THE QUARTERLY DEMAND FOR AUSTRALIAN IMPORTS

A simple quarterly econometric model of Australia to explain imports.

I certify that this thesis represents my own original work, that it contains no material which has already been published or otherwise used by me and that to the best of my knowledge, it contains no copy or paraphrase of material previously written by another person or authority, except where due acknowledgment is made.

R. M. B. Jessup

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PREFACE

The purpose of this thesis is to establish the significance of the factors that determine the volume of Australian imports.

An econometric model is constructed which is simple in form as it does not include price or income equations for the economy. All estimating equations are linear and all variables aggregates. Results are obtained by the simple single equation least squares method from 30 quarterly observations covering the period 1958/59 to the second quarter of 1965/66.

The relatively small number of observations is a limiting factor but they cover the end of a boom, a recession and a recovery of the economy. They also cover a number of periods when artificial limitations were imposed on the demand for imports. These were in the form of import licensing controls. Such a diversity of conditions is rarely found in the space of only 30 quarters. Although the number of periods is rather small for the purposes of statistical estimation the conclusions are based on data that covers a wide variety of circumstances. Therefore it will be unlikely that the results of the study will be biased through the prolonged existence of one set of economic conditions.

The final import function enables the conclusion to be reached that 96.4% of the variation in the total imports of goods and services in any quarter to be explained by the independent variables in the function.

Although the study does not aim specifically to forecast future levels of the volume of imports, the final import function allows predictions to be carried out on a limited scale. Such predictions are included in Chapter III.

The statistics used in the calculations are in general obtained from various publications of the Bureau of Census and Statistics. Specific sources for all data will be given in the text.

The study has been undertaken at the macro level. The difficulties which prevented a non aggregative approach are mentioned in Chaper II.

A general review of the results of studies already undertaken on similar topics has not been included. These studies relate to the economies of the United States, United Kingdom and Canada. As yet no published material exists on this subject for the Australian economy.

Finally I wish to acknowledge the assistance given to me by my supervisor, Professor G.G. Firth, and by other members of the Faculty of Commerce. I would also like to extend my appreciation to Dr. J.N. Baxter for the time he gave in writing many computer programs for me.

CONTENTS

CHAPTER ONE

Introduction

(i) Determinants of Imports

The degree to which a particular country depends upon international trade is reflected by the ratio of imports to G.N.P. (the import ratio).[1] In general terms the smaller this ratio becomes the greater the degree of economic independence.

The import ratio will, however, vary from country to country as the amount and type of product imported is closely related to the level of economic development that the country has attained. For example, an underdeveloped country that is predominantly rural, will export goods from this sector and import capital equipment and finished manufactured goods. This will result in a high import ratio due to G.N.P. being relatively small as compared to the level of imports. The opposite is the case of a highly industrialised country. Therefore, in general terms, the import ratio will fall as the level of economic development rises. Thus for each level of economic development attained by a particular country there will be a separate import-ratio. This being the case, a separate level of economic activity and associated levels of demand and imports will exist for each stage of development.

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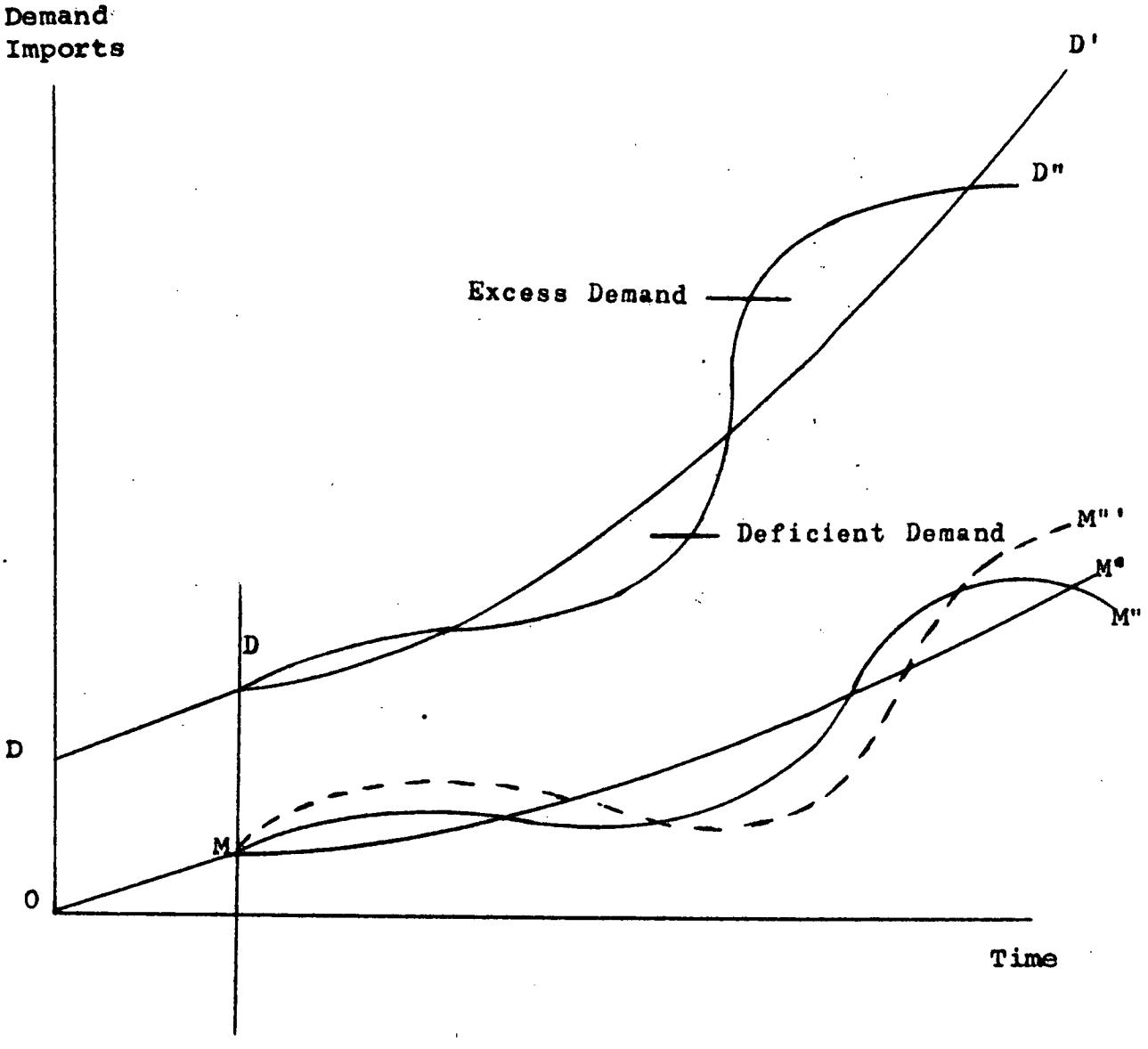
(1) The import ratio is discussed in:
Report of the Committee of Economic Enquiry, Commonwealth of Australia, 1965.

DIAGRAM I


Demand
Imports
D'
D"
Excess Demand
Deficient Demand
M"'
M*
M"
D
D
M
0
Time

If the level of economic development were held constant then the levels of demand and imports could be represented by the lines DD and MO in Diagram I constructed on a log scale so as to show the rate of growth. Thus for a particular country there is associated with each level of economic development an "actual" level of demand and an "actual" level of imports which in turn will maintain the required economic activity.

In reality the assumption of constant or stable economic development is unreal, it is therefore assumed that it increases with respect to time. Consequently the associated "actual" levels of demand and imports are depicted by the trend lines DD' and MM' in Diagram I. It will be noticed that as the level of economic development increases over time, thetrend lines DD' and MM' are diverging so that the import ratio is falling.

In reality the trend lines DD' and MM' will not be smooth curves, in fact a number of fluctuations will occur in the "actual" levels for a variety of reasons. Periods of excess and deficient demand will cause DD' to become DD" and therefore the associated level of imports to change from MM' to MM". The line MM"' depicts the level of imports after other factors that influence imports have been accounted for, the most important of which is relative price. (2)

If the price of an imported article is less than a similar good that has been domestically produced then assuming other factors (especially the substitution effect) to be constant, the imported article will be purchased in preference to the home produced one.

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(2) Relative price is the level of import prices relative to the level of domestic prices.

Thus for a particular economy there exists a number of factors that help determine the volume of imports of goods and services. On the one hand there is the "actual" level of imports that are associated with the "actual" level of demand. In addition to this, fluctuations in the "actual" level of demand, described here as excess or deficient demand, will cause fluctuations to occur in the "actual" level of imports. On the other hand, the different types of demand are not the only causal factors of imports. Relative prices directly influence the volume of imports in any one period.

Summarising, the hypothesis is that there are three determinants of imports namely, "actual" demand, excess demand and relative price. Each of these factors would be subject to a suitable time lag the size of which would depend on the structure of the economy.

To test this hypothesis, a simple quarter econometric model of the Australian economy will be constructed. Before doing so, however, a brief investigation of the Australian post-war economy will be made in order to establish whether in fact the above hypothesis can be "a priori" assumed and also to see if there are any special circumstances that may have influenced the determinants of imports in this period.

(ii) The Australian Post War Economy (3)

Since the end of World War II, the Australian economy has achieved outstanding development and expansion, with

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(3) A general discussion of which can be found in:
Karmel and Brunt, The Structure of the Australian Economy (Cheshire, Melbourne, 1962).
Report of the Committee of Economic Enquiry, Vol.1, Chapter 1, Commonwealth of Australia, 1965.

real gross national product growing at the rate of 4.5% p.a. (prices at 3.0% p.a.). This growth rate has been associated with the increasing proportion of expenditure on fixed capital equipment in G.N.P. (from 20% to 26%) and a population growth rate of 2.2% p.a., thus enabling productivity to grow at 2.3% p.a. Relative to its geographical size, Australia has a small population but the work force is highly mechanised with approximately 35% being engaged in manufacturing and 10% in primary production. With this relatively small percentage of the total civilian work force, primary production is responsible for 90% of Australian exports; total exports accounting for some 20% of National Income. The high percentage of primary products in total exports is explained by the fact that Australia has a very small population, but one which has a high average productivity especially in the rural sector. The small domestic market thus has a large surplus of primary products for export.

In any discussion on Australia's position in international trade, it must be remembered that exports of primary production are subject to both world price instability and domestic seasonal conditions - thus Australian export proceeds are subject to wide fluctuations. The specialization in rural exports, coupled with a high real income per head, has resulted in the majority of imports being manufacturers' materials (55% of total imports); 25% are of capital equipment while the remaining 20% are finished consumer goods. Australia's geographical position also adds to international trade difficulties. Situated long distances from principal export and import markets, there is considerably delay between the ordering and delivery of goods (this is discussed more fully on page 47.

The post-war expansion of the economy has been accompanied by high levels of demand and production both of which have helped to create serious balance of payments difficulties and inflationary tendencies. Full employment of the labour force, however, has been almost continuous throughout. Hence Australia's productive capacity has been very nearly fully attained for many years, therefore, any sharp or unexpected change in the level of demand has been reflected in both domestic production and imports. If, for example, the level of total demand increased sharply (e.g. as a result of an unexpected increase in export proceeds) then the level of production, because it is already at, or very near to, full capacity, could not raise the level of output to a complementary degree. To increase the productive capacity of the economy (in such a situation) is usually a long and difficult process and therefore to satisfy the new level of demand existing supplies were supplemented by increasing imports. The increase of domestic supply, when the economy was below full capacity became more difficult as the economy moved towards full capacity. As there was little scope for increased output (in the short run), stocks were run down, idle capacity eliminated and then an attempt made to enlarge the capacity. The creation of "bottlenecks" caused by the shortage of labour continually frustrated attempts to achieve higher output. Some industries may have had the facilities to increase output but lacked the necessary labour to do so.

The situations described above were not necessarily peculiar to the Australian economy. They also applied to those countries with a high growth rate and an almost continuous full employment of factors. They were, however,

sufficiently distinctive for the following discussion on Australian imports to be viewed in the light of the post-war expansion of the economy.

(iii) Australian Imports

The post-war Australian economy has been growing at the rate of 4.5% p.a. (see page 5) so that significant economic development has occurred. For instance, the industrial sector of the economy has been steadily growing in relation to other sectors while immigration has boosted the population growth rate. For this reason the level of economic activity has been continually changing, so much so, that a comparison of the economy of 1948/49 and that of 1965/66 would amplify the changes in its structure.

Hence the "actual" levels of demand associated with levels of economic development would also have been growing in a similar fashion. During this period, however, demand did not grow at a continuously steady rate as both excess and deficient demand occurred in significant proportions on a number of occasions, e.g. 1950/51 and 1960/61. (4) This being the case, it would be reasonable to conclude (without the benefit of empirical testing) that two of the three causal factors for importing are applicable to the post-war Australian economy.

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(4) Karmel, P.H., "Perspective March 1961", Economic Record, March 1961, pp.1-3.

Perkins, J.O.N., Anti Cyclical Policy in Australia 1960-64, (Melbourne University Press, Melbourne) 1965, p.5.

As previously mentioned, the post-war era has been constantly associated with different types of inflation, thus the domestic price index has been rising almost continuously. (5)

Overseas prices have also fluctuated but not necessarily to the same degree as the Australian prices, for this reason relative prices may play an important part in Australian international trade along with "actual" and excess demand.

Mention must be made of two special features connected with imports which exist at present or have existed in the Australian economy. Both of these features may be interrelated. Much has been written on the subject of import licensing controls. These controls were enforced with varying degrees of intensity from 1939 until their abolition in 1960. (6). This means that the effective demand for imports was suppressed during this period. The question of how to measure their effect is difficult but can be accomplished in one of two ways. On the one hand a dummy variable[(7)] can be introduced, taking the value of unity in the periods in which import licensing controls are in force, while in all other periods the variable assumes a value of zero.

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(5) Downing, R.I. "The Australian Economy, March 1956", Economic Record, May 1956, pp.2-3.

Arndt, H.W., "Emerging Independence of the Australian Economy", Economic Record, December 1957, p.299

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(6) Main contributions to the literature are by:

Department of Trade, History of Australia's Import Licensing Measures from December 1939, Canberra 1959

Mofatt, G. "The Australian Import Licensing System 1952-1960", Australian Economic Papers, Vol. 1, September 1962, pp.119-138.

(7) A discussion on the dummy variable can be found on p. .

On the other hand the strength of such controls could be measured by export proceeds. (8) This relies on the assumption that the government varies the severity of the licensing controls in relation to the balance of payments situation. The balance of payments figure itself, however, would not be an entirely satisfactory measure as it would be affected by the licensing. Seeing that exports are not subject to government control and are the other "half" of the balance of payments, it would be reasonable to assume that export proceeds of the previous period would provide an indication to the government of the expected level of overseas reserves. Thus the government could alter its import policy to vary the effective demand for imports and in this way maintain an acceptable level of overseas reserves.

The other special feature pertains to shipping. Australia provides a relatively small market for external economies and it is a considerable distance from the world's main trade routes. Consequently Australian imports may not be shipped immediately after they have been ordered. Possibly they are retained until shipping is available and is needed for the movement of Australian exports. In other words, there may be a delay in the delivery of imports because of the fact that exports are not ready to be shipped overseas at that time. Hence imports may again be related to exports through the availability of shipping.

It follows that there will be a time lag between the actual demand for, and the delivery of, the imported goods. The extent of this lag will be determined by the time taken in ordering, acquiring shipping space and the length of the sea voyage itself. If the time lag is too great, then

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(8) Kmenta, J., "An Econometric Model of Australia, 1948-61", Australian Economic Papers, Vol. 5, December 1966, pp.138-9.

it would be reasonable to assume that demand in the majority of cases would be satisfied by a home produced substitute. To test the hypothesis that the causal factors of imports are relevant in the Australian economy they must either be quantifiable in themselves or represented by a measurable value. It is assumed that "actual" demand is the total flow of final goods and services in a given period (National Turnover of goods and services as defined in the Australian National Accounts). For the purposes of this discussion "actual" demand will be divided into two components, aggregate demand and the demand for exports. The reason for the division is the "a priori" assumption that the latter type of demand has a separate and distinct influence in the determination of imports. Exports have already been mentioned but a detailed discussion on this topic is presented on p. 30. It is sufficient for the present to know that "actual" demand has been separated into two components. Hence there are three types of demand inherent in the causal factors of imports.

Aggregate demand will therefore be total demand (National Turnover of goods and services) less export proceeds which is Gross National Expenditure, the "total expenditure within a given period on final goods and services ... bought for use in the Australian economy". (9) Gross National expenditure will be valued at market prices so that direct comparisons can be made with imports of the current period. Valuation on this basis is consistent with the construction of the deflating price index. (See p 14).

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(9) Commonwealth Bureau of Census and Statistics, Australian National Accounts, "National Income and Expenditure 1948/49 to 1964/65", Canberra, 1965, P.3.

Perhaps the most difficult causal factor to represent in a measurable quantity is that of excess demand. An attempt was made along the lines suggested by Dicks-Mireaux and Dow, (10) but the finer adjustments proved too difficult in the Australian context. The measure finally adopted was the excess of registered vacancies over the registered unemployed divided by the former and expressed as an index. (11 This assumes that when vacancies in the economy exceed the number of the members of the work force seeking employment, then the economy is in a situation of excess demand, i.e. there are more vacancies than people to fill them and therefore we can expect "bottlenecks" to occur because of a shortage of labour. (See p. 6). The components of the relative price index, the import and domestic price indexes, are available but adjustments are required for the published data. (12) Now that all the causal factors for determining imports have been identified in the Australian economy (in an "a priori" sense) a simple quarterly model in the form of a total import function followed by a number of equations representing the Australian economy will be constructed to test the basic hypothesis.

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(10) Dow, J.C.R., L.A. Dicks-Mireaux, "The excess demand for labour. A study of conditions in Great Britain, 1945-56" Oxford Economic Papers, Vol. 10, 1958, pp.1-33.

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(11) Arndt, H.W., op. cit., pp. 292-302.
Karmel, R.H., op.cit., p.2.

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(12) A description of which can be found on p. 41.

The model is described as "simple" for a number of reasons. Firstly the model is not a complete estimation of the Australian economy - price and income sectors are treated as data. Secondly all estimating equations are linear and independent variable are not always the best in an economic sense in estimating the dependent variables. This is especially true in the equations estimating the different forms of investment expenditure where trend and timing variablesare used instead of expected sales and cost, uncertainty, and speculation variables. Finally, difficulties in the quarterly estimation of data prior to 1958/59 only allowed data after this date to be used in estimating equations. In these circumstances data refers specifically to the last decade and not to the post-war Australian economy. The previous discussion on the post-war economy does however apply to the period 1958/59 - 1965/66. This period witnessed a boom, a recession, a recovery as well as import licensing controls. A variety of conditions which will test the "a priori" assumptions on the determinants of the volume of imports.

CHAPTER TWO

A SIMPLE ECONOMETRIC MODEL TO EXPLAIN IMPORTS

(1) Introduction

"Econometric models can be designed to serve any or all of three purposes; to increase understanding of the structure and of the underlying characteristics of an economy, to aid in forecasting, and to help evaluation of policy measures." (1)

The model constructed below being based on 30 periods of quarterly data is short-run and dynamic (2) and is not primarily designed for the purposes of forecasting or evaluation. Because the structure of the Australian economy is changing, it would be unwise to use this short-run model for policy calculations or to forecast future possibilities when the model has been based on data relating to a past set of conditions. Relevant differences probably exist between the past and future structure of the economy. As the future structure has not been specifically accounted for, the model will be used to forecast for 2 periods only. Furthermore, the quarter-by-quarter changes may only be gradual.

Thus the main function in constructing this model is to analyse a particular aspect of the Australian economy, namely, imports of goods and services. The model is based on the hypothesis that variations in the demand for imports are explained by variations in aggregate demand, demand for exports, excess demand and import prices relative to domestic prices.

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(1) Nevile, J.W. "A Simple Econometric Model of the Australian Economy", Australian Economic Papers, Vol.1, September 1962, p.79.

(2) A short-run dynamic model is a model that shows the reactions of unknowns to changes in the data quarter-by-quarter in contrast to year-by-year.

Thus it is a macroeconometric model and as such depends on conventional macroeconomic theory.

All the estimating equations are of the following linear form,

$$y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \ldots + \alpha_{x\,n} X_{x\,n} + u$$

where y = endogenous variable

$X_1 \ldots X_n$ = lagged endogenous and exogenous explanatory variables

u = random disturbance.

The parameters are based on thirty observations, i.e. quarterly figures from 1958/59 to the second quarter 1965/66 inclusive. This is not as many as one would have liked, but reliable quarterly statistics for all of the variables employed in the model are available only from 1958/59.

(ii) Method of Deflation

The majority of the basic data used in the model are contained in the "Quarterly Estimates of National Income and Expenditure" No.22 and Supplement to No.22. The remaining data are to be found in the "Monthly Review of Business Statistics" from 1958 to 1966. These statistics are all valued at current prices, while the theory on which the model is built assumes constant prices, consequently an adjustment has to be made for price level changes. Three distinct methods were tested to convert current into real values. The first two were discarded in favour of the final method for reasons that will be given.

