A STUDY ON MOTOR CAR IMPORTS IN BARBADOS FROM 1973 UNTIL 1997

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This paper on motor car imports for the period 1973 until 1997 has been written against the background that firstly, motor cars impact to some extent on Barbados' balance of payments outcome, and by extension, on the country's foreign reserves, secondly, they account for over 50% of consumer durables in Barbados and thirdly, they are contributing to the increasing problem of traffic congestion which the country presently faces. The paper also examines the trends in motor cars imports during the above-mentioned period when Barbados experienced periods of economic boom and recession, identifies those variables which influence motor cars in the long and short run with the use of regression analysis and looks at policy implications from the results obtained. The regression results show that in the long-run, real income, motor cars credit, motor car repayments, an attitude index and a Government policy variable, representing the period when import licences to import motor cars were suspended, help to explain motor car imports. In the short run, the variables affecting motor car imports are real income, motor car credit, motor car repayments, relative prices and previous motor car purchases from abroad.

Introduction

The study of motor cars in Barbados is one to which little attention has been paid over the years. This is surprising especially when one considers that motor cars may be seen as one of the indicators of social and economic advancement in this country. In addition, motor cars have accounted for over 50% of consumer durables in Barbados. The fact that all motor cars are imported into Barbados suggests that not only are these items one of the many consumer imports of the country but that they help to determine the country's overall balance of payments position, thereby impacting directly on Barbados' foreign reserves. Another aspect which has surfaced is the amount of motor cars entering Barbados at a time when the country is increasingly being faced with the problem of traffic congestion.

It is against this background that a study of motor car imports in Barbados is being undertaken. Section two deals with a short review of some of the literature on motor cars. The following section will address trends in motor car imports since 1973, during which Barbados experienced periods of economic boom and recession. Section four will look briefly at possible determinants of motor car demand both in the long and short run and the implications for policy. A summary and conclusion will then follow.

2 A Short Review Of The Literature on Motor Cars

During the 1930's, the Japanese and world markets were dominated by the United States of America. As a result of this, a venture in the automobile industry seemed to be almost an impossible dream to many businessmen and government officials in Japan. Yet the founders of Nissan and Toyota persisted, and their late entrance into a mature industry made it possible to learn from older automakers in the USA and Europe, and to concentrate more on technology transfer and process innovation rather than new product technologies (see Cusumano, [1985]).

As the domestic industry grew, the Japanese turned historical disadvantages stemming from the initial backward state of their technology and low level of demand for cars prior to 1960 into competitive advantages in the international market place. It was during the 1950's that Japanese engineers first mastered small-car technology from Britain, France and Germany and two methods were employed to learn how to design and manufacture automobiles, namely direct and indirect technology transfer. The first method required formal tie-ups with foreign automakers and parts manufacturers, or direct assistance from foreign engineers. The second method on the other hand, involved the selective copying of designs and manufacturing techniques from various foreign producers, as well as the importation or copying of machinery. As a result, Japanese firms were able to enter the automobile industry and market their products internationally.

By the end of the 1960's, Nissan and Toyota had learned how to produce small cars that compared favourably in quality, performance and price with European vehicles. It was not until ten years later that Europeans became fully aware of just how much the Japanese had improved their ability to compete in the automobile industry and since than, Japan has been the main source of importation.

In terms of previous studies conducted, Gargantas [1975] fitted an equation for consumption expenditure on motor cars in the United Kingdom with the use of quarterly data from 1957 to 1970. This study showed that the predominant influence on the demand for cars was the weighted average of present and past disposable incomes. However other variables such as new credits granted for hire purchase, the level of repayments and the lagged stock of cars were also significant. A dummy variable designed to represent pre-Budget anticipation effects was also an important indicator. However relative prices did not add significantly in explaining motor car purchases. Gargantas argued that the estimates of consumption functions from time series data in the USA suggested that an index of consumer attitudes can sometimes add to the accuracy of the prediction of durable purchases, especially motor cars. This view was also held by Evans [1969] who, with the use of US quarterly data spanning from 1948 to 1964, explained that the rationale of the attitude index was that if consumers thought that times would be bad, they would not purchase durables even if they were not affected. Both Evans and Gargantas used the unemployment rate as a proxy for this variable. However in the study by Gargantas, the attitude index turned out to be insignificant in explaining motor cars. Other variables used by Evans were personal disposal income adjusted for transfers, relative prices (that is, implicit price deflator of all automobiles and parts and implicit price deflator for all consumption, both using 1958 as base year), dummy variables both for supply shortages and credit conditions, and the previous year's stock of automobiles (in billions of 1958 dollars). All of the explanatory variables were significant at the 5% level but those which had the greatest impact on motor cars were relative prices and supply shortages.

