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PLANNING AND POLICY
FORMATION IN IRELAND,
1958-1974

DESMOND NORTON

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General Summary

IN retrospect, it seems that among the deficiencies in Irish economic policy in the early and mid-'fifties were: (i) Failure to reorientate sufficiently Irish industry, and to promote services such as tourism, toward export markets after the period of growth via import substitution (the mid-'twenties to the 'fifties) had tapered off, and (ii) Failure to maintain, by fiscal measures, a high level of domestic demand. The extreme openness of the economy is a feature to be recalled: imports since 1947 have averaged over 40 per cent of GNP at factor cost. Despite import substitution, imports, and the ratio of imports to GNP, had risen between the 'thirties and the 'fifties. In the absence of considerable foreign borrowing (which, apparently for nationalistic reasons, successive governments discouraged) increased demand for imports, necessary for, as well as generated by, income growth, could not be satisfied without placing stress on balance of payments constraints on domestic expansion. Fear of adverse international payments balances was, in fact, the principal rationale for the deflationary fiscal policies of the 'fifties.

In the nine years 1950/58, the economy expanded at an average real annual rate of about one per cent. It was against this background of stagnation, coupled with the highest emigration rates of the century, that the need for fundamental changes in policy was seen in the late 'fifties.

In contrast to the preceding years, the period since the late 'fifties saw, in summary: (i) Greater realisation at policy levels that rapid growth in exports of goods and services was a necessary condition for faster growth in real income. Accordingly, economic policy, in particular, fiscal policy, became much more export orientated. Increasing exports were both a

source of growth (via their effects on aggregate demand) and a condition for growth (by easing balance of payments constraints on domestic expansion). (ii) A change in official attitudes toward borrowing abroad, whether by way of ownership by foreigners of industry in Ireland, or by Government borrowing in foreign capital markets. As the bulk of the output from new foreign-owned industry was for export, considerations (i) and (ii) are not independent. (iii) Expansionary domestic fiscal policies: because of the high marginal propensity to import and balance of payments constraints, this stimulation of domestic demand would not in practice have been possible in the absence of the changes in (i) and (ii).

Growth in the economy since 1958 has been at an average real annual rate of about 4 per cent. The objective of this paper is not to congratulate policymakers for this growth, but rather, to focus on methodological deficiencies in their approaches to economic planning and policy formation since the late 'fifties.

We begin with a survey of the modern theory of economic policy. This body of analysis is concerned with the consistency and feasibility of plans and with the optimality of economic policy actions. It highlights the fact that the policy instruments, rather than the targets, are the ultimate unknowns in any policy problem. The survey provides the vantage point for much of what follows. The theory leads to the conclusions that in order to attain any number of targets, policymakers must generally employ at least as many policy instruments; also, since a given instrument is likely to affect many target variables, the policy instruments should be co-ordinated. Furthermore, recognising that normally policymakers are not free to vary instruments arbitrarily and that they operate in a world of uncertainty, leads to the conclusion that the more policy instruments available, the better—even if policymakers already have as many instruments as targets. Finally, uncertainty does not destroy the case for planning; it merely changes the form which planning should take.

It seems to us that few Irish policymakers have ever tried to

analyse the formal structure of an economic policy problem; had they done so, it is unlikely that they would have behaved in the way they did. Setting up a list of objectives without indicating how they are to be attained does not constitute a policy or plan; it is, rather, a statement of mere aspirations. In many respects, that is the approach we have tended to adopt in Ireland. In focusing on objectives (targets) rather than on policy instruments, we have tended to view economic policy with its head upside down. For example, the methodological work in designing the Second and Third Programmes was overwhelmingly concerned with making consistent projections of the economy rather than with analysing how the targets could be attained.

Turning to the short-run, the poor quality of our national income statistics is noted. Nevertheless, it is argued that the cumulative short-run effects of fiscal policy accounted for a very considerable part of the real growth in the economy in the period under review. Since balanced budget multipliers for Ireland are extremely low, the bulk of this growth is attributable to the capital budgets. Less of a concrete nature can be said about monetary policy. That is because the Central Bank, until the 'seventies, was very poorly equipped with statutory policy instruments by means of which it could implement effective monetary policies. In particular, the Bank had no legal power to impose minimum reserve or liquidity ratios on the commercial banks. It is concluded, in this context, that in so far as monetary matters were concerned, short-run economic policy in Ireland was, until recently, inefficiently pursued. Because the Bank had little power to use effective policy instruments, some important instruments could not be employed in the pursuit of national economic objectives.

An exercise in financial programming involves analyses of the monetary and fiscal implications of attaining medium-term and longer-run objectives. Thus, it is concerned with the formulation of financial policies over time rather than mere target setting. The three Irish medium-term programmes to

date are analysed in the context of financial programming. It is concluded that scant attention has been paid to this important matter in Ireland. This is reflected in the target orientation rather than the policy orientation of the Second and Third Programmes. It is argued that had the financial implications of the three programmes been adequately analysed (and, in consequence, the complementary policy alternatives been highlighted) the need for additional monetary policy instruments would almost certainly have been seen at an early stage; also, the importance of co-ordination in monetary and fiscal policies would have been underlined.

Failures in financial programming also brought potential problems in Debt management. It seems that, until recently, little attempt was made to create a graduated structure in the maturity of the National Debt. The resulting bunching meant that relatively large amounts could fall due for repayment and refunding at any one time. Such bunching could interfere with the operation of short-run monetary policies. On 31 March, 1974, the total *official* National Debt was over £1,622 million. Of this, about £1,454 million was internal, while over £167 million was borrowed abroad. Almost one half of the official Debt will mature in the five years to 31 March, 1979. It is understood that attempts have been made in recent years to effect a graduated structure in the official Debt. As, however, bunching can be eliminated only in the longer-run, the present problem in this respect possibly reflects failures in consciously attempting to avoid such bunching in the not so recent past.

What we call the *unofficial* National Debt is of greater concern to us. In Ireland, these State liabilities are normally forgotten about in discussions of "the National Debt". Our classification "unofficial" reflects the fact that the official Debt understates State liabilities. When, for example, a public enterprise negotiates a loan abroad, the resulting liabilities are not reckoned as part of the National Debt. The State does, however, guarantee such loans. Such external borrowing by public enterprises has been rising very rapidly in recent years. How-

