DEMAND FOR NEW PASSENGER CARS AND PICK-UPS IN KENYA

AN EMPIRICAL STUDY

BY

ABAGA, O.A.A.

RESEARCH PAPER SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN ECONOMICS.

JUNE, 1990

This Research Paper is my original work and has not been presented for a degree in another university.

.....
ABAGA, O. A. A.

This Research Paper has been submitted for examination with our approval as University Supervisors.

.....
Dr. S.W. Masai

.....
Mr. G.K. Ikiara

ACKNOWLEDGEMENT

I am indebted to all those many individuals who made this study possible. To my first supervisor, Dr. Masai, I am grateful for his valuable comments throughout the study period. I am also thankful to Mr G.K. Ikiara, my second supervisor, for his contribution to the writing of this thesis.

To my colleagues, I am very grateful for the support and encouragement I got. Special thanks to Mr. Jamasai of Central Bank of Kenya, Mr. Thuo of Automobile Association of Kenya, Mr. Kamau of Toyota Kenya and Mr. Ciro of Price Control of Kenya for the help they gave me. The support from Ms Jane Kimani and Mr Ng'ang'a J.C. who facilitated timely polishing of this work is deeply appreciated.

My gratitude also goes to the University for financing my two year stay at the University.

Finally, I would like to thank my dad, Amwoyo, and mum, Martha, for all those invaluable things they have done for me.

T A B L E O F C O N T E N T

	Page
Title	(i)
Declaration	(ii)
Acknowledgement	(iii)
Abstract	(iv)
Table of Content	(v)
List of Tables	(vi)
CHAPTER ONE - INTRODUCTION	
1.1 Background	1
1.2 Strategies of Establishment of Automobile Industry	2
1.3 The Kenyan Experience	3
1.4 The Trend of Demand for Automobiles in Kenya Since 1964	6
1.5 Current Situation	6
1.6 The Problem	11
1.7 Objectives of the study	12
1.8 Justification and Significance of the study	12
CHAPTER TWO - LITERATURE REVIEW	
2.1 Introduction	13
2.2 The Review	13
CHAPTER THREE - THEORETICAL FRAMEWORK AND METHODOLOGY	
3.1 Introduction	27
3.2 Determinants of demand for automobiles	28
3.3 Data Source, type and limitation	36
3.4 Hypotheses and Model Specification	39
CHAPTER FOUR - DATA ANALYSIS	
4.1 Demand for passenger cars	44
4.2 Demand for pick-ups	55
4.4 Forecasting	58
CHAPTER FIVE - SUMMARY AND POLICY IMPLICATIONS	
5.1 Summary of the Study	62
5.2 The Policy Implications of the Study	62
5.3 The Limitations of the Study	64
BIBLIOGRAPHY	65

ABSTRACT

The automobile industy is an important sector in many modern economies. In Kenya, the government's policy on this industry has been characterized by various inconsistencies. This study sought to identify the determinants of demand for automobiles in Kenya, their statistical significance and policy implications.

The parameters in the model were estimated using time series data for the period 1970-86. The demand for cars was found to be determined by the stock of cars' own price, personal income and government policy. These findings show that fiscal and monetary policies do affect the demand for cars considerably. The demand for pick-ups was found to be determined by national income and stock of pick-ups; this contradicts the general belief that price is the major determinant of demand for commercial vehicles. The government therefore could rationalize the operations of the sector through fiscal policies without undermining the economy.

CHAPTER ONE

INTRODUCTION

1.1 Background

The share of many sectors in an economy change overtime with economic development. This, however, does not diminish the importance of their interdependence. Every sector in an economy acts as a part of a symphony without which the economic process can not operate smoothly. It is in this respect that the role of the automobile industry may be viewed. The role of this industry is reflected indirectly by the transport industry on which many economic activities depend.

Besides its direct role in the economy through transport sector, the automobile industry is an integrated industry whose establishment facilitates development of other industries. Many components used in automobile industry e.g. tires, glass and cushions are sourced from various industries. In terms of employment, this industry is a major employer when all those dependent on it directly and indirectly are considered.

The motor vehicle industry also facilitates economic development through its role in technological change. A successful motor vehicle industry may bring industrial revolution as evinced by the technological and economic development of countries like South Korea, Brazil, Japan etc. which was proceeded by the establishment of this industry. Competition in this industry requires that the manufacturers invest in research and development if they are to at least maintain their status

quo. Benefits of these investments spill over to other sectors of the economy in the long run.

These considerations explain the high direct government involvement in the industry, even in the developed countries. Even where direct government involvement is non-existent, countries at all levels of development have, at times of severe competition, abandoned orthodox economic arguments to protect their automobile manufacturers.

The automobile industry can be established in countries with no comparative advantage in the industry which explain why newly industrialised countries and many developing countries have established automobile industries, technological gaps not withstanding. This has, however, been done under a blanket of protection characterized by high costs and foreign exchange burdens unconducive to competition.

Of the constraints many countries encounter in establishing competitive automobile industries, the market constraint ranks highest after technological know-how. In many of the third world countries, the automobile markets are small and can not sustain economies of large scale production required to realize cost minimization through mass production.

1.2 Strategies of Establishment of Automobile Industry

There are two principal ways in which a country can establish automobile industry:

(i) local assembly approach,

(ii) direct manufacturing.

Under the latter, all the manufacturing units required for automobiles are established in a country which did not manufacture automobiles before. This approach is expensive and demanding in terms of resources, skills and technology which many countries do not have in abundance.

The assembly approach is preferred by many countries as it does not impose an instant burden on a country's resources. In this approach, an automobile industry is established gradually both by discouraging importation of completely built-up vehicles in favour of local assembly of completely knocked down kits and by encouraging the manufacture of automobile components. The philosophy behind this approach is that after a period of time, local components used in the local assembly plants will increase gradually to make more comprehensive local manufacturing possible and economical.

1.3 The Kenyan Experience

Kenya adopted a local assembly approach to automobile manufacture and embarked on a serious promotional strategy in 1973 (Masai, 1986). The principal aims of local vehicle assembly industry were:

(i) job creation

(ii) dissemination of skills

(iii) technological transfer

(iv) stimulation of ancillary industries

(v) increase utilization of local inputs, raw materials, and

(vi) save and earn foreign exchange.

Local assembly started off with the assembly of commercial vehicles which are bulky and more expensive if imported fully built. The assembly of station wagons started in 1984 and was finally followed by the assembly of saloon cars in 1986. Due to consumers' preference for completely built-up imported saloon cars, the industry had to operate behind both qualitative and quantitative protection barriers. The government also realized the revenue earning potentiality of the industry and imposed almost punitive taxes on completely built-up imported automobiles. Punitive taxes on cars were further justified by the popular belief in developing countries that cars are luxury goods and should, therefore, be a target of progressive taxation.

Prior to 1985, duty on locally assembled passenger cars was 35 percent while sales tax ranged between 70% and 240% depending on engine capacity with bigger cars taxed more. The former was reduced to 25 per cent while the later was revised to range from 40% to 400% in 1985. In 1987, the government, in response to both public and the manufacturers' outcries, reduced the taxes, though they still remained high. Sales tax on passenger cars not exceeding 1200cc was lowered from 40 to 30 per cent, cars exceeding 1200cc but not larger than 1500cc, from 50 to 40 per cent; cars not exceeding 1750cc from 65 to 55 per cent; cars not exceeding 2000 cc from 100 to 85 per cent; cars exceeding 2000cc but not exceeding 2250cc from 230 to 195 cent; cars exceeding

2250cc from 400 to 340 per cent. The same tax was further reduced in 1988 to 25, 30, 45, 60, 155, 270 per cent respectively according to engine rating. The year 1989 saw a further reduction in sales tax on passenger cars as follows:

1000cc or less 25 per cent to 20 per cent,

1001cc - 1500cc 30 " " to 20 " "

1501cc - 1800cc 45 per cent to 35 per cent,

1801cc - 2000cc 60 " " " 50 " "

2001 - 2250cc from 155 per cent 110 per cent,

2251 and above 270 " " 210 " ".

Commercial vehicles were not exempted from these taxes either and like passenger cars, the rates have been declining. Motoring was made even more expensive by taxation on complementary goods associated with motoring such as insurance, petrol, driving licence, road licenses etc.

Inspite of these high rates of taxation there are those who argue that car prices are, at their present levels, not prohibitive and can be increased with no adverse effect on demand. Those who ascribe to this opinion maintain that the real cost of motoring depends on the way the motorist uses his vehicle and not the show room cost.[1]

---

[1] Kenya Times, Thursday; February 8, 1990.

1.4 The Trend Of Demand For Automobiles In Kenya Since 1964

Motor vehicle registration statistics show vehicle population on the Kenyan roads to have increased considerably, with saloon cars leading. The number of new registration of saloon cars has, however, varied over the years since 1964. From 4058 saloons registered in 1964, the registration peaked at 8072 units in 1972 and came down to an all time low of 2096 units in 1985 (See Table 1a). Commercial vehicles have also shown a marked growth but with less fluctuation in new registrations compared with personal cars. Table 1a also shows new registration of motor vehicles of different categories between 1964 and 1988 and confirms a fluctuating trend for most of the categories. The total number of all types of motor vehicles has increased by more than three times since 1963, i.e. from 92005 in 1963 to 281,410 in 1986 as shown in Table 1b.