One local study on motor cars was done by Campbell [1996] with the use of a simple income elasticity approach to examine the income elasticity patterns for motor cars over a thirteen year period. One of the important conclusions drawn from this paper was that on several occasions when the classification of motor cars changed from, for example being a luxury item to an inferior item, this was not based on consumption switching due to market forces, but the result of Central Bank policies implemented to protect the Balance of Payments.

3: Trends In Motor Car Imports In Barbados

The period 1973 to 1975 was one in which Barbados was affected by the international recession. Indeed in 1973, the country experienced high inflation, continued expansion in domestic credit accompanied by slower growth in bank deposits, and a deterioration in the balance of payments. During that year, motor car

purchases totaled $8.1 million (see Table and figure 1) and new credit extended by commercial banks for motor cars reached $11.9 million while car repayments were in the vicinity of $11 million [Annual Statistical Digest, Central Bank of Barbados, 1998]. In the following year, Central banking policy was concerned with, among other things, unemployment, a tenuous balance of payments situation and the Bank sought to restrict the expansion especially to the consuming sector. Not surprisingly, there was a substantial contraction of over 50% in new credit for motor cars, the imports of which fell sharply by 53.1% to $3.8 million. By 1975, although there was some improvement in motor car imports, an overall decline of some 28% had been recorded within these two years.

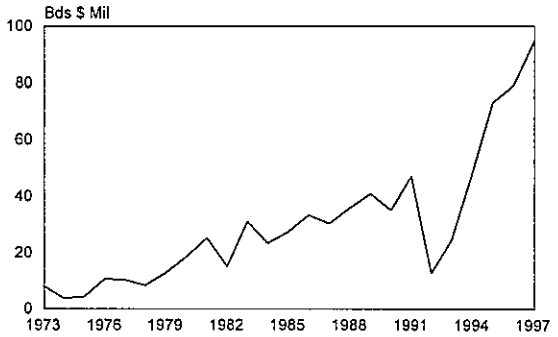
Motor Car Imports Table

Year	Bds $000
1973	8,183
1974	3,819
1975	4,459
1976	10,736
1977	10,354
1978	8,345
1979	12,831
1980	18,610
1981	25,305
1982	15,083
1983	31,078
1984	23,435
1985	27,466
1986	33,372
1987	30,374
1988	35,924
1989	40,952
1990	35,081
1991	47,200
1992	12,746
1993	24,638
1994	47,960
1995	72,992
1996	79,054
1997	94,635

Sources (a) Central Bank of Barbados (b) Barbados Statistical Service

Figure 1

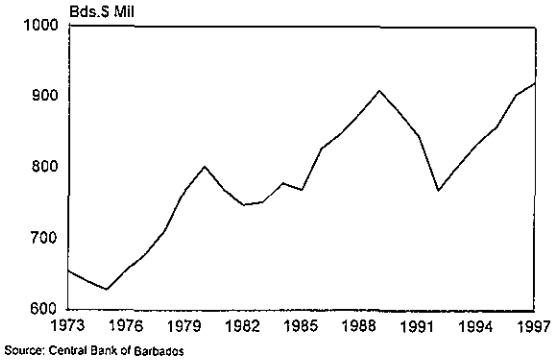
Motor Car Imports



Source: Central Bank of Barbados

Figure 2

Real Gross Domestic Product (1974 Prices)