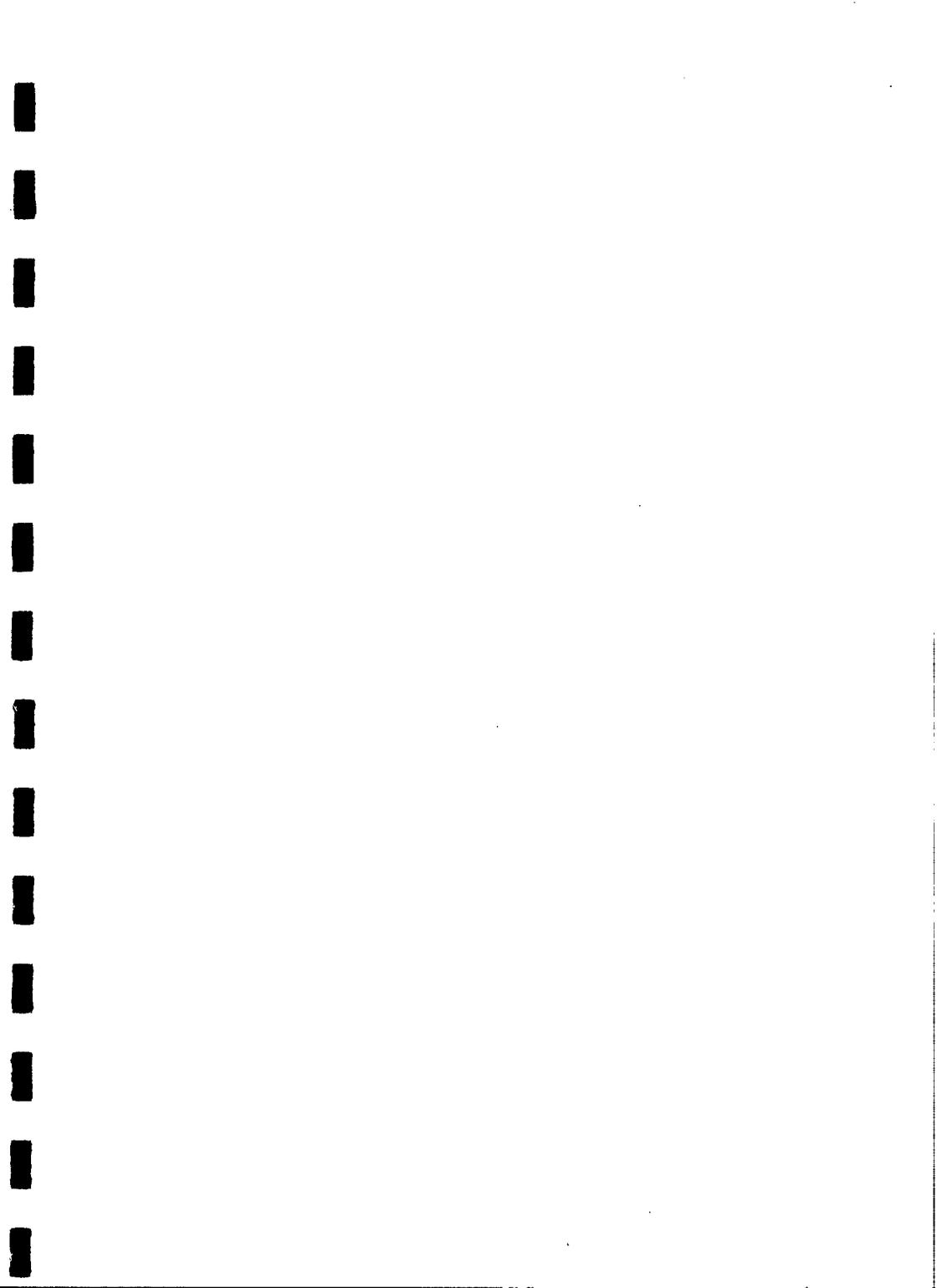
ever it seems that, until 1974, nobody in the public service had analysed the maturity structure of these "unofficial" external debts. The dangers are clear: unless we have conscious co-ordination to create a graduated structure in the *total* externally borrowed National Debt (which includes the rapidly increasing external liabilities of public enterprises) we are in danger of reaching a situation in which very substantial sums unexpectedly fall due for repayment abroad in a given year. To avoid such a situation and its possible consequences, we require greater co-ordination between the Department of Finance, the public enterprises, and the Central Bank.

As in longer-run matters, there has been serious lack of co-ordination in short-run monetary and fiscal policies. The fact that the commercial banks did not feel that they ought decline government requests for additional credit was one of the reasons why the credit advice by the Central Bank to the banks since the mid-'sixties had only very limited success. This was the very antithesis of co-ordination in monetary and fiscal policy. It seems to us that the Bank, in the 'sixties, was expected to act as a rubber stamp for government policies.

The final topic taken up is whether or not we should have another national plan, and if so, what form such programming should take. The need for some form of national planning beyond the fiscal year is obvious when we bear in mind that policy actions today have consequences in future years, while the attainment of objectives in future years requires policy actions in the current year. Two questions are of particular relevance: (i) what should the time horizon of the practical planner be and (ii) how should he take account of uncertainty?

With a *rolling plan*, the plan, for a given number of years, is revised at the end of each year and an additional year is added to the list. The effect of such revision is *always* to maintain a planning horizon of approximately fixed length. Both theoretical and immediately practical issues lead us to conclude that considerations of intertemporal dependence, combined with the uncertainties underlying Irish planning (due in large

measure to the openness of the economy), present a very strong case for the adoption of rolling plans with a time horizon of about four years to the (rolling) terminal date. Such rolling plans would however, have to be integrated in some (relatively loose) perspective planning framework. Thus, contrary to what appears to be the view in certain official circles, the existence of uncertainty does not imply that planning cannot be pursued effectively.



Introduction

THE theme of this paper—"Problems in Economic Planning and Policy Formation in Ireland, 1958-1974"—is rather broad. There will, however, be a common unifying thread, namely, the modern theory of economic policy. What we shall do, in essence, is evaluate economic planning and policy formation in Ireland from the vantage point of that body of analysis. This, in turn, will highlight the methodological deficiencies of our approach to policy. An attempt is made to remain relatively non-technical. Because of this, and because we do wish to be practical, some of our analysis—in particular, that pertaining to decision-making over time under conditions of uncertainty—will necessarily lack the rigour demanded by a pure theorist.

Some remarks before proceeding. This paper is critical rather than complimentary. That is because the success of economic policies in Ireland since 1958 is reasonably well known. To dwell on such matters would, from the standpoint of bringing about fundamental *changes* in our approach to policy, be redundant. On the other hand, by focusing on the major methodological deficiencies of our approach, it is hoped that fresh thinking will be stimulated at the policy formation levels, thereby leading to action to rectify those deficiencies.¹

¹Some of the arguments outlined below were independently advanced by Kieran A. Kennedy in "The Irish Economy: The Challenges and Options", *Management*, Journal of the Irish Management Institute, May 1974. Thus, Kennedy writes (p. 60): "There is little point in planning when there are no policies to ensure that the plan will be implemented. Planning in future should be concerned as much with how things should be done as with what should be done." This concurrence is not purely coincidental. It is, rather, a reflection of the urgent need for serious re-appraisal of our approach to economic policy in Ireland.



1. *The Theory of Economic Policy*

ECONOMIC policy consists in the deliberate variation of instruments to attain certain objectives. Turn first to the *theory* of economic policy. The modern theory of economic policy is concerned with the consistency and feasibility of plans and, under various assumptions, with the optimality of economic policy actions. This body of analysis, which is essentially mathematical-logical, was developed by Jan Tinbergen, Bent Hansen, and Henri Theil in the 'fifties and was subsequently extended by major advances in control and systems engineering.