1.5 Current situation

Following the Kenya Government's acceptance of local assembly of all types of vehicles in 1986, motor vehicle manufacturers have responded by introducing different models inspite of the small market. This has had both positive and negative consequences for the country. Positive in the sense that the market has remained competitive inspite of its size and negative as the economy has to shoulder the cost of spare parts for many ranges of makes and models. Currently, there are 117 models of trucks, buses and saloon cars assembled in Kenya

Saloon cars											6469	5575	4981	7296	7842	4881	6881	2751	3018	3214	3571	2096	3229	4914	5422
Station Wagons											2112	2047	1942	2517	2749	2312	2298	1560	1527	1781	1877	1821	3092	3008	2795
Panel Vans, Pick-ups etc											3528	3878	4156	7354	5717	5979	7454	6699	5447	4415	5187	4652	4751	4720	4492
Lorries/Trucks											1402	1262	1471	1856	2848	2669	2255	2091	1355	1355	1434	1421	1906	1759	1694
Buses and Caoches											265	186	215	171	205	275	208	247	330	304	651	791	680	761	1017
Mini Buses											322	218	202	214	169	216	217	434	295	280	391	426	368	569	489
Speial Purpose Vehicles											104	79	120	100	82	380	163	163	103	75	31	39	43	46	32
Trailers											670	587	669	827	1244	1030	763	868	524	491	498	477	565	619	597
Rolers, Graders, Cranes											232	108	87	73	94	153	207	178	96	184	57	15	79	54	25
Wheeled Tractors											957	1042	1129	1916	2032	1141	1023	1217	822	843	852	876	1038	1124	1086
Crawler Tractors											13	7	3	46	114	153	14	47	26	31	18	3	5	3	2
Motor and Auto Cycles											1137	986	1316	1707	1861	1757	1749	1945	1506	965	1124	1046	1196	1146	1110
Three Wheelers											16	13	7	27	14	8	14	15	12	2	2	0	3	4	3
Motor Cars	4058	5031	5579	6014	5630	6389	7680	8072	6337	6850															
Utilities	2974	3402	3636	4212	3465	4232	4959	5514	4671	2593															
Lorries	658	687	1231	1612	1483	1760	2472	2038	1494	1689															
Buses	281	252	239	339	271	311	435	639	409	562															
Motor Cycles	650	729	871	978	1016	1244	1317	1393	1437	1072															
Others	980	850	1301	1186	1186	1045	1419	1157	1419	1105															
TOTAL	9601	11049	12857	14350	13051	14981	18282	18813	15766	13871	17225	15988	16246	24105	24971	20883	23246	18115	15061	13940	59694	13663	16955	18727	18764

SOURCE: Economic Surveys 1964 - 1989

1988* Provisional

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Motor cars	42218	42920	44403	45984	47970	49218	53472	58458	63607	67500	70660	78312	83676	99947	104272	109121	110431	113629	114197	115316	116852	122300	126188	127351
Utilities Panel Vans Pick-ups	24943	26024	27347	28713	30584	31338	34425	37415	41058	44165	46285	52627	58349	44543	48264	50203	52249	55524	57969	59358	59618	64805	69441	69457
Lorries, Trucks and Heavy Vans	10475	10313	10317	10805	11667	12270	13656	15319	16591	17405	17943	19635	20875	20732	21007	22185	2315	2394	23956	23634	23335	24769	26186	25190
Buses and Mini-buses	1536	1684	1805	1913	2053	2142	2358	2653	3159	3424	3523	4196	4605	4706	4772	4825	4985	5075	5432	5726	5959	7001	8217	8218
Motor and Auto Cycles	5339	5572	5793	6164	6593	7004	7970	8823	9774	10681	8966	10332	11312	11870	12763	13746	14573	15343	16345	16870	16823	17944	18987	18990
Other Motor Vehicles	5003	5620	6725	7357	7730	8430	10251	10875	11716	9486	10984	12297	12842	14121	15491	16316	16316	16703	17318	17367	17493	18454	19415	19415
Trailers	2491	2494	2594	2871	3213	3626	4037	4352	4666	5078	7359	8000	8601	8806	9152	9876	10360	10567	10913	10895	10839	11337	11784	11814
TOTAL	92005	94597	98258	103175	109439	113328	124346	137271	149750	159969	164222	184086	199715	203446	214351	225447	232029	240435	246132	249162	250919	266613	280191	281410

Source: Statistical Abstracts 1966 - 1988

although in 1989, 14,194 units of all vehicles were sold. Sales are, however, concentrated in a group of about five makes (in the case of cars) and it is generally believed in the motor vehicle industry circles that if this trend continues, the unpopular makes and models will be eliminated and leave only a few models in the market.

Sales figures for 1989 indicate that the Motor vehicle industry in Kenya experienced some expansion. A total of 14,194 vehicles were sold during the year compared with 12,600 units sold in 1988.[2] Table 2 below shows the units of some of the vehicles sold in 1989 by make. The table shows that in the saloon cars category, three makes (Peugeot, Nissan and Toyota) led in sales while pick-up market was fairly contested. Overall, each category was dominated by five makes.

It should be noted that more vehicles were registered locally than the above statistics indicate, especially in the passenger car category due to some direct importations of completely built up cars. So far no statistics have been compiled by the Ministry of Transport to confirm the extent of these direct importations.

---

[2] Figures were obtained indirectly through dealers.

Table 2 Type and November of vehicles sold in 1989

Type of vehicle	Units sold
Peugeot	1200
Nissan	717
Toyota	565
Mitsubishi	282
Mazda	196
Isuzu	132
VW Golf	60
Subaru	18
Suzuki	18
Pick-up	
Peugeot	1243
Toyota	738
Nissan	438
Mazda	231
Mitsubishi	103
Petrol-Propelled 4WD	
Land Rover	401
Isuzu Trooper	351
Suzuki	251
Mitsubishi	172
Nissan	100
Toyota Land Cruiser	83
Subaru	62
Niva	38
6 - 9 haulage tonners	
Isuzu	653
Fuso	221
Nissan Diesel	888
Toyota	39
Hino	18
British Bedford	14
Fiat	4
Five door Station Wagons	
Nissan	220
Toyota	164
Peugeot	153
Daihatsu	141
Mazda	95
Mitsubishi	71
Suzuki	58
Fiat	52
Half ton pick-ups	
Nissan Datsun	758

Source; Various automobile dealers

1.6 The Problem

Knowledge of the forces which determine demand for any commodity and their respective marginal importance is a prerequisite for rational policy decision in both private and public sectors. The emphasis that Kenya has put on the motor vehicle industry, manifested by the growing number of local assembly lines and development of the indigenous Nyayo Pioneers, makes the study of automobile demand highly pertinent. So far, studies on the motor vehicle industry in Kenya have been supply oriented (e.g, Obere, 1987). The dangers of disregarding demand and its relationship with aggregate national economic variables such as GDP, inflation, savings, interest rates etc. is best exemplified by Brazil's experience. The Brazilian car industry virtually stopped building cars for the domestic market and many car manufacturers laid off workers due to a drastic fall in demand resulting from a liquidity freeze imposed by the government.[3] To establish a successful motor vehicle industry, it is important to know the present and future needs to facilitate planning for requirements such as foreign exchange, and complementary goods associated with automobile consumption, e.g fuel or road-networks.

As the motor vehicle industry matures, it becomes a source of revenue to the government. The way in which this tax-related revenue is levied without necessarily disrupting the industry

---

[3] See Financial Times, Tuesday; March 27,1990.

depends, to a substantial extent, on the information concerning market demand.

Inconsistency which has characterized the Kenya Government's policy on this industry can be partly attributed to the scanty knowledge of the demand pattern.

1.7 Objectives of the study

(i) This study specifies the demand function for automobiles in Kenya and analyzes the relative importance of the determinants.

(ii) It generates data on automobile demand useful for forecasting, and

(iii) On the basis of (i) above, discusses policy implications.

1.8 Justification and significance of the study

Demand analysis is not only useful academically but it also provides valuable information to the industry, Government policy makers and the consumers. Determinants of demand and their relative significance vary both spatially and with time hence the need to conduct demand analyses which are country-specific. It is inaccurate to assume that studies done in different countries and at different times would yield the same results. This is so because countries differ in many aspects which influence demand for goods and services. As was noted earlier, most of the studies that have been done on the motor vehicle industry in the country have ignored the demand side.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A review of literature on the demand for automobiles reveals that not much has been done in the area. Furthermore, the few studies that have been done in other countries do not have a uniform historical spread; most of them concentrated in the period immediately after the second world war. Thereafter, interest in it seems to have stalled somewhat at a time when the motor industry experienced major developments in many national economies.

This chapter reviews the studies on demand for consumer durables in general and demand for automobiles in particular. Available publications on automobile demand are almost entirely on demand for cars thus offering minimal clues on demand for commercial vehicles.

2.2 The review

There is a general concurrence amongst scholars with respect to determining variables and their relative levels of significance on the demand for automobiles so that the major differences revolve mainly around methodology and data types used.

The two major approaches adopted in analyzing demand for automobile are the stock adjustment and user cost methods. Stock adjustment models assume that with a given income and

prices, there exists some desired level of stock of automobiles such that the rate of purchases depends on the difference between the existing stock, some rate of depreciation and the desired level. On the other hand, the user cost approach is based on the assumption that consumers derive utility from the services provided by durable goods and that it is the prices of the services, rather than the purchase price of the durable that determine the flow they will consume.

Stone (1957) following the stock adjustment approach developed a demand theory of consumer durables in which the actual stock of the commodity and its equilibrium quantity are adjusted through an investment process which takes into account the relevant income and price configurations. His analysis of demand for durables was such that the demand for perishables appears in it as a special case in which one of the parameters assumes a limiting value. He gives the total purchases as follows:-

q = v + u where,

q = total purchases of, or gross investment in, a commodity during a period separated into:

v = net investment, and represents an addition to the opening stock, s, and

u = current consumption and is assumed can be expressed by a reducing balance depreciation formula with a depreciation rate per period of 1/n such that in a period there will be

used up 1/n of the opening stock s, plus an equal or smaller proportion, 1/m, of the purchases of the period, q, so that

$$u = s/n + q/m$$

$$= \frac{m}{n(m-1)} s + \frac{1}{m-1} v$$

where, $m > n > 1$

If n = 1, the good in question is perfectly perishable. If $n > 1$ the good is, in greater or lesser degree, durable.

From the above identities, Stone derived a demand theory which he applied to the determination of the demand for clothing and household durable goods in the United Kingdom. The basic consumption relationships were fitted to the first differences of the logarithms of consumption and in each case about 90 per cent of the observed variance was accounted for by the fitted relationships. Stone's model is, however, a stock demand model and can be of little help in estimating the demand for new durables.

