

# The Import Dependence of the Irish Economy during the Decade of the Sixties

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## I INTRODUCTION

There was an acceleration of the rate of economic growth and a rise in the rate of gross domestic investment in the Irish economy during the 1960s which occurred simultaneously with the execution of the outward-looking policies introduced step-by-step after the mid-1950s. Economic growth was sought through special incentives for export expansion and the facilitation of the increase in production for export by the encouragement of foreign capital and technology inflows. Gradually trade and other government policies gave the Irish economy a more open character. In its policy mix, the Irish government also pursued expansionary macroeconomic policies (Kennedy and Dowling, 1975). While the Irish economy has always had a high dependence on imports, the question that interests us is what happened to that dependence during the 1960s.

The growth of the domestic market which occurred during the period of operation of these policies provided opportunities for Irish producers to expand their domestic sales. Whether domestic sales would expand at a rate equivalent to the growth of the domestic market would depend on the behaviour of imports. Equal rates of expansion of domestic sales and the domestic market would indicate a constant share of imports in the domestic

\*I would like to thank Professors D. McAleese and Li Way Lee and three referees for comments on earlier drafts of this paper. I, alone, remain responsible for any errors.

market. A faster rate of expansion of domestic sales would reflect decreasing import dependence; a slower rate increasing import dependence. In an earlier study, Chenery (1960) had provided empirical evidence that import substitution would naturally be associated with a process of economic development and that such an outcome would particularly occur in industries subject to significant economies of scale.

Pulling against these forces were two sets of opposite influences. The first was the factor of the small size of the Irish economy, making it difficult to exploit economies of scale even in the face of expanding domestic market sales. The other was the character of outward-looking policies. Import substitution policies were not totally neglected but the most favourable incentives were given for the expansion of exports. The desire to expand exports and the reduction of restrictions against imports made it likely that a growing import dependence would come to prevail in the Irish economy during the 1960s.

Recent work by Henry (1972), Copeland and Henry (1975) and Kennedy and Dowling (1975) has given some attention to the direct and indirect requirements of imports for total final demand and its components. None of these works, however, has given a central focus to the behaviour of imports in the Irish economy during the 1960s. Was there a movement to growing import dependence in the Irish economy during the 1960s? Why? These are the central questions for which answers will be sought in this paper. Various measures of import dependence will be introduced, efforts will be made to sort out the roles of changing demand patterns and input coefficients in determining the direction of movement in Irish imports and some suggestions as to the causes of these observed movements will be provided. We will explore the ramifications of the findings for policy formulation and the future of the Irish economy.

## II IMPORT SUBSTITUTION AS A PROCESS AND AS A POLICY

### II.1 THE ANALYSIS

As Paauw and Fei (1973) have pointed out, a decline in import dependence involves two kinds of substitution. The first kind of substitution occurs on the external accounts. A movement to a decline in import dependence across a range of industries changes the composition of imports. Normally, at the industry level, a process of import substitution starts with consumer goods and the fraction of imports in the form of intermediate and investment goods increases. In the case of a sustained effort to increase manufactured good exports, it is also possible that a similar change in the composition

of imports can occur, although the situation is more complicated in this case because of the continuing role of imports in meeting the needs of the domestic market for intermediate and final goods and services caused by the export orientation of the fast expanding industries.

The second kind of substitution occurs within the domestic market as the share of imports in total domestic sales (or purchases) decreases. Such import substitution can occur for either intermediate or final goods and services. In a comparative static framework, changes in relative prices may be the cause of import substitution and such price changes may be brought about by either demand or supply factors. For example, sudden shifts in the level or composition of aggregate demand may be the cause of a greater dependence on imports. Static economies of scale often also have an important role to play in causing import substitution (Chenery 1960). In a dynamic framework, the introduction of new products and new processes may help or hinder import substitution depending on both the source of the 'newness' and the degree to which new inputs are 'technology specific'.

Government policy can also have a role to play in determining the degree of import dependence. Revisions of tariff policy can change the relative domestic prices of domestic and importable output. Tax policies which discriminate in favour of exports can both simultaneously lead to the growth of export-oriented industries while leaving the domestic market for intermediate and final goods and services to be met by imports. Finally, it should be again added that import substitution may naturally occur in the process of economic development as the size of the domestic market grows.

Import substitution was not a primary preoccupation of Irish policy-makers in the 1960s, although it must be noted that some efforts were made in this direction particularly by the IDA.<sup>1</sup> It is of particular interest, therefore, whether Ireland succeeded as a secondary policy matter as well as a result of economic expansion in achieving some degree of import substitution or whether the trade dependence of the Irish economy grew with the operation of outward looking policies.

## II.2 THE DATA

The form of the analysis is dictated by the nature of the available data. We have input-output tables at hand for 1960, 1964 and 1969.<sup>2</sup> We have adjusted these tables so that common definitions and forms apply to the tables for all three years. It is also possible to supplement these data with

1. Industrial Development Authority Annual Reports.
2. Ireland, Central Statistics Office, Input-Output Tables for 1960 and 1969, Unpublished and Unofficial: Ireland (1970).

other forms of the tables for 1964 and 1969 and we have also used these in our analysis.<sup>3</sup>

### II.3 THE MODELS

#### A. *Notation in Model I.*

Except for (a) nine measures of import dependence, i.e.,  $C_1, C_2, \dots, C_8, C_9$ , (b) the element,  $a_j$ , and (c) subscripts to the left of the unit vector, the notational scheme used here follows these conventions:

- (1) subscripts to the left of a symbol identify components of final demand;
- (2) subscripts to the right of a symbol refer to an element in a matrix or vector,
- (3) the parentheses (t) and (t + 1) after a symbol refer to the import and technological coefficients as well as the distribution of demand among industries for times (t) and (t + 1).