The three basic ingredients of the *static* theory of economic policy are:

- (i) *The objectives of the policymaker.* These may be of a fixed or flexible kind. In the former, the objective is to attain fixed targets; in the latter, instrument values are chosen so as to maximise some objective function.
- (ii) *A model of the economy.* This may exist formally on paper or merely in the policymaker's mind. Four kinds of variables may enter the structural equations of the model:
 - (a) *Instrument or Control or Policy Variables;* exogenous variables subject to *direct* control by the policymaker. A list of possible examples might include, along with various categories of government expenditure, tax rates, minimum liquidity requirements on the banking system, the exchange rate, and so on. The definition categorically rules out certain variables, such as a budget deficit, which

are often erroneously described as instruments, from being true instruments of policy.

- (b) *Data, or Uncontrollable Exogenous Variables*; exogenous variables which the policymaker cannot control, either directly or indirectly. In the case of a small economy like Ireland, foreign prices of most manufactured goods, being in effect beyond the direct or indirect control or influence by Irish policymakers, would be considered as data.
 - (c) *Target, or State Variables*; endogenous variables, the values of which yield utility (or disutility) to the policymaker. He may be able to control these variables *indirectly*, via the instruments. The level of real income and the balance of international payments are standard examples of target variables in economic policy models.
 - (d) *The Irrelevant Variables*; endogenous variables the values of which yield no utility (or disutility) to the policymaker. Which variables are considered as irrelevant depend on the particular policy problem on hand. If, for example, a policymaker sought a certain target level of GNP and a certain balance of international payments deficit, and if he were unconcerned with the size of the budget deficit implied by the use of instruments in pursuing those two objectives, then the budget deficit would be regarded as an irrelevant variable in the policy problem on hand.
- (iii) *Boundary conditions*. There may be a set of boundary conditions, or constraints, on the admissible values of the instruments. For example, in countries where the international rate of exchange is actually regarded as a

policy instrument, considerations of tradition or "prestige" may prevent the exchange rate from moving outside certain bounds.

The approach of the static theory of economic policy to any particular decision problem (such as drawing up a one year plan) is typically as follows: the targets are normally assumed given. Given that the target variables have fixed values in the structural equations to which we have already referred, the policy problem collapses into finding a set of values for the instrument variables which satisfy those structural equations. If no such solution exists, then the problem must, in practice, be changed, often by dropping the less urgent targets, or, alternatively, by solving for that set of instrument values which maximises the policymaker's preference function. *In either case, the approach highlights the fact that the instruments are the ultimate unknowns in any consistent policy problem.* Greater awareness of this fact would frequently prevent policymakers from pursuing targets which, given the instruments employed, are logically inconsistent; secondly, even if the targets are consistent, it would enable decision-makers attain those targets more efficiently.

Some elaboration on the preceding two paragraphs—in particular, of what we mean by a "consistent" policy problem—may be desired. Further discussion on this matter, which is necessarily technical, is deferred to Appendix I.

The main conclusions from the static theory of economic policy are as follows:²

²See W. C. Brainard, "Uncertainty and the Effectiveness of Policy", *American Economic Review, Papers and Proceedings*, May 1967; K. Fox, J. Sengupta, and E. Thorbecke, *The Theory of Quantitative Economic Policy*, North-Holland, 1966; Bent Hansen, *The Economic Theory of Fiscal Policy*, Allen and Unwin, 1958, and *Lectures in Economic Theory, Part II, The Theory of Economic Policy and Planning*, Studentlitteratur, Lund, Sweden, 1967; L. Johansen, *Public Economics*, North-Holland, 1965; E. Malinvaud, "First Order Certainty Equivalence", *Econometrica*, October, 1969; H. Theil, *Optimal Decisions for Government and Industry*, North-Holland, 1964; J. Tinbergen, *On the Theory of Economic Policy*, North-Holland, 1952, *Centralization and Decentralization in Economic Policy*, North-Holland, 1954, and *Economic Policy: Principles and Design*, North-Holland, 1956.

(1) *In order to attain any number, say N targets, decision-makers must, in general, employ at least N instruments.*³ Furthermore, if there are boundary conditions on the admissible values of the instruments it may be absolutely necessary, in order to attain N targets, to employ more than N instruments. However, even in the absence of boundary conditions, a mere excess of instruments over targets does not guarantee that the targets can be attained. Nevertheless, *the more instruments that are available, the more likely it will be that all targets can be attained.* It may be well to point out that, even if perfect foresight were to prevail, the use of more instruments than strictly necessary may be recommended. Not only will it then be possible to avoid some of the difficulties imposed by boundary conditions, but also the "pressure" on the population may be more evenly distributed; for example, by employing a number of different kinds of taxation, efforts to avoid payment of taxes may be averted. Evidently, these are other targets, assumed implicitly.

(2) *The instruments*—and we wish to emphasise this—*must be co-ordinated. That is because each instrument will normally affect many, and possibly all, target variables.* Therefore, unless the economy has a peculiar recursive structure, or causal ordering,⁴ some policy instruments should not, in general, be assigned to one decision-making body, such as a central bank, while at the same time others are assigned to another decision-making agency, such as a department of finance, without providing for continuous consultation and co-ordination between the two decision-making agencies. There are several studies in the

³We cannot, however, exclude the possibility that sets with fewer instruments than targets may be feasible, though such cases are likely to be rare. Those rare cases can occur when one target is automatically attained with the attainment of another. The structure of the system may also be such that two targets are incompatible, even if there are no boundary conditions on the instruments and one has the same number of instruments as targets. (This would imply that, given the chosen values of the target variables, the structural equations are inconsistent.) Discussion of these cases can be found in Bent Hansen, *op. cit.*, 1958 and 1967.

⁴See H. Simon, "Causal Ordering and Identifiability", Ch. 3 in W. Hood and T. Koopmans, (eds.), *Studies in Econometric Method*, Cowles Commission Monograph No. 14, Wiley, 1953, and Bent Hansen, *op. cit.*, 1958 and 1967.

theoretical literature analysing the consequences of a department of finance pursuing targets independently of central bank action, and vice versa. It has been demonstrated that this may have disastrous consequences.⁵

(3) The third conclusion is that if, instead of attempting to attain fixed targets, the policymakers seek to maximise some preference function², then the larger the number of relevant instruments available, the better.

(4) The fourth conclusion recognises that policymakers normally operate in a world of uncertainty. This uncertainty may be of two principal forms:

(a) Uncertainty about the effects of the policymaker's own actions, i.e. of varying the instruments. He may, for example, be uncertain of the multipliers applying to changes in government expenditure or tax rates.

(b) Uncertainty about the data, i.e. those exogenous variables not under the decision-maker's control. Thus, he may be uncertain of the state of foreign demand and hence exports. There are theoretical reasons for believing that when the policymaker is faced with both these forms of uncertainty, when he has more instruments available than targets, and when he seeks to maximise the expectation of some function of the target variables, he should often use *all* the instruments he has available; hence, the more instruments, the better he can perform.

The conclusions that at least N instruments must be employed to attain N targets, and that the instruments must be co-ordinated do not, as already indicated, hold without exception. They are, however, sufficiently general to be considered

⁵See Bent Hansen, *op. cit.*, 1958, and Robert Mundell, "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability", *International Monetary Fund Staff Papers*, March 1962.

important rules of thumb. Thus, *even if we know little about the structure of the economy*, linear or otherwise, "if actual policies happen not to conform with these rules viz., the two conclusions just repeated in the present paragraph, one should in general suspect that something may be wrong with the policies".⁶

So far we have assumed that policy makers have a time horizon of a single period. The theory of economic policy has, however, been extended to optimal policy formation over time,⁷ using the techniques of control and systems engineering.