O'Herlihy (1965) also developed a model along the same lines as Stone but integrated used car prices into the analysis. He defined new car purchases (q) as the sum of depreciation (or replacement demand) and the change in total car stock during the year (or investment demand) given by the equations:

(i) $u = 1/n\ S_{-1} + 1/m\ q$

(ii) $q = u + S - S_{-1}$

where,

u = depreciation (or replacement demand)

S_{-1} = car stock at the end of the previous year

q = purchases of new cars during the year

1/n = the annual rate depreciation, and

1/m = effective annual rate of depreciation on new purchases.

By combining (i) and (ii) above he got the following relationship:

$$S = \frac{m-1}{m} q + \frac{n-1}{n} S_{-1}$$

$$= \frac{m-1}{m} q + \frac{n-1}{n} \frac{m-1}{m} q-1 + \frac{n-1}{n} S_{-2}$$

$$= \frac{m-1}{m} \sum \left(\frac{n-1}{n}\right)^{z} q^{-}z,$$

implying that the level of car stock at the end of the current year may be expressed as a weighted sum of past and current new purchases, where the weights decline in magnitude as z increases.

He postulated a long term relationship between the level of car stock demanded by consumers and determinant factors such as real income, new car price, credit terms, taste, etc written as

$$S^* = a_1 + b_1 + d_1 po$$

where,

S^* = the equilibrium or long term level of stock per head,

P = real income per head

P_o = new car price (relative to other prices),

a,b,d = structural constants.

By integrating used and new car prices he obtained the estimating equation of the form:

$$q = r(f + a) + rb\ (1 + (n-1)\ *\ )\ p + rd\ (1 + (n-1)\ *\ )\ p_o$$

$$+ \ldots\ldots\ldots + rg\ (1+(n-1)\ *\ )\ \ I + (1-r)\ q\_1;$$

that is, the dependent variable, sales of new cars (q), can be expressed in terms of sales of new cars in the past year (q_1) and adjusted variables such as income (p), relative new prices (P_o), index of supply (I), etc.

The equation was estimated by iterative maximum likelihood method using Great Britain's annual data for the pre-war period (1928-1938), with unsatisfactory results. This model is also a stock demand model and assumes that purchases of new cars are given. It can therefore not be very useful in estimating demand for new autobiles.

Wykoff (1973) proposed an alternative structure to stock adjustment approach to automobile demand analysis, notably the "user cost approach". Following the assumption of user cost theory, the implicit user cost, or rental prices, of an s year old car in year t can be given by the following relationship:

$c(s,t) = r(t).p(s,t) + P(s,t) - p(s+1, t+1)$ where,

$c(s,t)$ = rental price of an s year old car in period t

$p(s,t)$ = the purchase price of an s year old car in period t

and $r(t)$ = the market interest rate.

This relationship implies that the implicit rental price of a car for a year is the opportunity cost of holding the car plus the loss of value of the car over the year. This constitutes the major difference between stock adjustment and user cost approaches. The stock adjustment approach considers new car

purchases to serve two purposes: replacement of worn out stock and net increases in demand for cars without taking into account the quality difference between new cars and the existing stock of old cars.

The application of user cost is, however, limited by the fact that consumers do not add to their stock of specific durables whenever they depreciate hence its inability to estimate additions to stock accurately.

In addition to methodology, issues such as the prominence given to specific explanatory variables, e.g, income, practicality, and underlying theory or the role of qualitative data have been addressed. Adams (1964), for example, examined the role of subjective data in predicting consumers' expenditure on durable goods and addressed the following issues;

i) the extent and in what regard aggregate data on various consumer attitudes and intentions measure separate aspects of consumer sentiment; and

ii) whether the various attitudes and intentions variables make a significant net contribution to predicting consumer durable expenditures.

Consumer sentiments and expectations have been said to exert a great influence on demand for durable goods. Adams found that attitudes make a significant contribution to forecasting durable expenditures and therefore supported the case for attitudes as a key consumer anticipation variable and as a means of forecasting. The use of this approach is, however, limited by the availability

of data on consumer altitudes. The approach assumes that consumer's income is not a constraint which is not true for a developing country.

Bandeen (1957) adopted a rather restrictive approach with respect to determining variables. His study was devoted to the relationship between automobile consumption and income. He defined consumption of automobiles during a year as the depreciation of new and used automobiles registered during the year. He hypothesized the relationship between consumption and income as follows;

$D = ft\ (p)$

$C = f\ (y)$

$C = D$

where,

D = automobile depreciation

P = a price vector

t = an indicator implying that the function D = ft (p) may be different from year to year in accordance with the changing preference patterns of consumers.

C = consumption of automobiles and

Y = consumers' income.

By using the least-squares regression method, Bandeen obtained income elasticity of automobile consumption of near unity, i.e. 0.9 implying that a 10 per cent change in income is associated with a 9 per cent change in automobile consumption in the same direction. This model, however, may not be useful in analysing

demand for automobiles in situations where the demand is influenced by other factors other than income.

Smith (1962) narrowed his analysis even further by attempting to find out which concept of income - permanent or transitory - determines the demand for durable goods. Contrary to expectations, he did not, however, find enough evidence to conclude that transitory income is an important determinant of durable goods purchases though his results pointed towards this. Smith's model is also not useful in situations where demand for automobiles is influenced by various factors besides income.

Farrel (1954) developed a rather theoretical model in his study. He started from the assumption that the market for cars is a set of interrelated markets. He separated cars into groups based on age and quality such that each group constitutes a homogenous commodity. For each group, he argues, there is a demand function relating incomes, prices and taste factors ie -

$X_i = f_i(y,P,t)$

and a corresponding supply function given by

$X_i = p\ (y,p,z)$ where z represents other variables relevant to the supply of cars. He also made the following major assumptions;

i) that the homogenous groups are simply age groups;

ii) that the supply functions are perfectly inelastic with respect to prices and incomes;

iii) that no individual owns more than one car;

iv) that new cars are valued more than old ones;

v) that the distribution of income is uniquely determined by national income;

vi) that tastes is a random variable with a normally distributed log, and

vii) that the preference functions of all the consumers are the same but for taste.

From these, Farrel developed an intricate model which however had a very low explanatory power. The model also presupposes a comprehensive and developed data base and this may reduce its usefulness in developing countries where there is a dearth of data. Implicit in the model is also the assumption that only three independent variables - income, price, and taste- explain the demand for automobiles which is not necessarily not. The model is also basically a stock demand model and may be of little help in predicting demand for new automobiles.

Suits (1958) made a significant improvement on previous studies by incorporating variables like credit conditions and the supply of used cars, hitherto ignored by earlier researchers. He gave the demand function by the following formula:

$$R = a_o + a_1Y + \underset{M}{a_2P} + a_3S + a_4X$$

where,

R = demand for new cars

Y = real disposable income

P = real retail price of new cars

M = average credit terms given by the number of months the average automobile instalment contract runs,

S = stock of used cars, ie the number of automobiles in existence on January 1 of the year

X = dummy shift variable representing years of severe shortages,

and a_o = a constant.

He estimated the equation using least-squares regression method with variables expressed in their first differences. The result revealed that disposable income, stock of cars and real monthly price index were the most important variables in that order. It was also observed that the price variable does not enter the relationship significantly when the credit term is omitted and that the rate of increase in income does not have any significant impact on demand. This model can be applied in a developing country situation without any loss in its predictive power. It also gives the demand for new automobiles as opposed to models mentioned previously.

Rhys (1972), borrowing from previous studies, proposed a more practical approach to automobile demand analysis. Unlike most studies which were concerned basically with demand for passenger cars, Rhys constructed models for both passenger cars and commercial vehicles. He gave the demand function for passenger cars with the following equations;

$$C_c = a_o + bY - \frac{(Tr)}{(Pc)} - c\,\frac{(Pa)}{(Pc)} - d\,Uu - eXs + fCr - g(a) - 1$$

Where,

a_0 = a constant

C_c = purchase of cars

Y = personal disposable income

$\left(\frac{Tr}{Pc}\right)$ = transfer payment

$\left(\frac{Pa}{Pc}\right)$ = relative prices of cars

Uu = attitude variable given by the number of unemployed.

eXs = dummy variable for supply shortages

Cr=dummy variable for credit conditions

(a) = stock of used cars and

b, c, d, e, f and g are the coefficients

or

$Dt = f(Y_t, P_t, h_t, S_t - 1\ t)$ where,

D = car demand for cars

Y = per capita real income

P = relative prices
h = hire purchase conditions

S_{t-1} = lag in adjustment from the present stock level to the desired level.

Demand function for commercial vehicles was given by the following equation:

$$C_{cvt} = a + bY_{t-1} + K_{t-2} + dI_{t-1} - g\frac{P^*}{Pg} - h\frac{(H)}{(T)} + R$$

Where,

$C_c$vt = demand for commercial vehicle at time t,

Y = income

K = Capital Stock

I = investment

P^* = general price level

Pg = the price of goods carried by commercial vehicles.

H = the number of professional road haulers

T = the total number of commercial vehicle users and

R = replacement demand.

Both the models encompass variables which determine the demand for cars and commercial vehicles for most practical purposes. Rhys, however, did not indicate the relative significance of the variables so included which makes it difficult to justify their inclusion. The range of the variables included in the model is also wide and data on them may not be available in developing countries.

Nowicki (1969) was of the opinion that forecasting techniques used in developed countries were unsuitable for developing countries (United Nations, 1969, P. 84). Automobile demand, according to him, follows a three stage growth pattern with a slow build-up in the initial stages followed by a steeply accelerating middle slope and then a decelerating approach to an upper asymptote. He therefore, suggested a logistic type of function which can be obtained from the function:

$$Y = \frac{k}{1+e^{a+bx}}$$

Where, $b<0$

Where y = demand for car ownership,

k = saturation level of ownership,

x = time, and

a and b = fixed parameters.

He, however, noted that experience with consumer durables saturation suggests that the best fit is likely to be obtained with the $Gompert_z$ curve which has the following function:

$$\text{Log } Y = \log k + (\log a)\, b^x, \text{ or}$$

$$Y = ka^{bx}$$

Where,

$0<a<1$

$0<b<1$

Despite its ability to estimate car ownership in developing countries, this approach ceases to be of much relevance once saturation has been attained. This technique is just but a convenient way of estimating demand for cars in situations characterized by dearth of statistics. Once relevant statistics are available as automobile ownership becomes common, mathematical - statistical models based on either user cost or stock adjustment methods are more appropriate. Another weakness of this technique is that it is basically a passenger car demand function and can not reasonably hold for commercial vehicles. The model is also a stock demand model and cannot be used in estimating the demand for new automobiles.