The first method was to deflate the current values of all value variables by an appropriate price index, e.g. personal consumption expenditure by the consumer price index and exports by the export price index.

In addition to the absence of corresponding price indexes for all value variables, another objection was registered, which will be explained.

The second method tested consisted of indexes interpolated from annual data obtained from the Australian National Accounts. (3)

By dividing the value of an aggregate, e.g. exports, expressed in average 1959/60 prices into the same aggregate expressed in current prices an index can be obtained for each year. Quarterly indexes are then found by interpolation. This method gives the average change per quarter for any one year and therefore is not a true reflection of price indexes on a quarterly basis.

For theoretical and practical preasons, the following method was the one finally adopted. All value variables were deflated by the same price index which is assumed to portray the changes in the general level of prices in the economy. The benefit of adopting a single deflating index for all value variables is that it avoids any distortion that different price indexes may introduce into a relationship between variables, as would be the case in the two previous methods of constructing a price index. (4) Having decided on the type of price index the next problem was to decide on what index should be used. Unfortunately there was no general index available, hence one was constructed along the lines suggested by Nevile in his econometric model of Australia. (5)

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(3) Commonwealth Bureau of Census and Statistics, Australian National Accounts, Table 11, "Value of Main Aggregates at Current and Average 1959/60 Prices $m.", Canberra 1966.

(4) This is adequately explained in Christ, C.F., "Aggregate Econometric Models", American Economic Review, Vol. 49, June 1956, pp. 395-397.

(5) Nevile, J.W., op. cit., p.81

Here use was made of "a composite index which is a weighted average of the consumer price index and the basic materials and foodstuffs wholesale price indexes." (6) The consumer price index was given a weight of two while the wholesale price index a weight of one.

As Nevile points out, the weights are somewhat arbitrary but the method assumes that the prices of approximately "one third of the goods making up gross national product move more in accordance with changes in wholesale prices than with changes in retail prices." (7) This index along with all other indexes used in the model has as a base the average of the four quarters of 1962/63 i.e. 1962/63 = 100.

Once all value variables have been deflated they are along with all other seasonally affected variables, de-seasonalised by the four-quarter moving average method. The seasonal indexes are based on the average of six years in the case of the first and second quarters, and seven years for the third and fourth quarters. Hence seasonal influences are assumed to be approximately the same each year. Personal expenditure on vehicles was an exception to this as the four quarters of 1961 were excluded from the calculation of the seasonal indexes. This was done so as to eliminate non-seasonal influences due to the fact that in the year 1961 expenditure on vehicles was reduced by specific measures of fiscal and monetary policy.

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(6) Nevile, J.W., op. cit., p. 81.

(7) Nevile, J.W., op. cit., p. 81.

For a discussion on the limitations of statistics de-seasonalised by this method see p.19.

(iii) Import Data

Consideration was given to three classifications of import statistics. The first, "Degree of Manufacture", contained in the "Monthly Review of Business Statistics", listed three groups, Producers' Materials, Finished Consumer Goods and Total Imports each of which was subdivided into crude, simply transformed, and elaborately transformed. This classification was rejected as the equations of the model could not be constructed to correspond to the sub-groups. Figures for "Imports into Australia" which were for individual imports were annual, and were therefore not suitable for the purpose of this model. These statistics can be found in the "Overseas Trade Bulletins" 1959-1966.

The classification finally chosen was "Imports of Merchandise, Economic Classes $m.f.o.b. Port of Shipment". (8) To allow a discussion of a micro based model, two adjustments have been made to the published classification so that each economic class corresponds to a portion of aggregate demand as estimated in the model. Producers' Materials for use in Motor Vehicle Assembly has been transferred to Capital Equipment - Complete Road Vehicles, while imports of Fuels and Lubricants, and Auxiliary Aids to Production have been included with Producers' Materials - Manufacturing Other.

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(8) Commonwealth Bureau of Census and Statistics, Monthly Review of Business Statistics, 1959 to 1966, Canberra, 1959 to 1966.

This means that Total Imports are divided into eleven economic classes. Another reason for choosing this classification was that some of the classes have corresponding import price indexes.

One major adjustment has been made to total imports and that is the conversion from a 'f.o.b.' to a 'c.i.f.' basis. This adjustment is limited to the total as a break-down of the factors involved is not available for the economic classes of imports. The purpose of the conversion from 'f.o.b.' to 'c.i.f.' is to enable comparison between imports and home produced goods, i.e. the actual cost of landing the imported goods in Australia as opposed to the price paid to the exporter. "Imports are recorded statistically in the month in which import entires are passed by the Department of Customs and Excise. Normally this is within a few days of discharge of cargoes." "All Import values are 'f.o.b.' port of shipment ...", this means that "... all charges in particular the cost of freight and insurance, incurred after the goods have been exported from the port of shipment are excluded". (9)

Consequently freight and insurance charges are added to imports 'f.o.b.'; but in order to arrive at the total cost of importing a particular good the amount of customs duty incurred must also be added. Thus the value of import 'f.o.b.' plus freight and insurance charges (from port of shipment to Australia) plus customs duty gives the value of imports 'c.i.f.'.

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(9) Commonwealth Bureau of Census and Statistics, Overseas Trade, 1965-66, No. 63, 1966, pp. iv. v.

The construction of the import price index on a 'c.i.f.' basis can be found on p. 41.

(iv) Seasonal Adjustment

"Relationships between economic variables are postulated by economic theory. Statistical analysis enables us to test whether the postulated relationship are consistent with the observed facts, and if so, to give empirical content to them." (10).

The 'a priori' assumption is that the volume of imports is determined by certain conditions that exist in the economy. The validity of this assumption will now be empirically tested and to do so, adjustments to the published data are required. The conversion of data from current into real terms has already been described. Data in real terms are then seasonally adjusted. A description of the method by which seasonal adjustments is achieved and its limitations are now examined. (11)

Quarterly data frequently exhibit strong seasonal movements which must be eliminated if comparisons between quarters are considered desirable. This operation is known as seasonal adjustment and is a "means of removing the effect of the estimated normal seasonal variation from statistical series".(12). De-seasonalisation does not remove irregular fluctuations or other types of influences (such as, cyclical and trend) in the series. Usually seasonal variation indexes are calculated over a small number of periods as the seasonal pattern can alter. The method used in this model is the four-

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(10) Karmel, P.H., Applied Statistics for Economists, Melbourne, 1957, p. 195.

(11) Seasonal adjustment only applies to data that is seasonally affected.

(12) Commonwealth Bureau of Census and Statistics, Seasonal Adjusted Indicators 1967, Canberra, 1967, p. viii.

quarter moving average method which assumes that the seasonal influences are reasonably constant, throughout the period covered. If in the short run a large change occurs (e.g. motor vehicle registrations in November and December 1960) then the moving average method is too inflexible to accurately measure the seasonal variation. To assist in overcoming this problem the quarters of a series which have been subjected to a large outside influence were eliminated from the series for the purpose of the construction of the seasonal indexes. A similar problem occurs at the turning points of some series where the limitations of this method of de-seasonalisation cause seasonal indexes to be incorrectly calculated. The moving averages are affected by the periods well before and after the change so that "they fail to get into the corners at peaks and troughs of the series". (13).

The final limitation is that the seasonal indexes only apply to the periods used in their calculation. If the indexes are applied to extensions of the relevant series then the assumption that seasonal influences are unchanged must apply. Other de-seasonalising methods such as the use of a dummy variable for each quarter, or the Census II method (used by the Commonwealth Statistician) were considered but not adopted.

The real de-seasonalised data are now used for the calculation by the method of simple linear least squares regression of the structural parameters of the estimating equations.

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(13) Seasonal Adjusted Indicators 1967, op. cit. p. XVlll.

(v) Statistical Procedures

(a) Regression and Correlation

The regression equation estimates a dependent variable (Y) from independent variables (X_1, X_2 ..... X_n), i.e. the regression equation of Y on X_1, X_2, ... X_n which in its simplest form for two independent variables is

$$Y = \alpha_{10} + \alpha_{11} X_1 + \alpha_{12} X_2$$

where α_{10}, α_{11} and α_{12} are constants, being the structural parameters. Sometimes it is neceesary to measure the correlation that exists between the dependent variable (Y) and one particular independent variable (say X_1) thus the influence of the other independent variable or variables X_2 ..... X_n, must be removed i.e. held constant. This measure is called the partial correlation.coefficient ($r_{12.3}$) and it shows the relative importance of X_1 in explaining variations in Y. The strength of the relationship that exists between all the independent variables (three or more) and the dependent variable is known as the multiple correlation coefficient ($R_{1.23}$). The value of both $R_{1.23}$ and $r_{12.3}$ (and any other r) lies between 0 and 1. The closer they are to unity the better is the linear correlation between the variables. If the coefficient is zero then there is no linear relationship, but if the value is unity then perfect correlation exists. It must be remembered that a high correlation coefficient (either partial or multiple) "does not necessarily indicate a direct dependence of the variables." (14) In other words correlation does not necessarily imply causation.

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(14) Spiegel, M.R. Statistics, (Schaum, New York) 1961 p.244.

(b) Dummy Variable

Mention has already been made of the dummy variable (Z_t), however, their use as an econometric tool has not yet been explained. "They are used to represent temporal effects such as shifts in relations between wartime and peacetime years, between different seasons ..." (15). In this model the dummy variable is used as an independent variable to assist in explaining the effect on the volume of imports of the imposition of import licensing controls. (See p. 45.).

(c) Tests of Significance

Two tests of significance are used in all estimating equations. One of the assumptions on which linear least squares estimation is based is the serial independence of the random disturbance. The Durbin-Watson Statistic ('d') is used to test the null hypothesis of independence of disturbances against the alternative hypothesis that successive disturbances are positively correlated. The random disturbance (u) in the estimating equations includes all effects other than those which are explicitly included in the regression function. The value of 'd' will be given after each estimating equation. If this first test is successful the 't' distribution is used to test for the significance of each structural parameter (whether it is significantly different from zero) by taking the parameter of each independent variable (α) and the corresponding standard error (θ_α) and entering the normal table at 't' = α/θ_α . In the following equations is recorded in parantheses below α which will have a level of significance of 1% unless otherwise stated.

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(15) Johnston, J., Econometric Methods, (McGraw Hill, New York), 1963, p.221

(v) The Model

The hypothesis on which the model is based is that variations in the volume of imports are explained by variations in -

(a) "Actual" demand - aggregate demand
- demand for exports

(b) excess demand

and (c) relative prices - import prices relative to domestic prices,

all subject to suitable time lags.

Before constructing the model a brief discussion is included on the reasons for adopting the macro rather than the micro approach.

(a) The Micro Approach

As explained on Page 17 the classification of import statistics finally chosen were those divided into economic classes. This meant, theoretically, for each economic class a micro based estimating equation could be constructed. This being based on the assumption that the demand for each economic class would be determined by a number of different independent variables. (16) Once all the estimating equations for the economic classes were established they could be aggregated to form an estimating equation for the demand for total imports.

Basically the independent variables in the estimating equations for each economic class of imports would be variations of the three causal factors discussed in the introductory chapter and reiterated above. Thus for each economic class a corresponding demand variable, would have to be established to account for the "actual" import demand of that class.

(16) For example, the demand for imported finished consumer goods would be determined by independent variables different from those determining the demand for imported capital equipment

Similarly, independent variables for excess demand and relative prices would have to be established for each economic class. In addition to the three causal factors mentioned, each estimating equation would have to include independent variables to represent any artificial level placed on the demand of a specific economic class.

As a starting point the above approach was adopted. Attempts were made to establish micro based independent variables representing the hypothesis.

The aggregate demand section of "actual" demand for each economic class was represented in the estimating equations by the components of gross national expenditure. (17)

In this way it could be ' a priori' assumed that the first section of "actual" demand, aggregate demand could be successfully estimated.

The estimation on a micro basis of the remaining section of "actual" demand; the demand for exports, was unsuccessful. Sufficient breakdown of total exports into relevant micro components, in order that they be applied to the economic classes of imports could not be achieved. The main problem was the identification of export proceeds corresponding to particular economic classes of imports. This difficulty was maindly due to the difference in the nature of the goods exported and those imported.

As an alternative it could be assumed that total, rather than any one portion of export proceeds, determined the relevant section of "actual" demand for each economic class of import.

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(17) For example: Imports of finished consumer goods - food, had as an independent variable for aggregate demand, personal consumption expenditure on food; imports of producers materials for building and construction had investment in dwelling construction plus investment in other building and construction.

This assumption has some basis on purely economic grounds but it also results in each micro based estimating equation containing the macro variable total export proceeds. Including a macro variable in a micro equation is not acceptable in this model.

Similar difficulties were encountered when developing individual excess demand variables for each economic class of import. The method by which total excess demand in the economy is estimated is described in Chapter II, viii. It is sufficient to know that total excess demand has been estimated by means of labour excess demand; statistics being registered vacancies and registered unemployed. These two sets of statistics are available in specific classes, but difficulty is found in establishing relevance to each economic class of import.

When this same difficulty was confronted with export proceeds it was assumed that perhaps total exports determined portion of "actual" demand in each estimating equation. The equivalent assumption, that excess demand is similar in all sectors of the economy, is not realistic and is, therefore rejected.

The final independent variable, relative prices, is 'a prior' assumed to be one of the most important in a 'micro' based approach.

A number of problems were confronted with this variable and unfortunately they could not be solved with the available statistics. The first problem was that the majority of economic classes of imports did not have a corresponding import price index (See Page 18). Similarly, in some cases a domestic price index was also unavailable. Even if sufficient relevant import and domestic price indexes could be established to construct separate relative price indexes for each economic class, a further difficulty is encountered.

As explained in Chapter 2. ix, the relative price index, or more specifically the import price index component must be on a c.i.f. rather than on a f.o.b. basis. Published data of import price indexes are f.o.b., consequently relevant customs duty, freight and insurance charges must be added to these indexes. (18) The problem is, although customs duty could with some difficulty be identified with individual economic classes of imports, freight and insurance charges could only be obtained from the Bureau of Census and Statistics in the aggregated form. Unfortunately no successful or acceptable method for apportioning this aggregate over the different economic classes of imports could be found. As with the case of excess demand, it is unrealistic to assume that the relative price of all economic classes will be identical.

A considerable amount of time was spent attempting to solve the problems presented by this micro approach as theoretically, this method is considered to be the more acceptable of the two. The solutions to these difficulties although not completely acceptable could in some cases (19) be introduced into the estimating equation. However, the micro approach was finally abandoned when solutions to the problems of individual excess demand variables, import and relative price indexes could not be found or compromised. Once the micro approach was found to be impractical the macro approach to estimating a total import function was adopted.

(b) <u>The Macro Approach</u>

The macro model is based on the hypothesis that variations in the volume of imports are explained by variations in -

(a) "actual" demand being comprised of
  (i) aggregate demand, and
  (ii) the demand for exports.

(18) The method by which this is achieved on a macro basis is found on Page 41. The same method would apply for a micro approach.

(19) For example, Total Export proceeds.

(b) Excess demand, and

(c) Relative prices.

Construction

(i) A summary of the construction of the total import function.

(ii) Independent variables are developed to represent aggregate demand, the demand for exports, excess demand and relative prices.

(iii) A dummy variable is introduced to represent import licensing controls.

Development

The model is developed in a consistent manner. Once each independent variable has been estimated it is correlated and regressed with total imports. This has been done to enable the importance of each independent variable to be established. Further to this, the independent variables are correlated and regressed with total imports on a cum basis. For example, after the estimation of the components of aggregate demand, the total form is correlated with total imports. The equation is known as the Import Function Mark I. The results are discussed and evaluated. A similar procedure is adopted with the demand for exports. Following from this, the independent variable representing the demand for exports is added to the Import Function Mark I to form the Mark II Import Function. This enables "actual" demand to be evaluated as a determinant of total imports. This procedure is followed for all remaining independent variables. (20)

After the completion of Import Function Mark V, the independent variables that are not significant at the 1% level (by the 'd' statistic and 't' distribution tests) are eliminated from the function. The result is the final Import Function for the Australian Economy.

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(20) The excess demand variable is added to the Import Functio Mark II to form the Import Function Mark III. The Relative prices variable is added to form Mark IV and the Import Licensing Controls variable to form Mark V.

(c) Summary of Construction of Total Import Function

I. Aggregate demand.

$$M_t = -189.63 + .214D_{t-1} + u^1 \qquad (50.88) \quad (.013)$$

R	R^2	d.
.9552	.9124	.8193

II. "Actual" demand (aggregate demand plus demand for exports).

$$M_t = -93.97 + .131D_{t-1} + .392E_{t-4} + u^{II} \qquad (76.41) \quad (.045) \quad (.202)$$

R	R^2	d.
.9528	.9078	.8743

III. "Actual" demand and Excess demand

$$M_t = 69.60 + .099D_{t-1} + .381E_{t-4} + .411D^E_{t-1} + u^{III} \qquad (56.28) \quad (.029) \quad (.129) \quad (.070)$$

R	R^2	d.
.9818	.9639	1.9595

IV. "Actual" demand, Excess demand and Relative Prices.

$$M_t = 123.187 + .098D_{t-1} + .383E_{t-4} + .408D^E_{t-1} - .490R_{t-1} + u^{IV} \qquad (339.38) \quad (.013) \quad (.133) \quad (.074) \quad (3.077)$$

R	R^2	d.
.9819	.9641	2.0178

V "Actual" demand, Excess demand, Relative Prices and Import Licensing Controls.

$$M_t = -92.46 + .094D_{t-1} + .349E_{t-4} + .495D^E_{t-1} + 2.13R_{t-1} - 26.79Z_{t-1} + u^V \qquad (364.33) \quad (.031) \quad (.132) \quad (.084) \quad (3.52) \quad (18.81)$$

R	R^2	d.
.9835	.9673	1.9206

Where M_t = total imports

D_t = aggregate demand

E_t = exports demand

D^E_t = excess demand

R_t = relative prices

Z_t = a dummy variable representing import licensing controls.

(vi) Aggregate demand (D_t)

Aggregate demand is defined as the Gross National expenditure of the economy. As discussed in the opening chapter "actual demand" consists of aggregate demand and the demand for exports. This provides the base amount of imports for the Australian economy at a given level of economic development. Consequently the economic activity associated with the levels of aggregate demand would determine a very large proportion of the total imports of Australia.

To measure the relevance and importance of this independent variable, G.N.E. with varying time lags is correlated and regressed with total imports c.i.f. Both variables being deflated and de-seasonalised by the methods described earlier.

$$M_t = \underset{(50.88)}{-189.63} + \underset{(.013)}{.214D_{t-1}} + u^I \qquad R = .9552 \quad d = .8193$$

$$M_t = \underset{(70.13)}{-162.34} + \underset{(.018)}{.210D_{t-2}} + u \qquad r = .9186$$

$$M_t = \underset{(94.94)}{-148.53} + \underset{(.024)}{.210D_{t-3}} + u \qquad r = .8658$$

(21)

The lag giving the highest correlation coefficient is for one period. In fact as the lag increases the correlation coefficient progressively worsens. Consequently the estimating equation with D_t lagged one period is adopted. This suggests that any change in the "actual" demand for imports is satisfied within three months of the change that affects orders for imported goods and services.

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(21) All equations are constructed with the maximum number of periods that is allowed by the lag structure in the relevant equation. It may be noted that as a result, in some equations an independent variable, although correlated with the same dependent variable, will have a different correlation coefficient.

This equation will now be shown as the import function Mark I and means that 91.2% of the variations in imports c.i.f. are explained by this regression with D_{t-1}.

The value of 'd', .8193, is very low and indicates that rejection of the null hypothesis in favour of the alternative hypothesis of positive correlation is required. In other words, there are determinants of imports other than aggregate demand. From the introductory chapter it will be remembered it was 'a priori' assumed that aggregate demand plus exports ("actual" demand) was the causal factor for determining "actual" imports and not total imports.

A discussion on the other component of "actual" demand, the demand for exports, will therefore follow.

(vii) Exports

The demand for exports is represented in the model by the level of export proceeds. This is treated as an exogenous variable as the majority of Australian exports are disposed of in markets which are outside the control of the economy, e.g. wool. Apart from this fact, separation from aggregate demand is warranted on the grounds of different lag structure. In this section an analysis will be made of the way in which the demand for exports assists in determining the level of "actual imports, and this will be followed by a discussion on the size of the lag attributed to export proceeds.

In the Australian case, a high (or increased) level of overseas reserves resulting from sustained (or increased) export proceeds, provides excellent conditions for a rise in the demand for imports, depending of course on other factors such as import licensing controls and tariffs. Any general increase in economic activity initiated by an increase in export proceeds will increase the demand for imports in either or both of two ways.