This body of analysis, which is highly technical, will not be reviewed in detail here. Suffice it to say, that in the control and systems theory approaches, the economy is represented by a set of differential or difference equations in which the state of the economy at any time depends on the state in the recent past and on the controls (or instruments) applied in the recent past. It has been shown that if certain mathematical conditions are satisfied,⁸ there exists a path for the policy instruments over time which will transfer the economy from any arbitrary initial state to any arbitrary terminal state. Alternatively, if the objective is to maximise the policymaker's preference function over time, the main body of control theory is concerned with finding that sequence of instrument values which brings about such a maximisation.⁹ Thus, *like the static theory, the theory of*

⁶Bent Hansen, *op. cit.*, 1967, p. 5.

⁷See, for example, G. Chow, "Problems of Economic Policy from the Viewpoint of Optimal Control", *American Economic Review*, December 1973; K. Arrow and M. Kurz, *Public Investment, the Rate of Return and Optimal Fiscal Policy*, Johns Hopkins, 1970; C. Holt, "Linear Decision Rules for Economic Stabilization and Growth", *Quarterly Journal of Economics*, February 1962; D. A. Livesey, "Control Theory and Input-Output Analysis", *International Journal of Systems Science*, 1971, Vol. 2, No. 3, pp. 307-318; R. S. Pindyck, "An Application of the Linear Quadratic Tracking Problem to Economic Stabilization Policy", *Institute of Electrical and Electronic Engineers, Transactions on Automatic Control*, Vol. AC-17, No. 3, June 1972.

⁸See M. Aoki, "Sufficient Conditions for Optimal Stabilisation Policies", *Review of Economic Studies*, January 1973; R. Brockett, *Finite Dimensional Linear Systems*, Wiley, 1970; C. Desoer, *Notes for a Second Course on Linear Systems*, Van Nostrand Reinhold, 1970; S. Gershwin and D. Jacobson, "A Controllability Theory for Non-linear Systems, with Applications", *Technical Report No. 592*, Division of Engineering and Applied Physics, Harvard University, 1969.

⁹For a standard textbook exposition of the principal methods of optimal control theory see, for example, A. Bryson and Y. Ho, *Applied Optimal Control*, Blaisdell, 1969.

economic policy over time focuses, in an ultimate sense, on the instruments rather than on the targets.

Some final remarks regarding the theory of economic policy over time concern the formulation of an optimal strategy in the event of uncertainty. Suppose, as is quite common in practice, that a policymaker must make decisions regarding the use of instruments over a finite time period in order to maximise the expectation of some objective function. Suppose, furthermore, that the outcome of each decision (that is, the *state* of the system) at each point in time is a vector of variables, some or all of them random with given (possibly subjective) probability distributions. An important practical question, in such circumstances, is: how should the rational decision-maker behave, or phrased otherwise, what kind of control scheme (strategy for using instruments) should he adopt? It is useful, in this context, to distinguish between two kinds of control which can be envisaged. One is pure *open-loop* control, in which the optimal control path is determined at the beginning, as a function of time. Another type of control is pure *closed-loop* control, in which the optimal sequence of controls is determined as a function of the current state variables and time. By contrast to open-loop control, in which all decisions are made in advance, in closed-loop control the decisions may be revised in the light of new information embodied in the current state variables; there is, that is to say, *feedback*.

It is known from stochastic control theory¹⁰ that in a random environment, control schemes using optimal feedback are preferable to optimal pure open-loop systems, in the sense that, on average, they yield a higher value for the decision-maker's objective function. Therefore, if a rational policymaker seeks

¹⁰See K. Astrom, *Introduction to Stochastic Control Theory*, Academic Press, 1970; S. Dreyfus, *Dynamic Programming and the Calculus of Variations*, Chapter VII, Academic Press, 1965; S. Dreyfus, "Introduction to Stochastic Optimisation and Control", in Karreman (ed.), *Stochastic Optimisation and Control*, Wiley, 1968; H. Theil, *op. cit.*; H. Theil, "A Note on Certainty Equivalence in Dynamic Planning", *Econometrica*, Vol. 25, (1957), pp. 346-349; H. Theil, "Linear Decision Rules for Macro-Dynamic Policy Problems", in B. Hickman (ed.), *Quantitative Planning of Economic Policy*, Brookings Institution, 1965.

to maximise the expected value of his preference function over time, he should, if possible, devise a feedback control scheme. We can quickly outline some of the practical relevance of this to economic planning. Consider a planner who, by manipulation of policy instruments, seeks to maximise the expected performance of the economy (as measured by the planner's preferences) over, say, a period of five years. His best strategy is then approximately¹¹ as follows. At time zero, the beginning of the planning period, he should devise that five-year plan for employment of policy instruments which seems best to him, given the information available at time zero, and recognising that he shall have opportunities to revise this plan at subsequent points in time. At the beginning of the second year he can observe the state of the economy resulting from the first year's decisions and random terms; also, his knowledge of the distributions of the random variables may have improved over time. These are new items of information not available at time zero. At time one, the beginning of the second year, he should devise that four-year plan for control of policy instruments which seems best to him, given the (increased) information he has at the beginning of the second year, and recognising that he shall have opportunities to revise his plan at later dates. He should plan in like manner at the beginning of the third, fourth, and fifth years. Thus, what is envisaged for rational behaviour under circumstances of uncertainty and *with a fixed terminal calendar date* is in fact a series of plans, formulated each year, each plan encompassing the whole period which remains up to the terminal date. *By planning in this manner, the decision-maker computes his expected future actions; hence, he will be able to make preparations in advance. At the same time, however, he regularly revises his plans to take account of unforeseen initial conditions and the accumulation of information over time.*¹²

¹¹We say "approximately" because our general description and specific terminology are inexact—but we do not wish to be drawn into the detailed methodologies of stochastic dynamic programming or of adaptive control theory; also, we do wish to be practical.

¹²For an application of the kind of procedure suggested in the last two sentences of this paragraph, see the essay by H. Theil in B. Hickman (ed.), *op. cit.*

Later in this paper we will make an important extension to the above outline of the design of a rational strategy in an environment of uncertainty. We will argue that policymakers should not, in general, plan over a *fixed* calendar time period (such as five calendar years) as was assumed above. They should, rather, *add* a year to the planning horizon everytime the base year of the previous planning period elapses. Thus, we will advocate what we call rolling plans. It will however be seen, when we come to discuss such rolling plans, that planners should adopt a strategy very *similar* to that outlined above.

It may be felt that the theory of economic policy is so abstract that it is irrelevant as a guide to decision-making by real-world policymakers, or that they would need to have exact large-scale models of the economy before any empirical relevance could be attached to the conclusions. Fortunately, such is not the case, for the theory leads to general *qualitative*, rather than precise *quantitative*, conclusions concerning how decision-makers must normally behave if they are rationally to pursue what they themselves have declared to be their objectives. Thus, the theory leads to a sensible method of thinking about policy problems and a general guide to rational policy action.