The symbols used in the text are:—

- $\theta$  is a  $n \times n$  matrix whose elements are intermediate domestic input coefficients.
- $\epsilon$  is a  $1 \times n$  row vector whose elements are industry import coefficients (the  $(n + 1)^{\text{th}}$  row of the input-output table).
- $a_j$  is an element which represents the intermediate (domestic and imported) coefficient for industry  $j$  (defined within the model below).
- $a$  is the ratio of total intermediate input expenditures to the sum of intermediate and final expenditures (defined within the model below).
- $k^\lambda$  is a  $n \times 1$  final demand column vector for the  $n$  industries in the economy. There are five different  $n \times 1$  final demand vectors for  $k = C$  (household consumption),  $K$  (gross domestic capital formation),  $G$  (government consumption),  $E$  (exports),  $T$  (total final demand).
- $k^\psi$  is a  $p \times 1$  final demand vector including elements for final imports, indirect business taxes, subsidies, factor payments made between owners of factors of production and final purchasers. There are five different  $p \times 1$  final demand vectors for  $k = C, K, G, E, T$ .
- $k^{\beta(t)}$  is a  $n \times 1$  vector for time  $t$  of final demand met from domestic sources. There are five such  $n \times 1$  vectors and  $k$  is normalised as follows:

$$k^{\beta(t)} = [k^\lambda] [k^\lambda \cdot {}_n I]^{-1} \text{ where } {}_n I \text{ is the } n \times 1 \text{ unit vector.}$$

3. A model and a series of measures having some similarity to the analysis here has been developed by Weisskoff and Wolff (1975).

$k^{\beta^*}(t)$  is a  $n \times 1$  vector in time  $t$  showing, as a fraction of final demand, the domestic component of final demand. There are five such  $n \times 1$  vectors for  $k = C, K, G, E, T$ . The normalisation procedure is:

$$k^{\beta^*}(t) = [k^{\lambda}] [k^{\psi} \cdot (n+1) I]^{-1} \text{ where } (n+1) I \text{ is the } (n+1) \times 1 \text{ unit vector.}$$

$k^{\sigma}(t)$  is a  $(n+1) \times 1$  vector in time  $t$  showing, as a fraction of final demand, the domestic and import components of final demand where  $k$  is normalised as follows:

$$k^{\sigma}(t) = [k^{\lambda}] [k^{\psi} \cdot (n+1) I]^{-1}$$

There are five of these vectors.

$x$  is the  $n \times 1$  column vector of gross domestic output.

$R(t)$  is the  $1 \times n$  row import inverse vector in time  $t$ .

$k^M(t)$  is the level of indirectly induced imports brought about by final demand met from domestic sources, where the technological and import coefficients and the distribution of final demand among industries are for time  $t$ . There are five  $k^M(t)$  values and  $k$  is normalised as follows.

$$k^M(t) = [k^{\lambda}] [k^{\lambda} \cdot p I]^{-1} \text{ where } p I \text{ is the } p \times 1 \text{ unit vector.}$$

$k^{M^*}(t)$  is the total direct and induced imports associated with £100 of final demand (defined within the model below).

$\hat{K}$  is the ratio of gross domestic investment expenditures to total final expenditures.

B. *Additional Notation for Model II.*

$\gamma$  is a  $n \times n$  similar import intermediate input coefficient matrix.

$\delta$  is equal to  $\theta + \gamma$ .

C. *The Form of the Models.*

The  $(n \times 1)$  vector of gross domestic output in Model I is derived as follows:

$$x = [1 - \theta]^{-1} T \lambda \tag{E1}$$

We can now derive the level of intermediate imports generated by the model. The row  $(1 \times n)$  import inverse vector is:

$$R(t) = \epsilon [1 - \theta]^{-1} \tag{E2}$$

The intermediate imports generated by £100 of final demand met from domestic sources are:

$${}_kM(t) = R(t) \cdot {}_k\beta(t) \cdot 100 \quad (\text{E3})$$

To discover whether changes in  ${}_kM(t)$  over time are caused by changes in input coefficients and/or changes in the composition of final demand, we set up the relationship:

$${}_kM(t+1) - {}_kM(t) = (R(t+1) \cdot {}_k\beta(t+1) - R(t) \cdot {}_k\beta(t)) \cdot 100$$

from which we ultimately find that:

$${}_k\Delta M \equiv {}_kM(t+1) - {}_kM(t) = \underset{(1)}{R(t) \cdot V} + \underset{(2)}{W \cdot {}_k\beta(t)} + \underset{(3)}{WV} \quad (\text{E4})$$

where

$$W = R(t+1) - R(t)$$

and

$$V = {}_k\beta(t+1) - {}_k\beta(t)$$

(1) is the demand effect; (2) the input effect and (3) the interaction effect on the behaviour of  ${}_kM(t)$ .

Finally, total imports from final demand can be derived:

$${}_kM^*(t) = ([{}_k\sigma(t)]_{n+1} + R(t) \cdot {}_k\beta^*(t)) 100 \quad (\text{E5})$$

#### II.4 THE MEASURES

All of these initial measures accept the existing pattern of final demand, and until further notice, we will be operating within Model I.

The fraction of total imports to total final expenditures is:

$$C_1 = ([{}_k\psi]_{n+1} + \epsilon x) / \sum_i [{}_k\psi]_i \quad (\text{M1})$$

where  $(n+1)$  is the final import component and  $i = 1, 2, \dots, n, (n+1), \dots, p$ .