On the one hand the export proceeds provide the overseas funds necessary to enable the new level of demand for imports to become effective. At the same time proceeds themselves stimulate increased levels of production and expenditure in the economy. If the level of economic activity changes then so does the volume of imports associated with it. Increased levels of production and expenditure will include; imported materials, which will be transformed into finished goods by the new level of domestic production; imported finished consumer goods to assist in satisfying the new level of expenditure, and imported capital equipment and stocks to enable the increased level of production to be sustained.

In these circumstances the demand for exports indirectly assists in determining the total demand for imports. Export proceeds do this by stimulating the level of economic activity and therefore the "actual" imports associated with it. There is no evidence to suggest that changes in the level of export proceeds directly change the volume of imports. This is due to the essential difference between the nature of the goods imported and the nature of the goods exported. Australian imports mainly constitute capital equipment and materials for use in the manufacture of domestic goods, while exports are predominantly from the rural sector and do not directly require imported materials or imported capital equipment. (22)

The process by which the demand for exports assists in the determination of the volume of imports is therefore indirect and time consuming. The influence exerted by the value of export proceeds in changing the level of economic activity may take many months. However, once the levels of

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(22) In the case of U.K. imports imported raw materials are used in the manufacture of exports. Thus the volume of U.K. exports are an important factor in determining the demand for U.K. imports.

production and expenditure have adjusted to the new level of activity the increased demand for imports will be satisfied in a similar manner to those determined by aggregate demand. The time that elapses from the original change in export proceeds until the satisfaction of demand for imports that it generates will be greater than that which follows changes in aggregate demand (D_{t-1}).

Any delay that is encountered in acquiring shipping space for imports as well as the departure date of the ships from a foreign port, may be linked with the demand for exports. Although there is a lack of evidence, it may be correct to assume that ships will time their arrival in Australia to correspond to export orders. This being so imports may be delayed in arriving in Australia. This type of delay plus the duration of the voyage would tend to generate a considerable lag between ordering and delivery dates of imports. This delay could also be expected to exist for imports determined by aggregate demand.

The most successful lag associated with the value of export proceeds is one of four periods where r = .9347 (23). It will be remembered that aggregate demand and the demand for exports have been 'a priori' assumed to be the causal factors of 'actual' imports. Aggregate demand has already been estimated in the Import function Mark I so by including in this function the value of export proceeds lagged four periods, the causal factor "actual demand" will be completely estimated. The Import Function Mark II becomes:

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(23) E_{t-2} returns an r = .7962

E_{t-3} returns an r = .8832

$$M_t = -93.97 + .131D_{t-1} + .392\,E_{t-4} + u^{II}$$
$$\qquad\quad (76.41) \qquad (.045) \qquad (.202)$$
$$R = .9528$$
$$d = .8742 \qquad (24)$$

The value of the 'd' statistic is similar to that achieved in the function Mark I. This result is to be expected as it was' a priori' assumed that aggregate demand (D_{t-1}) and the demand for exports (E_{t-4}) are not the only determinants of the volume of imports. (These two independent variables are assumed to account for "actual" imports).

Returning to Diagram I (p. 2) it will be remembered that the trend line DD' was not sufficient to explain all the causal factors of imports, only those of "actual" imports. For this reason the line DD" which was assumed to represent the fluctuations caused by periods of excess and deficient demand was introduced. The corresponding import line was MM". The Import Function Mark II will now be refined by adding the causal factor, excess demand.

(viii) Excess Demand

The interpretation and measurement of excess demand in the Australian economy is very difficult. Distinction will be made between two types, both of which can exist in the Australian environment either separately or jointly. Firstly, there is 'long run' excess demand, where demand for a particular article is continually satisfied from both domestic and foreign sources. Diagram II illustrates this concept.

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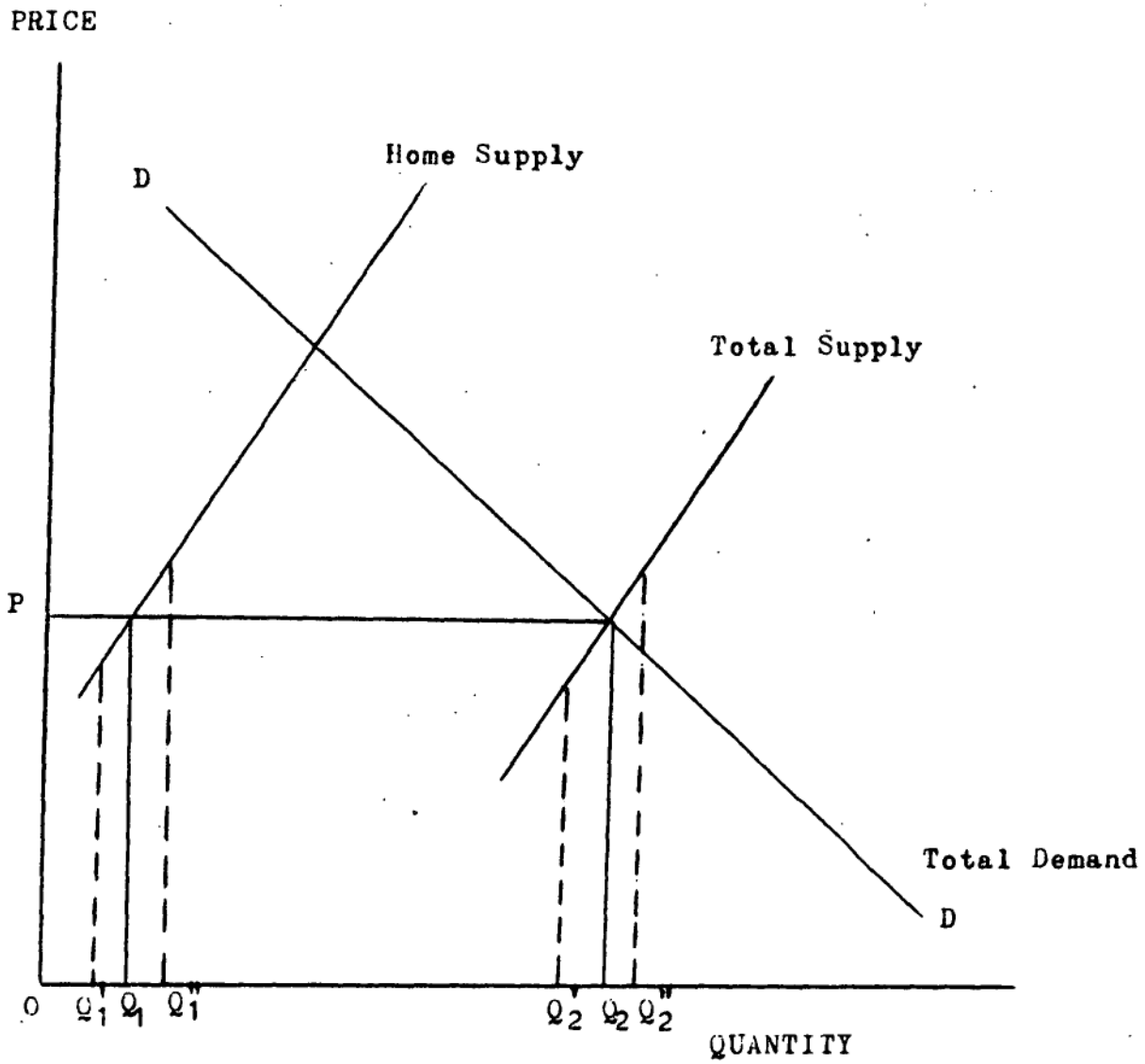
(24) R has decreased in value from the one achieved in Import Function Mark I as the partial correlation coefficient (r) of D_{t-1} is now .9449. In the Import Function Mark I the r of D_{t-1} was .9552. The fall could be due to the number of periods being decreased from 29 to 26.

DIAGRAM II


PRICE
Home Supply
D
Total Supply
P
Total Demand
D
0
Q_1' Q_1 Q_1''
Q_2 Q_2 Q_2''
QUANTITY

OQ_1 is the domestic supply at price OP.

OQ_2 is the total supply at price OP.

Hence Q_1Q_2 is the quantity imported at price OP.

As Q_1Q_2 is continually imported period after period this type of excess demand can be viewed as part of "actual" demand and therefore Q_1Q_2 will be a portion of "actual" imports. When the economy moves to another level of economic development Q_1Q_2 may change. In fact it may be the establishment of another plant to manufacture domestically the products represented by Q that causes the change in the industrial structure of the economy. This being the case the associated "actual" levels of demand and imports will change. The quantity supplied from overseas will, however, fluctuate with quarterly movements in aggregate demand and domestic supply. (25) These movements are represented in Diagram II with small changes around Q_2 and Q_1 (i.e. Q_2', Q_2'', Q_1', Q_1''). These are referred to as 'short-run' excess demand. The quantity of imports resulting from these movements (plus those determined by "actual" demand) are represented by MM" in Diagram I. (See p. 2). In most cases, therefore, both types of excess demand will be present together. 'Short-run' excess demand will exist separately when the source of supply is only occasionally in the overseas sector. This is illustrated when domestic production fails in the short run to provide sufficient supplies due to a sudden increase in demand or because of the short supply of essential raw materials.

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(25) Changes in domestic supply will result from breakdowns, strikes and temporary short supply of materials. In other words small fluctuations in domestic supply.

In this model no specific attempt will be made to measure the extent of 'long run' excess demand. It will be assumed that this type of excess demand is included in the independent variable "aggregate demand" and is therefore portion of "actual" demand at the current level of economic development. As the economy grows, some types of domestic production will be increased at a greater rate than aggregate demand. This may reduce the level of 'long run' excess demand. At the same time new 'long run' excess demand will occur as the demand for new products is created. Hence the assumption, that the net effect increases and decreases with fluctuations in "actual" demand and hence "actual" imports, is adopted.

The problem of how to measure 'short run' excess demand is now encountered. It has already been mentioned that the method adopted by Dow and Dicks-Mireaux was tested and rejected. Nevertheless a measurement of labour excess demand will be used to indicate the extent to which 'short run' excess demand is present in the economy. The reason for choosing labour excess demand is due to the low level of unemployment that has generally existed in the Australian post-war economy. This coupled with the high rate of growth of G.N.P. at factor cost (see p. 5), has lead to "bottlenecks" in domestic production when the economy has attempted to satisfy increases in aggregate demand and exports. Consequently on a number of occasions domestic production has fallen short of the level required to satisfy this new demand. Thus the burden of satisfying demand has been taken by overseas sources of supply.

Therefore there exists a situation where demand is greater than supply in both the product and factor markets

i.e.where aggregate demand (plus the demand for exports) is greater than total supply, and where registered vacancies (demand for labour) are greater than the registered unemployed. Although both markets may be in a similar situation, labour excess demand may not necessarily reflect the true extent of 'short run' excess demand. At best it can only give an indication of the economy's position or the direction in which it is moving. Labour excess demand therefore, does not give an absolute figure as to the extent of 'short run' excess demand but provides the information that it is either negative ('short run' deficient demand) or positive and whether it is increasing or decreasing in size.

Labour excess demand has been expressed in the following manner.

$$\frac{\text{Registered vacancies less Registered unemployed}}{\text{Registered Vacancies}}$$

i.e. the excess of vacancies over those seeking employment relative to registered vacancies. (26) Representing 'short run' excess demand by D^E_t, correlation with imports c.i.f. returns an r of .7134 when D^E_t is lagged one period. (27) Incorporating this result in the Import Function Mark II the Import Function Mark III is calculated and becomes:

$$M_t = \underset{(56.28)}{69.90} + \underset{(.029)}{.099}D_{t-1} + \underset{(.129)}{.381}E_{t-4} + \underset{(.070)}{.411}D^E_{t-1} + u^{III}$$

$$R = .9818$$

$$d = 1.9595 \text{ (1\% level)}$$

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(26) The data for this calculation has been de-seasonalised. The resulting index has been converted to a base of 1962/63 = 100.

(27) With lags greater than 3 months, r falls.

The 'd' statistic and all parameters are significant at the 1% level. With the introduction of the causal factor D_t^E the functions ability to explain variations in total imports has increased by 5.6% percentage points. (28). The results obtained by the Import Function Mark III state that the two types of demand, "actual" and excess, as defined in this model explain 96.39% of variations in the volume of imports. This result, along with the value of the 'd' statistic strongly indicates that there is very little chance of other independent variables existing which will significantly improve the function.

Despite this conclusion the fourth causal factor that was 'a priori' assumed to be relevant in theAustralian economy is introduced.

(ix) Relative Price

By accepting the assumption that imports are price elastic (29) and for the moment ignoring the substitution effect, changes in the level of both the import and domestic prices will play an important role in determining the volume of imports for any period.

The extent to which they do so will depend on the degree of price elasticity of demand for imports. (See Appendix I). A rise (or fall) in the level of domestic prices would, with the assumptions given above, be expected to increase (decrease) the volume of imports. While a rise (fall) in the level of import prices would result in a reduction (increase) in the volume of imports. Thus in any one period a movement in one of the price levels could reduce, offset or amplify changes in the other, consequently a combination of the two price levels is constructed.

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(28) The Import Function Mark II explained 90.78% i.e. $R^2 = .9078$, and
the Import Function Mark III explains 96.39% i.e. $R^2 = .9639$.

(29) Wherever the terms "elastic" or"inelastic" are used, they should be understood to mean, respectively, that the numerical value (negative) price elasticity is greater or less than unity.

This represents the net effect of the price level changes and is known as the relative price index. This type of index is applicable to the Australian economy as it is only on very rare occasions that either of the two price levels has remained constant on a quarter-to-quarter basis.

The relative price index R_t is defined as import price (P_t^M) relative to domestic price (P_t^D), thus $R_t = \frac{P_t^M}{P_t^D}$ where P_t^M and P_t^D are both price indexes. Before R_t is constructed and empirically tested, it is interesting to note the results of some studies undertaken with data from the United States economy. "Changes in import prices relative to the level of domestic prices have apparently exercised only a negligible influence on the volume of imports". "Imports are essentially price-inelastic - a change of relative prices of imports apparently having caused but minor changes in the opposite direction of the volume of imports." (30)

In a more recent study, however, R.J.Ball and K. Marwak conclude that apart from imports of foodstuffs and crude materials (which accounted for 50% of total merchandise imports), imports "are elastic with respect to relative price". (31) There would therefore seem to be a wide difference of opinion as to the nature of the price elasticity of (U.S.) imports, on the one hand imports are said to be inelastic, while on the other hand some writers contend that imports are price elastic. Ball and Mavwark state "the truth of the matter clearly lies between these two". (32).

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(30) Adler, J.H.,E.R.Schlesinger and E.van Westerborg, "The Pattern of United States Imports", Federal Reserve Bank of New York, 1952, p.40.

(31) Ball, R.J.and K. Mavwak, "U.S. Demand for Imports 1948-1958", The Review of Economics and Statistics, Vol.44, 1962, p.400.

(32) Ball, R.J., K. Mavwark, op. cit., p. 400.

Little has been written on this subject with respect to Australian imports but Cameron's article (33) does make some mention of relative price, but not of the size of the price elasticity of Australian imports. (34).

P_t^D is assumed to be the internal price index which has been used to deflate all current data, (see p. 14). The construction of P_t^M follows closely the adjustments made to the import data. It will be remembered that imports were first expressed on an f.o.b. basis and then converted to a c.i.f. basis (i.e. the addition to imports f.o.b. of customs duty, freight and insurance). In order to be consistent with the import data the import price index must also be expressed in c.i.f. terms. "The relationship between the quantity of imports and the import price is not a simple one". "Cost of buying imported goods is not the price quoted by the foreign sellers" (i.e. f.o.b.), "but the quoted price c.i.f. plus import duties". (35) The method of constructing the import price index c.i.f. is best explained by the diagram III. The relevant data can be found in Appendix IV.

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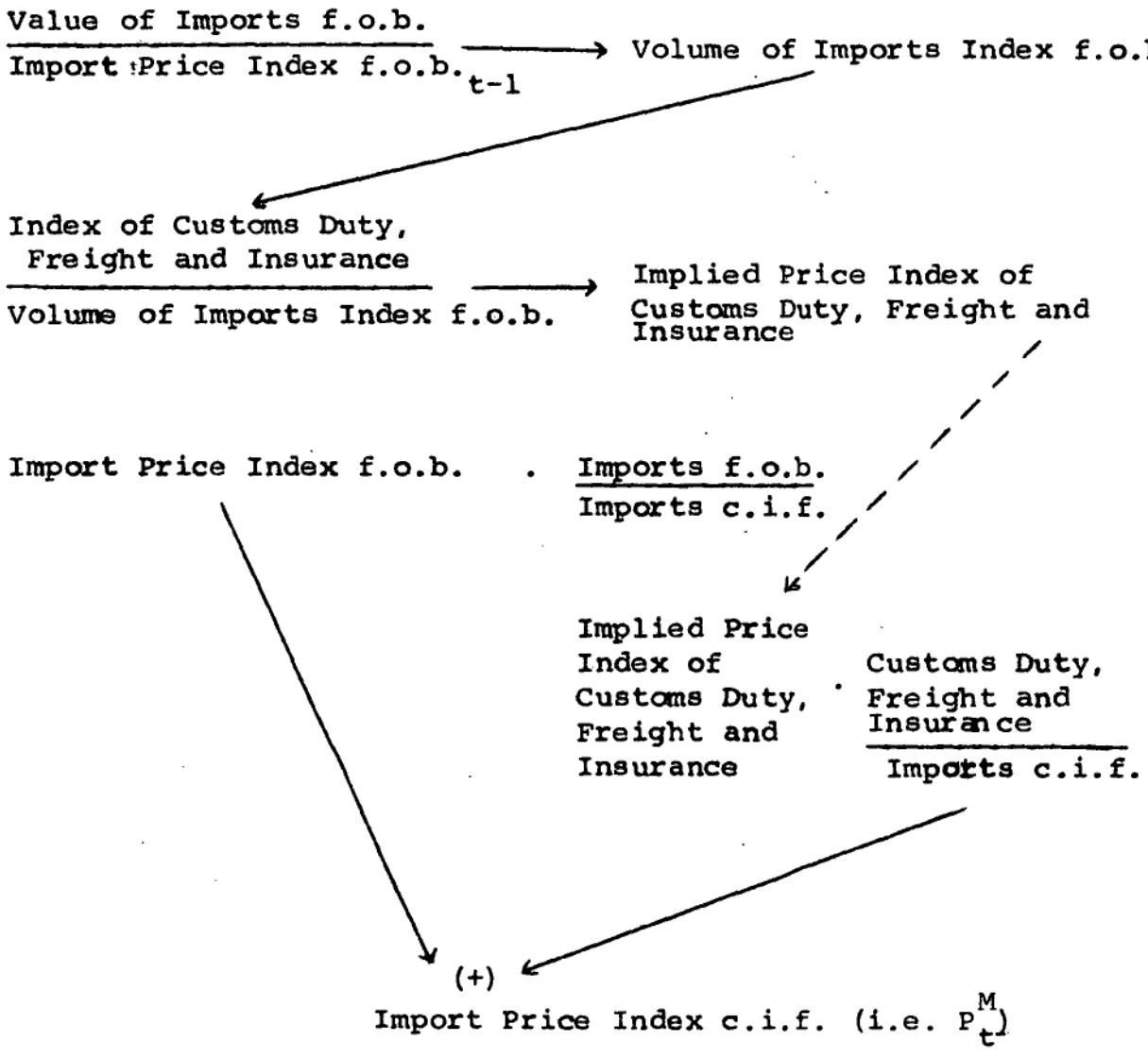
(33) Cameron, B. op. cit., p.47.

(34) Price elasticity measurements can be found in Appendix I.

(35) Chang, T.C., "British Demand for Imports in Interwar Period", Economic Journal, June 1946, p. 193.

Diagram III



This method of constructing the import price index c.i.f. is also used by B. Cameron in his publication Production, Employment and Prices in Australia 1958/59 to 1963/64.

Kemp also uses a similar method to the one adopted here by obtaining the import price series c.i.f. "from the f.o.b. series correcting for insurance and freight charges, import duties .... and wholesalers mark-ups." (36)

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(36) Kemp, M.C., The Demand for Canadian Imports 1926-55, University of Toronto Press, 1962, p.9.

The relative price index, as defined above, is constructed with a base of 1962/63 = 100, using the assumptions with which this section began, this index would be expected to have a negative structural parameter in the import function. (37)

The importance of movements in relative price cannot be discussed without briefly mentioning the effects of substitution.

"The demand for imports ... is influenced not only by the price of imports ... but also by the price of home-produced substitutes. If the latter increases, for example, it will tend to increase the demand for imports", the size of the increase depends on the extent of the price rise and the similarity of the two products, i.e. "on the size of the elasticity of substitution between them". (38).

The importance of substitutability is best explained by the following example. If the domestic price of an article falls then although there is a movement away from the imported article to the home produced substitute the increased demand for the latter will not be as great as the reduction in imports if the goods are not exactly substitutable. Thus if the imported and domestically produced articles are not identical, the amount to which the price falls and the extent of the substitution that follows are each related in a positive manner. Changes in relative price may also "lead to substitution between ... two foreign sources of supply," (39) rather than exclusively between domestic and foreign sources of supply.