Source: Central Bank of Barbados

Unlike the 1973 to 1975 period, the next five years in Barbados were ones of economic boom and real gross domestic product (GDP) increased on average by 4.7% as shown in figure 2. In 1976, real GDP rose by 4.4% and for most of that year, the balance of payments position was strong and the banking system retained some excess liquidity. However in response to an unprecedented increase in the rate of consumer imports in the last four months of 1976 and a corresponding drain on the foreign reserves, the Central Bank of Barbados (hereinafter called the Bank) took progressively severe measures to restrict commercial bank credit. Consequently early in 1977, the Hire Purchase Credit Sale and Hire Control Act 1975-34, by which minimum downpayments and maximum repayment period of items sold under hire purchase contracts were specified, was employed and limits were placed on credit to distribution and personal sectors. As a matter of fact, the issue of import licences for the import of motor cars was suspended and a number of items placed on licence or embargoed (See Central Bank Annual Report [1977]) and Campbell [1993]). Motor car credit which had almost doubled one year ago, fell by $3.6 million on this occasion and a further $2 million in the following year while a $2.4 million (22.4%) decline in motor car imports was recorded in the two years after 1976. Nevertheless there was some pick up in automobile demand in the years that followed with the addition of $2 million to the quota for motor cars.

Barbados was affected by another international recession during 1981 and 1982. In 1981, the Bank's main concern was that the rapid increase in disposal income together with the fiscal deficit might cause an excessive demand for imports as well as create serious balance of payments problems. During this year, the Hire Purchase Credit Sale and Control regulations were amended to reduce maturities of instalment loans and increase downpayments for the purchase of motor cars and other consumer durables. These measures did not impact immediately on motor vehicles which were rising and continued along this trend in the early part of 1982 with the abolition of motor car quotas. However during that year, there was a slowdown in foreign exchange which coincided with the build-up of assets under the Caricom Multilateral Clearing Facility (CMCF).[1] The Bank therefore supported the Government in approaching the International Monetary Fund (IMF) to request balance of payments assistance under a Stand-By Arrangement and under the Compensatory Financing Facility. Measures to reduce credit outstanding to the personal sector were reinforced that year and a significant reduction ($10.3 million or 60%) in motor cars was experienced.

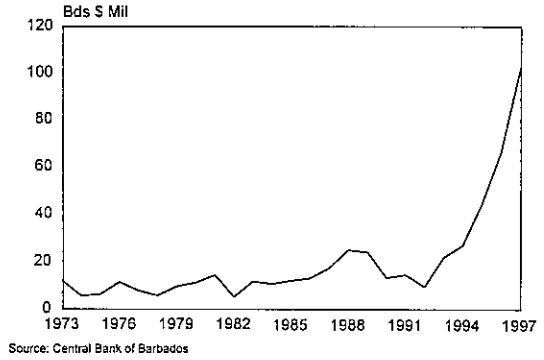
By the year 1985, the Bank eased its restrictions on access to bank credit by the distributive and personal sectors so as to temper consumer spending and this was reflected in a $4 million (17.1%) rise in automobile imports, in contrast to one year ago. The Bank's credit policies remained unchanged for 1986 except for minor modifications of the terms on which certain items could be bought on hire-purchase. In the meantime motor car imports continued to climb in line with credit availability for these goods. However by 1989, slower deposit growth and an exceptional increase in private sector credit resulted in a marked tightening of liquidity. This caused the re-introduction of selective credit controls and ceilings were placed on the level of personal, consumer and distribution credit at financial institutions. This had the impact of reducing motor car imports by $5 million (14.3%) lower than in 1988.

In 1991, Barbados' foreign exchange problems became severe as output in the export sectors remained depressed relative to activity in construction, distribution and Government services. The net international reserves of the Bank which amounted to $281 million at the end of 1988, fell sharply to $39 million, with the liquid assets being the equivalent of two weeks of import cover. In order to correct this deficiency, Government implemented an eighteen-month stabilization programme with the help of the International Monetary Fund (IMF) during the fourth quarter of the same year. The programme sought to reduce spending on imports in the short term through reductions in the fiscal deficit and private sector credit. To complement fiscal policy, monetary policy was strengthened. The result of these policies were felt especially in 1992 when Barbados not only experienced a huge contraction in import growth (23%) but also one in which, for the first time since 1975, the unemployment rate exceeded 20% and reached 23%. The drop in motor car imports was in the vicinity of 60%.