2.2.1 Overview

The review shows that most of the studies have been done in developed countries where the market for automobiles is mature. The approaches used, viz. stock adjustment and user cost, are not suitable for developing countries' situations. The two

approaches posit that consumption of automobiles in a given year is given by depreciation of automobiles in that year. This assumption may not be suitable in developing countries where depreciation and consumption of automobiles differ substantially. Moreover, in developing countries, there is insufficient data on depreciation. The review also shows that most of the studies were concerned with stock demand and therefore not very useful in determining the demand for new automobiles. Most of the results of the reviewed studies also indicate that we cannot generalize on the relationship between the demand for automobiles and its determining variables. This study seeks to show the extent to which the demand for automobiles in Kenya is influenced by some of the variables discussed in the literature review using a methodology that the current data base permits.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 Introduction

There are several difficulties in the demand analysis of durables in general and automobiles in particular. First, there is the problem of measurement. At any given time, there exist great differences in quality of automobiles. Furthermore there are greater changes in quality over time. Price data also tends to be unreliable due to problem arising from quality differences. In this study new car and pick-up price indices of the reference models were used under the assumption that changes in the prices of new cars and pick-ups induce similar changes in the price of second-hand cars and pick-ups by the same magnitudes.

Second, demand analysis of durable goods face a set of problems peculiar to themselves, arising from the twin nature of durables demand. At any given time, there is the demand for automobile ownership and the demand for new automobiles. The former is usually referred to as stock demand and the later as flow demand. These two sets of demand are interrelated. The stock of automobiles cannot be maintained let alone increased without new purchases. The stock demand also exerts considerable influence on the rate of new purchases. For any given level of demand for the services provided by a durable, new purchases in a given period will be lower the higher the level of services obtainable from the existing stock carried into the period. It is, however, not easy to measure the amount of services that may

be obtained from the existing stock. However, for the purposes of this study, it is assumed that all automobiles yield the same services to their owners so that the aggregate service yield of the existing stock of automobiles is measured by their numbers. In this section we give the theoretical relationship between the determinants of demand for automobiles and the demand for automobiles.

3.2. Determinants of demand for automobiles

3.2.1 Income

An analysis of economic theory suggests that the demand for normal goods, a category of goods cars belong to, increases with a rise in income, all other factors held constant. It therefore follows that a particular income group is associated with the demand for cars of a given quality defined by the age of the car. Since new car buyers usually sell or trade in their existing cars to purchase new ones, the real threshold income of demand for cars effectively lies on the secondhand buyers without whom no market for secondhand cars would exist and demand for cars would not increase. It is in this category of buyers that the threshold income of demand for cars lies and not in the higher income groups.

3.2.2 Threshold Income

The threshold income, in the context of demand for cars, is the level of income at which purchase of a car becomes possible.

Threshold income is partly determined by the prices of cars and partly by the terms of credit. High car prices increase threshold income and vice-versa. This can, however, be ameliorated by credit facilities which enable consumers to supplement their incomes. But availability of credit does not in any way make the threshold income concept irrelevant. Hire purchase finance can only be obtained subject to certain conditions, usually a given level of income below which no funds may be availed. It is this base income that plays an important role in the determination of threshold income. From this we may infer that the threshold income is that income level at which hire purchase institutions will grant a buyer finance to purchase the least costly car of a given quality (usually denoted by the age of the car) acceptable to the institution. Thus supposing that a hire purchase institution gives a car loan subject to the condition that the buyer must not purchase a car aged more than five years, that five year old cars go for Ksh. 72,000 on the average, that repayment must be done within two years and that the repayment should not take more than one third of the buyer's income and assuming a zero rate of interest, the threshold income will be Ksh. 108,000 per year.

3.2 3 Gross Domestic Product

Demand for pick-ups and other commercial vehicles is derived demand and can be best explained by the general state of the economy. A particular level of income (GDP) corresponds with a

specific level of demand of pick-up services. The demand for new pick-ups will therefore depend on the changes in GDP. A rise in GDP will call for higher stock while a fall in GDP will bring a reduction in the stock. Thus, the demand for new pick-ups will rise or fall accordingly.

3.2.4 Credit Terms

Consumer durables compete both among themselves and with non-durables for the limited consumer's income. The consumer can thus not satisfy all his wants for both durable and non-durable commodities at the same time. Consumer credit institutions allow the buyer to satisfy his desire for durables more than his income in a given period would permit. Credit facilities, thus, make the budget constraint less severe. Most business activities rely heavily on credit so that its availability and terms will reflect significantly on the demand for pick-ups. Unrestricted credit with affordable terms does, to some extent reduce the relative significance of automobile prices and income related budget constraints. The impact of credit facilities on the demand for cars and pick-ups can be captured by interest rates, repayment period and total credit disbursements. In this study, interest rates were used to capture the extent of the impact of credit facilities on demand for automobiles. Since interest rate is the cost of borrowing, a rise or fall in the interest rate will induce a rise or fall in the demand for cars and pick-ups.

3.2.5 Stock of automobiles

It has been observed that demand for passenger cars, especially in a mature market, is inversely related to the stock of automobiles. As the market for passenger cars approaches maturity stage, the incremental increases in stock increase at a decreasing rate. The demand for new cars, therefore, also tends to be low.

The same inverse relationship between stock and demand applies to pick-ups. Any given level of GDP corresponds to a certain level of economic activity which requires a specific level of pick-up services. The quantity of pick-ups demanded will therefore depend on available stock and the changes in the economic activity. A rise in economic activity coupled with a low stock level will lead into a sharp increase in demand while a fall in economic activity at a time when the stock is serviceable may reduce the demand.

3.2.6 Investment

Investment may affect the demand for automobiles in two ways. The first one is direct whereby part of investment outlay goes directly into purchases of automobiles especially of the pick-up and passenger car hire categories. Business organizations also acquire passenger cars and pick-ups as part of their investments. The second form is indirect. Investment invigorates economic activity with a multiplier effect which consequently results in increased demand for automobiles. The

correlation between investment and income, however, may obscure its significance and in extreme cases, it may bring an element of multicollinearity.

3.2.7 Roads

Well planned highways both in rural and urban areas are conducive to car ownership and pick-up operation. In urban centres, better road and town planning increases the centres' ability to accommodate increased traffic.

Road construction in the rural areas has a double impact, particularly in developing countries. In addition to the above, it opens up these areas and hence increases economic activity. This brings about a rise in incomes which results in demand for both passenger cars and pick-ups. But as this particular infrastructure becomes common, its impact on additional demand wanes. In Kenya, it can only be of significance up to the present level of development when road construction, especially in rural areas, has not been accomplished.

3.2.8 Urbanization

Urbanization affects the demand for automobiles in two ways. First, it necessitates the need for transportation both within the urban centers and between urban and rural areas. Second, since urban centres are associated with manufacturing and rural areas with agricultural products, urbanization will trigger demand for transport to ferry goods between the urban centers and

rural areas. Possibly, under the first impact of urbanization, there will be a rise in both the demand for pick-ups and passenger cars while the second impact will be dominated by pick-ups or commercial vehiches in general.

In developing countries, where income disparities between urban and rural areas is pronounced, urbanization may reveal a rather spurious correlation with demand. Observed positive correlation between urbanization and the demand for automobiles may actually be due to income disparities between the urban and rural areas. A study done in the USA (Bennet, 1967) for example, showed that rural households were more likely to own cars than their urban counterparts, which implied an inverse relationship between urbanization and demand for automobiles. This, however, may only be relevant to developed countries where due to congestion, car ownership in urban areas is discouraged. In Kenya, where the market for cars is still not mature and urbanization has just began relative to developed countries, the reverse may apply.

3.2.9 Government Policy

Government policy influences demand for automobiles through its impact on price, credit facilities, running costs and import restrictions. Fiscal instruments like duty and sales tax imposed on automobiles have a direct impact on the demand through price while licencing, insurance and taxes on complementary goods such as petrol have an indirect influence via running costs. Import

restrictions and foreign exchange rationing also constrict demand.

3.2.10 Price

Price is one of the important determinants of demand for automobiles. Since automobiles are normal goods, their demand is inversely related to price. This, however, does not proceed in the way of non-durable goods where a fall in price is associated with a household consuming more. A fall in price affects demand for automobiles by lowering threshold income thus increasing ownership. Low car prices will create incentives of buying new cars amongst households which already own cars. But to buy new cars, they sell their used cars. This dampens second hand car prices thus lowering the threshold income.
Pick-ups are regarded as investments and therefore a fall in their prices will stimulate an increase in their demand.

The long-run impact of price as a determinant of automobiles demand is, however, disputable. In the long-run households tend to adjust to price changes so that its effectiveness can be mainly felt in the short-run. The existence of hire purchase institutions also undermines the effectiveness of price in the short-run. Accordingly, most automobile manufacturers do not, in general, indulge in price competition. In fact the philosophy in the motor industry has been: same price for better car than same car for less price. The Kenyan market clearly attests to this. In Kenya, motor vehicle price cuts have only come in the form of

tax reductions. Competition has been concentrated on make-model variations and not on price. In developing countries where importation of automobiles is constrained by scarcity of foreign exchange, price increase are in fact common with little or no impact on demand. This appears quite contradictory theoretically since due to low incomes in these countries, a price increase should be more significant. This may, however, be explained by the fact that automobile ownership in these countries is still dominated by a few comparatively rich individuals, business organizations and the public sector to whom slight price variations may not matter.

New car registration in Kenya is characterized by cars of different ages, engine capacity and makes. This makes quantification for pricing almost impossible. Even if we consider that ownership derives from the services that the buyer expects to get from the car, it is still not easy to quantify the services of these cars since the quality of service that a car of a different make and age gives to a particular owner is not the same.

This hurdle can, however, be overcome by using new car price indices on the assumption that changes in the prices of new cars induce similar changes in the prices of second-hand cars by the same magnitude. The same argument can be extended to movements in the prices of cars of different engine capacities or to movements in the prices of pick-ups.