From this we can state that:

$$C_1 = G \cdot C_2 + C_3 \quad (\text{M1a})$$

where

$$G = \left( \sum_{j=1}^n x_j + \sum_{i=n+1}^p [{}_k\psi]_i \right) / \sum_{i=1}^p [{}_k\psi]_i \quad (\text{M2})$$

and

$$C_2 = (\epsilon x) / \left( \sum_{j=1}^n x_j + \sum_{i=n+1}^p [{}_k\psi]_i \right) \quad (\text{M3})$$

and

$$C_3 = ([{}_k\psi]_{n+1}) / \left( \sum_i [{}_k\psi]_i \right)$$

From this we see that  $G$  is the ratio of the sum of total intermediate and final expenditures to total final expenditures,  $C_2$  is the ratio of imported intermediate inputs to the sum of intermediate and final expenditures and  $C_3$  is the ratio of final expenditures met from foreign sources to total final expenditures.

The equivalent individual industry measure for  $C_2$  is:

$$C_{2j} = \epsilon_j \tag{M2a}$$

and for each component of final demand:

$$C_{3k} = ([k\psi]_{n+1}) / \sum_{i=1}^p [k\psi]_i \tag{M3a}$$

$C_4$  and  $C_{4j}$  are our next measures of import dependence and show the ratio of imported intermediate inputs to total intermediate inputs purchased. For one industry this measure is:

$$C_{4j} = (\epsilon_j) / (\sum_e [\theta]_{ej} + \epsilon_j) \tag{M4a}$$

where  $e = 1, 2, 3, \dots, n$ .

For all industries:

$$C_4 = (\epsilon x) / (\epsilon x + \sum_{j=1}^n [\theta x]_j) \tag{M4}$$

A relationship emerges between  $C_{2j}$  and  $C_{4j}$  such that:

$$C_{2j}/C_{4j} = \sum_e [\theta]_{ej} + \epsilon_j = a_j$$

i.e.

$$C_{2j} = a_j \cdot C_{4j} \tag{M5a}$$

At the economy level:

$$C_2/C_4 = (\epsilon x + \sum_{j=1}^n [\theta x]_j) / (\sum_{j=1}^n x_j + \sum_{i=1}^p [k\psi]_i) = a$$

$$\text{so that } C_2 = aC_4 \tag{M5}$$

In a four industry model,  $C_2$  can be derived as follows:

$$C_2 = \sum_{j=1}^4 x_j \cdot a_j \cdot C_{4j} \tag{M6}$$

Where  $x$  is the fraction of output originating in industry  $j$  and  $j = 1, 2, 3, 4$ . For total final demand and for each component of total final demand we can measure the direct import content for each £100 of that demand:

$$C_{5k} = [k \sigma(t)]_{n+1} \quad (M7)$$

The induced import leakage for each £100 of total final demand and of each component of total final demand is:

$$C_{6k} = R(t) \cdot k \beta^*(t) \quad (M8)$$

The total direct and induced imports associated with £100 of total final demand and of each component of total final demand can be found as follows:

$$C_{7k} = ([k \sigma(t)]_{n+1} + R(t) \cdot k \beta^*(t)) 100 \quad (M9)$$

From all of this we are able to examine a measure for the composition of total imports.

$$C_8 = (\epsilon x + [m_1 \psi]_{n+1}) / (\epsilon x + [m_2 \psi]_{m+1}) \quad (M10)$$

where  $m_1 = K$ , and  $M_2 = T$ .

A relationship can be found between  $C_8$  and  $C_1, C_2, G$  and  $C_{3k}$  such that:

$$C_8 = 1 / (C_1 (G \cdot C_2 - \hat{K} \cdot C_{3k})) = 1 - [(C_3 - \hat{K} \cdot C_{3k}) / C_1] \quad (M11)$$

Finally, using the framework of Model II, we can use one other measure of import dependence:

$$C_{9j} = ([\gamma x]_j) / ([\theta x]_j + [\gamma x]_j) \quad (M12a)$$

and

$$C_9 = \left( \sum_{j=1}^n [\gamma x]_j \right) / \left( \sum_{j=1}^n [\theta x]_j + \sum_{j=1}^n [\gamma x]_j \right) \quad (M12)$$

We are measuring for one and all industries the ratio of similar intermediate import sales to all intermediate input sales.

Finally, in examining these measures, the most aggregate ones for the performance of the economy are  $C_1$  and  $C_8$  and these, in turn, are related to the behaviour of  $G, C_2, C_3, C_{3k}$  and  $\hat{K}$ . None of these measures can provide a comprehensive measure of the inter-relationships between the economy and the outside world. But of all of these measures,  $C_1$  and  $C_8$  provide the most aggregate indicators of the degree and character of import dependence for the economy. The magnitude of these measures, in turn, depends on structural and behavioural characteristics of the economy, viz., its rate of



domestic capital formation, the ratio of total expenditures to final expenditures, the intermediate import content of capital formation and of total final expenditures. Movements in some of these aggregate measures, then, have a great deal to do with measures of the degree and character of the overall import dependence of the Irish economy.

### III AGGREGATE MEASURES OF IMPORT DEPENDENCE

The importance of aggregate imports as well as the character to those imports for the economy is shown by the levels and movements of  $C_1$  and  $C_8$ :

	1960	1964	1969
$C_1$	.275	.300	.304
$C_8$	.662	.673	.726

of which as a percentage of total imports:

Intermediate Input Imports	.560	.562	.564
Capital Input Imports	.102	.111	.162

Movements in both  $C_1$  and  $C_8$  suggested changes in the commitment to import dependence. Between 1960 and 1969 there was a tendency to a growing dependence on imports and a shift particularly to the acquisition of imports in the form of capital inputs. The results can be broken down to see how less aggregated measures were influencing the import dependence of the economy.