2. *The Three Programmes for Economic Expansion: Methodologies*

A PLAN, if it is to be regarded as something more than mere aspiration, must focus on the policy instruments, rather than on the targets as the ultimate unknowns in the planning exercise.¹³ Our policymakers in Ireland seem to have been insufficiently aware of this fact, underlined in the theory of economic policy. That is apparent from a quick survey of the methodologies of the three Irish programmes.

The First Programme,¹⁴ 1959/63, while devoting considerable attention to the analysis of past policies, did not have a formal planning methodology lying behind it.

The documents pertaining to the *Second Programme*¹⁵ 1964/70, were much more detailed. This was largely because (a) there was more time to prepare the programme, work having begun in January 1962, and (b) the level of available technical expertise had greatly increased. Two basic methodologies were used in preparing the programme: (i) an iterative, material balances, national accounts approach and (ii) the use of economic models. The *stated* purpose of the exercises was to get

¹³It may be felt that this paper places too much emphasis on instruments and too little on targets. It is generally true that neither the targets nor the instruments are known when one sets out to design a plan. The immediate question then is: What targets should be chosen? The set of targets is feasible only when, given that those variables have their chosen values in the structural equations, a set of instrument values can be found which satisfies those structural equations, and the boundary conditions on instruments. It is in this sense that the instruments are the ultimate unknowns. Research like that of Geary, Simpson and Henry is important in deriving information for use in specifying sensible targets. See R. C. Geary, "Towards an Input-Output Decision Model for Ireland", *Journal of the Statistical and Social Inquiry Society of Ireland*, 1963-64; D. Simpson, *A Medium-Term Planning Model for Ireland*, Paper No. 41, ESRI, Dublin, 1968; E. Henry, *Irish Full Employment Structures*, 1968 and 1975, Paper No. 74, ESRI, Dublin, 1974.

¹⁴*Programme for Economic Expansion*, Pr. 4796, Stationery Office, Dublin.

¹⁵*Second Programme for Economic Expansion, Part I*, Pr. 7239, and *Part II*, Pr. 7670, Stationery Office, Dublin.

a profile of the economy in 1970 which reflected the highest growth rate attainable in the light of policy possibilities, and on assumptions regarding the external environment and resource availability. Because (early in 1962) 1960 was the latest year for which reasonably firm statistics were available, 1960 was made a base year. The programming was done in terms of 1960 prices, in the context of the ten years 1961/70, with 1960 as base.

The iterative method, employed in the Department of Finance, proceeded by successive approximations. This method is well known, so little time will be spent in describing it here. It starts with a simple breakdown, e.g., of output or expenditure and goes on to more detailed breakdowns. Initially, three growth rates in GNP—3, 5, and 7 per cent a year in 1961/70—were taken, and, according to the methodological Appendix 5 of the *Second Programme, Part II*,¹⁶ the implications of each of these for the main sectors were examined. According to the same appendix, attention was then narrowed down to analysis of the implications of a 50 per cent increase in real income over the decade.

On the assumption of an overall output increase of 50 per cent in the decade, projections of outputs in the main sectors were made. In like manner, on the assumption of an overall increase in real expenditure of 50 per cent, projections of the main categories of expenditure were made. Thus, the role of the iterative method in the Second Programme was in attempting to make consistent projections of material balances on the assumption that the economy “would grow” by 50 per cent.

The advantage of the iterative method is that although tedious it is simple. The problem of feasibility aside, the overwhelming disadvantage of the method is that it provides no way of ensuring, given the base structure of the economy and its laws of motion, that the various projections are logically consistent.

¹⁶See, alternatively, W. J. L. Ryan, “The Methodology of the Second Programme for Economic Expansion”, *Journal of the Statistical and Social Inquiry Society of Ireland*, 1963-64.

As mentioned earlier, an economy and its evolution over time can be represented by systems of equations. If a set of target variables is specified, and if the structural equations (or equations of motion) satisfy certain conditions, then there exists at least one set of instruments (or sequence of instrument vectors) which enables all the targets to be attained, and the instrument values which do this can normally be calculated. To check that the targets are feasible, we then insure that the instruments satisfy the boundary conditions. The iterative method, on the other hand, *implicitly* assumes some (generally unspecified) model of the economy. Full application of the method then amounts to making an initial guess of a vector of unknowns which satisfy the simultaneous (structural) equations. If, as is likely, the first guess fails to yield a solution, the method then amounts to making a second guess, and so on. But unlike some computer algorithms, for example, the method has no built-in property which ensures that the (in effect) sequence of guesses will converge toward any of possibly many solutions. The use of explicit formal models, on the other hand, both highlights the assumptions, and normally surmounts the other deficiencies of the iterative method.

We have already mentioned that formal models of the economy were also employed as a methodological basis of the Second Programme. These interesting models were developed by R. C. Geary and others at The Economic and Social Research Institute.¹⁷ Their main virtue, in our view, was that they highlighted some of the important implications for policy—above all, in so far as the supremely important savings and capital-output ratios were concerned—of actually attaining macroeconomic targets. Thus, in explaining the work at The Economic Research Institute, Geary reported that the principal task was “to produce, on various hypothetical bases involving policy decisions during the period from base to reference year (i.e., 1960 to 1970), tables (i.e. projections) for the year of refer-

¹⁷See R. C. Geary, *op. cit.*

ence".¹⁸ It appears, nevertheless, that very little attention was paid to those formal models, and that the iterative method of the Department of Finance was regarded as overwhelmingly the dominant basis in the design of the programme. The assumptions made regarding the import ratio support that conclusion. Thus, the projections in the programme documents assumed that the import ratio (in 1960 prices) would be 0.46 (the figure assumed in the iterative approach) in 1970. This was considerably less than that assumed in Geary's formal macroeconomic model. Such serious underestimation of the import ratio was one of the alleged reasons for scrapping the programme in 1968.

Note that, up to now, we have referred to the methodological basis of the Second Programme as being concerned primarily with making *projections* of the national accounts in the year 1970. This is because the overwhelming emphasis in the methodological exercises was on the *consistency of a set of material balances* rather than on the economic policy question: what sequence of vectors of policy instruments should be employed in order that a specified set of targets shall be attained (or, in theory, in order that a particular preference function be maximised)? It seems, in fact, that the OECD collective target of a 50 per cent real income increase for the decade^{18a} was assumed at an early stage, and the *bulk* of the subsequent methodological work involved finding a set of (in some sense) plausible sectoral growth rates consistent with the overall increase. The view that the methodology of the Second Programme was not sufficiently policy orientated is reinforced when it is noted that neither Geary's paper on the formal models nor the (methodological) Appendix 5 of the programme document made any reference to the monetary policy instruments to be employed, while only vague references were

¹⁸R. C. Geary, *op. cit.*, p. 82. The emphasis and the parentheses have been added by the present author.

^{18a} In November 1961, the member countries of the OECD adopted the target of increasing their *combined* national output by 50 per cent during the decade 1960/70.

made to fiscal policy, the chief one being that net indirect taxes, just like GNP at factor cost, would increase by 50 per cent¹⁹—almost as though that were some law of nature.