3.3. Data source, type and limitations

The study used time series data with the criteria for inclusion of key variables based on the reviewed past studies, prevailing conditions in Kenya, e.g., data base and theoretical considerations as laid down in the section of theoretical framework. Data for various variables were obtained from different sources namely:

i) Central Bureau of Statistics (CBS) for data on motor vehicle registration, consumer price index, investment, road construction and income. These data were obtained from various statistical abstracts;

ii) Geography department, University of Nairobi for data on urban population;

iii) Various automobile dealers for data on current and past prices and types of models produced;

iv) Price control, Ministry of Finance for historical price changes on some specific models of vehicles; and

v) Ministry of Planning and National Development for data on personal disposable income, GDP and interest rates.

The data used cover the period between 1970 and 1986. This period was chosen due to the following considerations:

i) Over a very long period, model changes reduce comparability of data. Invariably, one encounters situations where completely new makes and models dominate the market while the previous makes and models are phased out and as such price comparisons can not be accurate.

ii) Based on preliminary analysis, 1970 is representative of the year when automobile demand, especially car ownership, entered its second phase with a marked acceleration of ownership.

iii) To avoid the degrees of freedom problem, the study had to stretch over a reasonably long period with minimal adverse effect on (i) mentioned above.

It is assumed that the makes and models of passenger cars and pick-ups used are representative of the population. For the pick-ups category, petrol propelled Peugeot 404 pick-up was taken as a reference model while for the passenger cars category, Peugeot 504 GL saloon was taken as a reference make-model. The choice of these makes of vehicles was based on the popularity and make-model continuity over the study period.

Table 3 below provides a count of new saloon cars, station wagons and utilities by make. The table indicates that among saloon cars, Peugeots were the most popular makes with 827 and 867 registrations in 1987 and 1988 respectively. Similarly, Peugeots were also the most popular makes in the pick-up category of vehicles with 1128 and 1092 recorded registrations in 1987 and 1988 respectively.

This study estimates a linear demand function for both passenger cars and commercial vehicles and uses an econometric method of analysis. The criteria for the choice of this method was based on the study objectives and the shortcomings of the other probable alternative approaches like controlled market

TABLE 3 COUNT OF NEW SALOON CARS, STATION WAGONS AND UTILITIES BY MAKE (POPULAR MAKES)

	Saloon cars		Station Wagons		Pick-ups	
MAKE	1987	1988	1987	1988	1987	1988
Alfa Romeo	2	3	1	1		
Audi	1	1				
BMW	8	16				
Nissan	485	477	284	337	857	1,019
Daihatsu	31	42	223	176	2	1
Isuzu	224	98	149	171	574	473
Mazda	342	320	59	73	145	190
Mitsubishi* (Canter)	217	288	352	257	426	439
Peugeot	827	867	206	204	1,128	1,092
Suzuki	38	44	203	229	5	3
Sunbeam	38	54	77	117	3	0
Toyota	104	514	563	366	1,225	1,092
Volkswagon	19	39	28	68		
Volvo	38	27	8	11		

*The totals of Mitsubishi and Canter are added together

Source: Ministry of Transport
Registration of Motor Vehicles
Print Out - 1987 and 1988 pages
Count of Vehicles by Town of Registration, Make, Body Type and Registration Type - pages 0001-0028

experiments and survey research methods. The survey method, for example, may facilitate understanding the effects of consumer buying power and attitudes on automobile demand more accurately. The method allows for stratification of consumers with respect to their buying power, attitudes and the type of cars they buy. The method is also expensive and time consuming. For the purposes of this study, an econometric method using time series data suffices without compromising the quality of the results.

3.4 Hypotheses and Model Specification

The study variables mentioned in the theoretical framework, the prevailing Kenya's conditions and the study objectives constitutes the basis of the hypotheses to be tested in the model.

3.4.1 The Estimated Model

This study separates the demand for automobiles into two categories of demand for new passenger cars and the demand for new pick-ups. With due acknowledgement of the difficulties mentioned previously, the present study argues that the demand for new passenger cars is a function of the stock of passenger cars, real national income, retail price index of cars, real import price index, real interest rates and urbanization. In particular, the demand for passenger cars is:

(1) $Dpc = f(a, Y_d, P, C, U, X, IMPR, e)$, where

Dpc = demand for new passenger cars,

a = stock of passenger cars and $\frac{dDpc}{da} < 0$,

Y_d = national income and $\frac{dDpc}{dYd} > 0$,

P = real price index of passenger cars and $\frac{dDpc}{dP} < 0$,

C = terms of credit is represented by interest rates and $\frac{dDpc}{dC} < 0$,

U = urbanization is given by the total urban population and $\frac{dDpc}{dU} > 0$,

X = a dummy variable capturing shortages arising from government policy changes

IMPR = real import price index and $\frac{dDpc}{dIMPR} < 0$, and

e = error term

while demand for new pick-ups is a function of the stock of pick-ups, gross domestic product, real retail price index of pick-ups, real import price index, credit terms, road construction, urbanization and investment.

(2) $D_cv = f(a, Y_t\text{-}1, Y_t\text{-}1, P, C, R, U, I_t, IMPR, e)$ where

D_cv = demand for new pick-ups,

Y = real gross domestic product and $\frac{dD_cv}{dY} > 0$,

P = real price index of pick-ups and $\frac{dD_cv}{dP} < 0$,

C = interest rate and $\frac{dD_cv}{dC} < 0$,

U = urbanization given by the total urban population

and $\frac{dD_C v}{dU} > 0$,

R = road construction in kilometres and $\frac{dD_C v}{dR} > 0$,

I = investment and $\frac{dD_C v}{dI} > 0$,

IMPR = real import price index and $\frac{dDcv}{dIMPR} < 0$, and

e = error term.

The ordinary least-squares method was used to estimate the coefficients to determine the significance of the explanatory variable and the appropriateness of the model.

CHAPTER FOUR

DATA ANALYSIS

Data used for regression analysis are given in tables 4 and 5 for cars and commercial vehicles respe

Table 4

YEAR	CARS	CART	GNP	PCAR	INT	DUMCA	URBAN	IMPR
1970	8063.000	58458.00				.000000	1158273	NA
1971	8676.000	63607.00				.000000	1241541	NA
1972	7054.000	67500.00	1661.620	10.60	0.760000	.000000	1333174	NA
1973	7836.000	70660.00	1494.320	27.12	-7.950000	.000000	1434236	22.0300
1974	8581.000	78312.00	1721.850	19.46	-10.67000	.000000	1545932	26.1100
1975	7622.000	83676.00	1727.030	38.73	-11.48000	.000000	1669756	32.1300
1976	6923.000	99947.00	1791.930	24.31	-4.350000	.000000	1807225	40.0400
1977	9813.000	104272.0	1955.280	4.14	-10.60000	.000000	1960226	48.4400
1978	10591.00	109121.0	2074.710	6.26	-8.290000	.000000	2130874	55.3800
1979	7123.000	110431.0	2184.350	15.84	-2.390000	.000000	2309000	61.8300
1980	9179.000	113629.0	2247.260		-7.660000	.000000	2472939	67.8500
1981	5513.000	114197.0	2417.550		-5.040000	1.000000	2648517	77.4400
1982	4545.000	115316.0	2487.570		-9.840000	1.000000	2836562	91.9900
1983	4995.000	116852.0	2574.480		-0.370000	1.000000	3037958	11.4800
1984	5448.000	122300.0	2596.330		-4.200000	1.000000	2253653	141.940
1985	3917.000	126188.0	2712.160		-3.220000	1.000000	3484662	150.630
1986	6321.000	127351.0	2854.960		-7.540000	.000000	4004514	155.280

CARS - Demand for New Cars
CART - Stock of Cars
GNP - Disposable Income (in Million Kenya Pounds)
PCAR - Real Price Index of Cars
INT - Real Interest Rate
DUMCA - Dummy Variable
URBAN - Total of Urban Population
IMPR - Real Import Price Index

Source: (i) CBS, Statistical Abstract
(ii) Toyota Kenya
(iii) Ministry of Planning and National Development, Long Range Planning Unit.
(iv) Department of Geography, University of Nairobi

Table 5

YEAR	COMV	STOCV	PCOMV	Y	INT	URBAN	ROAD	INV
1970	5445.000	37415.00	50.00000	1636.000		1158273	37927.00	210.220
1971	6042.000	41058.00	53.60000	1642.162		1241541	41829.00	258.330
1972	5288.000	44165.00	55.70000	1836.910	0.760000	1333174	43428.00	232.350
1973	3067.000	46285.00	64.00000	1911.440	-7.950000	1434236	44893.00	285.980
1974	3528.000	52627.00	77.70000	1971.590	-10.67000	1545932	48333.00	294.190
1975	3878.000	58349.00	100.0000	2028.310	-11.48000	1669756	48234.00	217.100
1976	4156.000	44543.00	119.0000	2119.710	-4.350000	1807225	46047.00	256.870
1977	7354.000	48264.00	130.0000	2292.770	-10.60000	1960226	46027.00	357.880
1978	5717.000	50203.00	147.4000	2473.160	-8.290000	2130874	46241.00	739.020
1979	5979.000	52249.00	173.0000	2596.030	-2.390000	2309000	46032.00	137.240
1980	7545.000	55524.00	229.5000	2698.450	-7.660000	2472939	46930.00	421.260
1981	6808.000	57969.00	235.0000	2860.140	-5.040000	2648517	47037.00	391.680
1982	5447.000	59358.00	275.0000	3067.280	-9.840000	2836562	47373.00	314.910
1983	4415.000	59618.00	302.0000	3124.970	-0.370000	3037958	47863.00	309.700
1984	5187.000	64805.00	329.0000	3147.980	-4.200000	2253653	47864.00	313.330
1985	4652.000	69441.00	354.0000	3302.740	-3.220000	3484662	47450.00	356.190
1986	4751.000	69457.00	414.0000	3484.160	-7.540000	4004514	47540.00	402.860

COMV - Demand for Commercial Vehicles
STOCV - Stock of Pick-ups
PCOMV - Real Price Index of Commercial Vehicles
Y - Real Gross Domestic Product (in Million Kenya Pounds)
INT - Real Interest Rates
URBAN - Total of Urban Population
ROAD - Road Construction in kilometers
INVI - Real Gross Investment (in million Kenya Pounds)

Source: (i) CBS. Statistical Abstract
(ii) Toyota Kenya
(iii) Ministry of Planning and National Development, Long Range Planning Unit
(iv) Department of Geography, University of Nairobi

4.1 Demand for passenger cars:

4.1.1. Stock Demand

Stock of cars increased from 42920 in 1964 to 127,351 in 1986. This growth has proceeded in three distinct stages (see table 1b). The first stage, 1964 to 1969, was characterized by slow growth in the stock of car. The second stage of the growth of stock of cars started in 1969 and continued up to 1976. During this stage, the stock of passenger cars increased rapidly. The third stage started in 1976 and went up to 1983. This stage was characterized by a slower rate of increase in stock of cars compared to the second phase. The table also shows that there have been rapid increase in the stock of cars since 1983. Since this last phase covers only three years according to our statistics, we can not say with certainty for how long this phase might last. The experience of the last three phases shows that each phase lasts for about seven years so that the rapid growth in stock demand should be over by 1990.