In the case of  $C_1$ , the following underlying forces were in operation:

$$C_1 = G.C_2 + C_3 \quad (M1A)$$

$$1960 = 1.352 \times .114 + .121$$

$$1964 = 1.383 \times .122 + .131$$

$$1969 = 1.387 \times .124 + .133$$

Here we observe that both  $G$  and  $C_2$  and  $C_3$  were tending to pull up  $C_1$  between 1960 and 1969 and in each sub-period. The upward movement of  $G$  reflected a structural shift in the economy with an increasing emphasis being given to the production of a greater amount and variety of goods. What is most directly indicated is the growing importance of intermediate input transactions in the purchase and sale of goods and services in the market place.

A related way to look at this is to note that 'a' for the overall economy rose from .375 in 1960 to .478 in 1964 and .500 in 1969. In terms of total gross domestic output, there is a suggestion that proportionately less was being added to intermediate inputs, and more emphasis was being put on 'final stage' production. But we have to be careful in interpreting these

results for, in the measurement of 'a', we are including factor payments made by final purchasers to owners of factors of production as well as final imports.

A better way to examine changes in the production process is to focus on individual sectors. Within a 17 sector input-output table where we exclude the government and artificial sectors, we can examine the behaviour of sectoral  $a_j$ 's. Here between 1960 and 1969,  $a_j$  rose in 9 cases and fell in 6. From these results, it is worthy of note that chemicals, metals/engineering/vehicles and other manufacturing were becoming more oriented to final-stage production and were the prime examples of the high (science-based) technology industries which grew rapidly during the 1960s with the help of foreign capital, technology and know-how. Textiles and clothing took on greater depth as they grew with foreign participation and with the exception of parts of textiles, these were not high technology industries.

The trend of  $C_3$  was also upwards over the period and in each sub-period. Further confirmation of this finding is found later on when we will examine the direct import content of final demand. This finding is fully consistent with McAleese's (1976) recent conclusions about the development of two-way trade.

Underlying the behaviour of  $C_8$  we see that:

$$C_8 = 1 - [(C_3 - \hat{K} \cdot C_{3k}) / C_1] \quad (M11)$$

1960	.622	= 1 - [.121 - (.107) (.261)] / (.275)]
1964	.673	= 1 - [.131 - (.142) (.234)] / (.300)]
1969	.726	= 1 - [.133 - (.169) (.290)] / (.304)]

These data indicate that upward movements in  $\hat{K}$  and  $C_{3k}$  were increasing  $C_8$ . Of particular note was the rise in the rate of gross domestic investment. This was a predictable outcome of the effort to raise the rate of economic growth. The one exception to this pattern was  $C_{3k}$  between 1960 and 1964, and the erratic behaviour of  $C_{3k}$  is explained by changes in the composition of gross domestic investment between 1960 and 1964 and the reversal of these changes between 1964 and 1969. We can also see that the direct import content of investment spending was always higher than the import content of total final demand so that the increase in  $\hat{K}$  over the 1960s was raising both  $C_3$  and  $C_8$ . Increases in the magnitude of  $C_1$  were also associated with increases in  $C_8$ .

The following show the level and magnitude of changes in  $C_4$  and  $C_9$ :

	$C_4$	$C_9$
1960	.304	NA
1964	.255	.133
1969	.248	.146

As we noted above,  $C_4$  measures the ratio of all intermediate imported inputs to all intermediate inputs from the purchase side while  $C_9$  looks at the ratio of all intermediate similar import sales to all intermediate input sales. At this aggregate level, the different results were caused by the different coverage of imports in the two measures.

The results for  $C_4$  provide the first indication of import substitution between 1960 and 1969. The percentage of intermediate inputs which took the form of imports decreased over the period and we will seek reasons for this outcome. But the results for  $C_9$  between 1964 and 1969 produced a contrasting result suggesting a growing import dependence for intermediate goods and services.

#### IV REASONS FOR THE BEHAVIOUR OF SELECTED MEASURES

##### IV.1 CHANGES IN $C_2$ AND $C_4$

We began by computing  $C_{2j}$ ,  $C_{4j}$  and  $a_j$  for each of the 33 sectors in the 1964 table and ordinally ranked the results for each measure. The results were then aggregated into four major groupings: primary (sectors 1–8), manufacturing (sectors 9–16), other (sectors 17–33) and the final demand production sector. This last sector covers all factor transactions between the owners of factors and final demanders.

Looking at the 8 manufacturing sectors, 7 of them had  $a_j$  values in the top 10 and  $C_{2j}$  and  $C_{4j}$  values in the top 8. Performance in the primary sectors showed only food ranked in the top 10 in terms of  $a_j$  and only drink and tobacco ranked in the top 11 in terms of  $C_{2j}$  and  $C_{4j}$ . The 'other' sectors contained 2 in the top 10 in terms of  $a_j$  and 1 in terms of  $C_{2j}$ . Across the 33 sectors, there was a high rank correlation between the values of  $C_{2j}$  and  $C_{4j}$ . Kendall's tau was .809, significant at the 1 per cent level.

Overall, as contrasted with the rest of the economy, manufacturing industries had the lowest value-added/total input ratios, and the highest dependence on imported intermediate inputs as a percentage of total inputs. They also imported the highest percentage of intermediate input purchases.

We will now examine the results for the changes in  $C_{2j}$ ,  $C_{4j}$  and  $a_j$  between 1960 and 1969 in the framework of the 17 sector table excluding the government and artificial sectors. These results are contained in Table 1.