The final period from 1993 to 1997 was one in which Barbados recorded successive years of economic growth. It is interesting to note that in 1993 motor car imports moved from $24.6 million to almost twice that amount one year later. By 1997, imports of motor cars reached a huge $94.6 million, partly due to the influx of re-conditioned automobiles. The movement of new motor car credit is also worthy of note. Between

Figure 3

New Consumer Instalment Credit by Commercial Banks for Motor Cars



Source: Central Bank of Barbados

1973 and 1992, motor car credit reached its highest in 1988 when loans totalled $24.9 million. At the end of 1997, credit reached a mammoth $102.3 million (figure 3) and averaged just over $60 million over the last three years.

4: Possible Determinants Of Motor Car Imports in Barbados

The work of Evans and Gargantas may be used as a guideline for determining possible variables which could influence the demand for motor car imports in Barbados. The variables under consideration are real income, new consumer instalment credit extended by commercial banks for motor cars, repayments to commercial banks for motor cars, relative prices, an attitude index, proxied by the unemployment rate as was the case in the two above-mentioned studies and a dummy variable, representing the 1977-81 period when the issue of licences for the importation of motor cars was suspended by the Government of Barbados. It is expected that there will be a positive relationship between real income and motor car imports since in a growing economy, as real incomes rise, these should result in higher motor car demand. This view has been reinforced by Downes, Craigwell and Greenidge [1998] who argue that improvements in real disposable income, which began during the oil-price shocks in mid-1970's, encouraged many households in Barbados to increase their purchases, mainly of consumer durables.

The use of credit enables an individual to save after he has purchased instead of before. If terms become easier, greater use would be made of credit and this would tend to raise the demand for motor cars. On the contrary, an increase in the level of repayments to commercial banks should depress further purchases of motor cars in the same way as would a reduction in new credits extended in any period of time. One should also expect an inverse relationship between motor cars and relative prices. An increase in the price of motor cars relative to all other goods should lead to a shift in demand towards other goods while the opposite is expected to occur should there be a decrease in the price of motor cars. Likewise a positive relationship between the attitude index and motor cars should occur since as more individuals become unemployed, they should have a lower priority and therefore a negative attitude towards motor cars, resulting in a decline in the purchasing of these items from abroad, while, at the same time, preferring to place more emphasis on

other goods and services which they consider more important. The dummy variable will have values of one for the period when the issue of import licences to import motor cars was suspended by the Government of Barbados, that is from 1977 to 1981, and zeros otherwise. The coefficient of this variable should be negative since this policy was implemented in an effort to dampen motor car purchases.

4(a) Model Specification

The theoretical model presented here is based to some extent on the framework of Evans and Gargantas. Formally the theoretical model can be expressed as:

$$M_t = M_t (Y_t, CRED, REPAY, RP, UN, DUM) \quad (1)$$
$$\quad + \quad + \quad - \quad - \quad - \quad -$$

where M_t represents import demand for motor cars, Y_t, real income, CRED, new consumer instalment credit extended by commercial banks for motor cars, REPAY, repayments made to commercial banks for motor cars, RP, relative prices, UN, an attitude index, proxied by the unemployment rate, and DUM, a Government policy on motor cars. The relationship of the explanatory variables with the dependent variable is shown by the signs which appear under each explanatory variable. The model was estimated in logarithms using ordinary least squares.

$$LM_t = \alpha_0 + \alpha_1 LY_t + \alpha_2 LCRED + \alpha_3 LREPAY + \alpha 4\, LRP + \alpha_5 LUN + \alpha_6 DUM \quad (2)$$

where α_1, $\alpha_2 \geq 0$ and α_3, α_4, α_5, $\alpha_6 \leq 0$.

4(b) Data and Variables

In this study, the data which are analyzed are annual observations which span over twenty five years from 1973 to 1997. Various issues of the Annual Statistical Digest published by the Central Bank of Barbados in addition to information prepared by the Barbados Statistical Service have been used to compile the data set. The real income and relative price variables of Barbados are estimated at base years 1974 and 1990 respectively. Real GDP is the variable used to estimate real income in this paper. In the case of relative prices, the average landed price of motor cars is used to proxy the price of motor cars, while the consumer price index is used to estimate the price of other goods. The unemployment rate is used as a proxy for the attitude index. All estimations have been performed using the econometric software package EVIEWS 3.0.

