Projection of the Irish Economy to 1965

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1.   In planning economic development, the responsible
authorities normally do so with some specific objective or
objectives in mind, such as a certain minimum per capita
income, a certain level of employment, or a certain rate
of growth.   Though there might be little disagreement
about the objectives, difficulties arise in realising them
because of certain constraints, the most obvious of which,
in the normal case, is the availability of labour and
capital resources.   Particularly in a free enterprise
economy, there are other constraints which may affect the
feasibility of the objectives, such as the balance of
payments, the investment behaviour of businessmen and the
savings habits of firms and persons.

2.   Before committing oneself to a plan, therefore,
it is natural to ask what are the implications of attempting
to achieve a particular objective?   For example, what are
the implications of achieving a balance of payments surplus
of so many million in 1965, or of achieving a particular
level of income in 1965?   This is not precisely the same
as the question of how such a surplus or level of income
might be attained: rather, by assuming the target to be
achieved, it states, by implication, the conditions
required for its achievement.   The conditions represent
the technical"implications" of the projection, and it is
upon them that the feasibility of the specifically assumed
objective can be judged.

3.   In this projection the chosen target is a level
of income in 1965 of £770 million, valued at current 1960
market prices.   This represents a rate of growth of GNP
between 1961 and 1965 inclusive of 3% per annum, and an
overall increase of 16% over the 1960 level.   The object
of the projection is to derive the implications, as defined
above, of assuming this level of income to be achieved.
The projection resolves itself into

> (a) <u>Assumptions</u>, about the propensity to consume,
>   the growth of Government expenditure, the
>   propensity to import, productivity, the labour
>   force, capital/output requirements.

(b) <u>Estimates</u>, of the level of consumption, government expenditure and imports.

(c) <u>Implications</u>, for the level of exports, and the level of investment.

The accuracy of the implications depends upon the realism of the assumptions and the estimates which are based upon them. If the assumptions are "reasonable" in the light of past conditions and probable trends in the future, then the implications become conditions for the achievement of the specific objective. For example, the achievement of a GNP of £770 million in 1965 may require that exports double over this period, and/or that gross investment increases by 5%.

4. It must be emphasised that this projection can in no way be described as a <u>forecast</u> of what is likely to happen in fact. In a forecast, the rate of growth would emerge as the <u>answer</u>. Nor is it a plan or programme as such, although it might be of use in preparing a plan: in preparing a plan, it would be natural to start off by analysing the causes and limitations of economic growth in Ireland, including the availability of resources as a basis for the study, and then to base the plan upon what the planners think could be achieved in the light of all this information, including the reconciliation of all parts in the whole. The rate of growth which would emerge from this would then be used for the purposes of projection. There is no reason to believe, however, that 3, 5 and 7% have been other than arbitrarily selected. A projection such as this is a useful and necessary part of an overall development plan; but the rate of growth upon which it is based should be the result of initial studies - studies, for example, of Ireland's probable future foreign trade position. Otherwise there is no basis upon which to judge the feasibility of the projection, in terms of its "implications". Indeed, as we shall see, it is very difficult to make a detailed reasonable projection at all under such conditions, without making some very dubious and arbitrary assumptions. This difficulty emerges when we come to consider the method by which the projection is made.

5.　　　　Given the rate of growth, and therefore the levels
of income, output and expenditure in 1965, how would this
level of expenditure be distributed amongst the major
categories of demand - consumption, investment etc? Since

(1)　　　　$Y = C + I + G + (X - M)$

then

$$C + I + G + (X - M) = 770.$$

Now if we could confidently predict the value of some of
these variables in 1965 under this assumption - either by
taking them to be functions of Y or by some other means -
then the remaining variable or variables would be a
"residual", at a particular level <u>necessary</u> to achieve the
postulated level of income.　For example if we assume
consumption and government expenditure and imports to be
functions of Y such that $C = 520$, $G = 90$, $M = 200$, then

$$C + G - M = 410$$

and
$$X + I = 360$$

i.e. to sustain a level of income of £770 million,
exports plus gross investment would have to reach a total
of £360 million.　If we further predicted in some way
that domestic investment would be £140 million in 1965,
then the "required" level of exports would be £220 million.
In this case domestic expenditure would be less than
output and net foreign investment of £20 million would
occur.　If four of the five variables in equation (1)
are dependent i.e. functions of Y, and the fifth is an
independent variable, then it is clearly the latter which
is of importance in determining the level of income.　In
the simple closed Keynesian model it is investment which,
as the independent variable, determines the level of
income: in an open economy exports also enter as an
additional independent variable.

　　　　In Ireland's case exports and imports, as well
as investment, are important factors in determining the
rate of growth.　Increases in income due to a rise in
internal demand tend to be accompanied by a rising level
of imports so that unless there is a commensurate increase
in exports, the pressure on reserves results in a

restriction on the further expansion of demand and output. If imports can be controlled by means of tariffs and quota, then expansion could theoretically continue without the necessity of rising exports, although this possibility is limited due to the need of importing raw materials, but if Ireland joins the Common Market then the importance of exports will be considerably increased. First, control over imports will disappear, and secondly it is likely that imports will increase in even greater proportion as incomes rise - if they do rise. Thus in the projection "required exports" is the important independent variable.