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(37) This method of constructing the relative price index and the correction of the import price index is very similar to the method suggested by T.C. Chang in another of his articles, Chang, T.C.,"International Comparison of Demand for Imports", Review of Economic Studies, Vol.13. p. 63.

(38) Scott, M.F.C., A Study of United Kingdom Imports, Cambridge University Press, 1963, p.7.

(39) Adler, J.H., E.R. Schlesinger and E. Van Westerborg, op.cit., P.24.

Hence the volume of imports may not alter following a change in relative price as the substitution effect may counteract the latter, or at least minimize its impact.

Unfortunately the different effects caused by substitution on the volume of imports cannot be represented in this model as the relevant data is not available to allow for their specific inclusion or for adjustments to be carried out to other data.

Apart from the substitution effect, the effect on the volume of imports of changes in relative price will also be distorted by the imposition of tariffs and import controls. "Tariff changes represent only one particular form of change in the price of imports ... and their effects are likely to be the same as those of other price changes". (40). A detailed discussion on the effectiveness, extent and range of tariffs on dutiable imports can be found on pp. 53-54 of Adlers article. There have been a number of suggested methods by which tariffs can be incorporated into the import price index, but as has already been shown above, a simple method has been adopted in this model (see p.22). (41)

The only other major limitation with respect to relative prices is the imposition of import licensing controls; this topic is fully discussed on p.45 .

P^D and P^M with different time lags are correlated with imports c.i.f. to enable comparison of partial correlation coefficients. Since the highest partial correlation coefficients for both indexes are obtained with a lag of one period it is

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(40) Adler, J.H., E.R. Schlesinger and E. van Westerborg, op.cit. P.53.

(41) Other methods can be found in
Chang, T.C. "British Demand for Imports in Interwar Period", op.cit., p.201.
Chang, T.C. "International Comparison of Demand for Imports", op.cit., p.63.
Kemp, M.G., op.cit., p.60.

assumed that a smmilar lag will be the most effective for the relative price index. Empirical results are as follows:

For P^D

$$M_t = -1848.07 + 24.99P^D_{t-1} + u \qquad r = .8023$$
$$(359.03) \quad (3.58)$$

$$M_t = -1582.87 + 22.50P^D_{t-2} + u \qquad r = .6913$$
$$(460.52) \quad (4.61)$$

for P^M

$$M_t = -4154.85 + 47.87P^M_{t-1} + u \qquad r = .7330$$

$$M_t = -3935.54 + 45.80P^M_{t-2} + u \qquad r = .6621$$
$$(1020.72) \quad (10.16)$$

and for R

$$M_t = 4007.28 - 33.38R_{t-1} + u \qquad r = -.6967$$
$$(664.03) \quad (6.62)$$

$$M_t = 3475.16 - 27.98R_{t-2} + u \qquad r = -.5579$$
$$(820.67) \quad (8.16)$$

By including R_{t-1} in the Import Function Mark III we are able to construct the Import Function Mark IV which becomes:

$$M_t = 123.187 + .098D_{t-1} + .383E_{t-4} + .408D^E_{t-1} - .490R_{t-1}$$
$$(339.38) \quad (.031) \quad (.133) \quad (.074) \quad (3.077)$$
$$+ u^{IV}$$

$$R = .9819$$

$$d = 2.0178$$

Both the multiple correlation coefficient and the 'd' statistic have improved on the results of the Mark III function. All independent variable apart from R_{t-1} are significant at the 1% level. The relative price parameter, although negative is only significant at the 90% level. For the purposes of this model a 90% level of significance is not acceptable, however, R_{t-1} will remain in the function while a dummy variable is added to explain the affect of import licensing controls on the demand for imports.

(x) Import Licensing Controls

To account for the effect caused by the imposition of import licensing controls a dummy variable will be introduced into the model. It is not proposed to discuss the methods by which these controls were implemented, knowing that they existed and had some effect on the volume of imports is sufficient.

The reason that a dummy variable is required is that the controls were not enforced uniformly throughout the period covered by the data. In fact they apply to only four of the thirty quarters. Dummy variables are designed to account for situations similar to this. Despite the small number of periods an attempt must be made to account for their effect as "controls .... can reduce the effective demand for particular groups of imports by substantial amounts". (42) Apart from the direct reduction of the volume of imports, these controls also distort the influence that relative prices and other factors have on the demand for imports. In fact import licensing controls could completely distort the effects that independent variables have on the volume of imports.

In this model the dummy variable (Z_t) takes the value of unity in all periods when import licensing controls were enforced, and is zero in all other periods. Z_t has been lagged one period so as to enable the effect of changes in import licensing controls to be reflected in the volume of imports. The Import Function Mark V becomes -

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(42) Scott, M.F.G., op. cit., p.71

$$M_t = -92.46 + .094\ D_{t-1} + .349E_{t-4} + .495D^E_{t-1} + 2.13R_{t-1} - 26.79Z_{t-1} + u^V$$

(364.33) (031) (.132) (.094) (3.52) (18.81)

$R = .9835$

$d = 1.9206$

Again the multiple correlation coefficient has increased so that the Mark V function explains 96.7% of the variations in total imports. The 'd' statistic has fallen but still remains at the 1% level. The relative price index is significant at the 40% level but now has a positive parameter. Z_{t-1} is significant at the 20% level, probably because of the limited number of periods in which its value was unity.

All the causal factors that were 'a priori' assumed to determine the volume of Australian imports have now been accounted for. In addition an attempt to refine the function by introducing a dummy variable to explain import licensing controls has been made. However, acceptance of the Mark V function is rejected as it contains two independent variables that are not significant at an acceptable level. Hence in the construction of the final import function Z_{t-1} and R_{t-1} will be eliminated from the equation.

(xi) <u>The Total Import Function</u>

The hypothesis on which the model is based, that "actual" demand, excess demand and relative prices are the causal factors of the volume of Australian imports, can now be represented by the Import Function Mark V. The results obtained by this function indicate that the hypothesis should be rejected - in part.

The 'd' statistic is significant at the 1% level, consequently the significance of all exogenous variables can be tested at this level with reference to the 't' distribution. The independent variables R_{t-1} and Z_{t-1} are rejected as their parameters are not significantly different from zero at the 1% level.

For this reason it is concluded that the causal factors of the volume of Australian imports are "actual" demand (aggregate demand and the demand for exports) and excess demand (as defined in this model). This conclusion is represented by the Import Function Mark III.

$$M_t = \underset{(56.28)}{69.90} + \underset{(.029)}{.099}D_{t-1} + \underset{(.129)}{.381}E_{t-4} + \underset{(.070)}{.411}D^E_{t-1} + u^{III}$$

$$R = .9818$$

$$d = 1.9595$$

With the 'd' statistic and all independent variables significant at the 1% level, this function explains 96.4% of the variations in total imports. (43) As one would expect, "actual" demand (D_{t-1} and E_{t-4}) determines the largest portion of imports while short run excess demand (D^E_t) is only marginally involved.

The length of the lags as finally determined are consistent with expectations. Aggregate demand and short run excess demand are both lagged one period. This period which consists of ordering and voyage time will be known as the 'order lag'. An 'order lag' greater than three months would in many cases cause consumers to turn to home produced substitutes where they exist. This situation would be

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(43) R^2 the coefficient of determination = .9639.

amplified when short run excess demand is highly positive. It must be remembered that the four period lag of the demand for exports (E_{t-4}) is not the 'order lag' but is the time taken for this causal factor to exert its influence on the level of economic activity (as the demand for exports is portion of "actual" demand) and the satisfaction of the change in the volume of imports that the new level generates. Three months of the nine to twelve months constitutes the 'order lag' as is the case for D_{t-1} and D^E_{t-1}.

The macro import function has now been developed to the fullest extent. An attempt is now made to 'break down' the independent variables that are represented in the import function and consequently see as far as possible the determinants of imports.

Of the three independent variables, E_t and D^E_t are considered to be data. E_t because the majority of Australian exports are disposed of in markets which are outside the control of the economy. D^E_t, simply because of the method of construction of the excess demand index. The index is constructed from statistics of registered vacancies and registered unemployed. No attempt has been made to introduce functions to explain these two series of statistics.

The only remaining significant independent variable which can be further explained is D_t i.e. aggregate demand.

CHAPTER THREE

Aggregate Demand

Aggregate demand (D_t) is the most significant determinant of the volume of imports and also represents a large segment of the Australian economy, namely Gross National Expenditure.

The most important elements of aggregate demand should be determined so that aggregate demand can be discussed in more detail with respect to the volume of imports. Consequently a number of equations and one data have been constructed to represent G.N.E.

It is not the intention of this section to construct a complete model of the Australian economy but rather to explain the determinants of aggregate demand. Once this has been achieved, the estimated values of aggregate demand generated by the estimating equations for aggregate demand will be used as an independent variable in the total import function already constructed.

Aggregate demand is defined as follows:

$$D = C + I + I^S$$

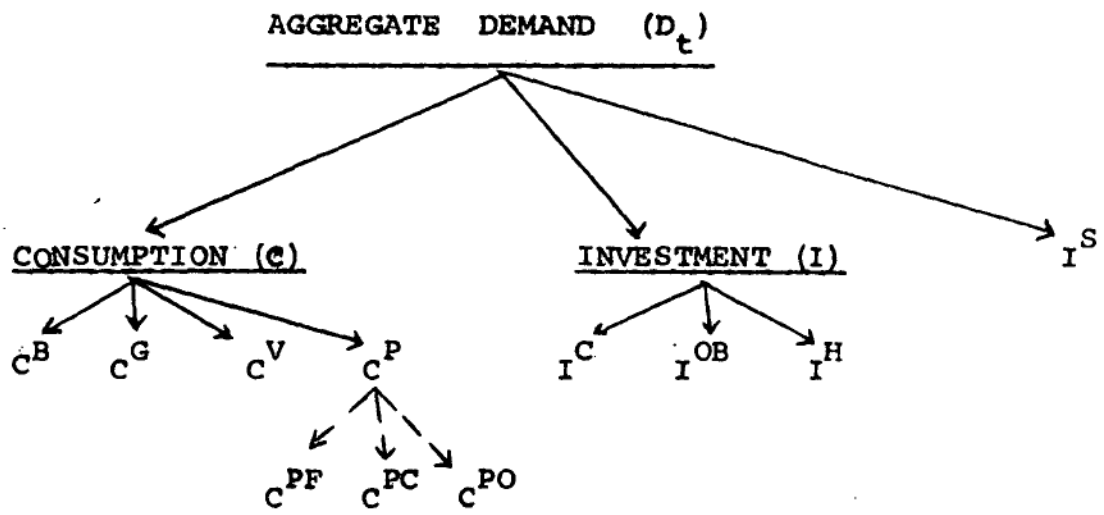
where D = gross national expenditure

C = net current expenditure on goods and services.

I = non stock gross fixed capital expenditure.

I^S = increases in the value of total stocks.

C + I account for approximately 98% of aggregate demand (C = 74%, I = 24%) and therefore, they require particular attention. To facilitate their estimation, C and I have been separated into distinct subdivisions, four for consumption, and three for investment, the following diagram illustrates:



where C^B = consumption expenditure on goods and services by business enterprises.

C^G = consumption expenditure on goods and services by public authorities.

C^V = personal consumption expenditure on vehicles.

C^P = personal consumption expenditure excluding vehicles.

C^{PF} = personal consumption expenditure on food, beverages and tobacco.

C^{PC} = personal consumption expenditure on clothing and accessories.

C^{PO} = personal consumption expenditure on 'other goods and services'.

I^C = non stock investment in fixed capital equipment.

I^{OB} = investment in other building and construction.

I^H = investment in dwelling construction.

I^S = investment in total stocks.

As can be seen above, C^P is sub-divided into C^{PC}, C^{PF} and C^{PO} the sum of which is not C^P, as additional items such as electricity, rent, postal and telephone services and fares are included in C^P. The remaining component of aggregate demand I^S will be discussed on Page 70.

(1) Summary of estimating equations for Australian economy.

Consumption

	R.	R^2.	d.
$C_t^P = 465.25 + .681X_{t-1}^D + u$	.9870	.9742	2.2704
(59.47) (.021)			
$C_t^V = 59.90 - 2.338T_{t-1} + .028_{t-1}^D + .534B_{t-1}^V + u_5$			
(41.03) (.710) (.011) (.157)			
	.9010	.8118	1.1266
$C_t^G = -31.26 + .510G_t + u_6$	.9763	.9532	.9753
(18.33) (.021)			
$C_t^B = .583 + .013 (Y-F)_{t-1} + u_7$	.9598	.9212	.9050
(2.77) (.0008)			

Investment

$I_t^H = -4.665 + .532H_{t-1} + .035X_{t-1}^D + u_8$			
(7.338) (.051) (.004)			
	.9855	.9712	1.5524
$I_t^C = -6.39 + .082\bar{Y}_t^{1.9} + .507I_{t-1}^A + u_9$			
(28.21) (.030) (.194)			
	.9713	.9434	1.9938
$I_t^{OB} = -51.33 + .049\bar{Y}_t^{1.9} + .049V_{t-1} + u_{10}$			
(27.01) (.005) (.020)			
	.9864	.9730	1.3800

Aggregate Demand

$$D_t = C_t^P + C_t^V + C_t^G + C_t^B + I_t^H + I_t^C + I_t^{OB} + I_t^S$$

(ii) Consumption

Introduction - The principal component of aggregate demand is consumption expenditure and this is therefore dealt with in detail. The aggregate consumption expenditure of the economy is represented in the Australian National Accounts by "Net current expenditure on goods and services". This is the total consumption expenditure of the household, government and business sectors of the economy, each of which is sufficiently unique in character and function to warrant a separate estimating equation. Quotations from the Australian National Accounts as to the composition of each type of consumption expenditure serve to illustrate their differing characteristics and consequently their dependence on different variables.

Personal consumption expenditure is defined as "net expenditure on goods and services for purposes of consumption by persons .... excludes purchase of dwellings ... but includes expenditure on motor vehicles and other durable goods ..." (1) Motor vehicle purchases, for the purposes of this model, have been separated from personal consumption expenditure to form the second consumption equation. The reason for this is the recent recognition of the use of sales tax on vehicles as a fiscal policy measure.

Public authority current expenditure includes "expenditure on wages, salaries and supplements, and on goods and services other than fixed assets and stocks .. all expenditure on defence is classified as current". (2)

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(1) Australian National Accounts, op.cit., p.73.

(2) Australian National Accounts, op.cit., p.73.

Consumption expenditure of financial enterprises includes that of "banks, instalment credit companies ... building societies, after deduction of bank charges to customers." (3)

The model will therefore have four separate current consumption variables, personal, (C^P), vehicle, (C^V), government, (C^G) and business, (C^B). Further explanation of all consumption equations including the three sub divisions of C^P is given below.

(a) Personal Consumption Function (C^P)

The Keynesian consumption function states that consumption is a stable function of income, i.e. the aggregated incomes of different sectors in the economy, e.g. businessmen and wage-earners from the farm, non-farm and government sectors. This hypothesis has been empirically tested many times with annual data from the U.S. economy, however, little attention has been given to the testing of quarterly data and consequently to the short run consumption function. Despite empirical studies, results are far from conclusive (Especially for the short run consumption function) and do not entirely support the Keynesian hypothesis. Ackley summarises for the U.S. studies where " .... current disposable income alone does not fully explain consumption spending in either the short run (e.g. by quarters) or in the medium run (i.e. by years) ..." (4). However, no acceptable alternative has yet been offered for either the U.S. or Australian economies. Thus the simple hypothesis, that consumption is related to income, will be employed in this study.

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(3) Australian National Accounts, op.cit., p.73.

(4) Ackley, G., Macroeconomic Theory, (Macmillan, New York) 1961, p.266.

Disposable income seems a more logical choice than gross income, as provision for personal income, estate and gift duty taxes are usually made prior to income being committed for consumption. In the majority of cases the wage-earners personal income tax is deducted from gross wages before payment while businessmen make provision for taxation in anticipation of their final tax settlement. Gift and estate duty taxes are in general also calculated and provided for in anticipation of their payment. Thus it would seem that consumption expenditure is more likely to be related to disposable income than gross income.

The next question to be answered is what type of disposable income should be used in an Australian short run consumption function. Arndt and Cameron (5) suggest real non-farm personal disposable income in preference to the frequently used (in U.S. studies) real total personal disposable income. They base this suggestion on results obtained from correlation between personal consumption expenditure and non-farm disposable income. The exclusion of real farm personal disposable income was primarily due to large fluctuations in farm income that were not reflected in consumption expenditure. Arndt and Cameron's justification of this exclusion was that the farm sector followed the consumption habits of the non-farm sector rather than farm income received. Thus if it is assumed as Kmenta does that "farmers tend to adapt their consumption to the level of consumption in the non farm sector", (6), then real non-farm personal disposable income could be used as the independent variable in the personal consumption function.

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(5) Arndt, H.W., B. Cameron, "An Australian Consumption Function", Economic Record, April 1957, p.108.

(6) Kmenta, J. op. cit., p.134.

This argument is not theoretically sound, consequently the more theoretically acceptable function of consumption being related to real personal disposable income is adopted, even though a higher correlation coefficient is registered when farm disposable income is omitted. (See results below). There is, however, a difference between studies based on this type of function and the one to be used in this model. Being a short run function and to be consistent with the model, (quarterly data) real personal disposable income has been lagged one period. In studies using annual data this lag does not exist.

The personal consumption function is therefore

$$C_t^P = \underset{(59.47)}{465.25} + \underset{(.021)}{.681}\ X_{t-1}^D + u_1$$

$R = .9870$

$d = 2.2704$ (absence of serial correlation at 1% level)

where X_t^D = real personal disposable income.

By lagging X^D two periods r = .9855. (7) If X^D is not lagged at all, r increases to .9874. By correlating C^P with real non-farm disposable income (X^{NFD}) the following result is obtained:

$$C_t^P = \underset{(64.71)}{463.84} + \underset{(.025)}{.802}\ X_{t-1}^{NFD} + u$$

$R = .9873$ (8)

By including real farm personal disposable income (X^{FD}) lagged two periods as an independent variable R increases to .9876.

$$C_t^P = \underset{(65.50)}{467.60} + \underset{(.028)}{.794}\ X_{t-1}^{NFD} + \underset{(.090)}{.065}\ X_{t-2}^{FD} + u$$

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(7) Where estimating equations have a single independent variable R and r are the same. In all following equations R is used with reference to the estimating equation and r with the independent variable.

(8) It is estimated that the average amount per quarter of personal income tax, plus estate and gift duty taxes, that relates to the non farm sector is 88.5% of total personal taxes. This is based on calculations made from data contained in the Taxation Statistics Bulletins and Australian National Accounts.

It will be noted that X^{FD}_{t-2} is only significant (by the 't' distribution test) at the 50% level giving weight to the conclusions drawn by Arndt and Cameron that fluctuations in X^{FD} are not reflected in C^P. It has already been concluded that the farm sector must be included so real total personal disposable income is accepted as the independent variable.

To establish separate demand variables (Refer Appendix II) C^P has been subdivided into C^{PF}, C^{PC} and C^{PO}. The results of regression and correlation of these variables with X^D_{t-1} are as follows:

$$C^{PF}_t = 343.55 + .177\ X^D_{t-1} + u_2 \qquad R = .9840$$
$$(17.16) \quad (.006) \qquad d = 1.6958$$

$$C^{PC}_t = 121.89 + .055\ X^D_{t-1} + u_3 \qquad R = .9707$$
$$(7.33) \quad (.003) \qquad d = 1.3340$$

$$C^{PO}_t = 73.60 + .271\ X^D_{t-1} + u_4 \qquad R = .9852$$
$$(25.21) \quad (.009) \qquad d = 1.7036$$

In all cases the value of 'd' indicates rejection of the null hypothesis at the one per cent level.

(b) Personal Vehicle Expenditure C^V

Personal expenditure on motor vehicles which "includes cars, station wagons, motor cycles and motor scooters bought on personal account" (9) accounts for approximately 5% of total personal consumption expenditure. Although this is a relatively small portion of the total the reason why this type of expenditure warrants a separate equation is that vehicle expenditure has an unique relationship with aggregate demand. Governmental attempts at control have singled out vehicle expenditure from other types of personal consumption expenditure.

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(9) Australian National Accounts, op.cit., p.80.

The use of sales tax on vehicles as a method of regulating the demand for vehicles and thereby assisting in the overall control of aggregate demand, has received greater recognition in the period covered by the data for this model than in previous periods. (10) The most notable example of this discriminatory measure being in November 1960 where vehicle sales tax reached 40%, however, the government stressed that it would only be a temporary increase, thus greatly adding to the impact it caused on sales of vehicles. Consequently an explanatory variable for sales tax is included in the estimating equation for personal vehicle expenditure, it is expressed as a percentage and is lagged one period. The lagging is not entirely due to any possible time lag between implementation and the effect on demand, but because in the majority of cases the alteration of vehicle sales tax has been made during and in particular towards the end of a quarter. This is borne out by tests that show a higher partial correlation coefficient for lagged rather than current sales tax.