4(c) Empirical Results

The Augmented Dickey-Fuller (ADF) test has been used to determine the order of integration of each data series. This is a test of the null hypothesis of non-stationarity or a unit root [integrated of order d, where d $\geq$ 1] against the alternative hypothesis of stationarity [or integration of order zero, I(0)]. The ADF test employed different lagged structures as was necessary to eliminate any serial correlation in the residuals of each series. The ADF tests as well as plots of the sample correlograms of the first differences of each variable indicate that all of the variables are I(1). The Ordinary Least Squares (OLS) regression of model 2, a long run equation, is reported as equation 3. All of the variables have the correct apriori signs and the numbers which are shown in parenthesis directly under the variables are the respective "t" statistics.

$$LM_t = -21.05 + 4.84\, LY_t + 0.76\, LCRED - 0.62\, LREPAY - 0.01\, LRP - 0.85\, LUN - 0.38\, DUM \quad (3)$$
$$\qquad\quad (4.91) \quad (4.06) \quad\quad (-2.26) \quad\quad (-0.08) \quad (-2.20) \quad (-2.05)$$

$R^2 = 0.92$ Adj. $R^2 = 0.89$ D.W. = 1.56 ADF = -3.73 (-2.9969) PP = -3.71 (-2.9907)

The results indicate that all of the explanatory variables are cointegrated since both the Augmented Dickey-Fuller (ADF) and Phillips Peron (PP) tests reject the null hypothesis of non-stationarity of the residuals at the 5% level of significance. In addition the Durbin Watson statistic does not indicate any first order serial correlation.

All of the variables, with the exception of relative prices, have been found to be significant in explaining motor car imports at the 5% level of significance. The data suggest that with all other variables remaining unchanged, a 1% rise in real income will result in the demand for motor car imports rising four times as quickly (placing cars in the category of luxury items), whereas if new consumer instalment credit for automobiles increases by 1%, this will be accompanied by a 0.76% rise in motor car demand. Every additional percentage increase in motor car repayments would reduce motor car imports by 0.62%. The results also show that in

Barbados, the attitude index will impact strongly on motor car imports in the long run. According to the data, a 1% increase in the unemployment rate will lead to a 0.85% reduction in motor car purchases. The significance and the sign of the dummy variable implies that, from the data provided, Government's policy will have some effect on dampening motor car demand.

The Granger Representation Theorem (1987) states that if a set of variables are cointegrated, then a valid Error Correction Model of those variables can be formulated. This Error Correction Model nests both the long-run behaviour and short run dynamics. The Hendry General to Specific Methodology is applied in this exercise. It starts with an over parameterised model and using a step-wise process, eliminates insignificant variables until a parsimonious representation of the model is obtained. The results are shown below.

$$DLM_t = \underset{(2.11)}{0.05} + \underset{(2.43)}{0.29}\, DLM_{t-1} + \underset{(-1.76)}{3.62}\, DLY_t - \underset{(6.32)}{2.79}\, DLY_{t-1} + \underset{(-2.34)}{0.98}\, DLCRED - \underset{(2.56)}{0.61}\, DLREPAY + \underset{(-4.22)}{0.43} DLRP - 0.85\, ECM_{t-1} \quad (4)$$

$R^2 = 0.85$ Adj $R^2 = 0.78$ D.W = 1.94 Norm = 0.45 BG = 0.97 ADF = -3.10 (-3.01) ARCH = 0.56

D represents the first difference operator, while Norm is the Jarque-Bera test for normality which is based on a test of kurtosis and skewness of the residuals. BG is the Breusch-Godfrey Lagrange Multiplier test for serial correlation while ARCH is the Engle's kth order Autoregressive Conditional Heteroscedasticity test statistic. All other variables are described as before.