6.   Consumption and current government expenditure are being taken as functions of the level of income. Theoretically by estimating a marginal propensity to import, imports should also be subject to the same treatment, but in practice the prediction of imports presents rather serious obstacles. As mentioned above, the gradual reduction of tariffs, assuming Ireland's entry into the E.E.C., is likely to alter the ratio of imports to GNP to an extent which defies accurate or even approximate prediction. In addition the high proportion of raw materials in Ireland's imports renders estimation on aggregative level very difficult - not only the pattern of final demands but the structure of outputs should be considered. Finally, about two thirds of Ireland's capital goods are at present imported; since investment is an independent variable, these imports cannot be treated as a function of the level of income.

     Unless some attempt to estimate the likely level of imports is made, however, the projection would lose any value which it may have, since its most important function is to derive the required level of exports to sustain the postulated level of income, and to maintain an acceptable balance of payments position. The only solution which seems possible is to "estimate" several possible levels of imports and apply each in turn to the projection - resulting, of course, in several different (possible) answers in terms of "required exports".

7.   Projections based merely upon national income and expenditure aggregates are of limited value for planning purposes. A more disaggregated model is required which shows the pattern of demand amongst

different commodities, the pattern of output amongst
different industrial sectors, the level of employment,
and a more accurate picture of the pattern and level of
imports.

The next step therefore is to introduce a
limited input-output projection, whereby demand will be
disaggregated into various different sectors e.g. food,
consumer durables etc. In the case of Ireland a 14
sector table would be suitable, the sectors being -
agriculture, food processing, drink, tobacco, clothing,
chemicals, metals and machinery, vehicles, other
manufacturing, construction, fuel and power, transport,
trade and services, and Government administration and
defence, the last being a "dummy" sector (i.e. no inter-
industry relations). The assumptions of input-output
relations are necessary in any case, whether an explicit
table be used or not. Unfortunately the only Irish
input-output table extant is that for 1956; changes in
technical coefficients have obviously taken place, but
lack of information on this subject makes the intro-
duction of such changes difficult, though adjustments
of the coefficients to a more recent year can be made;
this may make for errors of considerable magnitude.
This problem will be discussed later.

8.   A more fundamental difficulty, however, lies in
the very nature of this type of projection. In order
to project the structure of the economy in terms of
industrial outputs, it is necessary to disaggregate final
demands amongst the (14) different sectors. Now since
consumption and government expenditure are estimates,
derived as functions of income, it is possible to
disaggregate these respective totals with the help of
demand studies and other data; investment and exports,
on the other hand, are not estimates but "residuals" -
their levels are not functions of income but statements
of what exports and investment must be to sustain the
postulated level of income. For example, the "required"
level of exports might be £300 million - since this is
not an estimate or forecast, there is no accurate way in
which this £300 million can be divided up amongst the
various exporting industries. This in turn means we
cannot properly disaggregate total final demands, and by

this means calculate required levels of output in
different sectors. If a country's exports consisted of
only one or two commodities, then of course this problem
would not arise, or could be dealt with fairly
satisfactorily, but this is not the case in Ireland: or
if exports formed only a small proportion of GNP and the
output of each industry, then they could be distributed
amongst different sectors in a fairly arbitrary manner,
since the errors in the results would be very small.
Again this is not the case in Ireland, where exports form
some 40% of GNP, and thus the way in which exports might
be distributed amongst different commodities would
significantly affect the results, in terms of levels of
output, employment, imports for further production, etc.
Unless an independent forecast for exports in 1965
happens to approximate to the "required" level resulting
from the projection, it is hard to see how this difficulty
can be resolved in a way which will make the input-output
projection useful.

A similar criticism can be made in the case of
investment, although here the limited number of producer-
goods industries in the table (two plus construction)
suggests that the difficulty here may not be insoluble
on the output side.

9. Consumption

Though we can say that consumption and income
are functionally related, the variety of theoretical
assumptions which can be used to "explain" the relationship -
some independent, some mutually exclusive - poses a wide
range of choice as to the exact form of the function. The
main interest in establishing a relationship is to estimate
the marginal propensity to consume (MPC) - the relation
between increases in income and increases in consumption.
In theory, it is generally held that as income per head
rises the MPC falls, so that if GNP rises faster than
population, aggregate consumption falls proportionately to
GNP.

As Table I indicates, however, this does not
appear to be the case in Ireland, where over an eight-

year period consumption fluctuated but showed no marked
trend downwards as a proportion of GNP.

Table I - GNP and consumption 1953-60 (1953 market prices).

	(1) GNP (£ mill)	(2) Personal consumption (£ mill)	(3) Ratio (2)/(1)	(4) Index GNP
1953	525.6	389.1	0.740	100
1954	532.4	397.1	0.746	101.3
1955	541.9	416.5	0.769	103.1
1956	533.7	404.0	0.757	101.5
1957	540.5	396.9	0.734	102.8
1958	519.8	401.4	0.772	98.9
1959	543.4	407.7	0.750	103.4
1960	571.0	428	0.750	108.6

A linear regression of consumption on GNP yields the equation

$$C = -0.7 + 0.754x$$

(2)   i.e. $C = 0.754x$ (x = GNP).

The parameter 0.754 is almost exactly equal to
the average consumption/GNP ratio of col. (3), which
is 0.752.   Using these two figures as approximations,
the APC and the MPC are equal in Ireland's case.   Attempts
to calculate the MPC on a year to year basis proved
unsatisfactory, either from the original data or from 2-
and 3 - year moving average values.   In a majority of
years, the change in consumption was greater than the change
in income - in the other years no consistent relationship
could be discerned.