Other variables that should be considered when estimating the personal demand for vehicles are income, availability of credit and relative prices i.e. vehicle prices relative to prices of other consumer durables. It could be argued that the first two are in fact complementary and therefore only one variable is required. For vehicle demand to be effective it must be backed by the ability to pay, either in cash or over a number of periods in the form of hire purchase. (11) Before credit facilities are available to a potential purchaser his ability to regularly pay instalments has to be shown, the most common way of which is his present, and to a lesser extent, future income.

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(10) See Perkins, J.O.N., op.cit., p.10.

(11) This term is used here in a very broad sense.

Therefore the inclusion of a single income variable is sufficient for both determinants. As in the case of the personal consumption function, and for the same reasons, this will be real total personal disposable income lagged one period. A number of variations of X^D were tested before X^D_{t-1} was adopted, because it was thought that on a priori grounds X^D would not be highly significant as such. One test included $X^D_{t-(1+2+3+4)}$ i.e. the total X^D of the preceding year; this was an attempt to include the influence of past income. X^D_{t-1} proved to be the most highly correlated and significant income variable of all those correlated with C^V_t. The estimating equation becomes:

$$C^V_t = \underset{(48.60)}{63.22} - \underset{(.841)}{2.30}\, T_{t-1} + \underset{(.011)}{.049}\, X^D_{t-1} + u$$

$$R = .8741$$

On the other hand, it can be argued that the influence of credit should be treated separately. The availability of vehicle credit and real total personal disposable income may not vary in accordance with each other. If, for example, the economy was developing towards boom conditions, X^D would be rising, however, under these circumstances the availability of vehicle credit would be progressively tightened. So that at the peak (or trough) of the business cycle the availability of credit and X^D are not complementary. A variable to represent the availability of vehicle credit for a particular period was difficult to estimate. The most successful was found to be vehicle instalment credit lagged one period (B^V_{t-1}). By including this variable in the equation above the estimating equation becomes:

$$C^V_t = \underset{(41.03)}{59.90} - \underset{(.710)}{2.338}\, T_{t-1} + \underset{(.011)}{.028}\, X^D_{t-1} + \underset{(.157)}{.534}\, B^V_{t-1} + u_5$$

$$R = .9010$$

$$d = 1.1266$$

The value of 'd' means that the test was inconclusive at the one percent level. This being the case v_5 may contain an independent variable not explicitly included in this equation. It also means that the validity of the independent variables cannot be discussed with reference to the 't' distribution significance test. However, as a matter of interest we refer to the 't' test where it will be noted that X^D_{t-1} is now significant at the 2% level rather than at the 1% level. It could be concluded from this that the X^D of only one quarter would, as already mentioned, not on 'a priori' grounds, have a great influence on the purchase of a vehicle. (X^D_{t-1} did, however, prove to be the best indication of income).

The remaining determinant to be considered is that of relative price (vehicle prices relative to other personal durables) which will be assumed to be represented by the sales tax variable. Apart from the fact that an index of vehicle prices does not exist, sales tax is one of the main components (and is at least subject to the greatest variation), of vehicle prices. Therefore it is assumed that changes in vehicle sales tax reflects movements in the relative price.

From the results obtained, especially that of 'd', this estimating equation is not very satisfactory. Other independent variables must exist that would assist in explaining personal consumption of vehicles.

(c) Government Consumption Expenditure (C^G)

Government consumption expenditure has been included in this model as a separate estimating equation because of the manner in which government expenditure on goods and services is determined.

Personal consumption expenditure, it will be remembered, is dependent on the income of the immediate past and not that of the future. Government consumption expenditure is, however, planned four quarters in advance on the estimates of receipts

that will be received in the ensuing year. This can be accomplished because the government knows with a reasonable amount of certainty that the anticipated income will be forthcoming. Modification of the estimates may have to be made during the year, but broadly speaking this type of expenditure is determined a year in advance. Therefore the main explanatory variable for government consumption expenditure is the estimated receipts for the coming year. Unfortunately these estimates (12) are annual figures. The testing of them on this basis (the same annual amount for each of the four quarters in any one year) gave low correlation, therefore the following adjustment was made.

The annual estimates of government receipts for any one year were apportioned over the four quarters of that year in relation to the average of the respective quarterly actual receipts received for the period 1958/59 to 1965/66. The portion for each quarter of the total receipts received in any one year proved to be very consistent so that little detail is lost in the adjustment. (13)

Due to this consistency no single variable has been included to account for mid period adjustments.

The estimating equation for government consumption expenditure becomes

$$C_t^G = -31.26 + .510\ G_t + u_6$$
$$\qquad\quad (18.33) \quad (.021)$$

$$R = .9763$$

$$d = .9753$$

where G = estimated quarterly government receipts.

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(12) Contained in the Budget Papers 1958 to 1965.

(13) Proportion of total for each quarter is as follows:

Quarter 1	- 18%	Quarter 3	- 25%
Quarter 2	- 20%	Quarter 4	- 37%

The low value of the 'd' statistic indicates rejection of the null hypothesis in favour of the alternative hypothesis of positive correlation. Therefore, although R is rather high there must exist one or more independent variables that assist in the determination of C_t^G. The most likely are timing or adjustment variables for mid period fluctuations and abnormal circumstances. These are not included here as no satisfactory variables could be established.

(d) Financial Enterprises Consumption Expenditure (C_t^B)

The final type of consumption expenditure to be considered is related to current purchases by financial enterprises. C^B has been separated from the other types of consumption expenditure because it is an unique type of consumption, i.e. it is carried out by the financial sector of the economy whereas those already considered are from the household and government sectors. Thus it is claimed that the independent variables associated with variations in C^B will be different from those affecting C^P, C^V or C^G.

As the expenditure is solely consumed by financial institutions the independent variable used in the estimating equation is real G.N.P. (Y) less real farm income (F) i.e. real non farm G.N.P.

$$C_t^B = \underset{(2.77)}{.583} + \underset{(.0008)}{.013}\ (Y-F)_{t-1} + u_7$$

$$R = .9598$$

$$d = .9050$$

The value of the 'd' statistic for this estimating equation indicates the alternative hypothesis of positive correlation is the correct one. The reasons for this would be similar to those suggested for C_t^G. The only other independent variable tested was gross operating surplus where the estimating equation returned an r of .9220.

The argument that C^B is not determined by the same independent variables as C^P was not borne out when C^P and C^B were aggregated. If it is assumed that $C^P + C^B = C^E$, then results are as follows:

$$C^E_t = 463.35 + .699\ X^D_{t-1} + u$$
$$\qquad\quad (60.92) \quad (.022)$$
$$R = .9870$$
$$d = 2.2617$$

This is an improvement on the results obtained from the estimating equations for C^P and C^B. The R for C^P when regressed and correlated with X^D_{t-1} is .9774. The most notable difference being in the value of the 'd' statistic; for C^P it is 2.2704 and for C^B, .9050. C^E has a 'd' statistic of 2.2617. The improvements in R and 'd' may be caused through aggregation as no evidence can be found to support the fact that C^B is directly related to X^D except that it represents a large portion of G.N.P. Despite the result obtained by using C^E, C^B and C^P will still be treated as separate dependent variables.

(iii) Investment.

Investment in Australia has usually been much more unstable than consumption expenditure, but because it represents approximately 24% of aggregate demand, its correct estimation is most important for the model. For the moment, investment in stocks will be excluded and non-stock investment will be divided into the three following divisions:

(a) Investment in housing (I^H),

(b) Investment in fixed capital equipment (I^C),

(c) Investment in other building and construction (I^{OB}).

As a basic principle the investment equations are simply constructed and do not attempt to explain the reasons for investment. Rather, relevant variables are used to predict the level of the different types of investment. This is similar to the strategy adopted in construction of the consumption functions where the influences of the propensity to consume were not included in the estimating equations. Thus the expected rates of profit, sales and costs, along with the elements of uncertainty and risk, are not included in the investment equations as such. Instead, the estimating equations for investment are based on the simple hypothesis that there is a long-term expectation variable accompanied with certain timing variables. These will be explained in detail for the relevant equations.

One fact which emerged from empirical testing was that the acceleration principle was not significant in the determination of any of the types of investment. This is contradictory to the results obtained by Smyth and Nevile. (14) However, the use of quarterly rather than annual data may contribute to this result. Smyth concluded that the fixed capital accelerator of the type suggested by Hicks (15) was about half the size of the inventory accelerator, (.34 to .15). On the other hand Nevile, with an accelerator using company income as a measure of profits, also obtained acceptable results. In tests for this model quarterly estimates of G.N.P. were used where the value of the acceleration coefficient was calculated to be .22 (for the change of G.N.P. in the previous two periods (t-1 = t-2) it was .16). This was only significant at the 40% level ('t' distribution) and was therefore rejected.

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(14) Smyth, D.N. "The Inventory and Fixed Capital Accelerators", Economic Record, August 1960, pp.414-18. Nevile, J.W., op.cit. pp.83-85.

(15) Hicks, J.R. A contribution to the Theory of the Trade Cycle, (Oxford University Press, Oxford), 1950.

Investment in housing (I^H) is a combination of private gross fixed capital expenditure in dwellings and public enterprise expenditure in houses and flats. Investment in 'other building and construction' (I^{OB}) is also a combination of expenditure by the private and public sectors. Investment in fixed capital equipment (I^C) is comprised of public enterprises expenditure and all other investment excluding that of stocks, I^H and I^{OB}.

(a) Investment in Housing (I^H)

In general 19% of the total non-stock investment is investment in housing (16) of which the largest share (usually in excess of 90%) is attributed to private investment in dwellings, e.g. public expenditure on houses and flats only accounted for 6.5% of I^H in 1960/61 and 8.2% in 1962/63. Thus the majority of I^H is determined in the private sector. Therefore "in the short run the demand for new housing, like the demand for other goods and services, depends on a complex of factors including incomes, rents, building costs, interest rates, and the availability of finance". (17) Rather than attempt to include each of these variables in the equation for housing investment reliance has been placed upon the independent variable "housing approvals" (H_t), after being lagged one period the correlation between I^H and H_{t-1} produces an $r = .9528$. It is felt that H_t aggregates the majority of the short run determinants for investment in housing as such items as the cost of construction and interest rates are assumed to have been taken into account prior to the plans for the dwelling being submitted for approval. By the time approval has been given,

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(16) The words "housing" and "dwelling" are used interchangably.

(17) Hall, A.R. and M.R. Hill, "Housing Demand in Australia 1959-74", Economic Record, December 1960, p.550.

Economic Papers, "Housing a Nation", Editor R.H. Scott, March, 1967.

tenders have been called for and let, and actual construction has begun; the lag of one period for H_t would seem to be the minimum amount of time that should be given to this independent variable.

In the long run, however, the demand for housing will be determined mainly by the demographic forces. In post-war Australia the population growth rate has been approximately 2.2% p.a. In an attempt to include this growth of population on a short run basis along with completion of dwelling units, a measure of the housing shortage (or surplus) existing in the economy in any one quarter was estimated. It was not an absolute measure as the figures for both the number of dwellings demolished or withdrawn from the stock of available dwellings and those unoccupied were not available for all periods. This variable proved insignificant in tests in the quarterly model. The main reason for this is that it is probably a long run rather than a short run measure. This conclusion is strengthened by the results obtained by Kmenta (18) in an annual model where a similar measure was found to be significant. Kmenta's model was based on data running from 1946/47 to 1960/61.

As the majority of investment in housing is carried out by the private sector special consideration was given to the availability of housing finance and to personal disposable income. The total level of savings banks deposits was tested in the estimating equation to represent the accumulated savings of households. This was done because it was thought that past savings represent a significant determinant of private dwelling construction. Such was indicated not to be the case as the partial correlation coefficient was very low.

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(18) Kmenta, J., op.cit. p.136

(19) Hill, M.R. Housing Finance in Australia 1945-1956 (Melbourne University Press, Melbourne), 1959, pp.81-93.

However, further testing of the total level of savings banks deposits was prompted by a suggestion put forward by M.R. Hill, (19) who felt that there was a close connection between savings banks and building societies. The series of 'loans approved for new housing' were then tested to represent a measure of both building society loans and those made by savings banks. After having tested these two variables it was concluded, as did Hill, that there is a great number of institutions that finance dwelling construction. Hill concludes that a measurement of the total finance made available by these institutions by any one variable is impracticable. For this reason it is assumed that X^D_{t-1} will represent the income and finance variable in the estimating equation for I^H. When correlated with I^H, X^D_{t-1} (personal disposable income) produces a partial correlation coefficient of .9004. This is higher than expected but it seems to be the only income variable that is significant at the 1% level ('t' distribution) and also be associated with the private sector. This result indicates that the factors underlying variations in I^H are similar to those underlying the variations in X^D (e.g. general growth of the economy).

The estimating equation for I^H becomes

$$I^H_t = -4.665 + .532\ H_{t-1} + .035\ X^D_{t-1} + u_8$$

$$(7.338) \quad (.051) \quad (.004)$$

$$R = .9855$$

$$\hat{q} = 1.5524 \quad (1\% \text{ level})$$

(b) Investment in Fixed Capital Equipment (I^C)

Expenditure on fixed capital equipment accounts for approximately 59% of the total non-stock investment in Australia. A number of theories has been tested with Australian data, the most notable being two by Nevile and Smyth. (20) Both of these were concerned with the

(20) Smyth, D.J. op.cit. pp.414-418.
Nevile, J.W. op.cit.,pp. 83-85.

acceleration principle which has already been discussed.

A different approach, adopted by Cameron, was based on a "smoothed path of gross national product at factor cost .... to explain the long term expectations". (21) He calculated that the average quarterly rate of increase from 1950-51 to 1963-64 was 1.6% (expressed in current terms). Cameron also considered a number of timing variables which included profits, bank advances and bank deposits. He finally chose bank advances and obtained a multiple correlation coefficient of .951 for his private non dwelling investment expenditure estimating equation.

Cameron's method was adopted for the construction of an estimating equation for I^C. A long term variable was chosen as it was assumed that investment in fixed capital equipment in the Australian economy is based on the fact that the growth rate of G.N.P. at factor cost is high, (See p. 5). This long term trend is however, influenced by the shorter run policies of the investors which are subject to the current availability of funds and the short run fluctuations of the economy. These timing variables are of particular importance because of this short run significance since the model in which this equation is included is also short run.

The trend expectation variable is similar to that used by Cameron. The variable used in this model is the average quarterly rate of increase of gross national product at factor cost expressed in current terms. When calculated from data covering the period 1958-59 to 1965-66 it results in a 1.9% average increase per quarter. Commencing at the 1st quarter 1958-59 the values are generated to the 2nd quarter 1965-66 to form the series.

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(21) Cameron, B., Production, Employment and Prices in Australia 1958-59 to 1963-64, (Cheshire, Melbourne), 1967, p.37.

A number of timing variables was tested, among them, major trading bank advances in various forms and gross operating surplus. The latter was assumed to represent the firms' own ability to finance investment in fixed capital equipment. All these independent variables eventually proved to be insignificant ('t' distribution) even though most of them had very high partial correlation coefficients. The most successful timing variable was actual investment in fixed capital equipment in the previous period. This probably means, as one would expect, that most investment projects are longer than one quarter. The final estimating equation for I^C becomes -

$$I^C_t = -6.39 + .082\ \bar{Y}^{1.9}_t + .507\ I^A_{t-1} * u_9$$

$$\qquad\qquad (28.21) \qquad (.030) \qquad\quad (.194)$$

$$R = .9713$$

$$d = 1.9938 \quad (1\% \text{ level})$$

where $\bar{Y}^{1.9}_t$ is a 1.9% average quarterly rate of increase in gross national product at factor cost in terms of current prices; and where I^A_t = real actual investment in fixed capital equipment. The parameters of both independent variables are significant at the 2% level.

(c) Investment in Other Building and Construction (I^{OB})

As the name implies, investment in 'other building and construction' refers to all non-stock investment not embraced by I^H and I^C, the two types of investment already covered. Of the total non-stock investment in the economy I^{OB} accounts, on the average, for 22%.

At first glance one would expect I^{OB} and I^H to be determined by similar independent variables, the main variable being on an 'a priori' basis, approvals for "other buildings".

When correlated with I^{OB} this independent variable returns a partial correlation coefficient of .9048 but only at a level of significance of 30%, which for the purposes of this model is not acceptable. There are two main reasons for this variable being insignificant, both of which are to be found in I^{OB} itself. The first reason is that I^{H} is mainly a private sector investment while that of I^{OB} belongs to the business and government sectors, consequently different reasons motivate I^{OB} and I^{H}. The second reason is that I^{OB} is not confined to the erection of buildings as is I^{H}. In fact "other construction" is not included in the approvals for "other buildings". Thus the insignificance of approvals of "other buildings" would seem to be correct.

Having established the differences between I^{H} and I^{OB} a comparison will now be made of I^{OB} and I^{C}. Primarily they are both of major importance in the business and government sectors. Consequently an estimating equation will be constructed for I^{OB} on similar lines to that of I^{C}. A test was carried out for an accelerator based on gross operating surplus (as performed for I^{C}) and this also proved to be insignificant. The trend variable introduced to explain expectations of the future growth of the economy is the same as that employed in the estimating equation for I^{C}; i.e. $\bar{Y}^{1.9}$. A number of timing variables was considered: gross operating surplus proved to be insignificant, but bank advances from the major trading banks lagged one period was significant at the 2% level ('t' distribution". This implies that "other building and construction" on the average is of a very high cost nature and therefore requires considerable financial backing from the major trading banks over a number of periods.

With V_{t-1} representing real major trading bank advances the estimating equation for I^{OB} is -

$$I_t^{OB} = -51.33 + .049\ \bar{Y}_t^{1.9} + .049\ V_{t-1} + u_{10}$$
$$(27.01) \quad (.005) \quad (.020)$$

$$R = .9864$$

$$d = 1.3800 \text{ (1\% level)}$$

When correlated with actual investment in "Other building and construction" lagged one period (along with $\bar{Y}_t^{1.9}$) $R = .9855$, but with $\bar{Y}_t^{1.9}$ being significant at the 1% level and actual investment in "other building and construction" at only the 10% level (by the 't' distribution).

This completes the estimation of the linear equations for aggregate demand excluding investment in stocks.

The problem of estimation of inventory investment in relation to this model will now be discussed.

(d) Investment in Stocks (I^S)

In spite of many attempts, the quarterly estimation of an inventory investment function has not been entirely successful. As yet there is a lack of published work on the construction of such a function for the Australian economy. Nevile constructed an annual function and in doing so remarked that .. "investment in non-farm stocks has proved the hardest to forecast of the major components of Australian gross national product." (22) Kmenta (23) also successfully constructs an annual inventory investment function. The problem of the quarterly function was confronted by Cameron who states that "the treatment of investment in stocks presents a number of problems ... the available quarterly statistics give no clear indication of the nature of the lags involved". (24)

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(22) Nevile, J. "Forecasting Inventory Investment", Economic Record, June, 1963, p.238

(23) Kmenta, J., op.cit. p.137

(24) Cameron, B., op.cit. p.39.

Cameron assumes that the time lag involved is 6 months, and applies this to Nevile's conclusion that investment in non-farm stocks is approximately one-third of the rise in production.

The inventory investment functions mentioned above refer to non-farm inventory. Investment in farm stocks is considered to be an exogenous variable because it is largely determined by influences alien to the controlling forces of the economy, e.g. weather conditions. It is also the result of fluctuations in export demand.

The annual functions constructed by Nevile and Kmenta were tested with quarterly data but without success. Cameron's function was also tested, the results confirming his statement that "the inventory function does seem unsatisfactory". (25) In an effort to try and estimate quarterly investment in stocks a number of other attempts were also made, the most successful being that based on the value of non-farm stocks at the end of the period. The quarterly estimation of investment in non-farm stocks is the difference between end of quarter values calculated from the equation estimating the total closing value of non-farm stocks. The equation is as follows:

$$S_t = -219.32 + 18.21 \frac{S_{t-1}}{Y_{t-1}} + .672 \bar{Y}_t^{1.9} - 1.127 D^E_{t-1} + u$$

$$\text{(} \qquad (3.045) \qquad (.026) \qquad (.398)$$

$$R = .9877$$

where S_t = real non-farm stocks at end of period t

Y_t = real gross national product at market prices

Thus $\frac{S_t}{Y_t}$ = ratio of non-farm stocks to G.N.P.

$\bar{Y}_t^{1.9}$ = A 1.9% average quarterly rate of increase in G.N.P. at factor cost in terms of current prices

D^E_t = index of excess demand.

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(25) Cameron, B., op.cit., p.157.

$\frac{S_t}{Y_t}$ implies that there is a certain ratio between the level of stocks and G.N.P. that the economy attempts to maintain. (26) $Y_t^{-1.9}$ is included so as to account for the trend rate of growth of the economy. Due to the negative coefficient, D_t^E is really excess supply in this equation. For a full discussion on the construction of D_t^E see p.33 .