These phrases may be explained as follows; during the first phase, car ownership was dominated by the relatively few well-to-do individuals, the government and business organisations. As income increased, more people attained threshold income and demand for car ownership increased rapidly which explains the second phase. During the third phase, car ownership became common and hence there was less demand for additional car ownership. The third phase may, however, be explained by the

general economic conditions which shifts the threshold income and increases demand for car ownership.

Another observable feature is the fact that stock demand did not have any positive relationship with the demand for new new cars. The inflexion towards a slow growth in the stock demand actually occurred during the years when demand for new cars was at its highest levels.

4.1.2 Regression Results

Using the ordinary least squares method of estimation, the following, results were obtained:

$$D_{pc} = 3992 + 0.83(a) - 13.48m - 2.49\,(Y)$$
$$\text{Std. Error} \quad (3795) \quad (0.09) \quad (11.77) \quad (4.23)$$
$$\text{T-Statistic} - (1.05) \quad (0.87) \quad (-1.14) \quad (-0.59)$$
$$- 197.1c - 2273.58\,X_1 + 359.3\,X_2$$
$$(129.57) \quad (595) \quad (1369)$$
$$(-1.52) \quad (-2.36) \quad (0.26)$$

$$R^2 = 0.81$$
$$F - \text{Statistic} = 5.19$$

The result shows that the explanatory power of the model as a whole is significant, $R^2 = 0.81$. However, only one independent variable, X_1 (dummy variable), is statistically significant at 5% level. Besides this, the stock of cars, a, has a positive sign

which is against theoretical expectation. Personal income, Y, also entered the relationship with a negative sign implying that demand for cars increases as income decreases. Other independent variables, import price index, M, real interest rates, C, dummy variable, X_2, entered the relationship with the correct signs but were insignificant.

The foregoing result shows that the model, in its above form is misspecified. To improve on this, several other regressions were run. The following result was found to be more appropriate;

D_{pc} = 23355 - 0.128 $_{a-1}$ + 177.433 * Y-1 - 217P*

Std. Error = (3758) (0.035) (4975.63) (41)

T-Statistic =(6.2) (-3.59) (3.46) (-5.28)

R^2 = 0.9399

F-Statistic = 10.43

This second result was a considerable improvement on the first. The explanatory power of the model, R^2, increased from 0.81 to 0.9399 while all the independent variables were significant. The result shows that the demand for passenger cars in time t is a function of stock of cars in time t_{-1}, change in income in time t_{-1} and changes in prices of the cars.

4.1.3 Analysis of Regression result

The foregoing results show that the demand for passenger cars is determined by the stock of passenger cars, changes in

real disposable personal income and changes in passenger car own prices.

The regression results indicate that changes in the real personal disposable income affect demand for passenger cars in the same direction. As personal disposable income increases, more and more people reach the threshold income necessary for the purchase of passenger cars. This increases the demand for car ownership and subsequently increases the demand for new passenger cars. This result thus confirms our earlier theoretical postulation that the demand for cars is positively related to income.

The regression results also indicate that the demand for cars is inversely related to changes in the prices of cars. Price changes affect the demand for passenger cars in two ways: one, an increase in price increases the threshold income necessary for the purchase of passenger cars and is therefore tantamount to a fall in income; two, an increase in the prices of passenger cars makes other passenger cars competing durables more attractive so that funds are switched from purchases of cars to purchases of these durables.

The regression results further indicate that the demand for passenger cars is negatively correlated with the stock of passenger cars. This observation suggests that increase in the stock of passenger cars enhances the saturation of car ownership and thus, the demand for new passenger cars declines. This process can, however, be halted by increasing the consumers'

personal disposable incomes or by reducing the prices of passenger cars to enable more people reach the necessary threshold income. Population growth may also fuel additional demand for car ownership though this is more relevant to developed countries where income is a lesser constraint.

4.1.4 Government Policy

Government policy affects demand through its impact on price, credit facilities, running costs and actual availability of motor vehicles. Price has been, however, influenced considerably by the Government's fiscal policy. Table 6 shows the variation of sales tax over the last five years. The table indicates that sales tax ranged from 400% in 1986 to 18% in 1990, depending on engine capacity.

Table 6 Sales Tax Rates on Passenger Cars

Engine Capacity	1986	1987	1988	1989	1990
1200 or less	40	30	25	-	-
1201 - 1500	50	40	30	20	18
1501 - 1800	65	55	45	35	30
1801 - 2000	100	85	60	50	45
2001 - 2250	230	195	155	110	100
2251 and above	400	340	270	210	150

Source; Various Budget Speeches

Besides sales tax, the government also influences availability of credit and interest rates. Table 4 also provides information on the real interest rates between 1972 and 1986 and

shows that real interest rates have been negative for the years shown except for 1972 when a real interest rate of 0.76% was recorded.

The government also influences demand through direct controls. Direct controls may take the form of import bans and or foreign exchange rationing. As was noted earlier, the government banned the importation of saloon cars between 1980 and 1986 except for a few special cases. In this study a dummy variable was used to capture the effect of the ban on the demand for passenger cars during the period of ban. Effects of sales tax and duty were captured through price while interest rates was captured independently.

The first regression result indicates that the dummy variable, X^1, was statistically significant at 5% level. This variable was intended to capture the effect which the ban on importation of saloon cars had on the demand for saloon cars. The variable entered the relationship negatively implying that the ban had a negative impact on the purchases of passenger cars.

4.1.5 Price

Table 7 (a) and (b) show the monthly price variation for the reference models, peugeot 504 saloon G.L. 1600cc and Peugeot 404 pick-ups since 1971. The tables show that the current price of Peugeot 504 saloon, GL 1600cc increased from Ksh. 34.500 in 1972 to Ksh. 359986 in 1989 representing a current price increase of 943%. Similarly the current market price of Peugeot 404 pick-

Table 7 (a) Monthly Price Variation of Peugeot 504 G.L. 1600cc Saloon

DEALER/AGENT - MARSHALS

MAKE	MONTH	YEAR - PRICE																			
		1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
PEUGEOT 504 SALOON GL 1600CC	JAN				34500				97400	97400										347906	339990	
	FEB						49050													345906		359986
	MAR						50700	70900		98600											344900	
	APR						53000	74500		99500		121000										
	MAY										102200										349900	
	JUN					47500	55000															
	JUL						58500		93000		107500				262790						359950	
	AUG					49000	58000	82000														
	SEPT					50600	61100		94000												347680	
	OCT							94700	101300			134500									347680	
	NOV								10130	112200											329950	
	DEC																				329950	

Source: (i) Toyota Kenya
(ii) Ministry of Finance

Table 7(b) Monthly Price variation of Peugeot 404 pick-up

DEALER/AGENT - MARSHALS

MAKE	MONTH	YEAR - PRICE																				
		1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
PEUGEOT PICK-UP (PETROL)	JAN		25000				56800						116000					207566	239900			
	FEB				31460								116000	137425				207566		259995		
	MAR				31000	45000					59000			135000								
	APR					46800		55000			145600									239900		
	MAY																182576		239900			
	JUN			30300				57000												249890		
	JUL				38400							109405			146631		207576			249890		
	AUG			30900	36600	47800					99089	103000								249890		
	SEPT															159754	199693			249890		
	OCT						55000									166036				249890		
	NOV											109400				166036			225498			
	DEC		24000	24000	39500			66000							150055	166036	225498					

Source: (i) Toyota Kenya
(ii) Ministry of Finance

up increased from KSh. 24,000 in 1971 to Ksh 259995 in 1989 representing an overall increase of 983%. Various factors have been blamed for price increase since 1970. The major ones are:

(i) Foreign Exchange rate;

The Kenya shilling has continued to depreciate against the major hard currencies, e.g. the US dollar, pound sterling, French franc and the Japanese yen. Consequently, the prices of both the completely built-up (CBU) vehicles and completely knocked-down (CKD) kits have gone up accordingly. Table 8 compares the increases in foreign exchange rate and the price of Peugeot 404 pick-up. The comparison indicates that the depreciation of the Kenya shilling and the increases in price of Peugeot 404 pick-up have been unproportional. For example, the dollar appreciated by 124.5% between 1970 and 1986 while price increased by 724%.

(ii) Size of the market;

The size of the Kenyan market for automobiles is too small to allow for economies of scale. Data compiled by motor vehicles manufacturers show that only 14194 vehicles were sold in 1989. Accordingly motor vehicles manufacturers increase their prices to compensate for the diseconomies arising from the size of the market.