There are several points which should be mentioned
with respect to this calculation.   For one thing, GNP did
not change very much over the relatively short period
under consideration, and therefore it might be expected the
APC would remain fairly constant and that no discernible
trend would be observed in the MPC - against this however
is the fact that population declined over the period, so
that GNP per capita rose faster than GNP.   Nevertheless,
the significantly greater increase in GNP postulated for
1965 might have effects on the MPC not previously evident.

Another objection is against the use of GNP as
the independent variable, when disposable personal income
would appear to be the more relevant variable. A similar
calculation was therefore made for the linear regression
of consumption on disposable income, and yielded the
equation

(3)   C = 50.4 + 0.808X   (X = disposable income)

Once again the year to year movements in
consumption and disposable income were erratic in relation
to one another, and the use of 2 and 3-year moving
averages did not sensibly improve the situation.

If disposable income is accepted as a more
valid determinant of consumption than GNP, then it should
be used for the projection of consumption. This, however,
is not possible since we do not know disposable income in
1965: if we assume the same average relationship between
disposable income and GNP in 1965 then the same answer
will be obtained by either method. To do this would
involve the assumption that no change would occur in the
factors determining disposable income - namely undistributed
profits and direct taxation. This assumption will be made
for the initial projection, but there are reasons why
changes may occur in both these factors in 1965, and in this
case equation (3) becomes relevant in assessing the
possible effects upon consumption. Possible causes of
changes in undistributed profits and taxation are discussed
later.

Using an MPC of 0.754, therefore, estimated
consumption in 1965 is £580m. - but policy decisions
by businesses and Government may well result in a figure
for consumption lower than this.

10.   Government current expenditure

Quite clearly, Government expenditure is not a
real function of income in the same way as consumption.
Within limits, a Government can decide upon a certain
level of expenditure and then set about raising the funds
to finance it. A large proportion of Government
expenditure is fixed in real terms and although Government
activity may rise as income rises it is less likely to fall
significantly as a result of downward movements in the
level of income.

In a development plan, a rising share of
Government expenditure relative to other forms of
expenditure might form the basis of the plan, in terms
of current and capital expenditures. Thus there is
no functional relationship between income and Government
expenditure, and no reason why the latter should be taken
as a fixed proportion of the former.

As a result of enquiries made in connection
with the second Programme for Economic Expansion, however,
it was learned that the level of Government expenditure
was to remain proportionately the same in relation to
GNP throughout the period under consideration, for
projection purposes, and so this has been done here.

In the years 1953-60, the share of current
Government expenditure in GNP varied between 10.3 and
10.9%, with a mean of 10.7%. Adopting this figure for
1965, then, yields a total of £82m. for that year. In
the projection, this figure of £82m. can be regarded as
"given."

11. Imports

Assuming a rise of 16% in GNP between 1961
and 1965, what would be the likely trend of imports?

The importance of imports in the Irish economy,
and thus their importance in any development programme,
may be illustrated by Table 2 below.

Table 2 - Levels of and changes in GNP and
imports 1953-60. 1953 market prices

	(1) GNP	(2) Imports	(3) (2) as % of (1)	(4) Change in GNP	(5) Change in imports	(6) % change in GNP	(7) % change in imports
	£ million			£ million			
1953	525.6	205.2	39.2	12.9	22.7	2.5	12.4
1954	532.4	201.5	37.9	6.8	-3.7	1.3	-1.8
1955	541.9	223.9	41.1	9.5	22.4	1.8	11.1
1956	533.7	196.7	36.4	-8.2	-27.2	-1.5	-12.1
1957	540.5	186.6	34.4	6.8	-10.1	1.3	- 5.1
1958	519.8	205.1	39.5	-20.7	18.5	-3.8	9.9
1959	543.4	225.1	41.3	23.6	20.0	4.5	9.8
1960	571.0	237.0	41.7	27.6	11.9	5.1	5.3

Source: National income and expenditure 1960.

The arithmetic mean ratio of imports to GNP (col. (3)) is 38.9% for the period under review; if 1956 and 1957 are excluded, due to the imposition of Special Levies in 1956, the ratio rises to 40.1%, and it can be argued that this is the more "realistic" figure.[1] Cols. (6) and (7) show the percentage changes in GNP and imports for each year; again, if 1956 and 1957 are excluded, a fairly clear picture emerges. In 4 of the 6 years, changes in GNP were accompanied by a more than proportionate change in the level of imports - indeed in two of these cases the absolute increase in imports exceeded that of GNP, and in a third was almost equal. In a fifth year imports increased by almost 10%, whilst GNP fell, and in one year a slight increase in GNP was accompanied by a small decrease in imports. The rather diverse relative movements, and the break in continuity caused by the Special Levies, makes any precise (mathematical) relationship which may be calculated, between movements of imports and movements of GNP, of rather limited value when based on past aggregate movements.[2]

12.   Even if this were not so, however, Ireland's possible entry into the E.E.C. would almost certainly mean a change (rise) in the proportion of imports to GNP - otherwise high tariffs and quotas would be unnecessary. Attempting to estimate the level of imports if Ireland (a) enters the E.E.C. and (b) achieves a level of income of £770m. in 1965, is more than simply a matter of trying to estimate how Irish businesses face up to open European competition in their own market. Approximately 60% of Ireland's imports consist of materials for further production, much of which is processed by exporting firms. Irish exporting firms will have to face keener competition in the formerly preferential British market, whilst the future of foreign-owned firms, induced here by financial considerations and by preferential entry into Britain, is even less certain. As against this, Irish firms will gain

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(1)   Special Levies were maintained after the e 2 years, but quotas were probably eased, and the "shock" effects of the Levies had probably worn off by 1958.