S_t is calculated from data contained in the Taxation Reports. The level of closing stocks of the year ending June 30th, 1964 was extracted and to this were added the quarterly values for the increase in non-farm stocks as contained in the Quarterly Estimates of National Income and Expenditure. The figures for the years ending June 30th 1962 and 1961 were also extracted from the Taxation Reports and compared to those calculated by the method above. The difference in both cases was approximately 0.8% of the total closing level. This difference can probably be attributed to the continual revision of the figures for investment in non-farm stocks. Although the estimating equation has an R = .9877, changes in the estimated non-farm stocks ($S_t - S_{t-1}$) did not always produce an acceptable result, because the value of total stocks at the end of any quarter is in the region of $400m., while the quarter-to-quarter changes in this total range from $6m. to $190m. It follows that a 1% error in the estimation of S_t (i.e. a deviation of 1% of the estimated value from the actual figure) completely distorts the estimation of $S_t - S_{t-1}$. In some quarters the estimated value of S_t was 3% above the actual level while in the following quarter 3% below, thus giving a 6% error in the investment in non-farm stocks for that quarter. To avoid this kind of inconsistency, this function was not included in the model.

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(26) See J. Kmenta, op. cit, p.137

Although a satisfactory inventory investment function could not be constructed, investment in total stocks (farm and non-farm) must be included in the model. Apart from the fact that the estimation of total aggregate demand would be incomplete (investment in total stocks account for approximately 2% of G.N.E.), investment in stocks is related to the volume of imports. It would seem on an 'a priori' basis that if excess demand is to be of any real significance in the Australian economy, then a relationship must exist between imports and stocks. (27) Unfortunately no significant statistical relationship was established between the quarterly changes in the level of stocks and those in the volume of imports. Despite this fact, investment in stocks will be included in this model as a datum. Hence there is no necessity for the division of investment in stocks into their farm and non-farm components. There will, however, be one major adjustment to the published investment in stocks statistics and that is the elimination of stock appreciation. The method by which this is achieved is rather simple and is applied through the following relation which calculates the value of investment in stocks excluding stock appreciation.

$$\left(\frac{\text{Closing stock}}{\text{Closing price}} - \frac{\text{Opening stock}}{\text{Opening price}} \right) . \quad \text{Average Price.}$$

This relation was used by Cameron for the same purpose as

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(27) If, for example, aggregate demand increased to a level exceeding that of current domestic production, then one would expect a reduction in the level of stocks to occur. Following this disinvestment in stocks, imports of the commodity would be undertaken so as to satisfy the level of aggregate demand. This is assuming that domestic production has not increased sufficiently in the short run to compensate for the disparity between demand and domestic supply.

used here. (28)

The above could be expressed as follows:

$$\left(\frac{P_1 Q_1}{P_1} - \frac{P_o Q_o}{P_o} \cdot \frac{P_o + P_1}{2} \right)$$

if it is assumed that all stocks are valued in average prices (P_o and P_1). This is not, however, the case as some will be valued in end of year prices, others at lower cost or market and some in average prices. This simply means that the P_1's or P_o's in the above relationship are not the same. There is no way in which this problem can be overcome with the available statistics. Other limitations are contained in the stock figures themselves, those extracted from the Taxation Reports and the Quarterly Estimates of National Income and Expenditure. These figures are commonly believed to be suspect so that the final results obtained in this model for the total investment in stocks excluding stock appreciation cannot be relied upon entirely.

The price index that is used to value opening and closing stocks is the domestic price index that has been used on all previous occasions in this model. This has been done to preserve the consistency of the model and because there is no specific price index for the valuation of stocks. Closing and opening stock figures are calculated as previously explained in this section.

(iv) Estimated aggregate demand

By aggregating the estimated quarterly values generated by the estimating equations of aggregate demand and adding the data, total stock a series of figures representing estimated quarterly aggregate demand is constructed.

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(28) Cameron, B. op.cit., p.313.

Using this series of figures, rather than the series of actual figures, the total import function was re-estimated. The simple least squares method of estimation is used throughout.

The full set of estimating equations in the model is listed below. C^{PF}, C^{PC} and C^{PO} have been excluded as they are not required for the estimation of aggregate demand.

$$C_t^P = \underset{(59.47)}{465.25} + \underset{(.021)}{.681}\ X_{t-1}^D + u_1$$

$$C_t^V = \underset{(41.30)}{59.90} - \underset{(.710)}{2.338}\ T_{t-1} + \underset{(.011)}{.028}\ X_{t-1}^D + \underset{(.157)}{.534} B_{t-1}^V + u_5$$

$$C_t^G = \underset{(18.33)}{-31.26} + \underset{(.021)}{.510}\ G_t + u_6$$

$$C_t^B = \underset{(2.77)}{.583} + \underset{(.0008)}{.013}\ (Y-F)_{t-1} + u_7$$

$$I_t^H = \underset{(7.34)}{-4.67} + \underset{(.051)}{.532}\ H_{t-1} + \underset{(.004)}{.035}\ X_{t-1}^D + u_8$$

$$I_t^C = \underset{(28.21)}{-6.39} + \underset{(.030)}{.082}\ \bar{Y}_t^{1.9} + \underset{(.194)}{.507}\ I_{t-1}^A + u_9$$

$$I_t^{OB} = \underset{(27.01)}{-51.33} + \underset{(.005)}{.049}\ \bar{Y}_t^{1.9} + \underset{(.020)}{.049}\ V_{t-1} + u_{10}$$

Using $D_t = C_t^P + C_t^V + C_t^G + C_t^B + I_t^H + I_t^C + I_t^{OB} + I_t^S$

the estimated quarterly aggregate demand is constructed. The total import function becomes

$$M_t = \underset{(49.84)}{204.89} + \underset{(.021)}{.013} D_{t-1} + \underset{(.100)}{.740} E_{t-4} + \underset{(.082)}{.457} D_{t-1}^E + u$$

$R = .9743$

$d = 1.9558$ (1% level)

The most noteworthy feature is the small size and apparent insignificance of the parameter for D_{t-1} and the increase in size of the parameter for E_{t-4}. It will be remembered that the final import function using actual data rather than estimated aggregate demand is as follows.

$$M_t = \underset{(56.28)}{69.90} + \underset{(.029)}{.099}D_{t-1} + \underset{(.129)}{381}E_{t-4} + \underset{(.070)}{.411}D^E_{t-1} + u^{III}$$

with R = .9818

and d = 1.9595

By eliminating I^S from the estimation of aggregate demand, the components of 'actual demand' become non-stock aggregate demand and the demand for exports. When $(D-I^S)_{t-1}$ replaces D_{t-1}, remembering that $(D-I^S)_{t-1}$ is the aggregation of the values generated by the estimating equations for aggregate demand, the total import function becomes:

$$M_t = \underset{(53.22)}{107.35} + \underset{(.028)}{.079}\,(D-I^S)_{t-1} + \underset{(.123)}{.474}E_{t-4} + \underset{(.073)}{.502}D^E_{t-1} + u$$

with R = .9808

and d = 1.9408 (1% level).

The results obtained in this function are very similar to those obtained by the import function using actual data. This indicates that the estimating equations for the components of aggregate demand are quite acceptable. It also confirms the belief that the study is limited by including investment in stocks.

A summary of the results using the different estimations of aggregate demand in the total import functions are as follows:

	R	R^2	d.
(i) Using actual aggregate demand	.9818	.9639	1.9395
(ii) Using estimated aggregate demand	.9743	.9493	1.9558
	(D_{t-1} not significant)		
(iii) Using estimated non-stock aggregate demand	.9808	.9620	1.9408

(v) Prediction:

As a matter of interest the model will be used to predict the volume of imports for the 3rd and 4th quarter of 1965/66. Using the total import function

$$M_t = 69.90 + .099D_{t-1} + .381E_{t-4} + .411D^E_{t-1} + u^{III}$$
$$\quad (56.28) \quad (.029) \quad (.129) \quad (.070)$$

and using estimated values of aggregate demand (i.e. including I^S) and actual values of E_t and D^E_t (as they are exogneous), the results obtained are presented in the following table.

	Real De-seasonalised $m.		Difference	
Period	Actual Volume of Imports c.i.f.	Estimated Volume of Imports c.i.f.	in $m	% of Actual
3rd 65/66	797.38	797.00	-0.38	0.05
4th 65/66	747.94	786.16	+38.22	5.11

The results obtained for the 3rd quarter 1965/66 are very good. The estimated volume of imports for the 4th quarter moves in the same direction as the actual figure but the movement is not as great. With only two quarterly predictions, no definite conclusions can be made as to the ability of the import function to estimate future levels of imports.

CHAPTER 4

CONCLUSIONS

(i) The Total Import Function.

As already mentioned at the end of part two of Chapter 2 (p.47) the total import function is

$$M_t = \underset{(56.28)}{69.90} + \underset{(.029)}{.099}D_{t-1} + \underset{(.129)}{.381}E_{t-4} + \underset{(.070)}{.411}D^E_{t-1} + u^{III}$$

With the 'd' statistic and all independent variables significant at the 1% level, this function explains 96.4% of the variations in the volume of total imports. The function was developed around a hypothesis which in the period covered by the data was proved to be incorrect in one aspect (the elimination of relative price from the import function is discussed below).

Once the total import function was accepted the independent variables that constituted the function were further discussed in an attempt to find the ultimate determinants of imports. As E_t and D^E_t were exogneous variables only D_t was discussed. D_t was estimated by a number of estimating equations but again one variable (investment in stocks, I^S) was treated as a data. Consequently in a macro sense the total import function has been estimated fully.

The reasons and explanations for the inclusion of the indepent variables in the total import function have already been discussed, however, the reasons for eliminating R_{t-1} and Z_{t-1} have yet to be expanded.

(ii) Relative Price

There is a number of factors that may have led to the rejection of R_{t-1} from the import function. R_t has two components, P_t^D and P_t^M, both of which either separately or jointly could be responsible for the low significance of the relative price parameter.

P_{t-1}^D may not reflect the true level of prices in the home economy. The construction of P_{t-1}^D (see p.15) was based on certain assumptions as to the composition of goods in the economy and these assumptions may not fit the facts of the case.

Fluctuations in R_{t-1} are mainly caused by fluctuations in P_{t-1}^D as P_{t-1}^M has remained relatively constant over the entire period covered by the data. However, movements in P_{t-1}^D and D_{t-1}^E are likely to be similar, especially in periods of positive 'short-run' excess demand. It was mentioned that 'short-run' excess demand exists concurrently in both the factor and commodity markets. Hence 'short-run' excess demand could be reflected in increased costs and prices, i.e. in P_{t-1}^D. It is difficult to determine in this model whether movements in P_{t-1}^D and D_{t-1}^E are similar or whether movements in one results in movements in the other as D_{t-1}^E has been de-seasonalised and appears as a 'smoothed index' while P_{t-1}^D fluctuates.

Changes in the level of P_{t-1}^M, even though relatively minor compared to those of P_{t-1}^D, may only cause the source and not the volume of imports to change. Imports may be elastic (> 1) towards P_{t-1}^M but in such a way that the demand and thus the volume of imports remain unchanged. Fluctuations in P_{t-1}^M may cause importers to change the source of their supply from one foreign market to another but may not cause them to increase or decrease the physical volume of imports.

Further tests to establish the influence of P^{M}_{t-1} on imports were carried out by expressing each economic class of imports as a percentage of total imports for each of the 30 periods covered by the data. (See Appendix III). The purpose of this exercise was to establish whether fluctuations in P^{M}_{t-1} coincided with any marked change in the composition of imports. The only significant fact to emerge was that over the 30 periods, M^{P} increased from approximately 14% of the total to 18%, while M^{MLA} fell from approximately 38% to 34% (the latter being mainly due to a decrease, as a percentage of total imports, in the imports of fuel and lubricants). No pattern could be established between this change in composition and fluctuations in P^{M}_{t-1}.

The effect of relative price changes on the demand for imports may also be distorted by the elasticity of substitution. It has already been stated that the major cause of fluctuations in the relative price index (R_{t-1}) is the domestic price index (P^{D}_{t-1}). Thus if P^{D}_{t-1} increases and the home produced substitute, whose price it is that has increased, is not very similar to the imported article then changes in R_{t-1} would have little influence on the demand and therefore volume of imports. A study was not undertaken to establish the extent of substitutability between imported and home produced articles so that the effect and extent of similar situations to the one described above is unknown.

Although these results show that imports are not influenced by relative price there exists a number of important qualifications which make these results inconclusive.

(iii) Import Licensing Controls

The dummy variable Z_{t-1} (introduced to explain the effect of import licensing controls) was excluded from the final import function as it was only significant at the 20% level. The reason for the limited significance is that import licensing controls were only in force for the first four periods of the data used in the final import function, thus giving the dummy variable little opportunity to become fully effective.

A test to establish the significance of such a variable over a larger number of periods was carried out in the form of an annual function from 1948/49 to 1965/66. In this case the dummy variable proved to be significant at the 1% level.

(iv) Limitations

The results obtained by this study (an import function with R = .9818 and d = 1.9595) compare very favourably with results of other import functions constructed with Australian data. These functions, however, are not the subject of specific study but are contained in models of the Australian economy. Cameron's import function has an R = .9743 (1) while Kmenta in his annual model has an R = .9424 and d = 1.585 (1% level). (2)

Despite these results the model contains a number of limitations.

The first concerns the length of the period covered by the data involving thirty observations. This is not really sufficient for statistical purposes but as has already been mentioned, the data cover a wide variety of economic conditions. A longer series of data would have allowed an even greater variety of conditions to be included.

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(1) Cameron, B., op. cit., p.45.

(2) Kmenta, J., op.cit., p.144.

The second limitation involves the approach adopted in constructing the model which is macro-orientated. A micro-oriented study may have produced better results, that is a study of the sector and sub-sector levels of the economy as opposed to the macro level. This type of approach would result in an import function for each of the economic classes of imports. In this way the causal factors for total imports could be viewed in a more detailed manner. Unfortunately this approach was impossible due to the absence or limited availability of the relevant statistics.

All estimating equations were constructed in the linear form by the simple least squares method. Tests to establish whether or not other forms of estimating equations were better suited in estimating the endogenous variables were not attempted. Two stage least squares was not used as the purpose of the thesis was to establish the significance of the causal factors and not to predict or estimate future levels of the volume of imports. Consequently the final import function was constructed with actual data and therefore did not require estimation by the two stage method.

A number of limitations exist in the estimation of aggregate demand. Investment in stocks (I^{SC}) is the main component involved. The accuracy of data for this variable has already been discussed. However, the most serious limitation it imposes is the fact that an acceptable estimating equation for I^{S} could not be constructed.

The equation estimating personal consumption of vehicles (C^{V}) resulted in an inconclusive 'd' statistic test. It therefore requires further refinement to be completely acceptable.

Relative price has already been discussed with reference to limitations in its construction and insignificance in the import function.

These limitations are not considered to seriously affect the results obtained, although they must restrict to some degree the interpretation placed on the conclusions

(v) Further Study

There is need for further work and study on the topic of Australian imports because of the limitations mentioned above.

The areas that require particular attention are relative price, investment in stocks and vehicle expenditure. The effects of substitution must be evaluated before conclusive results can be established about the significance of relative price.

The estimation of import functions for each of the economic class of imports is essential to establish the exact relevance and importance of the causal factors. The three causal factors established by the model as being significant in the determination of the volume of total imports may not always be significant in determining the volume of imports of individual classes. Hence a more accurate conclusion could be reached about the importance of the way in which each causal factor assists in determining the volume of Australian imports.

APPENDIX I

RELEVANT MEASURES

(i) Price Elasticity of Demand for Imports

The price variable that will be used in the calculation of the price elasticity of demand for imports ($\mathcal{E}^P$) will not be the import price index but will be the relative price index. The reason for this is that imports are assumed to be influenced by the changes in both import and domestic price levels. Thus the price elasticity of demand for imports is the "ratio of the relative change of the quantity of imports to a relative change in relative price". (1)

i.e. $$\mathcal{E}^P = \frac{d M_t}{d R_t} \cdot \frac{R_t}{M_t}$$

There is, however, one very important assumption on which this definition is based. For the period that $\mathcal{E}^P$ is calculated income must remain constant (as $\mathcal{E}^P$, as defined above, is a static concept). For one quarter we might assume this to be so. If $\mathcal{E}^P$ is to be calculated for the 30 periods on which the model is based, it must be transformed into a dynamic concept. The basic problem involved is the assumption of constant income. In an attempt to overcome this problem, imports c.i.f. have been deflated by an index of national income lagged one period (Y^N_{t-1}). The lag has been introduced so as to coincide with the lagged aggregate demand variable in the import function. By deflating imports c.i.f. with Y^N_{t-1} (to obtain M^N_t) it is

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(1) Adler, J.H., "U.S. Import Demand during Interwar Period", American Economic Review, Vol.35 P.40.

assumed that changes in imports c.i.f. caused by changes in income have been eliminated, i.e. income remains constant for the entire 30 periods. This results in an $\mathcal{E}^P$ per unit of income as imports were divided by income. To enable the calculation of the $\mathcal{E}^P$ for the 30 periods the mean values of both the relative price index and M_t^N are calculated, and M_t^N is regressed on R_{t-1}. This enables the $\mathcal{E}^P$ calculated here to be defined as

$$\mathcal{E}^P = \frac{d\, M_t^N}{d\, R_{t-1}} \cdot \frac{\bar{R}_{t-1}}{\bar{M}_t^N}$$

where $\frac{d\, M_t^N}{d\, R_{t-1}}$ is slope of the regression line between M_t^N and R_{t-1} and M_t^N is imports c.i.f. deflated by an index of national income lagged one period. This results in an $\mathcal{E}^P$ of -1.59 (per unit of income). This means that a 1% increase in relative price will cause a 1.59% fall in imports per unit of income. The value of $\mathcal{E}^P$ becomes -5.09 if imports c.i.f. are not deflated by an index of Y_{t-1}^N. This means that, assuming income to be constant, a 1% increase in relative price will cause a 5.09% fall in imports.

(ii) Income Elasticity of Demand for Imports

The income elasticity of demand for imports ($\mathcal{E}^Y$) is defined in a similar fashion to $\mathcal{E}^P$. In this case imports c.i.f. are deflated by the relative price index lagged one period so that it can be assumed that relative price remains constant. This is actually $\mathcal{E}^Y$ per unit of relative price. The income variable Y_{t-1}^N is lagged to correspond with D_{t-1} in the import function. Consequently the income elasticity of demand for imports is defined as follows -

$$\mathcal{E}^{Y} = \frac{d\ M_t^Y}{d\ Y_{t-1}^N} \cdot \frac{\bar{Y}_{t-1}^N}{\bar{M}_t^Y}$$

where M_t^Y is imports c.i.f. deflated by R_{t-1} and Y_t^N is national income. This results in an $\mathcal{E}^Y$ of 1.31 per unit of relative price. This means that a 1% increase in income will cause imports per unit of relative price to rise by 1.31%. By calculating $\mathcal{E}^Y$ with imports c.i.f. (not deflated by relative price) it takes the value of 1.20.

(iii) Marginal and Average Propensities to Import

The marginal propensity to import (MPM) is defined as the ratio of the change in import expenditure to a small change in income which gave rise to it. The average propensity to import (APM) is the proportion of income spent on imports at a given level of income. By fitting a linear relationship between imports c.i.f. and national income (lagged one period for the same reasons as those given in the discussion on $\mathcal{E}^P$ and $\mathcal{E}^Y$) both these propensities can be evaluated in the following manner. The linear relationship is

$$M_t = -133.96 + .252\ Y_{t-1}^N$$

The MPM = $\frac{d\ M_t}{d\ Y_{t-1}^N}$ and is thus equal to .252. The

APM = $\frac{M_t}{Y_{t-1}^N}$ and thus equals $\frac{-133.96}{Y_{t-1}^N} + .252 = .209$ using

$\bar{Y}_t^N$, the mean value of Y_t^N.

The marginal propensity to import, calculated to be 0.252, is rather high but it must be remembered that imports are expressed on a c.i.f. basis whereas in other estimates of this propensity an f.o.b. basis is used. This, coupled with the fact that the MPM is with respect to

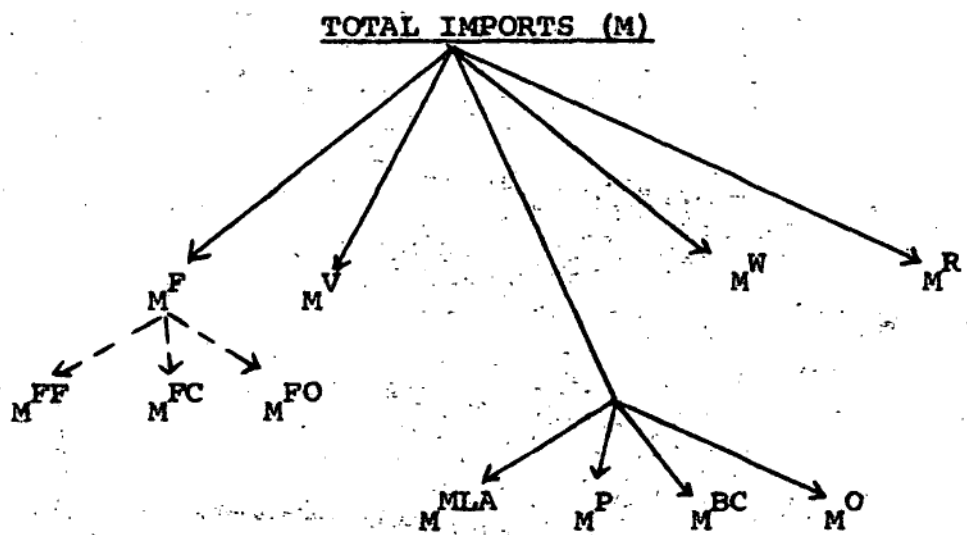
national income rather than G.NP. or G.N.E., probably explains the result. Similar reasons hold with the calculation of the APM. The APM is less than the MPM and therefore imports are an increasing function of income.