Table 8

Comparison between changes in foreign exchange rate and Price of Peugeout 404 pick up

YEAR	JAPANESE YEN	STERLING POUND	FRENCH FRANC	PRICE OF PEUGEOUT 404 PICK-UP	US DOLLAR
1970	1.997	17.098	1.294	22.500	7.143
1971	2.269	18.232	1.367	24.000	7.143
1972	2.365	16.772	1.394	24.950	7.143
1973	2.464	16.030	1.466	28.100	6.900
1974	2.374	16.754	1.609	34.800	7.143
1975	2.700	16.700	1.850	44.775	8.250
1976	2.846	14.150	1.680	53.200	6.310
1977	3.310	15.207	1.697	58.250	7.947
1978	3.825	15.059	1.771	66.000	7.404
1979	3.046	16.355	1.823	77.500	7.328
1980	3.737	18.081	1.672	102.797	7.568
1981	4.685	19.699	1.788	105.223	10.286
1982	5.440	20.627	1.889	123.141	12.725
1983	5.958	20.059	1.662	135.391	13.796
1984	6.306	18.401	1.641	147.562	15.781
1985	8.120	23.566	2.159	158.613	16.284
1986	10.030	30.685	2.490	185.394	16.042

Source; (i) Central Bank of Kenya
(ii) Toyota Kenya

(iii) Over pricing of components:

Motor vehicle components are priced such that they also include deletion allowance. The CKD value also usually includes the cost of assembling, testing, dismantling and re-packing.[1]

(iv) Foreign exchange allocation:

Due to unpredictable nature and delays in the foreign exchange allocation, dealers take advantage of shortages and hike prices.

(v) Duty and Sales tax:

As was mentioned earlier, motor vehicles are highly taxed, sometimes even by more than 200%. However, overtime the government has been reducing duty and sales taxes so that additional price increases can not be blamed on taxation.

(vi) Cost of model changes:

Motor vehicle manufacturers in Kenya assemble 117 models of trucks, buses and saloons. There are at least 60 makes of Sedan cars in about 300 models on the streets. The existence of so many models in the local manufacture of components and spares increases investment cost which is consequently borne by the buyers.

---

[1]See Report of the Inter-ministerial Committee on Rationalisation of Motor Vehicle Assembly in Kenya, Nov. 1989.

A study done in the United States (Fisher, 1962) found that the costs of model changes in the United States in the 1950's were substantial - totalling, $5 billion a year. So far no such study has been done in Kenya but there is no evidence to suggest that model changes in Kenya have been less costly.

4.2 Demand for pick-ups

4.2.1. Regression results

It should be made clear at the outset that the equation for the demand for new pick-ups:

$Dc_v = f(a, Y_t\text{-}1, {}^*Y_t\text{-}1, P, C, R, U, IMPR, I_t, e)$

as stated in the previous chapter was found to have a low explanatory power.

Most of the variable were found to be insignificant and the determination power of the equation overly low. Autocorrelation was also found to be high, judging from the low Durbin-Watson statistic, rendering the model inapplicable in that form. Variables - urbanization, road, investment, real interest rate (c), change in income and price - were found to have no determining value on the demand for new commercial vehicles and were dropped from the equation.

Only stock of pick-ups and national income were found to be significant. But current stock and income highly depend on their past values so that the autocorrelation problem persisted even

after the variables were expressed in their lagged form. The determining power of the model, however, remained low. Using ordinary least squares, the following results were obtained:

$$Dcv = 7459 - 0.175a_{-1} + 2.7416Y$$

Std. Error = (1510) (0.0611) (0.967)

T-statistic= (4.94) (-2.86) (2.83)

$R^2 = 0.38$

D.W = 1.11

F - Statistic = 4.29

4.2.2 Analysis of regression results

The foregoing results show that the demand for new pick-ups is determined by national income and the stock of pick-ups. The former affects demand positively while the later affects the demand negatively, thus supporting the theoretical expectation as was stated in the preceeding chapter.

Table 1b also shows that the stock of pick-ups has been increasing since 1970. However, there was a significant fall in the stock of pick-ups from 58349 in 1975 to 44543 in 1976. The table further shows that new registrations of pick-ups have been characterized by oscillatory variations since 1970. The most important observation, however, is that increases and decreases in new registrations of pick-ups moved in the same direction with stock of pick-ups in only 8 years.

The foregoing result is plausible since other variables which were found to be insignificant are primarily related to

GDP. To a considerable extent, urbanization, investment and level of road construction depend on GDP. The results of the study also indicate that low interest rates and prices can not induce additional purchases of pick-ups once saturation has been attained at some level of national income so that income and stock are the principal determinants of the demand of commercial vehicles. This, however, does not preclude the possibility of other factors playing some role. After all the result shows that the two variable only explain about 40 per cent of the variations in the demand for pick-ups, the rest being explained by other forces not captured by the model.

4.4 Forecasting

The independent variables used for forecasting the future demand for passenger cars and pick-ups were estimated using time as the independent variable.

Time had an explanatory power of more than 0.8 for all other variables except interest rates. Tables 9 and 10 present the forecasted values of the independent variables that were used for forecasting the demand for passenger cars and pick-ups respectively.

The estimated models for both passenger cars and pick-ups were used to forecast the future demand upto the year 2000. Table 11 shows the projected and actual demand for new passenger cars and pick-ups. The projected demand for passenger cars using the first regression equation, MASS, shows an increasing trend

and predicts that by the year 2000, 9242 units of passenger cars will be demanded. The short coming of this projection is that the specified equation used for the projection was not in conformity with theoretical expectations.

The projected demand using the second equation predicts a decline in the demand for passenger cars. This is possibly due to the projected figures of the stock of cars. The realized demand might, however, be above the projected figures if the stock of cars turns out to be lower. A faster growth in real disposable personal incomes could also result into a higher demand than the projected ones.

The projected demand for pick-ups, however, shows a slow but steady increase in future demand. In 1990, 5365 units will be purchased and this will increase to 5595 units by the year 2000.

Table 9 Projected values of independent variables; passenger cars dem analysis

Year	CART6	GNP6	PRCC6	IMPR6	INT6	URBAN6
1970	63202.00	NA	NA	NA	NA	984212.0
1971	67667,00	NA	NA	NA	NA	1135663.
1972	72132.00	1501,000	23.47700	NA	-7.239000	1287114.
1973	76597.00	1596.000	21.95400	10.31015	-7.088000	1438565.
1974	81062.00	1691.000	20.43100	19.49760	-6.937000	1590016.
1975	85527.00	1786.000	18.90800	28.68505	-6.786000	1741467.
1976	89992.00	1881.000	17.38500	37.87250	-6.635000	1892918.
1977	94457.00	1976.000	15.86200	47.05995	-6.484000	2044369.
1978	98922.00	2071.000	14.33900	56.24740	-6.333000	2195820.
1979	103387.0	2166.000	12.81600	65.43485	-6.182000	2347271.
1980	107852.0	2261.000	11.29300	74.62230	-6.031000	2498722.
1981	112317.0	2356.000	9.770001	83.80975	-5.880000	2650173.
1982	116782.0	2451.000	8.247000	92.99720	-5.729000	2801624.
1983	121247.0	2546.000	6.724000	102.1846	-5.578000	2953075.
1984	125712.0	2641.000	5.201000	111.721	-5.427000	3104526.
1985	130177.0	2736.000	3.678000	120,5595	-5.276000	3255977.
1986	134642.0	2831.000	2.155000	129.7470	-5.125000	3407428.
1987	139107.0	2926.000	0.632000	138.9344	-4.974000	3558879.
1988	143572.0	3021.000	-0.891000	148.1219	-4.823000	3710330.
1989	148037.0	3116.000	-2.414000	157.3094	-4.672000	3861781.
1990	152502.0	3211.000	-3.937000	166.4968	-4.521000	4013232.
1991	156967.0	3306.000	-5.460000	175.6843	-4.370000	4164683.
1992	161432.0	3401.000	-6.983000	184.8717	-4.219000	4316134.
1993	165897.0	3496.000	-8.506000	194.0591	-4.068000	4467585.
1994	170362.0	3591.000	-10.02900	203.2466	-3.917000	4619036.
1995	174827.0	3686.000	-11.55200	212.4341	-3.766000	4770487.
1996	179292.0	3781.000	-13.07500	221.6215	-3.615000	4921938.
1997	183757.0	3876.000	-14.59800	230.8089	-3.464000	5073389.
1998	188222.0	3971.000	-16.12100	239.9964	-3.313000	5224840.
1999	192687.0	4066.000	-17.64400	249.839	-3.162000	5376291.
2000	197152.0	4161.000	-19.16700	258.3713	-3.011000	5527742.

CART6 = Projected stock of passenger cars
GNP6 = Projected real personal disposable income
PRCC6 = Projected price index of passenger cars
IMPR6 = Projected real import price index
INT6 = Projected real interest rates
URBAN6 = Projected urban population

Source; Own computations

Table 10 Projected values of Independent Variables; Pick-ups Demand Analysis

YEAR	COMV9	STOCV8	YMAS8	IMPR6	INT6	URBAN6	ROAD6
1970	NA	39936.00	1527.432	NA	NA	984212	42967.38
1971	4926.428	41645.00	1646.751	NA	NA	1135663	43339.76
1972	4949.517	43354.00	1766.071	NA	-7.239000	1287114	43712.14
1973	4972.606	45063.00	1885.391	10.31051	-7.088000	1438565	44084.52
1974	4995.692	46772.00	2004.710	19.49760	-6.937000	1590016	44456.90
1975	5018.781	48481.00	2124.030	28.68505	-6.786000	1741467	44829.28
1976	5041.868	50190.00	2243.349	37.87250	-6.635000	1892918	45201.66
1977	5064.956	51899.00	2362.669	47.05995	-6.484000	2044369	45574.04
1978	5088.043	53608.00	2481.988	56.24740	-6.333000	2195820	45946.42
1979	5111.132	55317.00	2601.308	65.43485	-6.182000	2347271	46318.80
1980	5134.218	57026.00	2720.627	74.62230	-6.031000	2498722	46691.18
1981	5157.307	58735.00	2839.947	83.80975	-5.880000	2650173	47063.56
1982	5180.396	60444.00	2959.267	92.99720	-5.729000	2801624	47435.94
1983	5203.482	62153.00	3078.586	102.1846	-5.578000	2953075	47808.32
1984	5226.571	63862.00	3197.906	111.3721	-5.427000	3104526	48180.70
1985	5249.658	65571.00	3317.225	120.5595	-5.276000	3255977	48553.08
1986	5272.746	67280.00	3436.545	129.7470	-5.125000	3407428	48925.46
1987	5295.835	68989.00	3555.865	138.9344	-4.974000	3558879	49297.84
1988	5318.922	70698.00	3675.184	148.1219	-4.823000	3710330	49670.22
1989	5342.011	72407.00	3794.504	157.3094	-4.672000	3861781	50042.60
1990	5365.097	74116.00	3913.823	166.4968	-4.521000	4013232	50414.98
1991	5388.187	75825.00	4033.143	175.6843	-4.370000	4164683	50787.36
1992	5411.272	77534.00	4152.462	184.8717	-4.219000	4316134	51159.74
1993	5434.362	79243.00	4271.782	194.0591	-4.068000	4467585	51532.12
1994	5457.451	80952.00	4391.102	203.2466	-3.917000	4619036	51904.50
1995	5480.537	82661.00	4510.421	212.4341	-3.766000	4770487	52276.88
1996	5503.627	84370.00	4629.741	221.6215	-3.615000	4921938	52649.26
1997	5526.712	86079.00	4749.060	230.8089	-3.464000	5073389	53021.64
1998	5549.801	87788.00	4868.380	239.9964	-3.313000	5224840	53394.02
1999	5572.888	89497.00	4987.699	249.1839	-3.162000	5376291	53766.40
2000	5595.977	91206.00	5107.019	258.3713	-3.011000	5527742	54138.78

COMV9 = Projected demand for new pick-ups
STOCV8 = Projected stock of pick-ups
YMAS8 = Projected real gross domestic product (in Shs)
IMPR6 = Projected real import price index
INT6 = Projected real interest rate
URBAN6 = Projected urban population
ROAD6 = Projected road construction in Kms

Source; own computations.

