion	-1.555098
Sum of Squared Residuals	1.529309		Schwarz Criterion	-1.405902
Log-Likelihood	113.524200		Hannan-Quinn Criterion	-1.494468
F-Statistic	26.470360		Durbin-Watson Stat	2.196514
F-Statistic Probability	0.000000			

#14

Dependent Variable: Parking Meter Purchases				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	-0.000001	0.005126	-0.000099	0.9999
$Real\ Parking\ Meter\ Fee_t$	-1.010689	0.099551	-10.152520	0.0000
$Real\ Exchange\ Rate\ Index_{t-1}$	0.014800	0.243309	0.060830	0.9516
$Median\ Lot_{t-2}$	-0.011332	0.360708	-0.031415	0.9750
$Real\ Per\ Capita\ Personal\ Income_{t-4}$	0.699976	1.206606	0.580119	0.5628
MA_{t-1}	-0.797761	0.084652	-9.424021	0.0000
MA_{t-2}	0.248254	0.085673	2.897700	0.0044
R-Squared	0.569043		Mean Dependent Variable	-0.005023
Adjusted R-Squared	0.549454		S.D. Dependent Variable	0.157555
Standard Error of Regression	0.105755		Akaike Info Criterion	-1.606333
Sum of Squared Residuals	1.476308		Schwarz Criterion	-1.458554
Log-Likelihood	118.640100		Hannan-Quinn Criterion	-1.546279
F-Statistic	29.049220		Durbin-Watson Stat	1.984082
F-Statistic Probability	0.000000			

Appendix 3: Multicollinearity and Correlation

#1

Dependent Variable: Parking Meter Purchases, Real Exchange Rate Index omitted				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.000573	0.00526	0.109018	0.9133
$Real\ Parking\ Meter\ Fee_t$	-1.027126	0.100316	-10.238870	0.0000
$Real\ Exchange\ Rate\ Index_t$	-	-	-	-
$Average\ \ Lot_t$	0.389138	0.588938	0.660746	0.5099
$Real\ Per\ Capita\ Personal\ Income_t$	0.618510	1.281652	0.482588	0.6302
MA_{t-1}	-0.793168	0.082979	-9.558639	0.0000
MA_{t-2}	0.256170	0.08435	3.037000	0.0029
R-Squared	0.570257		Mean Dependent Variable	-0.004274
Adjusted R-Squared	0.554573		S.D. Dependent Variable	0.155848
Standard Error of Regression	0.104014		Akaike Info Criterion	-1.647538
Sum of Squared Residuals	1.482180		Schwarz Criterion	-1.523223
Log-Likelihood	123.799000		Hannan-Quinn Criterion	-1.597022
F-Statistic	36.359090		Durbin-Watson Stat	2.003698
F-Statistic Probability	0.000000			

#2

Dependent Variable: Parking Meter Purchases, ALOT omitted				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	-0.000734	0.005133	-0.143013	0.8865
$Real\ Parking\ Meter\ Fee_t$	-1.029143	0.100385	-10.251960	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.217299	0.235386	-0.923160	0.3575
$Average\ \ Lot_t$	-	-	-	-
$Real\ Per\ Capita\ Personal\ Income_t$	1.021918	1.229582	0.831110	0.4074
MA_{t-1}	-0.792132	0.082578	-9.592589	0.0000
MA_{t-2}	0.267899	0.08491	3.155108	0.0020
R-Squared	0.571465		Mean Dependent Variable	-0.004274
Adjusted R-Squared	0.555825		S.D. Dependent Variable	0.155848
Standard Error of Regression	0.103867		Akaike Info Criterion	-1.650351
Sum of Squared Residuals	1.478015		Schwarz Criterion	-1.526036
Log-Likelihood	124.000100		Hannan-Quinn Criterion	-1.599836
F-Statistic	36.538730		Durbin-Watson Stat	2.002604
F-Statistic Probability	0.000000			

#3

Dependent Variable: Parking Meter Purchases, Real Per Capita Personal Income omitted				
Variable	Coefficient	Std Error	t-statistic	Probability
$Constant$	0.002340	0.004203	0.556821	0.5786
$Real\ Parking\ Meter\ Fee_t$	-1.014809	0.097737	-10.383060	0.0000
$Real\ Exchange\ Rate\ Index_t$	-0.248779	0.237325	-1.048260	0.2964
$Average\ \ Lot_t$	0.610771	0.576202	1.059995	0.2910
$Real\ Per\ Capita\ Personal\ Income_t$	-	-	-	-
MA_{t-1}	-0.799045	0.082701	-9.661832	0.0000
MA_{t-2}	0.272257	0.084852	3.208609	0.0017
R-Squared	0.572797		Mean Dependent Variable	-0.004274
Adjusted R-Squared	0.557206		S.D. Dependent Variable	0.155848
Standard Error of Regression	0.103706		Akaike Info Criterion	-1.653466
Sum of Squared Residuals	1.473419		Schwarz Criterion	-1.529151
Log-Likelihood	124.222800		Hannan-Quinn Criterion	-1.602950
F-Statistic	36.738190		Durbin-Watson Stat	2.000874
F-Statistic Probability	0.000000			

#4

Correlation Coefficients of Independent Variables				
	MTR	EXR	ALOT	INC
MTR	1.0000	0.2619	-0.1732	0.5730
EXR	0.2619	1.0000	-0.3651	0.5152
ALOT	-0.1732	-0.3651	1.0000	-0.7505
INC	0.5730	0.5152	-0.7505	1.0000

Vita

Edward Pallarez was born in Abilene, TX, June 20, 1982. He graduated from Marfa High School in Marfa, TX on May 26, 2000, and from Sul Ross State University on December 16, 2006 with a Bachelor's of Science in Mathematics. In the Spring of 2010, he returned to Sul Ross State University to teach two math courses in the Department of Computer Science and Mathematics. Prior to enrolling at UTEP in, he worked for the TexPREP program on the Sul Ross State University campus and at the Marfa National Bank. While attending graduate school at UTEP, he worked as a Graduate Teaching Assistant in the Department of Economics and Finance. He was also employed as the Labor Market Analyst for the Workforce Solutions Upper Rio Grande. He is currently employed by UC Synergetic.

Permanent address: 1007 E. Texas
Marfa, TX, 79843

This thesis was typed by Edward Pallarez.