As seen in Table 1, the changes in the three coefficients for the food sector suggested a pattern of changes but it must be added that in this case the changes were exceedingly small. For all 15 sectors, it is striking that as  $a_j$  rose (fell), so also  $C_{2j}$  and  $C_{4j}$  fell (rose). This suggested that in sectors of increasing import dependence, greater reliance on imports was associated with greater depth in the production process. A lessening dependence on

imports was associated with a greater degree of 'final stage' production and this applied to much of the primary sector and particularly to agriculture as well as to 5 of the 8 manufacturing sectors. Within manufacturing for the sub-period 1964-1969, textiles, clothing, paper and printing, chemicals, metals, engineering and vehicles all had increases in  $C_{4j}$ . This partially fitted the pattern of the whole period and it is striking that textiles, clothing, chemicals and metals represented industries favoured under the IDA and outward looking policies and had a large representation of new firms, many foreign, in 1969.<sup>4</sup>

Table 1: *Changes in coefficients by sectors 1960-1969*

Sector	$a_j \uparrow$	$C_{2j} \downarrow$	$C_{4j} \downarrow$	$a_j \downarrow$	$C_{2j} \uparrow$	$C_{4j} \uparrow$
Agriculture/forestry/fishing		x				
Mining		x				
Drink and tobacco		x				
Wood/furniture		x				
Chemicals		x				
Clay/glass/cement		x				
Metals/engineering/vehicles		x				
Other Manufacturing		x				
Electricity/gas/water		x				
Food						x
Textiles						x
Clothing						x
Paper and printing						x
Construction						x
Private Services						x

Sources: Ireland, Central Statistics Office, Input-Output Tables for 1960 and 1969, Unpublished and Unofficial.

To measure the effects of changes in production, input coefficients and intermediate import input coefficients on  $C_2$ , we took the first difference of equation (M6), which we then used as the basis of our measurements. The results are contained in Table 2 and include an 'interaction' effect on  $C_2$  between changes in two or more of the variables represented by sectoral changes in  $x$ ,  $a_j$  and  $C_{4j}$ .

As results in Table 2 indicate, the major influences on the behaviour of  $C_2$  were changes in  $a_j$  and  $C_{4j}$ . Movements to final stage production, partly offset by import substitution in intermediate inputs, were largely responsible for the increase in  $C_2$  over the period. The primary sector, and particularly agriculture, made the largest contributions to these results. Not alone did this sector provide the major evidence of import substitution in intermediate inputs but also the largest suggestion of the effects of a rising ratio of intermediate to total inputs.

4. Industrial Development Authority Annual Reports.

IV.2 CHANGES IN  $C_0$

The lack of availability of data prevented us from distinguishing similar from complementary imports in 1960. Nor could we track down imports by sector of origin for 1960. But there was a definite advantage to examining similar intermediate imported inputs from the point of view of contrasting their changes with those for domestic intermediate input sales. The key point was that we were examining the most likely area of substitution in intermediate inputs between domestic and foreign sources. As a result, we will analyse the behaviour of  $C_{0j}$  for 16 sectors within the 33 sector tables for 1964 and 1969. We will further examine series showing movements in real domestic intermediate input sales, real final domestic goods and services sales in the domestic market and real similar imported intermediate inputs. By contrasting real intermediate and final domestic goods and services increases, as well as changes in real similar intermediate imports, we can get some indication of whether increasing or decreasing import dependence was likely to have occurred in intermediate transactions over the period and in each sub-period.

Table 2: *Reasons for the changes in  $C_2$  between 1960 and 1969*

	$\Delta C_2$	=	<u>.010</u>
which can be broken down into:			
	The Production Effect	=	<u>.002</u>
of which:	$\Delta x_a . a_a . C_{4a} = -.044$		
	$\Delta x_i . a_i . C_{4i} = .022$		
	$\Delta x_o . a_o . C_{4o} = .004$		
	$\Delta x_f . a_f . C_{4f} = 0$		
	The Ratio of Intermediate to Total Input Effect	=	<u>.014</u>
of which:	$x_a . \Delta a_a . C_{4a} = .010$		
	$x_i . \Delta a_i . C_{4i} = -.001$		
	$x_o . \Delta a_o . C_{4o} = .005$		
	$x_f . \Delta a_f . C_{4f} = 0$		
	The Import Content of Intermediate Input Purchase Effect	=	<u>-.012</u>
of which	$x_a . a_a . \Delta C_{4a} = -.013$		
	$x_i . a_i . \Delta C_{4i} = -.002$		
	$x_o . a_o . \Delta C_{4o} = .003$		
	$x_f . a_f . \Delta C_{4f} = 0$		
	The Interaction Effect	=	<u>.006</u>

*Note:* The subscript 'a' refers to the primary sector, 'I' to the manufacturing sector, 'o' to other sectors, and 'f' to the final demand production sectors.

*Source:* Ireland, Central Statistics Office, Input-Output Tables for 1960 and 1969, Unpublished and Unofficial.

Looking at the values of  $C_{9j}$ , it is worthy of note that this measure of import dependence was lowest for agriculture, forestry, fishing, mining and the food industries including drink and tobacco. The highest values pertained in textiles, clothing, wood/furniture and metals, engineering and vehicles. This fits the preconception of the operation of the Irish economy with agriculture making substantial sales in the intermediate input market, while the manufacturing sector had only a limited involvement in selling intermediate inputs in the domestic market.

It is striking that in 14 of the 16 sectors which competed with foreign producers for sales in the intermediate input market, the value of  $C_{9j}$  rose between 1964 and 1969 and this outcome applied particularly to textiles, clothing and metals, engineering and vehicles. The two exceptions were paper and printing, and wood and wood furniture but the changes in these two cases were small. In short, there was a strong suggestion that an expanding domestic market for intermediate inputs was being fed more by foreign rather than domestic producers.

An effort was therefore made to expand the analysis to cover the 1960-1969 period and the two sub-periods. Within the 17 sector table, series for domestically produced intermediate input sales, similar intermediate import sales, and domestically produced final good and services sales were translated into constant prices. Implicit CIP price deflators were used for this purpose as well as a general agricultural price index and an import price index.