(2) In an unpublished paper "A growth model of the Irish Economy" Dr R. C. Geary has examined movements in aggregate imports and growth in GNP for 20 different countries, showing a close statistical relationship between the two aggregates in all cases.

greater access to the present E.E.C. countries, and will improve their relative competitive position vis-à-vis Commonwealth countries and other countries outside this Customs Union. The level and pattern of imports of materials for further production, therefore, may undergo considerable change between 1960 and 1965.

On the other hand imports of finished goods and imports of capital goods are dependent upon quite different factors. Any consistency in imports of finished goods is likely to be related to GNP or disposable income, whilst imports of capital goods are clearly related to the level of investment in industry. For these reasons four separate calculations have been made with respect to imports i.e.

(i)   imports of materials for further production:

(ii)   imports of finished goods:

(iii) imports of capital goods:

(iv)   other imports - tourist expenditure, outflow
       of profits etc.

13.   (i) Imports of materials and semi-finished goods. Using an input-output model, this figure would emerge as a result of calculating levels of output for the different sectors of the economy; at the moment, however, this method is not available, since the pattern of final demands is not yet known. For the present, therefore, we can only estimate roughly the level of such imports to produce the given aggregate level of output, and then modify the figure when we come to make the input-output calculations for individual producing sectors.

Table 3 - Imports of raw materials 1953-61

Year	(1) Current Values	(2) Whole-sale price Index	(3) Value at 1953 prices	(4) Import Vol. Index (base 1953= 100)	(5) Index of Production transport-able goods
1953	111.1	100	111.1	100	100
1954	111.6	98.4	113.4	102.1	103.3
1955	128.7	100.0	128.7	115.8	107.5
1956	111.7	106.3	104.6	94.1	105.3
1957	114.0	112.4	101.4	91.3	104.5
1958	122.0	109.0	111.9	99.9	106.5
1959	134.1	107.5	124.7	112.2	117.3
1960	145.1	108.2	134.1	120.7	121.9
1961	162.9	108.1	150.7	135.6	136.8*

Sources: Irish Trade Journal June 1960, Sept. 1961,
          March 1962. National Income and Expenditure 1960.
                    * Provisional

The last two columns of Table 3 permit a
comparison of movements in the volume of production in the
transportable goods industries and the volume of imports of
raw materials. Not surprisingly, they move in the same
direction. What is of some interest is the fact that
changes in the volume of production are accompanied by
greater than proportionate changes in imports suggesting
that the expanding industries are those whose products
have a high import-content. This, again, though not an
astonishing hypothesis, has obvious implications (if true)
for future expansion: imports of raw materials are
likely to rise more than proportionately to GNP, in the
event of a 3% per annum growth. This is one of the facts
which should emerge from an input-output projection.

In the knowledge that imports of goods for
further production and raw materials will rise pari passu
with manufacturing output, can we make any sort of precise
estimate of the level of these imports in 1965, on the
basis of our 3% assumption? There are several factors to
be borne in mind here, of a negative nature with respect
to the problem. The most obvious one is that, although
a 16% overall increase in GNP has been postulated, we do
not (yet) know its likely distribution as between the
different major categories of GNP i.e. agriculture, industry,
services etc. This problem exists because exports, which
form a large proportion of output, are not an estimate but a
residual item, creating the difficulty discussed in 8 above.

Even if a guess were made as to the relative
movements of the major sectors, this would still be
insufficient. For example, it might be estimated that the
growth of output in the transportable goods industries would
be about 20%; but since the import requirements of each
sector within the transportable goods industry is different,
and there will be differences in relative growths of output
between them, the exact level of imports remains unknown.

To drive a final nail into the coffin of
statistical accuracy, the relation between imports and
manufacturing output has been and, probably will be,
influenced by tariff levels and quotas. For instance, a
rise in the price index number which includes customs duty,
is noticeable in 1956-57 - the rise is much more marked in
the base of finished consumer goods (Tables 3 and 4).
The Special Import Levies, as well as quotas which do not
reveal themselves in the tables, clearly affected the

volume of imports. This makes it difficult to arrive at
any precise mathematical relationship between output and
imports, and it is difficult to say what the quantitative
effects of a lowering of tariffs and elimination of quotas
will have in the future.

Despite these obstacles, it is nevertheless
necessary to make a previsional guess as to the level of
these imports in 1965. For unless this is done, we cannot
arrive at the important aggregate, namely "required level of
exports" which is to form the target figure for expansion
of GNP. Furthermore if "required exports" could be
distributed amongst the different sectors according to the
most likely trends, then a pattern of "final demands" can be
constructed: from this, a possibly more plausible figure for
imports can be calculated. Thus by a process of reiteration
we could theoretically arrive at a reasonably accurate estimate.

15. Between 1953 and 1960 the volume increase in
industrial (transportable) output (21.9%) was $2\frac{1}{2}$ times
greater than the increase in GNP in real terms (8.6%).
Agriculture, much more erratic in performance, made notable
contributions only in 1957, 1959 and 1960; in overall terms,
this sector has just kept pace with the rise in GNP.
Although the future is not unhopeful, it is unlikely that
agriculture could be looked to as the driving force behind
the postulated 16% increase in GNP in 1965. (In reality,
of course, it may be that agriculture will determine the
actual rate of growth of the Irish economy). Assuming
a small but steady growth in agriculture, therefore,
industrial expansion will have to be in the region of 35-40%
between 1960 and 1965. What does this imply for imports?
In the years of "recovery", 1957-58, 58-59, 59-60, imports
of raw materials rose twice as fast as the overall level of
output in transportable goods industries. Though a period
of 3 years may be insufficient to smoothe out the effects
of stock-piling, it would not seem unreasonable to assume
that an increase of 35-40% in output would be accompanied
by a rise of 70-80% in raw material imports. Although the
change in the index for imports and output is roughly the
same between 1953 and 1960, we have postulated that the
expanding industries are those with a high import content.
A sustained increase in the output of these industries,
therefore, would almost certainly push the volume index for
imports much higher than that for transportable goods
output as a whole.