A possible explanation for this result was the unusually low demand for imports at the beginning of the series of data, when import licensing and the 1961 recession were in force, compared to the later periods. Hence the results may only reflect short run influences. A longer series of data may well show a different result.

APPENDIX II

ECONOMIC CLASSES OF IMPORTS

Imports are divided into eleven economic classes, as illustrated in the following diagram.



where M^F = imports of total finished consumer goods ($M^{PF} + M^{FC} + M^{FO}$).

M^{FF} = imports of food, beverages and tobacco.

M^{FC} = imports of clothing and accessories.

M^{FO} = imports of other finished consumer goods.

M^V = imports of motor vehicles and accessories.

M^{MLA} = imports of producers materials for "other manufacturing", plus imports of fuels and lubricants, plus imports of auxiliary aids to production.

M^P = imports of producers equipment.

M^O = imports of railways, vessels and civil aircraft

M^{BC} = imports of producers materials for building and construction.

M^W = imports of munitions and war stores.

M^R = imports of producers materials for rural industries.

M = total imports.

The breakdown of total imports in this way corresponds to the breakdown of aggregate demand shown in Chapter III. This type of structure provides the basis for the micro approach discussed in Chapter II, V.

APPENDIX III

Percentage Composition of Imports

The economic classes of imports are expressed as a percentage of total imports, c.i.f. The calculation was carried out with current data so that seasonal patterns of classes of imports may be noted where they differ from the seasonal fluctuations of total imports c.i.f. Percentages may not add to 100% due to rounding.

IMPORT CLASSES AS A PERCENTAGE OF TOTAL IMPORTS C.I.F.

Period		M^F	M^{FF}	M^{FC}	M^{FO}	M^V
58/9	1	15.63	3.71	0.55	11.37	7.87
	2	14.38	3.17	0.40	10.80	7.82
	3	13.41	3.24	0.58	9.67	6.21
	4	14.01	3.03	0.40	10.58	7.99
59/60	1	14.44	3.43	0.48	10.56	7.51
	2	14.71	3.35	0.39	10.97	6.89
	3	14.95	3.46	0.65	10.85	8.90
	4	13.91	2.92	0.47	10.52	9.25
60/61	1	14.04	2.76	0.54	10.72	7.12
	2	14.71	3.16	0.48	11.07	7.41
	3	14.84	3.31	0.82	10.70	8.58
	4	15.38	3.38	0.51	11.48	6.87
61/62	1	17.24	3.75	0.70	12.81	4.86
	2	17.60	4.17	0.43	13.00	4.01
	3	16.50	3.61	0.72	12.15	6.24
	4	15.68	3.24	0.50	11.96	7.18
62/63	1	16.05	2.78	0.60	12.65	8.74
	2	16.07	3.31	0.42	12.34	8.36
	3	15.68	3.42	0.74	11.50	8.99
	4	14.65	3.01	0.46	11.20	10.20
63/64	1	15.05	3.04	0.65	11.37	8.46
	2	15.97	3.55	0.47	11.97	8.34
	3	14.15	3.27	0.74	10.15	9.70
	4	13.80	2.92	0.48	10.38	10.17
64/65	1	13.69	3.14	0.64	9.91	9.53
	2	13.29	3.04	0.41	9.85	8.16
	3	12.81	3.12	0.83	8.85	9.09
	4	12.08	2.67	0.46	8.94	9.18
65/66	1	13.66	2.97	0.64	10.05	8.80
	2	14.39	3.47	0.44	10.47	7.68

IMPORT CLASSES AS A PERCENTAGE OF TOTAL IMPORTS C.I.F.

Period		M^W	M^{BC}	M^{MLA}	M^P	M^O
58/9	1	1.05	2.47	37.73	14.44	1.99
	2	0.88	2.40	39.95	14.27	1.30
	3	0.80	2.03	36.96	13.39	2.84
	4	0.78	2.36	37.25	14.49	4.60
59/60	1	0.94	2.56	38.42	13.98	3.53
	2	1.03	2.25	38.64	14.73	3.13
	3	1.41	3.17	36.39	14.91	2.43
	4	1.04	3.41	37.41	15.18	1.64
60/61	1	0.79	3.83	39.06	13.64	1.55
	2	0.39	3.45	38.99	14.40	1.35
	3	0.57	2.68	37.73	16.06	1.46
	4	0.62	2.39	37.75	16.04	1.93
61/62	1	1.11	2.12	37.15	15.45	2.20
	2	0.81	2.45	37.57	15.41	2.15
	3	0.84	2.71	37.56	16.01	1.40
	4	0.79	2.78	36.91	15.98	1.34
62/63	1	0.41	2.71	35.85	16.16	1.40
	2	0.54	2.46	36.79	15.47	1.34
	3	0.44	2.89	37.39	15.33	1.40
	4	0.78	2.54	35.25	16.13	1.56
63/64	1	1.09	2.68	36.73	15.87	1.14
	2	0.79	2.51	36.36	15.33	1.49
	3	1.13	2.77	35.34	16.53	1.35
	4	0.84	2.71	34.88	17.51	1.46
64/65	1	1.32	2.78	34.95	16.76	1.79
	2	1.54	2.86	35.33	16.65	3.53
	3	1.52	3.06	35.77	17.47	1.48
	4	1.86	2.92	36.04	18.40	1.46
65/66	1	1.65	2.69	33.27	18.21	3.21
	2	0.96	2.69	33.78	18.79	2.19

IMPORT CLASSES AS A PERCENTAGE OF TOTAL IMPORTS C.I.F.

Period		M^R	Mf.o.b.	Customs Duty freight and insurance
58/9	1	0.79	81.95	18.05
	2	0.90	81.93	18.07
	3	0.68	83.49	16.51
	4	0.88	82.37	17.63
59/60	1	0.74	82.17	17.83
	2	0.77	82.14	17.86
	3	0.69	82.86	17.14
	4	0.66	82.46	17.54
60/61	1	0.80	81.87	18.13
	2	0.86	81.58	18.42
	3	0.79	82.67	17.33
	4	1.13	82.06	17.94
61/62	1	1.38	81.53	18.47
	2	1.17	81.17	18.83
	3	0.99	82.21	17.79
	4	1.04	81.72	18.28
62/63	1	1.11	82.40	17.60
	2	0.81	81.81	18.19
	3	0.79	82.56	17.44
	4	1.09	82.19	17.91
63/64	1	0.98	82.02	17.98
	2	1.17	81.99	18.02
	3	1.25	82.18	17.82
	4	1.11	82.34	17.66
64/65	1	1.36	82.18	17.82
	2	1.14	82.52	17.48
	3	1.13	82.34	17.66
	4	1.14	83.08	16.92
65/66	1	1.04	82.29	17.71
	2	1.01	81.70	18.30

APPENDIX IV

Tabulated below are the data used in the construction of all estimating equations and import functions. Values generated by estimating equations have also been included. a list of endogenous and exogenous variables are include to identify the series of data.

Actual Real De-seasonalised Data

Endogenous

C^P	personal consumption expenditure excluding vehicles
C^{PF}	personal consumption expenditure on food, beverages and tobacco
C^{PC}	personal consumption expenditure on clothing and accessories
C^{PO}	personal consumption expenditure on 'other goods and services'
C^V	personal consumption expenditure on vehicles
C^G	consumption expenditure on goods and services by public authorities
C^B	consumption expenditure on goods and services by business enterprises
I^H	investment in dwelling construction
I^{OB}	investment in other building and construction
I^C	non stock investment in fixed capital equipment
D	aggregate demand

Exogenous

I^S	investment in stocks
X^D	total personal disposable income
B^V	vehicle instalment credit
G	estimated quarterly government receipts
Y	G.N.P. at market prices
F	farm income
H	housing approvals
$\dot{Y}^{-1.9}$	1.9% average quarterly rate of increase in G.N.P. at factor cost in terms of current prices
V	major trading bank advances
E	export of goods and services
D^E	index of excess demand
Z	dummy variable
T	sales tax on cars expressed as a percentage
Y^N	national income
M^N	imports c.i.f. deflated by an index of national income lagged one period
M^Y	imports c.i.f. deflated by the relative price index lagged one period

Actual Real De-seasonalised Import Data

M^P	imports of total finished consumer goods ($M^{PP} + M^{PC} + M^{PO}$)
M^{PP}	imports of food, beverages and tobacco
M^{PC}	imports of clothing and accessories
M^{PO}	imports of 'other consumer goods'
M^V	imports of motor vehicles and accessories

M^W	imports of munitions and war stores
M^{BC}	imports of producers materials for building and construction
M^{MLA}	imports of producers materials for 'other manufacturing', plus imports of fuels and lubricants, plus imports of auxiliary aids to production
M^P	imports of producers equipment
M^O	imports of railways, vessels and civil aircraft
M^R	imports of producers materials for rural industries
M f.o.b.	total imports on a f.o.b. basis
M c.i.f.	total imports on a c.i.f. basis

ACTUAL REAL DE-SEASONALISED DATA

$Sm.^{(a)}$

Period		C^P	C^{PF}	C^{PC}	C^{PO}	C^V
58/9	1	1986.18	740.08	246.29	681.95	93.20
	2	2004.98	744.82	246.98	684.67	96.57
	3	2031.81	758.43	243.25	686.29	96.74
	4	2031.70	756.84	147.15	701.18	101.27
59/60	1	2073.87	762.12	257.25	714.86	109.96
	2	2109.40	770.22	260.51	733.45	123.98
	3	2162.91	782.07	266.27	754.59	125.29
	4	2148.83	772.23	261.56	752.02	125.30
60/61	1	2136.64	776.62	260.70	741.28	127.24
	2	2165.11	781.32	261.46	739.65	133.99
	3	2182.06	789.73	260.42	743.14	106.23
	4	2171.53	788.83	259.10	743.53	98.78
61/62	1	2241.13	816.68	263.11	777.52	93.91
	2	2258.52	813.81	262.45	781.29	108.59
	3	2319.45	817.06	270.37	802.28	128.80
	4	2353.20	834.26	274.50	822.58	136.34
62/63	1	2360.51	828.57	270.62	828.22	148.65
	2	2380.74	838.93	273.16	836.31	149.45
	3	2331.44	852.94	273.02	849.21	157.52
	4	2472.97	867.64	282.63	869.03	149.23
63/64	1	2499.68	864.55	288.62	881.39	167.24
	2	2529.57	874.50	292.44	900.28	163.04
	3	2572.18	878.99	299.81	906.53	165.70
	4	2590.20	887.77	298.64	921.45	172.28
64/65	1	2618.83	901.81	298.51	930.04	163.91
	2	2638.10	909.28	302.12	944.28	161.39
	3	2652.63	898.98	298.55	941.31	179.26
	4	2671.54	923.30	301.77	942.72	181.99
65/66	1	2670.81	927.89	298.82	939.76	152.27
	2	2698.60	939.98	295.47	958.43	128.51
SEASONAL INDEXES						
	1	.9791	.9741	.9498	.9745	1.0496
	2	1.0728	1.0670	1.1646	1.0751	1.0811
	3	.9568	.9927	.8358	.9581	.9085
	4	.9913	.9663	1.0499	.9922	.9608

ACTUAL REAL DE-SEASONALISED DATA

$m.(a)

Period		C^G	C^B	I^H	I^{OB}	I^C (g)
58/9	1	312.67	34.11	153.89	163.83	412.39
	2	315.33	36.36	151.05	176.99	439.36
	3	329.65	38.34	149.55	179.55	478.84
	4	329.08	40.53	156.06	183.29	488.34
59/60	1	336.10	43.47	160.65	191.59	462.45
	2	330.57	44.85	160.81	193.69	468.28
	3	329.22	46.42	167.94	202.12	498.65
	4	341.63	45.63	172.30	198.81	520.26
60/61	1	330.93	45.49	177.32	200.95	517.40
	2	343.94	43.53	178.10	205.60	511.88
	3	344.80	45.57	168.33	206.03	499.39
	4	354.50	45.88	161.62	208.02	485.90
61/62	1	373.51	48.39	158.71	204.20	556.23
	2	379.57	47.75	156.64	206.26	523.73
	3	390.13	47.69	163.13	221.03	540.32
	4	400.49	48.27	167.45	223.42	535.75
62/63	1	396.82	48.62	168.22	236.35	543.69
	2	408.30	49.36	174.36	227.79	566.61
	3	405.37	49.33	177.21	228.10	601.97
	4	419.98	51.76	175.44	238.04	593.18
63/64	1	421.11	50.80	186.12	242.29	589.05
	2	429.18	52.98	195.90	249.13	624.85
	3	447.03	54.79	204.76	251.90	608.75
	4	466.85	55.58	210.54	262.98	662.94
64/65	1	474.84	55.12	217.11	256.15	671.16
	2	485.27	58.71	222.09	275.03	711.69
	3	504.77	57.48	229.07	270.54	692.01
	4	492.26	58.46	233.40	279.64	725.02
65/66	1	570.00	59.83	221.87	301.23	749.01
	2	549.10	60.95	214.98	300.38	794.13
SEASONAL INDEXES						
	1	.9250	1.0286	1.0226	.9605	.9308
	2	1.0372	.9961	1.0014	1.0353	1.0184
	3	.9283	.9941	.9771	.9082	.9111
	4	1.1096	.9811	.9989	1.0960	1.1398

ACTUAL REAL DE-SEASONALISED DATA

$8m.^{(a)}$

Period		$I^{S(c)}$	$D^{(b)}$	X^{D}	B^{V}
58/9	1	+78.70	3280.80	2307.74	97.16
	2	+250.10	3364.55	2370.09	103.19
	3	+98.70	3302.53	2337.14	101.50
	4	-168.30	3362.91	2336.79	110.40
59/60	1	+73.10	3532.68	2499.64	110.24
	2	+168.50	3504.38	2460.99	123.13
	3	-54.20	3585.57	2445.47	124.16
	4	-128.30	3710.80	2499.28	121.64
60/61	1	+77.60	3708.31	2451.08	117.26
	2	+413.70	3790.04	2528.38	110.51
	3	+243.50	3767.30	2592.14	81.02
	4	-275.10	3465.75	2537.01	78.00
61/62	1	-23.50	3518.00	2617.10	74.95
	2	+173.70	3607.31	2655.84	84.51
	3	-10.20	3767.69	2703.37	100.53
	4	-226.40	3909.19	2799.06	110.58
62/63	1	+34.80	3980.76	2759.65	114.28
	2	+392.00	4073.27	2840.00	109.34
	3	+166.20	4094.55	2860.59	122.91
	4	-323.00	4198.91	2927.85	118.39
63/64	1	+21.30	4232.81	3029.65	132.87
	2	+283.70	4317.27	3113.51	126.08
	3	+19.40	4321.61	3116.98	131.96
	4	-301.80	4539.33	3189.20	132.28
64/65	1	+50.30	4649.19	3196.21	136.67
	2	+404.50	4686.19	3181.33	137.25
	3	+209.50	4843.53	3303.86	142.84
	4	-222.40	4913.20	3301.03	137.62
65/66	1	-23.90	4788,30	3222.10	130.00
	2	+341.60	4725.30	3130.17	116.15
SEASONAL INDEXES					
	1		1.0092	.9712	1.0308
	2		1.1180	1.1466	1.0995
	3		.9513	.9415	.9201
	4		.9215	.9407	.9496

ACTUAL REAL DE-SEASONALISED DATA

$m.(a)

Period		G	Y	F	H	$Y^{-1.9}$
58/9	1	667.31	3221.48	206.75	144.57	2696.00
	2	676.78	3330.99	260.22	134.97	2747.00
	3	690.39	3293.18	261.35	139.69	2799.00
	4	701.75	3359.12	324.10	148.25	2852.00
59/60	1	694.28	3520.13	302.15	144.25	2906.00
	2	703.19	3515.36	251.13	158.79	2961.00
	3	711.79	3544.12	193.75	182.69	3017.00
	4	710.30	3596.07	267.61	170.71	3074.00
60/61	1	755.33	3555.29	187.48	167.71	3132.00
	2	775.31	3625.56	248.26	162.50	3192.00
	3	794.01	3635.66	295.10	128.81	3253.00
	4	811.68	3498.37	151.53	127.33	3315.00
61/62	1	814.04	3602.02	247.86	132.61	3378.00
	2	839.54	3689.48	245.14	137.38	3442.00
	3	857.77	3822.35	215.17	145.58	3507.00
	4	881.52	3933.03	73.93	146.67	3574.00
62/63	1	802.99	3921.85	247.90	155.41	3642.00
	2	816.52	4024.40	293.85	156.31	3711.00
	3	835.96	4086.82	263.28	162.50	3782.00
	4	854.43	4173.90	340.89	167.97	3854.00
63/64	1	872.24	4325.88	376.13	183.33	3927.00
	2	894.21	4408.76	331.29	185.25	4002.00
	3	911.57	4400.29	338.00	199.88	4078.00
	4	921.67	4547.73	634.99	215.87	4155.00
64/65	1	995.44	4600.65	317.29	214.23	4234.00
	2	1007.26	4583.83	295.91	210.14	4314.00
	3	1025.39	4720.40	368.56	212.61	4396.00
	4	1041.78	4774.50	237.53	208.43	4480.00
65/66	1	1155.42	4646.27	199.22	191.16	4565.00
	2	1174.61	4571.78	230.38	186.88	4652.00

SEASONAL INDEXES					
	1	.7473	.9948	.9359	1.0812
	2	.8185	1.1296	1.9568	.9945
	3	.9985	.9543	.9845	.8869
	4	1.4357	.9213	.1227	1.0374

ACTUAL REAL DE-SEASONALISED DATA

$m.(a)

Period		V	E	$D^{E(d)}$ 1962/63=100	No. of Registered Vacancies(e)	No. of Registered Unemployed(e)
58/9	1	2016.19	445.35	-95.8	62419	206497
	2	1984.21	494.72	-87.2	62131	192760
	3	1957.50	487.25	-81.1	67437	199219
	4	1909.24	518.71	-67.5	75932	199466
59/60	1	1921.12	522.81	-50.4	86351	191183
	2	1939.24	591.03	-36.7	90861	171291
	3	1962.08	553.07	-24.2	101611	160845
	4	1982.72	502.06	- 8.9	119469	145138
60/61	1	2061.75	480.49	- 0.4	129520	130798
	2	2115.39	478.21	- 7.9	119451	142245
	3	2087.06	538.81	-47.1	92501	197369
	4	1988.09	595.58	-181.9	55519	298991
61/62	1	2005.18	610.66	-261.8	49756	363712
	2	1996.84	600.70	-210.2	55821	338634
	3	2009.61	612.03	-161.6	61524	301083
	4	2057.47	622.25	-126.3	69536	281251
62/63	1	2085.46	579.15	-113.7	72786	272206
	2	2084.95	601.36	-112.6	74335	276101
	3	2143.46	637.50	-90.5	80392	255613
	4	2174.47	649.10	-83.2	81542	245120
63/64	1	2148.00	784.63	-63.4	88140	222907
	2	2164.25	781.16	-44.1	100459	207257
	3	2186.13	785.69	-26.6	113289	185939
	4	2238.37	771.44	- 4.0	137171	150462
64/65	1	2248.53	758.35	+ 5.4	150553	130805
	2	2275.53	725.62	+ 2.8	150081	139825
	3	2311.08	710.87	+ 6.2	159668	135717
	4	2429.05	730.06	+12.2	174089	123103
65/66	1	2423.52	781.63	+10.3	164560	123594
	2	2425.27	700.75	- 3.8	149142	162110
SEASONAL INDEXES						
	1	1.0104	.9049		.8803	.9163
	2	1.0136	1.0530		1.2400	.9230
	3	.9758	1.0236		1.0723	1.1453
	4	1.0001	1.0186		.8073	1.1054