It may be objected that the Second Programme was, in fact, more policy orientated than we have indicated. True, the main texts of the programme documents made references to fiscal policy. But, fiscal incentives for agriculture excepted, these were vague, and ignored many important questions which we shall tackle later.

The methodology used in establishing the quantitative framework of the *Third Programme*²⁰ broadly followed the iterative projection-of-material-balances approach of the Second Programme, i.e., a projection of supply over the programme period was first made, demand patterns were then considered, and, next, a reconciliation between the two was effected. The 1964 input-output table was then used to test the *consistency* (rather than the feasibility) of the projections for 1972. The kinds of policy instruments to be used were similar to those employed in the Second Programme, namely, a general reliance on various fiscal incentives and expanded promotional campaigns abroad. It would be difficult to deny, nevertheless, that like its predecessor, the methodology of the programme was projection-orientated rather than policy-orientated.

¹⁹*Second Programme, Part II, p. 312.*

²⁰*Third Programme, Economic and Social Development, 1969/72, Prl. 431, Stationery Office, Dublin.*

3. Fiscal Policy and Monetary Policy in the Short Run

So far, we have dealt with the medium-term, namely, the planning periods of the three programmes. It may be appropriate, before returning to questions of that character, to pass some comment on the short-run effects of fiscal and monetary policies.

Turn first to fiscal policy. In order to make sensible short-run decisions, it is desirable that policymakers have some notion of the effects of their policies. Knowledge of the effects of currently proposed policies is frequently determined by estimating the effects of similar measures in the past. In order to assess the short-run effects of macroeconomic policies, one needs meaningful national income statistics. Now national income is normally defined as the total production of goods and services produced by the community in a period of time, such as a year, given certain definitions of what constitutes "production". It is a reflection of the lack of concern with the short-run effects of macroeconomic policies in the past that, even now, we do not have meaningful national income figures for Ireland. Thus, the official national income statistics as published in *National Income and Expenditure* classify most of the private sector on the basis of the calendar year, while, at the same time, the activities of the public sector are classified on the basis of the fiscal year. The sums of these two sets of figures are then presented as the national income for a given year, which, of course, they are not.²¹

Elsewhere²² we have attempted to assess the short-run effects

²¹The national income estimates for 1975, when they are eventually published, will probably be on a more meaningful calendar year basis.

²²D. Norton, "Estimation of the Short-Run Effects of Fiscal Policy in Ireland, 1960/1970", *The Economic and Social Review*, Vol. 6, No. 3, April 1975, and, for a general non-technical discussion, "Fiscal Policy and Growth in an Open Economy: The Case of Ireland", *Public Finance/Finances Publiques*, Volume XXIX, No. 2, 1974.

of discretionary fiscal policy changes on two key-target variables, real income and the balance of payments on current account. It was found that, in the eleven years 1960/1970, fiscal policy in Ireland was in fact unusually expansionary. This may seem surprising, given that in the early years of the period under review, the Minister for Finance seems to have accepted the pre-Keynesian notion that the Current Budget should not show a deficit. Thus, in his 1960 Budget Statement, the Minister remarked that "the year 1959/60 ended with a (Current Budget) surplus of £1.2 million. It was not spectacular . . . but . . . following immediately on the surplus for 1958/59, it is a welcome confirmation of the soundness of our budgetary policy".²³ Some comments in the 1961 Budget Statement are reminiscent of the erroneous pro-cyclical thinking at public policy levels throughout most of the developed world in the 'thirties. In noting that due to unexpected events the 1960 Current Budget had shown a small deficit in the out-turn, the Minister stated that "looking back over the last three years, however, there is no cause for disappointment. The (Current Budget) surpluses of 1959 and 1960 outweigh the deficit of 1961. I need not reproach myself for the deficit of 1957/58. The Government entered office in March, 1957, and had to take the economic and financial situation very much as they found it. The measures taken in 1957 (when the economy was very depressed) to bring revenue and expenditure into line and to revive economic activity could not be fully effective at once"²⁴ The 1966 Current Budget Statement seems to have been the first to recognise that planned deficits may on occasion be desirable on economic grounds. It was not until the 1972 Budget that the first of such (current budget) deficits was planned.

At an early stage in their university education, economics students read that the simplest kind of balanced budget

²³*Budget*, 1960, Stationery Office, Dublin, p. 6.

²⁴*Budget*, 1961, Stationery Office, Dublin, p. 10. The words in parentheses have been added by the present author.

multiplier—the increment (decrement) in real income resulting from a unit increase (decrease) in real government expenditure simultaneously matched by an equal increase (decrease) in real taxes—for a closed economy is unity. In the highly open economy of Ireland, however, balanced budget multipliers in the 'sixties were certainly well below unity²⁵. But in contrast to the Current Budget, the Capital Budget has been financed primarily by borrowing, both at home and abroad. For a variety of reasons, it appears that both the short-run and long-run contributions to growth of the public capital programme in the period under review were considerable.²⁶

Our estimates are that in 1960/1970 the average annual effect on real GNP of discretionary changes in fiscal instruments was an average annual increment in real GNP of about 1.9 per cent, or close to one half of the average annual growth in the economy in the period. Thus, the cumulative short-run effects on real income of discretionary budget changes in the period 1960/1970 equalled almost one half of the total growth in real income in those years. These results were derived by constructing a short-run econometric model of the economy and comparing the actual level of real income in each year with the level of real income which would have prevailed had no changes in discretionary budget measures been made in each year, over

²⁵Purely for purposes of illustration, consider the simple model: (1) $Y = C + I + G$ (2) $C = 0.9Y^d$ (3) $Y^d = Y - T$. The variables are defined as follows: Y , national income; Y^d , personal disposable income; C , personal consumption expenditure; I , private investment, G , government expenditure on goods and services; T , total tax receipts. It can readily be calculated that if $\Delta G = \Delta T = 1$, then $\Delta Y = 1$. If we now extend this model to an open economy, (1) becomes $Y = C + I + G + X - M$, where X and M denote, respectively, exports and imports of goods and services. We also add (4) $M = mY = 0.5Y$, say. We now find that if $\Delta G = \Delta T = 1$, then $\Delta Y = 0.17$. Note, however, that if $\Delta G = 1$ and $\Delta T = 0$, then $\Delta Y = 1.67$ in the open economy model. These considerations suggest that in the case of Ireland, increases in current government expenditure financed by taxation could have had only relatively marginal impacts on economic expansion, whereas (mainly capital) expenditure financed by borrowing was, even in the short run, substantially more expansionary.