Table 11 Actual and Projected Demand for New Passenger Cars and Pick

YEAR	CARS	CARS4	COMV	COMV9	MASS
1970	8063.000	NA	5445.000	NA	NA
1971	8676.000	NA	6042.000	4926.428	NA
1972	7054.000	NA	5288.000	4949.517	NA
1973	7836.000	NA	3067.000	4972.606	8453.913
1974	8581.000	10240.05	3528.000	4995.692	8483.132
1975	7622.000	9932.180	3878.000	5018.781	8512.351
1976	6923.000	9631.816	4156.000	5041.868	8900.569
1977	9813.000	9337.766	7354.000	5064.956	8929.788
1978	10591.00	9049.070	5717.000	5088.043	8959.007
1979	7123.000	8764.958	5979.000	5111.132	8629.225
1980	9179.000	8484.798	7545.000	5134.218	8658.443
1981	5513.000	8208.071	6808.000	5157.307	6414.662
1982	4545.000	7934.344	5447.000	5180.396	6443.881
1983	4995.000	7663.254	4415.000	5203.482	6473.100
1984	5448.000	7394.494	5187.000	5226.571	6502.318
1985	3917.000	7127.803	4652.000	5249.658	6531.537
1986	6321.000	6862.959	4751.000	5272.746	8833.755
1987	NA	6599.769	NA	5295.835	8862.975
1988	NA	6338.065	NA	5318.922	8892.192
1989	NA	6077.705	NA	5342.011	8921.410
1990	NA	5818.560	NA	5365.097	8950.629
1991	NA	5560.520	NA	5388.187	8979.848
1992	NA	5303.486	NA	5411.272	9009.066
1993	NA	5047.372	NA	5434.362	9038.285
1994	NA	4792.102	NA	5457.451	9067.504
1995	NA	4537.604	NA	5480.537	9096.722
1996	NA	4283.820	NA	5503.627	9125.940
1997	NA	4030.693	NA	5526.712	9155.160
1998	NA	3778.174	NA	5549.801	9184.378
1999	NA	3526.218	NA	5572.888	9213.596
2000	NA	3274.785	NA	5595.977	9242.815

CARS = demand for passenger new cars
CARS4 = Projected demand for new passenger cars using the second regression equation
COMV = Demand for new pick-ups
COMV9 = Projected demand for pick-ups
MASS = Projected demand for new passenger cars using the first regression equation

Source: (i) Central Bureau of Statistics
(ii) Own Computations

CHAPTER FIVE

SUMMARY AND POLICY IMPLICATIONS

5.1 Summary of The Study

The results of this study indicate that the demand for cars is determined by personal disposable income, the stock of cars, the prices of cars and government policy. All the variables, were found to be consistent with the theory. On the other hand, roads and urbanization were not statistically different from zero at the 5% level of significance.

The study also shows that real national income and stock of pick-ups are the major determinants of the demand for pick-ups. This confirms our earlier theoretical postulation that at any given income there is a corresponding stock of pick-ups that relates the level of the stock and the level of economic activity. Ipso facto the demand for new pick-ups will depend on the change in the economic activity and the previous stock level.

5.2 The Policy Implications of the Study

The regression results indicate that the dummy variable X1, was significant at 5% level. This variable was intended to capture the effect which the ban on importation of saloon cars had on their demand. It entered the relationship negatively implying that the ban had a negative impact on demand for passenger cars. This confirms the effectiveness of the government's qualitative controls on the demand for passenger

cars.

The findings of the study also show inconsistency in the government's fiscal policy and the government's objectives of the establishment of motor vehicle assembly plants. The objectives of the assembly plants and the motor vehicles industry in general can only be realized if there is sufficient demand. The low level of demand that exists has, however, been further stifled by high taxes on cars. The fact that price was highly significant in the regression equation shows that taxes have had negative impact on demand for cars. This is highly inconsistent with the government's objective of increasing production, employment and investment in the automobile industry.

The study also found that only the stock of pick-ups and real national income determine the demand for pick-ups. This suggests that a reduction of taxes on pick-ups and commercial vehicles in general has no impact on demand. The study therefore confirms our earlier theoretical postulation that at a given economic activity, once the desired stock has been met, reduction of interest rates or price can not induce additional demand.

On the basis of these findings, it is suggested that the demand for passenger cars should be managed by fiscal instruments - sales tax and qualitative controls (eg. import quotas). It is, however, recommended that commercial vehicles in general and pick-ups in particular can be used as a source of government revenue without affecting their demand significantly.

5.3 Limitations of The Study

There is no certain way of forecasting the demand for automobiles. The methods employed in estimating demand range from hunches to elaborate mathematical-statistical formulations. The method employed will depend on the availability and quality of data.

Like most attempts to unravel the myriad components of a complex process comprehensively, a great deal remains unknown. As it is, however, the present models discussed in the study encompass a range of determinants which, it is hoped, are useful in evaluating demand for automobiles in the present Kenyan context. Yet even more compelling is the fact that the dynamism of the model is undermined by the realization that each year, characterized by a different level of development, may exhibit specific features or the same features but with varying intensities.

The study, however, has several other limitations. For example, it has been assumed that the specified models hold for both the private and public sectors which may not necessarily be true. The reference makes for passenger cars and pick-ups may also not be perfectly representative since they constitute only a fraction of passenger cars and pick-ups bought in a year. The findings of this study is also limited by the data on which it is based. The data used for this study were most probably compiled for other purposes and limit their usefulness for demand analysis.

BIBLIOGRAPHY

Adams, F.G. (1964) "Consumer Attitudes, Buying plans and Purchases of Durable Goods; A Principal components, Time series Approach", "Review of Economics and Statistics, Vol. 46 No. 4.

Farrell, M.J. (1954) "The Demand for Motor Cars in the United States", Journal of the Royal Statistical Society, A Vol.117

Fisher, F.M., Griliches, Zvi and Kaysen C. (1962) "The cost of Automobile Model changes since 1949", The Journal of Political Economy, Vol. LXX

Gomez-Ibanez, J.A. and Harrison, D. Jnr. (1982) "Imports and the Future of United States Automobile Industry", American Economic Review, 1982

Grandall, R.W. and Eckans R.S. (1972) "The Demand for Automobiles. Senate Antitrust Subcommittee", Selected Readings, Contemporary issues in Economics. Little, Brown and Company (Inc.)

Gruenspectit, H.K. (1982) "Differentiated Regulation; The case of Auto Emissions Standards. American Economic Review (1982).

Houthakker, H.A. (1951) "The Effects of Rationing on Demand Elasticities", Review of Economic Studies 1951.

John-Davies, K.C. (1955) The Practice of Price Maintenance, with a particular Reference to the Motor Industry. London: Kiffen and Sons.

Kenya, Republic of, Economic Survey: Various Issues. Nairobi: Government Printer.

-------- Statistical Abstract, Various Issues. Nairobi: Government Printer.

Masai, S.W. (1986) "Approach to Promoting an efficient Transport vehicles Industry in Kenya", Discussion Paper, Industrial Research Project. Mimeo.

Maxcy, G. and Aubrey Silberston (1959) The Motor Industry. George Allen and Urwin Ltd.

Neisser, H. (1959) "The Pricing of Consumer's Durable," Econometrica Vol. 27.

Lindert, P.H. (1987) International Economics. Virender Kumar Arya. Delhi.

O'Herlihy, C.st. J (1965) "Demand for cars in Great Britain," Journal of the Royal Statistical Society Series C Vol.. 14.

Rhys, (1972) The Motor Industry. An Economic Survey, London, Butterworth and company publishers Ltd.

Shultz, H. (1965) The Theory and Measurement of Demand. Chicago and London, The University of Chicago Press.

Smith, P.E. (1962) "The Demand for Durable Goods: Permanent or Transitory Income?" Journal of Political Economy Vol. 70.

Stone, R. and Rowe, D.A. (1957) "The Market Demand for Durable Goods", Econometricia Vol. 25.

Suits, D. (1958) "The Demand for New Automobiles in the United States 1929 - 1956". Review of Economics and Statistics, Vol. 40.

The Economist (1964) "The Motor Trade - Resale Price Maintenance and After," October, 1964.

The Economist (1967) "The Motor Car Millenium", February 25.

United Nations (1969) "Establishment and Development of Automobile Industries in Developing Countries (Report and Proceedings of seminar held in Karlovy Vary, Czechoslovakia 24th February - 14th MArch 1969

Wykoff, F.C. (1973) (1973) "A User Costy Approach to New Automobile Purchases, "Review of Economic Studies, Vol. 40.

------, ---. (1970) "Capital Depreciation in the Post War Period: Automobiles," Review of Economics and Statistics Vol. 52.