16.   A rise of 75% in imports of semi-finished
products and raw materials would raise the level of such
imports, at 1960 prices, to £233m. No great injustice to
accuracy would result in rounding this figure to £230m.
The extremely tentative nature of this figure cannot be
over-emphasized. We do not know the exact contribution
which the industrial sector will make towards the overall
rate of growth. Within the industrial sector, we do not
know the relative contributions of each industry towards the
overall figure, and the structure of imports may change in
such a way as to significantly alter their cost, in either
direction.

17. (ii) Imports of finished goods. Though also subject
to error, the marginal propensity to import (MPM)
theoretically presents less difficulty in estimation, since
a simpler regression of past aggregates could be used to
forecast the likely trend in the future. Once again,
however, the alteration of tariff levels and quotas poses
difficulties, both from the point of view of estimation
based on past data, and from the point of view of future
projection. Thus, a drastic rise in the tariff on many
commodities in 1956, reflected in the price index (Table 4),
cut the volume of imports very sharply, and automatically
changed the relation between disposable income, consumption
and imports. And a reduction in tariff levels in the
future would probably have a similar effect in the opposite
direction.

Table 4 - Consumption Expenditure and Imports of Finished Goods 1953-60
At 1953 market prices

	(1) Consumption	(2) Imports	(3) Price index (imports)
1953	389.1	45.5	100.0
1954	397.1	42.7	100.3
1955	416.5	47.4	102.8
1956	404.4	35.2	116.5
1957	396.9	33.8	123.2
1958	401.4	36.2	120.0
1959	407.7	38.8	116.0
1960	428.0	40.5	114.6

A regression of imports on consumption expenditure
for the years 1956-60 i.e. after the imposition of Special
Levies, results in a MPM of almost exactly 0.20 or one fifth.
Since any change in tariff levels in the next few years is

likely to be downwards, it would seem that this should be the <u>minimum</u> estimate for changes in the level of imports in 1965. It will be observed that a change of almost £20m. in consumption expenditure between 1954 and 1955 was accompanied by a change of almost £5m. in imports, a MPM of approximately 1/4. It may be that this is a more likely coefficient. (Admittedly, in 1953-54, imports fell whilst consumption expenditure rose).

If we use the minimum coefficient of 0.20, the estimated rise in consumption expenditure of £152m. will include £30m. of imported consumption goods, raising the total level of such imports from £40.5m. in 1960 to about £70m. in 1965. A change in tariff levels would in all likelihood increase the MPM, however, and result in a level of imports several millions in excess of £70m.

18.   (iii) Imports of capital goods. As in the case of finished goods, there has been a fairly consistent though imprecise relationship between imports of capital goods and gross capital formation over the past few years; the ratio of imports to total investment has varied between 0.6 and 0.7 (Table 5). Moreover, the Special Levies of 1956 had little or no effect upon the price of imported capital goods.

Table 5 - Imports of Capital Goods and part of Gross Fixed Capital Formation*

| | (1) | (2) | (3) |
| | Imports at | (1953 prices) | Import |
Year	1953 prices	Capital formation	Price index
1953	20.9	30.3	100.0
1954	19.3	33.7	100.9
1955	19.1	33.0	105.0
1956	21.6	30.8	109.6
1957	17.7	27.5	113.8
1958	19.9	32.1	114.9
1959	21.0	32.5	115.5
1960	20.8	34.0	116.3

* The "gross" figures for capital formation include only capital formation in the form of transport equipment, agricultural machinery and other machinery. Roads, dwellings and other construction have been excluded, as such capital is not directly imported.

If no great change were to be expected in the
rate of such investment, therefore, we could estimate the
level of imported capital goods in 1965 on the assumption
that the ratio of imports to total investment (as defined
above) would remain at about 0.65.   The calculation of
such investment in 1965, however, poses difficulties
mentioned in the introductory part of this paper, in
addition to certain practical difficulties similar to
those raised by the estimation of raw material imports.
That is, the capital requirements, and present capacities,
of each industry differ, so that the level of investment
required to increase output to 1965 levels depends upon
the share of each industry in this expanded output -
relative shares which we do not yet know.

Even if this obstacle could be surmounted,
however, the more fundamental one of how to "estimate"
the level of gross investment in 1965 remains.   Estimation
of the level of capital imports, therefore, must wait
until this problem has been tackled.

19. (iv) "Other" imports, mainly tourist expenditure
abroad and outflow of dividends and profits, have been
arbitrarily calculated by straight-line extrapolation of
the 1953-60 figures.   In total they amount to £44m.
Both the main categories of this total have increased at
a steady rate since 1953, amounting to £34.1m. in 1960 in
a total of £37.4m. for "other" imports.   The minor items
(£3.3m. in 1960) have also shown a slow but steady increase
since 1953.   Thus the £44m. is composed of £22m. for out-
flow of profits and dividends (£18.9 m. in 1960); £18m.
for tourist expenditure (£15.2m.), and £4m. for the remain-
der (£3.3m.).