²⁶For an interesting critique of budgetary policy in the 1950s, and comparison of such policies with those of the 'sixties, the reader is urged to consult K. Kennedy and B. Dowling, *Post-War Economic Growth in Ireland, The Role of Exports and Home Demand*, Gill and Macmillan, forthcoming (1975). See also D. Norton, *op. cit.*, 1974.

the previous year's actions.²⁷ The effect of discretionary budget measures on the balance of payments on current account was estimated in like manner. This made it possible to calculate the trade-off between the two key-target variables. It was found that this trade-off was about minus one: a one million pound increase in *real* GNP brought about by discretionary budget measures was attained, in the short-run, "at a cost" of a one million pound increase in the balance of payments deficit expressed in *current* market prices. The data used in estimating these effects were not those reported in the official National Accounts publication. Rather, those statistics had to be transformed appropriately to put them on an intelligible calendar year basis.²⁸

So much for the short-run effects of fiscal policy. Less of a concrete nature can be said regarding the other most common instrument of short-run control, namely, monetary policy. A particular variable is a policy instrument if, and only if, it is subject to *direct* control by policymakers. By this definition, the Central Bank, *until the early 'seventies*, was very poorly equipped with statutory policy instruments by which it could control credit availability. The Bank did not have the power to impose binding minimum reserve ratios on the commercial banks. Under Section 50 of the Central Bank Act, 1942, compulsory non-interest-bearing deposits at the Central Bank could be required of any licensed banker if the assets held by him within the State fell below a specified proportion in relation to his liabilities within the State. The aim of that provision was to ensure that the banks would *expand* credit in

²⁷The model employed to generate these estimates, which was constructed under the supervision of Bent Hansen, is an elaboration, to suit the Irish context, of that used by Hansen to estimate the short-run effects of fiscal policy in seven other countries. See B. Hansen assisted by W. Snyder, *Fiscal Policy in Seven Countries* 1955/1965, OECD, Paris, 1968. We made no attempt to distinguish the short-run effects of demand management (stabilisation) policy from the short-run effects of expansion of government expenditure as part of overall development policy.

²⁸The transformation of data was made because the official National Accounts presentation is objectionable *in principle*. It is not known how important a factor this transformation was in arriving at the estimates reported above. In so far as the *cumulative* short-run effects of fiscal policy are concerned, it appears likely that it was of minor importance.

the State when the Central Bank deemed desirable. It implied, however, that in the absence of further legislation, any "reserve" ratio in the form of an external assets ratio formally set by the Bank would have to be a *maximum* rather than a *minimum* figure. The Bank could, in principle, have refused to recognise Exchequer Bills held by the banks as eligible paper for non-penal rediscounting. However, its first admission that it had rediscounted at a penal rate appears to have been in a lecture²⁹ given by the Governor of the Bank to the Economics Society at University College, Dublin, as late as February 1970. Finally, the Bank did have statutory power to restrain domestic lending by sales of Government securities on the open market. But from the standpoint of monetary control, that power was virtually irrelevant until very recently, simply because of the small size of the Irish money market, and because the Bank itself had only a very small portfolio of securities which it could sell on the open market.

The money supply in the 'sixties tended to react, passively, to real phenomena, rather than to policy decisions at the Central Bank. Assertions have, nevertheless, been made to the contrary. Thus J. Oslizlok, Economist at the Bank in November 1967, wrote that "credit creation is the policy variable, that is the variable which—in the light of external reserves criteria and broader economic policy decisions—constitutes the basis of monetary policy".³⁰ Credit creation in the 'sixties was not, even in the short-run, a variable subject to much control, either directly or indirectly, by the Central Bank, largely because (a) The Bank had no legal power to impose minimum reserve, or liquidity, requirements on the commercial banks. (b) The commercial banks did not feel that they ought decline government "requests" for additional credit. (c) The commercial banks, in the short-run, found difficulty in controlling the

²⁹See Central Bank of Ireland, *Quarterly Bulletin*, Spring 1970, p. 78. Refer also to David O'Mahony, *The Irish Economy*, Second Edition, Cork University Press, 1967, p. 93.

³⁰J. Oslizlok, "Towards a Monetary Analysis of Aggregate Demand", Central Bank of Ireland, *Quarterly Bulletin*, November 1967, p. 59. See also p. 61.

amount of credit extended by themselves to the private sector. That was because of the kind of overdraft facilities in operation in Ireland until recently. Typically, at any one time, there were large unutilised overdraft facilities outstanding. An attempt by a commercial bank to contract credit, in such circumstances, could be substantially offset by greater use of existing overdraft facilities.³¹

It has often been suggested that the openness of the Irish economy would have rendered futile attempts by the Central Bank to pursue discretionary monetary policies. Suppose, for example, on some occasion in the 'sixties, that the Central Bank had somehow succeeded in imposing an X per cent net external assets ratio, or Central Bank ratio, or liquidity ratio, with the objective of making credit conditions tight in the Republic. Other things being equal, there would then have been a tendency for interest rates to rise in the short-run. In the absence of further measures, this in turn would have attracted capital flows into the country, thereby offsetting the original policy measure. Such consequences could, however, have been avoided, or at least would have been delayed significantly, if the Central Bank reacted by, say, raising the relevant ratio, and/or imposed ceilings on the interest payable on new foreign deposits, and/or required a high discriminatory ratio applying to foreign deposits and/or increased compulsory non-interest-bearing deposits by the banks at the Central Bank. All of this assumes, of course, that the Central Bank would have had the statutory power to implement such policies.

We do not accept the view that monetary policy is unimportant, or is necessarily ineffective, in small open economies like Ireland. We cannot accept the statements, made recently in a study on money and economic activity in Ireland,³² that the Canadian economist Mundell "has established that in a relatively small economy with large trading partners, and fixed

³¹Central Bank of Ireland, *Report*, 1968/69, p. 42, and *Quarterly Bulletin*, Spring 1970, p. 74.

³²D. Rodney Thom, "Money, Interest and Economic Activity in Ireland", *The Economic and Social Review*, January 1974, pp. 201, 202, and footnote on p. 202.

exchange rates, changes in the domestic money stock are independent of open market operations carried out by the Central Bank . . . This implies that monetary policy (defined as open market operations) has no effect upon domestic income". Modern theoretical work (including that of Mundell) suggests that although monetary policy in the form of open market operations (when feasible) in small open economies with fixed exchange rates may have no *lasting*³³ impact on the level of real income, it can have significant effects on that variable in the short-run.³⁴ It may, accordingly, play an important role in stabilisation policy. Now we are not suggesting that large-scale open market operations for purposes of macro-economic stabilisation would have been feasible in the rudimentary money and capital markets of Ireland in the 1960s. Rather, extraordinary circumstances excepted, our reasoning is as follows: (i) Open market purchases (sales) and reductions (increases) in required minimum reserve ratios have similar short-run macro-economic effects. (ii) If it were true that open market operations, when feasible in small open economies with fixed exchange rates, have no short-run effect on domestic income, then changes in minimum reserve requirements would have no short-run effect on domestic income. (iii) Since open market operations, when feasible in small open economies with fixed exchange rates, *can* affect domestic income in the short-run, so too can changes in minimum reserve requirements. Besides, as remarked in the previous paragraph, open market operations, or a once-and-for-all change in minimum reserve requirements, are not the only effective media of short-run monetary policy.

As already indicated, the greater the number of relevant

³³By lasting impact is meant a permanent change in real income after the economy has adjusted fully to the change in the domestic assets of the banking system.