Measured in 1960 prices, the following pattern of results unfolded:

	<i>Increases in Real Domestically Produced Inter- mediate Input Sales</i>	<i>Increases in Real Domestically Produced Final Sales in the Domestic Market</i>	<i>Increases in Real Similar Intermediate Input Imports</i>
<i>All Production Sectors.</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
1960-1969	109.0	3.1	NA
1960-1964	82.9	4.1	NA
1964-1969	14.2	-0.9	65.0
<i>Sectors (1-4)</i>			
1960-1969	147.3	-14.9	NA
1960-1964	87.3	-11.4	NA
1964-1969	32.0	-3.9	-1.7

*Sectors (5-12)*

1960-1969	52.2	47.2	NA
1960-1964	76.3	42.0	NA
1964-1969	-13.7	3.6	65.1

From these results, a number of conclusions can be drawn:

- (a) the increase in real domestically produced intermediate input sales was faster during the 1960-1964 as contrasted with the 1964-1969 period;
- (b) this pattern applied to all production sectors, to the agricultural sector viewed separately and the manufacturing sector also viewed alone;
- (c) as contrasted with manufacturing, agriculture particularly showed faster rates of increase in domestically produced intermediate input sales;
- (d) for agriculture, real domestically produced intermediate input sales increased faster than real domestically produced final sales in the domestic market, and, in addition, similar intermediate imports, measured in constant prices, decreased between 1964 and 1969;
- (e) for manufacturing, both real similar intermediate imports and real domestically produced final sales in the domestic market increased faster than real domestically produced intermediate sales in the 1964-1969 period.<sup>5</sup>

These results suggest that increasing import dependence on similar intermediate imports was occurring in all production sections over the whole period and in each sub-period. The major evidence of import substitution was in the primary sector and particularly agriculture. Increasing import dependence prevailed in the manufacturing sector, and to a degree adequate to ensure that  $C_9$  increased over the period.

## V THE IMPORT REQUIREMENTS OF FINAL DEMAND

The results so far have been based on the actual structures of final demand in 1960, 1964 and 1969. We now need to move beyond these results to determine the changing (final plus intermediate) import content of final demand and, moving still further, to also determine changes in import requirements of various components of final demand. Finally, we also want to get some indication of the relative roles of changing structures of demand and movements of input coefficients in explaining the variations in import dependence over the period.

5. It is of interest to examine the rate of increase of intermediate good and service sales where expenditures are measured in current prices:

	1960-1964	1964-1969	1960-1969
Agriculture	110.5%	96.0%	211.8%
Manufacturing	62.7%	19.2%	84.2%
Other	242.6%	133.7%	474.2%

From another perspective, these data give further substantiation in the two sub-periods as well as over the whole period that the rate of increase of intermediate sales was lower for manufacturing than for either the agricultural or the other sector.

Examining Table 3, we see that  $(C_{5k} + C_{6k})$  per £100 of final demand rose significantly over the period. It was 26.6 in 1960, 30.2 in 1964 and 35.1 in 1969. The same pattern of results was also applicable to private consumption, total exports and, to a smaller degree, to manufacturing exports.

Table 3: *The import requirements of final demand in 1960, 1964, 1969*

	Symbol	1960	1964	1969
Direct Import Content of Final Demand:				
Total	$C_{5k}$	11.1	12.4	14.7
Private Consumption		13.1	14.2	17.3
Total Domestic Capital Formation		26.0	22.3	29.1
Total Exports		1.5	4.8	4.7
Manufacturing Exports		9.1	1.0	5.2
Indirect or Induced Import Leakage:				
Total	${}_kM(t)$	17.5	20.3	23.9
Private Consumption		15.9	19.3	22.2
Total Domestic Capital Formation		28.9	24.4	26.4
Total Exports		19.9	26.6	30.3
Manufacturing Exports		49.8	51.5	56.5
Indirect or Induced Import Leakage:				
Total	$C_{6k}$	15.5	17.8	20.4
Private Consumption		13.8	16.6	18.4
Total Domestic Capital Formation		21.4	19.0	18.7
Total Exports		19.6	25.3	28.9
Manufacturing Exports		45.3	51.0	53.6
Total Import Requirements of Final Demand ( $C_5 + C_6$ ) per £100				
Total	$C_{7k}$	26.6	30.2	35.1
Private Consumption		26.9	30.8	35.7
Total Domestic Capital Formation		47.4	41.3	47.8
Total Exports		21.1	30.1	33.6
Manufacturing Exports		54.4	52.0	58.8
The Induced Import Leakage on the Assumption that:				
(1) The Structure of Final Demand is for 1964			Input coefficient ( $R(t) \cdot V$ )	
Total		17.6	20.3	19.6
Private Consumption		16.1	19.3	18.5
Total Domestic Capital Formation		25.7	24.4	23.8
Total Exports		22.2	26.6	25.6
Manufacturing Exports		50.7	51.5	53.0
(2) Input Coefficients are for 1964:			The structure of demand ( $W_k B(t)$ )	
Total		21.0	20.3	24.2
Private Consumption		20.9	19.3	23.0
Total Domestic Capital Formation		24.6	24.4	26.9
Total Exports		23.5	26.6	30.2
Manufacturing Exports		51.5	51.5	54.5

Sources: Ireland, Central Statistics Office, Input-Output Tables for 1960 and 1969, Unpublished and Unofficial: Ireland (1970): Henry and Walsh (1971).

Note: For the measurement of  $C_{5k}$ ,  $C_{6k}$ ,  $C_{7k}$  and  ${}_kM(t)$  the 1960 table has been reduced to 17 sectors to permit comparability with the tables for later years. Estimates for 1964 and 1969 were made within the framework of the 17 and 33 sector tables. While the results were sensitive to the degree of aggregation, the same trends showed between 1964 and 1969 regardless of which sectoral breakdown was used. The results for the 17 sector table have been recorded here. The figure for the direct import content of manufacturing exports in 1960 is a crude estimate made from Irish trade statistics sources.