20.   Gross capital formation.   In considering gross
capital formation, and later exports, we come to the two
crucial aggregates in the projection, as far as the
achievement of the postulated level of income is concerned.
For investment and exports are not, like consumption,
functions of the level of GNP, i.e. determined by GNP, but
determinants of its level.   Given the level of GNP, the
MPC, imports and Government expenditure, there is a unique
level of the aggregate (investment plus exports) required
to achieve this level of income.   Thus a plan designed to
achieve a level of GNP of £770m. in 1965 hinges upon cert-
ain targets set for these two independent variables.

In this exercise we have started off with a postulated figure for GNP, and have derived from it consumption and Government expenditure. Imports have been only partially calculated, however, since imports of capital goods are dependent upon the level of gross investment, which is one of the independent variables. For this reason, if no other, it would be necessary to estimate (or guess at) the composition of the residual figure (investment plus exports) as between its two components, but there are two other obvious reasons. Although the generation of income might be equally effected by means of investment expenditure or exports, there are two constraints which must affect the composition of the demand equations.

21.   The first is that whilst investment is a constituent of demand, it is also a constituent of supply. Thus a certain minimum level of investment is necessary in order to supply the postulated increase in output.

22.   The second constraint is that of the balance of payments. It may not be desired, or even possible, to maintain a balance on current external account, but there are clearly limits to any deficit, set by political considerations, e.g. the availability of external assets and borrowing powers. However, since this paper concerns itself only with the "implications" of achieving a particular level of GNP, and not with the question of whether it is possible or not, no attempt is made to forecast exports. If we calculate investment, or postulate it, exports must be a particular level to sustain the postulated level of GNP i.e. to balance both sides of the identity equations (1) [page 3]. If the projection is to come true, then policy measures must be directed towards achieving the "calculated" figure of investment and the "residual" figure of exports; of the two, the latter figure is more important, because of the balance of payments.

23.   Investment, then, is not an estimate in the same way as was consumption, Government expenditure and imports. It is a calculation of the minimum level of investment required to supply the postulated increase of 16% in output. In addition it is necessary because it enables an estimate to be made of imports of capital goods, and it provides a residual figure for the level of exports required to sustain the postulated level of GNP.

For purposes of calculation, it is convenient
to regard several distinct categories of investment;
namely, Government capital formation, other building and
construction, capital formation in industry, agricultural
investment, and stock investment.

24.   (i) Government capital formation.   Table (6)
relates capital formation by public authorities to GNP
for the period 1956-60, at constant (1953) prices. The
price index used was derived from Tables A.10 and A.11 of
the National Income and Expenditure book 1960, relating to
expenditure upon dwellings, roads and other construction,
approximately 40% of which is public authorities' expenditure.
As a percentage of GNP, public authorities capital
expenditure shows a remarkable consistency for the period
1957-60.   Previous to this, i.e. from 1953-56, the figure
of 4.1% was a more representative estimate of the
proportion of Government capital expenditure in GNP.   The
fall from 1957 onwards was an important result of the
adoption of the first Programme for Economic Expansion, in
which a reduction in so-called "non-productive investment"
was a major policy aim.   Since it was indicated [10, page
11] that Government expenditure was to remain a constant
proportion of GNP in the years ahead, the figure of 2.9%
has been used to calculate Government capital expenditure
in 1965.   This gives a figure of £22.3m. at 1960 prices.

Table 6.

Public Authorities' Capital Formation as a
Proportion of GNP 1956 - 60.

	(1) Price index (1953 = 100)	(2) Govt. capital formation at market prices	(3) Govt. capital formation at 1953 prices	(4) As a % of GNP at 1953 prices
1956	106.7	23.2	21.7	4.1
1957	111.4	17.5	15.7	2.9
1958	113.7	16.9	14.9	2.9
1959	110.9	17.5	15.8	2.9
1960	111.9	18.3	16.4	2.9

Source : National Income & Expenditure 1960.   Tables 10, 11 & 14.

25.   (ii) Other building and construction.   The
nature of Government capital expenditure is such that, in
calculating its level in 1965, no attention need be paid
to the "capacity constraint" mentioned in 21 above.   For
although such expenditure is a constituent of final demand,

and important as regards generation of income, there is no
close direct link between the level of such expenditure and
the supply of goods and services for consumption.   Thus if
Government direct expenditure is to play a passive role, it
does not seem unreasonable to regard it as dependent upon
the level of GNP.

This lack of relationship between "capacity" and
total output of goods and services also _partially_ holds for
"other building and construction".   For example, there is
no obvious link between the construction of private dwellings
and the ability to expand total output of manufacturing
industry.   The link between output and office and factory
construction expenditure is more logical, though the extremely
diverse nature of such expenditure makes it difficult to
connect it with any particular aggregates;   and one may also
take the view that such expenditure is influenced by the
level of past profits rather than by precise calculations
as to future capacity needs.   Whilst this may not be true
for new factories and extensions, it is not easy to link
the future output of goods and services with required
capacity for insurance offices, shops, garages, dwellings
and churches.

For these reasons resort has been taken in guess-
work.   The arithmetic mean of "other building and
construction" as a percentage of GNP has been 5.1% over
the period 1953-60.   This represents, in 1965, £39.2m.,
and this figure has been adapted for the projection.   It
may perhaps be unnecessary to emphasize that, whilst the
other estimates given have some degree of theoretical or
other justification, this has none whatsoever.   If a
figure shows considerable stability in relation to some
other aggregate over a period, then its projection might
be regarded with some confidence, but as Table 7 shows,
there is no particular stability in the aggregate under
consideration.