The results of the diagnostic tests show that the model is adequately specified. The residuals do not violate the classical assumptions of normality, homoscedasticity and serial dependence. The value of R^2 is quite high (0.85), suggesting reasonably good success of the regression in predicting motor car imports. Six variables impact on import demand for motor cars in the short run, namely current and lagged real income, new consumer instalment credit, motor car repayments, relative prices and motor car purchases from abroad lagged one period. The impact of real income on motor car imports is not only restricted to the present year but also the previous year as well. The data suggest that a 1% rise in real income over a two year period will cause motor car purchases from abroad to increase by 0.83%. The impact on motor car credit on motor cars is significantly higher in the short run than in the long run while the effect of repayments on motor cars is almost the same for both periods. However relative prices, which are not significant in explaining motor car purchases from abroad in the long run, will positively influence cars in the short run. While this may seem surprising, it may be the case that by increasing the price of certain types of motor vehicles, this may make them more attractive to certain types of buyers and actually result in an overall rise in motor car demand. The short run adjustment of the amount of motor cars purchased from abroad is 0.29%. It should be noted that neither attitudes nor the Government policy variable introduced to restrict motor cars are significant in the short run. The error correction term (ecm) is negative and significant, thereby confirming the long run cointegrating results and its coefficient of 0.85 indicates a fairly rapid speed of adjustment to its long-run equilibrium relationship.

Summary and Conclusion

This paper has attempted to look at motor car imports in Barbados from 1973 until 1997. Prior to this paper, the only work recent in this area which the authors were able to discover was by Evans and Gargantas, both in 1975, with regard to long-run results and a subsequent paper by Campbell which dealt only with income elasticity of this product. The paper then addressed trends in motor car imports over the twenty five year period when the Barbadian economy experienced periods of boom and recession. Not surprisingly, the Bank introduced tight measures in recessionary periods to protect the balance of payments and some of these involved the reduction of credit to the personal sectors, which would impact directly on motor cars. The measures were generally successful as the contraction of motor vehicles would suggest. However even in economic boom, measures had to be taken by the Bank to restrict car growth when the balance of payments account looked shaky. Indeed in 1977, the issue of import licences for the import of motor vehicles was suspended for a four-year period. However it was observed that during the mid and late 1990's, there had been a significant pickup in motor cars, especially with the introduction of re-conditioned vehicles. It was also worthy of note that new motor car credit, which amounted to only $12 million in 1973, had jumped to just over $100 million twenty four years later. Indeed in the last three years, motor car credit to individuals averaged approximately $64.3 million, higher than the average credit extended any time before

that period.

Finally long-run and short-run regressions were run to determine which explanatory variables could influence import demand for motor vehicles in both situations. In the long-run, real income, credit, repayments, attitudes and a Government variable representing the period when motor car import licences were suspended, that is, a dummy variable, were found to be significant and had the correct signs. However in the short run, current and lagged real income, consumer instalment credit, repayments, relative prices and previous motor car imports were the variables which influenced motor car demand. Furthermore, a positive relationship existed between relative prices and motor cars.

As far as policy is concerned, it would appear that any attempt to stimulate motor car growth or dampen motor car demand would have to be done mainly through real income, consumer instalment credit and repayments which impact on automobiles both in the short and long run. Real incomes can be affected by various tax policies implemented by a Government. In the case of credit, the Bank can, if necessary, signal to the commercial banks the need to restrain motor car credit by using monetary tools such as raising the discount rate and increasing the reserve requirement ratio. As far as repayments are concerned, an increase in repayments is sometimes due to a selective control policy by commercial banks to shorten repayment periods for items such as motor cars. This results in an individual having to pay more over a shorter duration, and can lead to lower automobile demand. Finally, the positive coefficient of the relative price variable can influence a Government in the short run to increase its revenues by raising the price of motor cars.

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Footnotes

1.The Caricom Multilateral Clearing Facility (CMCF) came into effect on June 16, 1977 and was established by Caricom countries with the following aims and objects:

(a) to facilitate settlement on a multilateral basis of payments for eligible transactions among participating countries;

(b) to promote the use of participants' currencies in settling eligible transactions between their respective countries and thereby effect economies in the use of their foreign reserves;

(c) to promote monetary co-operation among the participants and closer relations among the banking systems in their respective countries and thereby contribute to the expansion of trade and economic activity in the Caricom region.