Increases in both  $C_{5k}$  and  $C_{6k}$  applied to total final demand and private consumption as time progressed through the periods 1960–1964 and 1964–1969.  $C_{6k}$  rose in total final demand, private consumption, total exports and manufacturing exports between 1960 and 1969. The one exception to this pattern was total domestic capital formation.  $C_{5k}$  rose in total final demand and private consumption. For total domestic capital formation, it fell between 1960 and 1964 and then rose to a level in 1969 higher than the value in 1960. With regard to total exports,  $C_{5k}$  rose until 1964 and then remained relatively unchanged between 1964 and 1969. For manufacturing exports,  $C_{5k}$  went down until 1964 and then regained some of its loss of value by 1969. However, the 1960 value of  $C_{5k}$  for manufacturing exports is the least reliable estimate in the whole set of statistics.

A key question that now arises is whether this movement to import dependence, as reflected in the changes in the value of  $C_{6k}$  for final demand and its components, except for total domestic capital formation between 1960 and 1964 was caused by changes in either import coefficients or the structure of final demand or in the interaction of changes in both.

We found earlier that:

$${}_k\Delta M \equiv {}_kM(t+1) - {}_kM(t) = R(t).V + W.{}_k\beta(t) + WV \quad (E4)$$

$$(1) \quad (2) \quad (3)$$

$$\text{where } W = R(t+1) - R(t)$$

$$\text{and: } V = {}_k\beta(t+1) - {}_k\beta(t)$$

(1) is the demand effect, (2) the input effect and (3) interaction effect.

The analysis produced a definite pattern of results which are contained in Table 4. For total final demand, and all of its components for the whole period and in each sub-period, except for total final demand and gross domestic investment between 1960 and 1964, changes in the composition of demand had major responsibility for the increase in  ${}_kM(t)$  over the period. In the case of gross domestic investment between 1960 and 1964, changes in the composition of this component of final demand had no effect on  ${}_kM(t)$ .

With regard to the input coefficient effect, the results for the 1964–1969 period are in sharp contrast to those for the 1960–1969 period and the sub-period 1960–1964. Except for gross domestic investment, total final demand and its components all showed the input coefficient effect raising  ${}_kM(t)$  between 1960–1964 and 1960–1969. This pattern of results reversed itself between 1964 and 1969. The only exception in the later sub-period was for manufacturing exports where the input coefficient effect continued to increase the value of  ${}_kM(t)$ .

Table 4: Changes in  ${}_kM(t)$  between 1960 and 1969, 1960 and 1964 and 1964 and 1969

	1960-1969	1960-1964	1964-1969
<i>Changes in <math>{}_kM(t)</math>: Total Final Demand</i>	6.4	2.8	3.6
of which:			
Changes in the Input Coefficient Effect	2.0	2.7	-.7
Changes in the Structure of Demand Effect	3.2	-.7	3.9
The Interaction Effect	1.2	.8	.4
<i>Changes in <math>{}_kM(t)</math>: Private Consumption</i>	6.3	3.4	2.9
of which:			
Changes in the Input Coefficient Effect	2.4	3.2	-.8
Changes in the Structure of Demand Effect	2.1	-1.6	3.7
The Interaction Effect	1.8	1.8	0
<i>Changes in <math>{}_kM(t)</math>: Gross Domestic Capital Formation</i>	-2.5	-4.5	2.0
of which			
Changes in the Input Coefficient Effect	-1.9	-1.3	-.6
Changes in the Structure of Demand Effect	2.3	-.2	2.5
The Interaction Effect	-2.9	-3.0	.1
<i>Changes in <math>{}_kM(t)</math>: Total Exports</i>	10.4	6.7	3.7
of which:			
Changes in the Input Coefficient Effect	3.4	4.4	-1.0
Changes in the Structure of Demand Effect	6.7	3.1	3.6
The Interaction Effect	.3	-.8	1.1
<i>Changes in <math>{}_kM(t)</math>: Manufacturing Exports</i>	6.7	1.7	5.0
of which			
Changes in the Input Coefficient Effect	2.3	.8	1.5
Changes in the Structure of Demand Effect	3.0	0	3.0
The Interaction Effect	1.4	.9	.5

Source: Results compiled from data contained in Table 3.

The results for the interaction effects were generally positive. The one exception was the result for gross domestic investment over the whole period and in the sub-period 1960-1964. This effect was significant but was usually not as large as the other two effects. The exceptions to this pattern were gross domestic investment over the whole period and between 1960 and 1964 and manufacturing exports between 1960 and 1964.

The importance of the interaction effect should not be underestimated. It picked up the impact on  ${}_kM(t)$  of changes in the input coefficients times the changes in the composition of demand. When this effect had a positive sign, it meant that sectors where input coefficients increased (decreased) were also the sectors which experienced growing (lessening) relative attention in the composition of final demand over time.

It was also clear that exports were subject to the greatest changes in  $kM(t)$  over the whole period and in each sub-period. This applied to total exports in the period 1960–1964. It was also true of manufacturing exports between 1964 and 1969.

A somewhat speculative note can be added about the impact of the outward looking policies on the import content of final demand and its composition. Probably the period 1964–1969 more clearly reflected the consequences of outward looking policies together with the influences of decade-long income growth. Policy influences had produced cumulative results and freer trade was in operation than in the 1960–1964 period. Primarily we could expect that the outward looking policies would produce large import coefficients because of the freeing of trade in intermediate goods and services as well as because of the expected higher propensity of new foreign firms to import intermediate goods. The discriminatory impact of tax exemptions on profits from increased exports also pulled in the direction of increasing import dependence. The natural process of import substitution would have the opposite effect. With regard to the role of the changing structure of demand, the outcome would depend primarily on which exports would be most encouraged by policy incentives and on the change in the rate and character of investment spending.