Table 7.

"Other building" as a % of GNP (1953 prices)	Index of building (volume at 1953 prices)	Index of GNP	Index of manufacturing output
1953	4.9	100.0	100.0	100.0
1954	5.5	113.5	101.3	103.3
1955	6.1	126.5	103.1	107.5
1956	5.8	118.8	101.5	105.3
1957	4.9	101.5	102.8	104.5
1958	4.2	83.1	98.9	106.5
1959	4.3	90.4	103.4	117.3
1960	4.5	98.5	108.4	121.9

Although, not surprisingly, all three index numbers tend to move in the same direction, there appears to be no meaningful (stable) relation between year to year changes in the building index and either of the two other indexes.

26. (iii) Stock investment. Change in the level of st c stocks, being of little significance in relation to GNP, need not detain us long. In a period of steady expansion, noticeable fluctuations in stock levels are unlikely to occur; as total manufacturing output increases, we should expect a similar increase in stocks held; this has been true of non-agricultural stocks over the period 1953-60, taking account of a certain time-lag. For example, although manufacturing output rose in 1958, after falling in 1956 and 1957, stocks continued to fall in that year also and the build-up did not re-commence until 1959. In the case of agricultural livestock, however, exactly the reverse is true. An increase or fall in sales of livestock or livestock products has been accompanied by a fall or increase respectively in stocks of livestock. This has been either a cause or effect of fluctuating livestock output over the period

reviewed, but it is only possible under conditions of
fluctuating output;   if we postulate a steady year-to-
year expansion of livestock output, then clearly we
cannot also postulate a continual fall in stocks of
animals, unless such stocks are very large in relation
to the postulated increase in sales.

It is likely then that small but positive
changes in both agricultural and non-agricultural stocks
will occur between 1960 and 1965:   on the basis of past
movements, the change is unlikely to exceed £4m.

27.   (iv) Agricultural machinery.   A postulated
expansion in agricultural net output over a period of
years clearly has implications for investment in
agricultural machinery: if a relation could be established
between increases in output and increases in investment,
then we could use this incremental capital-output ratio
to calculate the necessary level of investment in 1965,
assuming that we knew agricultural output in that year.
Unfortunately past statistics do not offer much guidance
in estimating the agricultural capital-output ratio.

Table 8.

Agricultural Output and Investment 1953-60.

Year	Volume index of net agric. output (excl. stock changes)	Investment at 1953 constant prices £m.
1953	100.0	4.4
1954	104.3	5.5
1955	101.6	4.4
1956	107.4	2.5
1957	112.9	3.6
1958	97.5	3.6
1959	98.6	3.5
1960	110.4	3.0*

* Provisional

Sources :   National Income & Expenditure 1961.

Irish Trade Journal, June 1961.

Output fluctuated considerably over the period, and invest-
ment displayed if anything a steady decline.   It is
difficult in these circumstances to calculate a capital-
output ratio of any real meaning.   Quite clearly machinery
was being worked at different levels of capacity throughout

the period, and it is not possible in these circumstances
to state the level of investment necessary to raise
agricultural output by a specified amount.

Apart from this, we return to the recurring
difficulty that, not having estimated the pattern of
exports in 1965, we do not know the level of agricultural
output in that year.   However, since an increase in
agricultural output depends primarily upon increasing
food exports, it is hard to imagine that total output
between 1960 and 1965 could be increased by an amount
much greater than that between 1953 and 1960 i.e. 10.4%
unless unexpectedly good export markets present themselves
and farmers react to this in a way similar to that of
industrial exporters.   At any rate it would seem over-
optimistic to expect an increase of over 3% per annum
average increase, and a total increase by 1965 of 15%.
Since past increases in output have been accompanied by
a lower level of investment than that of the earlier part
of the period 1953-60, this increase could probably be
achieved without requiring a noticeably higher level of
investment than in the past.   Bearing in mind the
murkiness of the agricultural crystal ball, and the
mystery surrounding the capital-output ratio, £5m. seems
a reasonably cautious estimate of the maximum required
investment in agricultural machinery.

28.   (v) Other machinery and equipment, including
transport equipment.   In the industrial sector of the
economy, we should be able to gauge with more accuracy
the increase in investment required to supply a specified
increase in aggregate output - though this involves an
implicit assumption as to the level of capacity at which
existing and past capital stock has been worked.   It
seems fairly clear, however, that capacity-use fluctuated
during this period;   particularly in 1956 and 1957
industrial production levelled off, declined, and then
began to rise again.

Table 9 compares changes in annual rates of
investment expenditure with changes in the volume of net
output of all industries, for certain selected years.

Table 9.

Industrial Investment and Industrial Output.

	(1) % increase in investment expenditure (base = 1953). 1953 prices	(2) % increase in net output of all industries (base = 1953).
1956	9.3	11.3
1958	10.0	17.7
1959	12.0	30.1
1960	19.7	40.0

These figures by themselves do not offer a
very precise measure of the relation between increases
in the level of investment expenditure and increases in
industrial net output, but they do give some idea of the
rough orders of magnitude involved. In 1956 a slowing-
down in the rate of increase of manufacturing output had
begun, so that in all probability there was surplus
capacity above the normal. This was probably still the
case in 1958 and 1959, while the upswing was under way.
In the following year, 1960, the continued rise in
demand and output required a stepping-up of the rate of
investment expenditure, so that this last year is
probably fairly representative of the relation between
industrial investment and industrial output. If we
adapt these latter figures for the projection, then a
further rise of 35 - 40% (p.13) in industrial output
will require an increase in investment expenditure of
approximately 20% over the 1960 level. This means a
level of investment in 1965 of about £44m. (at 1960
prices).