ACTUAL REAL DE-SEASONALISED DATA

$S_{m.}^{(a)}$

Period		$Z^{(e)}$	$T^{(e)}$	Closing stock at end of quarter (f)
58/9	1	1	30.0	32503
	2	1	30.0	35165
	3	1	30.0	36213
	4	1	30.0	34442
59/60	1	1	30.0	35204
	2	1	30.0	36955
	3	1	30.0	36396
	4	0	30.0	35100
60/61	1	0	30.0	35864
	2	0	40.0	39919
	3	0	30.0	42318
	4	0	30.0	39618
61/62	1	0	30.0	39386
	2	0	30.0	41129
	3	0	22.5	41026
	4	0	22.5	38744
62/63	1	0	22.5	39093
	2	0	22.5	43020
	3	0	22.5	44685
	4	0	22.5	41461
63/64	1	0	22.5	41672
	2	0	22.5	44483
	3	0	22.5	44676
	4	0	22.5	41713
64/65	1	0	25.0	42200
	2	0	25.0	46083
	3	0	25.0	48085
	4	0	25.0	45981
65/66	1	0	25.0	45659
	2	0	25.0	48799

ACTUAL REAL DE-SEASONALISED DATA

$m.(a)

Period		Y^N	M^N	M^Y
58/9	1	2544.82	-	-
	2	2645.05	648.66	485.28
	3	2604.75	648.43	502.94
	4	2664.22	648.41	504.44
59/60	1	2805.08	630.00	506.10
	2	2790.64	655.16	555.33
	3	2799.19	690.79	579.83
	4	2856.76	708.12	607.10
60/61	1	2824.11	754.68	674.58
	2	2887.83	783.40	698.97
	3	2874.12	754.58	676.56
	4	2770.20	644.40	582.01
61/62	1	2893.20	597.83	518.31
	2	2942.25	562.50	498.68
	3	3041.41	614.80	539.27
	4	3172.31	639.01	596.90
62/63	1	3130.15	677.63	656.66
	2	3219.25	671.62	654.36
	3	3239.34	637.68	631.02
	4	3357.03	674.43	675.78
63/64	1	3460.21	660.24	682.34
	2	3564.63	639.53	685.64
	3	3569.32	642.96	699.83
	4	3650.25	694.34	760.10
64/65	1	3708.13	706.99	805.39
	2	3686.05	722.27	827.33
	3	3834.57	702.49	815.98
	4	3846.51	721.90	876.00
65/66	1	3701.18	736.76	908.54
	2	3649.62	716.60	856.34

SEASONAL INDEXES	
1	1.0048
2	1.1571
3	.9423
4	.8958

ACTUAL REAL DE-SEASONALISED IMPORT DATA

$m.(a)

Period		M^W	M^{BC}	M^{MLA}	M^P	M^O
58/9	1	5.19	12.73	197.33	76.71	10.70
	2	4.94	12.68	201.63	74.44	5.81
	3	4.18	10.61	196.96	70.61	16.57
	4	4.03	12.28	195.68	73.17	24.64
59/60	1	4.59	13.06	198.88	73.54	18.79
	2	6.43	13.24	217.13	85.55	15.55
	3	8.29	18.63	217.96	88.40	15.93
	4	6.29	20.77	230.62	90.12	10.29
60/61	1	4.93	25.07	259.67	92.17	10.61
	2	2.94	24.49	263.72	100.71	8.07
	3	3.78	17.80	255.45	107.63	10.78
	4	3.47	13.62	217.45	89.00	11.32
61/62	1	5.33	10.65	189.74	80.21	11.55
	2	4.47	12.79	186.91	79.27	9.45
	3	4.67	14.96	211.06	89.06	8.61
	4	4.68	16.64	233.13	93.02	8.25
62/63	1	2.53	17.67	237.67	108.85	9.55
	2	3.88	16.56	236.49	102.77	7.60
	3	2.76	18.08	238.45	96.78	9.75
	4	5.21	17.04	239.52	105.52	10.80
63/64	1	7.02	18.00	251.06	110.22	8.00
	2	5.94	17,78	245.98	107.20	8.95
	3	7.90	19.36	251.64	116.48	10.51
	4	6.35	20.63	268.90	129.98	11.47
64/65	1	9.91	21.79	278.14	135.57	14.71
	2	13.97	24.53	289.31	140.90	25.58
	3	12.01	24.13	287.75	139.09	13.02
	4	15.68	24.87	310.32	152.54	12.80
65/66	1	13.52	23.17	290.75	161.68	28.87
	2	8.63	22.87	273.89	157.47	15.72
SEASONAL INDEXES						
	1	1.0664	1.0188	1.0027	.9868	.9738
	2	.9057	.9576	1.0044	.9716	1.1356
	3	1.0148	1,0181	.9989	1.0093	.9140
	4	1.0131	1.0056	.9940	1.0323	.9766

ACTUAL REAL DE-SEASONALISED IMPORT DATA

$Sm.^{(a)}$

Period		M^R	M f.o.b.	M c.i.f.[2]
58/9	1	3.87	430.18	523.91
	2	4.65	419.39	509.98
	3	3.93	440.35	529.90
	4	4.49	429.43	521.84
59/60	1	3.59	426.89	518.55
	2	4.43	468.19	567.83
	3	4.47	491.21	595.60
	4	3.98	504.53	612.38
60/61	1	4.99	546.34	666.08
	2	5.90	559.72	683.52
	3	5.81	553.98	673.24
	4	6.30	469.12	572.23
61/62	1	6.58	417.95	511.68
	2	5.96	409.67	502.82
	3	6.06	457.30	558.85
	4	6.09	490.26	600.48
62/63	1	6.89	548.27	664.15
	2	5.30	533.41	649.52
	3	5.46	521.21	634.24
	4	7.19	554.24	674.97
63/64	1	6.25	562.70	684.80
	2	8.10	562.70	683.72
	3	9.72	579.19	708.09
	4	8.26	629.88	765.72
64/65	1	10.11	656.46	797.34
	2	9.55	685.40	827.50
	3	9.97	655.66	799.99
	4	9.54	709.89	855.24
65/66	1	8.47	721.82	875.56
	2	8.32	672.00	819.43
SEASONAL INDEXES				
	1	1.0737	.9991	1.0009
	2	.9844	.9901	.9939
	3	.9163	1.0092	1.0045
	4	1.0256	1.0016	1.0006

(a) Data without seasonal indexes have not been de-seasonalised.

(b) Summing of data will not produce the relevant aggregates shown because of de-seasonalisation, e.g. $C^P + C^V + C^G + C^B + I^H + I^{OB} + I^C + I^S \neq D$

(c) Not deflated by P_t^D; see text P

(d) This index doesnot have seasonal indexes, but is constructed from de-seasonalised data (Registered Vacancies and Registered Unemployed).

(e) Data not expressed in monetary terms.

(f) Expressed in current $m.

(g) The series of data I^C is also I^A; I^A is lagged one period in the estimating equation.

CONSTRUCTION OF DOMESTIC PRICE INDEX

BASE 1962/63 = 100

Period		Consumer Price Index	Wholesale Price Index - Goods Principally Home Produced	P^D
58/9	1	92.27	97.61	94.05
	2	92.99	95.62	93.87
	3	93.39	96.53	94.44
	4	93.80	99.15	95.58
59/60	1	94.20	100.15	96.18
	2	94.76	99.24	96.25
	3	95.56	101.42	97.51
	4	97.25	107.03	100.51
60/61	1	98.37	111.01	102.58
	2	99.02	106.40	101.48
	3	99.74	105.13	101.54
	4	100.38	105.85	102.20
61/62	1	100.22	100.87	100.44
	2	99.82	96.80	98.81
	3	99.66	98.07	99.13
	4	99.56	98.61	99.24
62/63	1	99.82	100.33	99.99
	2	99.90	99.15	99.65
	3	99.98	99.79	99.92
	4	100.30	100.69	100.43
63/64	1	100.46	103.22	101.41
	2	100.38	100.51	100.42
	3	101.02	100.87	100.97
	4	101.99	104.13	102.70
64/65	1	103.19	105.76	104.05
	2	104.40	104.13	104.31
	3	105.12	104.77	105.00
	4	106.08	106.94	106.37
65/66	1	107.21	112.19	108.87
	2	108.57	108.93	108.69

CONSTRUCTION OF IMPORT PRICE INDEX C.I.F.

BASE 1962/63 = 100

Period		(1) Value of imports f.o.b.	(2) Index of (1)	(3)(b) Import Price Index f.o.b.	(4) Volume of Imports index $\frac{(2)}{(3)_{t-1}}$
58/9	1	67.4	75.0	98.7	76.7
	2	65.0	72.3	98.5	73.3
	3	63.9	71.1	97.5	72.2
	4	68.5	76.2	98.2	78.2
59/60	1	68.4	76.1	98.3	77.5
	2	74.6	83.0	98.9	84.4
	3	80.5	89.6	99.1	90.6
	4	84.7	94.2	99.6	95.1
60/61	1	93.3	103.8	99.9	104.2
	2	93.7	104.3	100.2	104.4
	3	94.7	105.4	100.4	105.2
	4	80.0	89.0	100.7	88.6
61/62	1	69.9	77.8	100.3	77.3
	2	66.8	74.3	99.8	74.1
	3	76.3	84.9	99.7	85.1
	4	81.2	90.3	99.7	90.6
62/63	1	91.3	101.6	99.4	101.9
	2	87.7	97.6	99.7	98.2
	3	87.6	97.5	100.3	97.8
	4	92.9	103.4	100.6	103.1
63/64	1	95.0	105.7	100.9	105.1
	2	93.5	104.0	101.4	103.1
	3	98.4	109.5	101.7	108.0
	4	108.3	120.5	102.0	118.5
64/65	1	105.6	117.5	102.7	115.2
	2	120.4	134.0	103.0	130.5
	3	118.7	132.1	103.1	128.3
	4	128.8	143.3	104.0	139.0
65/66	1	132.8	147.8	104.6	142.1
	2	121.4	135.1	105.0	129.2

CONSTRUCTION OF IMPORT PRICE INDEX C.I.F.

BASE 1962/63 = 100

Period		(5) Imports f.o.b	(6) Customs Duty, Freight and Insurance	(7) Imports c.i.f. (5) + (6)	(8) (1)/(3)	(9) (2)/(3)
58/9	1	404.2	89.0	493.2	.8195	.1805
	2	389.8	86.0	475.8	.8193	.1807
	3	419.7	83.0	502.7	.8349	.1651
	4	411.1	88.0	499.1	.8237	.1763
59/60	1	410.2	89.0	499.2	.8217	.1783
	2	446.2	97.0	543.2	.8214	.1786
	3	483.4	100.0	583.4	.8286	.1714
	4	507.9	108.0	615.9	.8246	.1754
60/61	1	559.9	124.0	683.9	.8187	.1813
	2	562.4	127.0	689.4	.8158	.1842
	3	567.7	119.0	686.7	.8267	.1733
	4	480.2	105.0	585.2	.8206	.1794
61/62	1	419.4	95.0	514.4	.8153	.1847
	2	400.8	93.0	493.8	.8117	.1983
	3	457.5	99.0	556.5	.8221	.1779
	4	487.3	109.0	596.3	.8172	.1828
62/63	1	547.7	117.0	664.7	.8240	.1769
	2	526.3	117.0	643.3	.8181	.1819
	3	525.6	111.0	636.6	.8256	.1744
	4	557.5	122.0	678.3	.8219	.1781
63/64	1	570.1	125.0	695.1	.8202	.1798
	2	559.5	123.0	682.4	.8199	.1801
	3	590.2	128.0	718.2	.8218	.1782
	4	647.9	139.0	786.9	.8234	.1766
64/65	1	682.4	148.0	830.4	.8218	.1782
	2	707.9	150.0	857.9	.8252	.1748
	3	694.8	149.0	843.8	.8234	.1766
	4	756.3	154.0	910.3	.8308	.1692
65/66	1	785.1	169.0	954.1	.8229	.1771
	2	723.2	162.0	885.2	.8170	.1830

CONSTRUCTION OF IMPORT PRICE INDEX C.I.F.

BASE 1962/63 = 100

Period		(10) Index of (6)	(11) (10) / (4) Implied Price Index of Customs Duty, Freight and Insurance
58/9	1	76.2	99.3
	2	73.7	100.5
	3	71.1	98.5
	4	75.4	96.4
59/60	1	76.2	98.3
	2	83.1	98.5
	3	85.7	94.6
	4	92.5	97.3
60/61	1	106.2	101.9
	2	108.8	104.2
	3	101.9	96.9
	4	89.9	101.5
61/62	1	81.4	105.3
	2	79.7	107.6
	3	84.8	99.6
	4	93.4	103.1
62/63	1	100.2	98.3
	2	100.2	102.0
	3	95.1	97.2
	4	104.5	101.4
63/64	1	107.1	101.9
	2	105.4	102.2
	3	109.6	101.5
	4	119.1	100.5
64/65	1	126.8	110.1
	2	128.5	98.5
	3	127.6	99.5
	4	131.9	94.9
65/66	1	144.8	101.9
	2	138.8	107.4

CONSTRUCTION OF IMPORT PRICE INDEX C.I.F.

BASE 1962/63 = 100

Period		(12) (11) . $\frac{(6)}{(7)}$	(13) (3) . $\frac{(5)}{(7)}$	(14) (12) + (13)
58/9	1	17.92	80,88	98.80
	2	18.16	80.70	98.86
	3	16.26	81.40	97.66
	4	17.00	80.89	97.89
59/60	1	17.53	80.77	98.30
	2	17.59	81.24	98.83
	3	16.21	82.11	98.32
	4	17.07	82.13	99.20
60/61	1	18.47	81.79	100.26
	2	19.19	81.74	100.93
	3	16.79	83.00	99.79
	4	18.21	82.63	100.84
61/62	1	19.45	81.77	101.22
	2	21.34	81.01	102.35
	3	17.72	81.96	99.68
	4	18.85	81.47	100.32
62/63	1	17.30	81.91	99.21
	2	18.55	81.56	100.11
	3	16.95	82.81	99.76
	4	18.06	82.68	100.74
63/64	1	18.32	82.76	101.08
	2	18.41	83.14	101.55
	3	18.09	83.58	101.67
	4	17.75	83.87	101.62
64/65	1	19.62	84.40	104.02
	2	17.22	85.00	102.22
	3	17.57	84.89	102.46
	4	16.06	86.40	102.46
65/66	1	18.05	86.08	104.13
	2	19.65	85.79	105.44

CONSTRUCTION OF IMPORT PRICE INDEX C.I.F.

BASE 1962/63 = 100

Period		(c) Import Price Index c.i.f. (P^M)	Relative Price Index P^M/P^D
58/9	1	98.84	105.09
	2	98.90	105.36
	3	97.70	103.45
	4	97.93	102.46
59/60	1	98.34	102.25
	2	98.87	102.72
	3	98.36	100.87
	4	99.24	98.74
60/61	1	100.31	97.79
	2	100.98	99.51
	3	99.83	98.32
	4	100.89	98.72
61/62	1	101.27	100.83
	2	102.40	100.63
	3	99.72	100.60
	4	100.37	101.14
62/63	1	99.25	99.26
	2	100.16	100.51
	3	99.80	99.88
	4	100.79	100.36
63/64	1	101.13	99.72
	2	101.60	101.18
	3	101.72	100.74
	4	101.67	99.00
64/65	1	104.07	100.02
	2	102.27	98.04
	3	102.51	97.63
	4	102.51	96.37
65/66	1	104.18	95.69
	2	105.49	97.06

(a) These values are contained in Reserve Bank of Australia Statistical Bulletins. They are in £ rather than $ and are a quarterly average figure.

(b) Contained in Reserve Bank of Australia Statistical Bulletin, 1958 - 1967.

(c) The import price index c.i.f. (P^M) does not correspond to the series in column (14) as the former has been adjusted to base 1962/63 = 100.

ESTIMATED REAL DE-SEASONALISED DATA

$m.

Period		C^P	C^{PF}	C^{PC}	C^{PO}	C^V
58/9	1	-	-	-	-	-
	2	2036.04	752.16	249.52	697.95	106.87
	3	2078.48	763.20	252.97	714.82	111.86
	4	2056.06	757.36	251.14	705.90	110.02
59/60	1	2055.82	757.30	251.12	705.81	114.77
	2	2166.66	786.13	260.13	749.87	119.28
	3	2140.36	779.29	257.99	739.41	125.08
	4	2129.79	776.54	257.13	735.21	125.19
60/61	1	2166.42	786.07	260.11	749.77	125.36
	2	2133.61	777.54	257.44	736.73	121.66
	3	2186.23	791.22	261.72	757.64	96.86
	4	2229.63	802.51	265.25	774.89	106.29
61/62	1	2192.10	792.75	262.20	759.71	103.12
	2	2246.61	806.93	266.63	781.64	103.75
	3	2272.98	813.79	268.77	792.13	109.95
	4	2305.34	822.21	271.40	804.98	137.39
62/63	1	2370.47	839.15	276.69	830.87	145.46
	2	2343.64	832.17	274.51	820.21	146.32
	3	2398.33	846.40	278.95	841.95	145.96
	4	2412.35	850.04	280.09	847.52	153.79
63/64	1	2458.13	861.95	283.81	865.72	153.27
	2	2527.42	879.98	289.44	893.26	163.88
	3	2584.50	894.82	294.08	915.95	162.63
	4	2586.87	895.44	294.27	916.89	165.87
64/65	1	2636.02	908.23	298.27	936.42	168.08
	2	2640.79	909.47	298.65	938.32	164.78
	3	2630.67	906.83	297.83	934.29	164.67
	4	2714.07	928.53	304.61	967.44	171.11
65/66	1	2712.14	928.03	304.45	966.68	168.25
	2	2658.42	914.05	300.09	945.32	161.94

ESTIMATED REAL DE-SEASONALISED DATA

$m.

Period		C^G	C^B	I^H	I^{OB}	I^C
58/9	1	-	-	-	-	-
	2	313.89	40.83	154.08	181.48	427.62
	3	320.83	41.58	151.19	182.48	445.55
	4	326.62	41.06	152.53	183.78	469.90
59/60	1	322.81	41.11	157.07	184.08	479.14
	2	327.36	43.55	160.72	187.35	470.52
	3	331.74	44.17	167.08	190.98	478.06
	4	330.98	45.32	179.23	194.89	498.12
60/61	1	353.95	45.02	174.78	198.74	513.83
	2	364.14	45.55	171.47	205.52	517.29
	3	373.67	45.68	171.44	211.13	519.49
	4	382.68	45.19	155.80	212.79	518.24
61/62	1	383.89	45.27	153.05	211.06	516.56
	2	396.89	45.37	158.70	215.04	557.45
	3	406.19	46.57	162.61	217.82	546.30
	4	418.30	48.75	168.66	221.73	560.20
62/63	1	378.25	52.11	172.63	227.39	563.45
	2	385.07	49.64	175.88	232.13	573.13
	3	395.07	50.39	179.21	235.59	590.56
	4	404.49	51.63	183.23	241.97	614.38
63/64	1	413.57	**51.76**	**188.53**	**247.06**	**615.90**
	2	424.77	53.32	200.31	249.45	619.95
	3	433.63	55.02	204.30	253.97	644.32
	4	438.78	54.82	212.20	258.81	642.47
64/65	1	476.40	52.82	223.27	265.23	676.40
	2	482.43	57.77	222.64	269.64	687.12
	3	491.67	57.83	219.94	274.98	714.38
	4	500.03	58.69	225.57	280.83	711.29
65/66	1	557.99	61.16	223.28	290.74	734.98
	2	567.77	59.96	211.30	294.73	754.26

ESTIMATED REAL DE-SEASONALISED DATA

$m.

Period		D_t
58/9	1	-
	2	3510.91
	3	3430.67
	4	3171.67
59/60	1	3427.90
	2	3643.94
	3	3423.27
	4	3375.22
60/61	1	3655.70
	2	3972.94
	3	3848.00
	4	3375.52
61/62	1	3581.55
	2	3897.51
	3	3752.22
	4	3633.97
62/63	1	3944.56
	2	4297.81
	3	4161.31
	4	3738.84
63/64	1	4149.52
	2	4522.80
	3	4357.77
	4	4059.02
64/65	1	4548.52
	2	4929.67
	3	4763.64
	4	4439.19
65/66	1	4724.64
	2	5049.98

ESTIMATED REAL DE-SEASONALISED DATA

8m.

Period		M.c.i.f. (with actual) D	M.c.i.f. (with estimated) D
58/9	1	-	-
	2	-	-
	3	-	-
	4	-	-
59/60	1	544.97	543.31
	2	587.61	590.88
	3	587.58	594.32
	4	612.74	620.57
60/61	1	632.09	630.00
	2	662.21	687.89
	3	652.77	660.33
	4	615.00	603.08
61/62	1	521.57	519.55
	2	493.08	483.89
	3	546.19	556.29
	4	603.65	618.73
62/63	1	637.90	644.56
	2	646.37	646,83
	3	660.30	660.14
	4	675.38	676.11
63/64	1	672.30	655.59
	2	692.24	672.89
	3	722.30	713.14
	4	734.33	727,67
64/65	1	816.79	834.59
	2	830.21	842.44
	3	834.53	849.37
	4	846.09	838.30
65/66	1	850.47	827.30
	2	824.85	805.77

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