Which forces had dominance is indicated by the results for the 1964–1969 period. During this period, it is clear that the major influence producing the increase in  $kM(t)$  was the changing structure of demand. The primary share in total final demand met from domestic sources was falling from 41.3 per cent in 1960 to 26.9 per cent in 1969, while the share of manufacturing was increasing from 7.1 per cent to 26.2 per cent. The share of services was rising from 41.6 per cent to 46.9 per cent. This compositional shift towards manufacturing and away from the primary sector and services meant a switch from sectors with a low import content to ones with higher import requirements. Contributing strongly to these results were the shifts in the composition of both private consumption and total exports.

All of this related to the demand for domestically produced final goods and services, with or without induced import leakages caused by the need for intermediate inputs. Left out of this analysis is all final demands met directly out of import channels. The results for  $C_5k$  have already pointed to a growing fraction of final demand being met directly by imports as the period progressed. While we cannot say anything directly about the year 1960 because of data difficulties, we do know that between 1960 and 1969 the share of manufacturing in total final demand (including demands met by domestic producers and by foreign producers) rose from 20.4 per cent to 26.2 per cent. The changing structure of demand had thus much to do with the growing import dependence of the Irish economy.

The changing input coefficients had a more limited influence than changes in the composition of demand on the import requirements of the Irish economy. It was here that conflicting forces confronted one another and there was a small suggestion that, with the exception of manufacturing exports, some import substitution was in process particularly after 1964. The significance of this was that there appeared to have been scope, particularly in agriculture, for the substitution of domestic for foreign output. This may give us some help in determining some of the possible dimensions of Ireland's future economic development.

## VI ASSESSMENT OF THE RESULTS

While the overall flavour of the results pointed to increasing import dependence in the Irish economy during the 1960s, the picture was not one of an across-the-board rush to growing import dependence as some analysts of outward looking policies might have suggested. No doubt, the changing structure (i.e., changes in the ratio of intermediate to final expenditures, changes in the composition of demand) of the Irish economy which followed from these policies contributed mightily to the growing dependence on imports which occurred, but there was also evidence of the working of the import substitution processes in parts of the economy, particularly after 1964.

Unambiguously, the operation of outward looking policies and the growth of incomes raised the ratio of investment good imports in total imports ( $C_8$ ), total imports in total final demand ( $C_1$ ), the share of final imports in total final demand ( $C_3$ ) and the direct import content of final demand and its components ( $C_{5k}$ ). A less clear picture emerged in examining the behaviour of intermediate input imports and the domestic production, purchases and sales of intermediate inputs ( $C_2$ ,  $C_4$ ,  $C_9$  and aspects of the analysis of reasons for the movement of  ${}_kM(t)$ ). But the conflicting movements of  $C_2$  and  $C_9$  on the one hand, and  $C_4$  on the other, pointed to a growing pattern of import dependence for intermediate inputs and also a growing depth of the production process in many individual sectors. Some evidence pointed to the agricultural sectors as increasing their sales of intermediate inputs in the domestic market and reducing their degree of import dependence in their purchasing of intermediate inputs. But above all else, structural changes rather than changes within individual sectors were primarily responsible for the growing import dependence of the Irish economy. In particular, the changing composition of demand was the main cause of increases in the induced import leakage from final demand and its composition over the whole period but particularly in the 1964–1969 period. For much of the period

also, the rising ratio of intermediate to final expenditures accompanied by a higher import content in intermediate than in final purchases and sales was important in explaining the growing import dependence that we have observed.

## VII CONCLUSION

One important insight for the future seems to come out of this study. It is a reasonable expectation that unless ever expanding export markets for Irish goods and services appear for the indefinite future, the continued expansion of the Irish economy will be accompanied by lessening import dependence of Irish manufacturing industries. No matter what policy orientation is chosen, and despite the small size of the Irish economy, growing evidence of backward linkage is bound to arise, caused by both the expansion of domestic industries in the face of growing internal demand for intermediate goods and services and the decision of foreign firms to meet the demands of foreign-owned, domestically based firms with operations in Ireland. How to accelerate this process should be given increasing attention in the formulation of Irish economic policy during the years ahead.

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*Technical Appendix*

- a. In the compilation of various measures of import dependence, one major problem has been in the handling of factor payments made to foreign residents. It is of particular note that we have no breakdown of such payments by sector and no division of these payments into intermediate and final items. We do not believe that, given the magnitude of these factor flows, the choice of method of measurement has much influence on either the trend or level of import dependence. In the light of the lack of information on the sectoral allocation of such factor payments abroad, it was decided to view such payments as final rather than intermediate items.
- b. Looking at the input-output table for 1960 on the one hand, and those for 1964 and 1969 on the other, it is noteworthy that there is a different handling of government services in the 1960 table as contrasted with those for later years. Many intermediate input purchases by government in the 1964 and 1969 tables are included under final demand in the 1960 table. For comparative purposes, then, an adjustment had to be made in the 1960 table. On the basis of the 1964 and 1969 patterns, we reallocated many items from final government expenditures to intermediate input purchases by government in the 1960 table, and correspondingly made an upward adjustment for final government expenditures along the row for government services. This last step was made on the assumption that final government expenditures are measured on a cost basis. The import inverse for 1960 was compiled with and without this adjustment and we found that the  $C_{5k}$  and  $kM(t)$  values derived from the two import inverse tables were very similar.
- c. A 17 sector domestic input inverse matrix for 1964 was published by Henry and Walsh (1971) and we have used their table. We have computed similar 17 sector matrices for 1960 and 1969.