29.   The total of agricultural machinery, industrial
machinery and equipment, and transport equipment is there-
fore £49m.   If we assume a fairly constant relationship
between this aggregate and imports of capital goods, the
latter forming about 65% of the former, then imports of
capital goods amount to £31m.

30.   At this stage it may be useful to present a
table of the results so far obtained, in the form of
national income accounts, since it is now possible to
enter a figure for "required exports".

Table 10.

Expenditure on GNP in 1965, at 1960 Prices.

	£m.
Consumption expenditure	530 (498)
Net Government expenditure	82 (71)
Gross fixed capital formation	111 (87)
Changes in stocks	4 (9)
"Required level of exports"	368 (255)
Less imports of goods & services	-375 (-256)

The figures in parentheses refer to the 1960 categories of expenditure.

It is important to note that the aggregate "required level of exports" is that figure which, given the other aggregates, is necessary to sustain a level of income of £770m. It need not be such as to result in an equilibrium in the balance of payments; in fact there is a deficit of £7m., which is the amount by which domestic savings (postulated) falls short of the postulated level of investment expenditure.

31.   Summary of the results

(1) It is required to study the "implications" of achieving a level of income of £770m. in 1965.

(2) The first step is to break down this £770m. according to the likely levels of major categories of demand.

(3) These categories can be split into two groups: those, like consumption, which can be estimated, since they are functions of GNP; and those, like investment and exports, which are primarily exogenous variables.

(4) The latter are the important aggregates, and it is towards them that policy must be directed, if the postulated level of income is to be achieved.

(5) Consumption and Government expenditure were projected on a simple basis; imports were more difficult, expecially in view of Ireland's possible association with the EEC. And no

allowance was made for changes in the terms
of trade.   Savings were derived as a residual
from the estimates of consumption out of income
and Government expenditure.

(6)   Investment, being an exogenous variable, could
not be estimated as a function of GNP, but a
calculation was made as to the minimum level
of investment required to satisfy the "supply
equation".

(7)   The difference between the sum of these
aggregates, imports being negative, and £770m.
gave the "residual figure" i.e. the level of
exports required to achieve this level of
income.

(8)   The most significant change is in imports,
and necessarily in required exports.   Imports
rise from 39% of GNP in 1960 to 48% of GNP in
1965 requiring a similar rise in exports in
order to sustain the chosen rate of growth.
Whether this can be achieved or not is the
key factor around which the achievement of
the projection as a plan revolves.

(9)   Clearly the estimates and calculations, in
particular those of investment and imports,
are subject to considerable degrees of error.
For example, the calculation as to the
required level of investment may be too low.
This in turn means that "required exports"
are too high, but it also means that internal
savings would fall further short of invest-
ment and there would be a larger deficit in
the balance of payments.   Or the estimate of
imports may be too high, which again means
that "required exports" are overstated.   The
main constituent of the rise in imports is
raw materials and goods for further processing,
and this was based upon an assumption of a big
rise in manufacturing output by 1965.   It may
be that this rise is overstated, or that the
pattern of outputs will change towards less
import-intensive industries.

(10) Nevertheless, given the circumstances and the
assumption upon which this projection had to
be made, this general picture may be of some
use as a first approximation. The inherent
difficulty in using input-output projection
for this particular exercise has already been
discussed; it would seem to the writer that,
given the vital importance of foreign trade
in the Irish economy, a projection made for
planning purposes should start off from rather
different premises.

If the projection used a _forecast_ of the
likely or even possible level of exports in
1965 as the basis, instead of a given rate of
growth, then the projection would seem not
only more realistic but in addition more
accurate, since final demands could be broken
down into sectors: by input-output methods,
sectoral outputs, a large bulk of imports,
capital requirements and employment could be
(theoretically) calculated with greater
precision. The rate of growth used would be
selected as a result of these initial studies,
instead of being arbitrarily chosen without
much regard to reality.

(11) The projection suggested a deficit in the
balance of payments of the order of £7m. -
domestic savings were not quite sufficient to
finance the postulated level of investment.
For policy purposes it seems sensible to
regard consumption as a residual and therefore
this deficit could be reduced by reducing
disposable income, either by fiscal means or
by higher undistributed profits. On the
other hand, this deficit is so small in
relation to reserves that it does not pose a
serious problem. [A small fall in the MFC
would eliminate the deficit altogether.]

(12) The next step should be a projection in input-
output form of these aggregates, as outlined
in an early part of the paper. Before doing
this it would be necessary to undertake "side-
studies" in relation to some important ag-

gregates, which proved themselves difficult
of estimation in this introductory essay.
Viz.:

(1)   The import-content of Irish industries,
      by sectors:

(2)   Capital requirements of industry, by
      sectors:

(3)   A finer breakdown of building and
      construction by sectors:

(4)   Price and income elasticities of demand
      for exports:

(5)   Supply potential of export industries.

(6)   Competitive position of Irish industry
      in relation to EEC countries and the
      U.K.[3]

These studies should enable a detailed and
reasonably accurate projection to be made, on
a sector by sector basis.

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[3]   See "The Comparative position of Irish
manufacturing industry" by Dr E.T. Nevin.
                        (Unpublished)