³⁴R. Mundell, "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates", *Canadian Journal of Economics and Political Science*, November 1963, and A. Swoboda, "Monetary Policy under Fixed Exchange Rates: Effectiveness, the Speed of Adjustment and Proper Use", *Economica*, May 1973.

policy instruments that are available, the larger the number of targets that can be attained. It seems clear, in this context, that in so far as monetary matters were concerned, short-run economic policy in Ireland was, until recently, inefficiently pursued. That was largely because the Central Bank had little statutory power to employ effective macro-economic policy instruments. Thus, some important policy variables were constrained to a value of zero, and so could not be employed in the pursuit of economic objectives.

4. *Monetary and Gap Analysis in the Formulation of National Plans: The Need for Financial Programming*

CONSISTENCY and feasibility are important features of economic planning. They relate, *inter alia*, to (i) the balancing of supplies (production and imports) and demands (including exports); (ii) the matching of production targets with capital stock capacities; (iii) the equating of supplies and demands for different kinds of labour; (iv) the matching of the balance of payments on current account with projected capital inflows plus projected changes in foreign exchange reserves; (v) the formulation of policies equating *ex ante* savings and investment at the levels implicit by (i) to (iv), and (vi) co-ordination of monetary and fiscal policies in the attainment of the chosen objectives.

We observed—in Section 2 of this paper—that the documents pertaining to the three Irish programmes paid scant attention to the monetary and fiscal implications of attaining the targets set or of realising the projections. We elaborate on that observation now, by focusing on (v) and (vi) above.

Analysis of the monetary and fiscal implications of material-balance projections, along with the design of complementary monetary and fiscal policies over the planning period, is what we mean by *financial programming*. Turn first to the role of fiscal policy in the *ex ante* equalisation of savings and investment. (We shall refer to this as *gap analysis*.)

Development planning in Ireland has proceeded in terms of constant prices. *Ex ante* savings and investment must be matched if an inflationary or a deflationary gap is to be avoided. This matching is largely the responsibility of fiscal policy.

Assume, in the problem of plan formulation, that the

physical balances have been projected so that for each year of the plan, total planned demand for each commodity, at constant *factor-cost* prices, equals total planned supply (from domestic production and imports). The fiscal implications and alternatives of these projections are then best seen by constructing a rough model of the economy in which variables projected in the physical balance exercise are assumed known, while fiscal variables would be among the unknowns. In order for a meaningful solution to exist for such a model, it would need to contain at least as many unknowns as equations. If there are a large number of fiscal instruments available, then analysis of the fiscal implications of the material balance projections will typically lead policymakers to realise that several combinations of tax rates, subsidies, and transfer payments are possible from the standpoint of balancing *ex ante* savings and investment in each year of the plan. If fiscal instruments, equal in number to the degrees of freedom in the model, can be set by government policy in each year under consideration, then the fiscal implications of the plan, and the implied profile of the economy at constant *market* prices, are completely determined.

We have just focused on the role of fiscal policy in ensuring that the plan projections, at market prices, are consistent. It was implicitly assumed, however, that the *general* economic policy of the government—and not just fiscal policy—would be directed toward attaining the targets. Monetary policy will be of some importance in this context. Analysis of the monetary implications of the plan is what we mean by the *monetary equilibrium* aspect of financial programming.

Given that the physical balance projections have been made, and given that consistent fiscal policies have been decided upon, the monetary analysis involves setting up some rough model providing a monetary mirror of the physical balance projections and the chosen fiscal policies. For the monetary mirror to be meaningful, the model of the monetary sector would have to contain at least as many unknowns as equations,

and some of these unknowns would, ideally, be policy instruments. Elsewhere³⁵ we have attempted to outline a financial programming model to highlight the fiscal and monetary implications of material-balance projections. Although we were unhappy with this exercise, the overwhelming practical conclusion was that, had the Irish planners tried to conduct the same *kind* of analysis, in say, the early 'sixties, they would have been made aware of the need for the imposition of flexible reserve, or liquidity ratios, on the commercial banks, as well as the need for greater co-ordination in monetary and fiscal policy.

It has probably been noticed that in our discussion of financial programming, the monetary analysis was made *after* consistent fiscal policies over the planning period were assumed to have been selected. In practice, both aspects should be analysed simultaneously. A further objection to the approach outlined, which was based on initial projections at constant factor-cost prices, is that the factor-cost price level may rise throughout the planning period, due in part to uncontrollable phenomena. It will be shown later, when we come to discuss rolling plans, that this objection is not serious.

We turn now to the Irish programmes for evidence of gap and monetary equilibrium analyses. The *First Programme* did not provide any *detailed* monetary and fiscal analysis. The two pages of Part VI of that document did, however, contain a discussion entitled "Capital Cost and Available Resources". A review of that section indicates that the *ex ante* balancing of savings and investment was not adequately considered. That can be seen by quoting the main body of Part VI of the programme document almost in its entirety:³⁶

Capital Cost and Available Resources

Cost of Proposals

133. An estimate of the amount required to finance the programme of economic development is made in Appendix I. . . . The

³⁵Chapter VII in D. Norton, *The Macro Stage in Irish Planning, 1958/1972; A Study in the Quantitative Theory of Economic Policy*, Ph. D. Dissertation, University of California at Berkeley, August 1973.

³⁶*First Programme*, pp. 47, 48.

capital cost is estimated at £53 million in the five-year period from 1959/60 (the first full year) to 1963/64.

134. This cost is additional to that which will be required to finance the public capital programme on the basis of *present* policies. . . . The total capital cost for the period is estimated at £220 million.

Resources

135. It is necessary to relate these estimates to the financial resources likely to be available. These resources are current savings, external assets and external borrowing (including foreign investment in Ireland).

Current Savings

136. It is assumed that in the years immediately ahead savings will, on average, be sufficient to maintain capital formation at the 1957 level. . . .

External Assets

137. These consist of the *external investments* held by the private sector and the *external reserves* held by the monetary authorities. External investments are not available to finance balance of payments deficits unless they are sold by their owners or used directly to purchase imports. In considering the extent to which external reserves can be drawn upon to finance any gap between investment needs and available resources, the following factors, amongst others, have to be borne in mind:

- (i) the primary purpose of these reserves is to underpin the exchange value of the currency. . . .
- (ii) our economy is subject to acute fluctuations in external trade, the impact of which falls primarily on the liquid external reserves of the commercial banks, affecting their ability to extend domestic credit;
- (iii) the external reserves of the commercial banks have been greatly reduced since the war and now afford little margin over minimum liquidity requirements. . . .

If there should be any scarcity of home capital for productive development, it would be in accordance with . . . policy that *future* issues of legal tender notes should not involve an addition to the external reserves of the Central Bank.

External Borrowing

138. Where available resources are inadequate to finance productive projects, they will be supplemented by borrowing from the specialised international lending institutions. . . . Moreover,

direct capital participation by externs in new industrial projects will be encouraged. . . .

The discussion of "costs" refers to the cost of the public capital programme. On the other hand, the discussion under the heading "resources" expresses little more than the view that *ex ante* savings should somehow *equal total (public and private) ex ante investment*. As, however, no attempt appears to have been made to forecast *ex ante* private investment (whether autonomous or induced by income changes), it is reasonable to conclude that no adequate gap analysis of *ex ante* savings and investment, with corresponding fiscal policy implications, was conducted.

Economic Development,³⁷ the background document for the First Programme, contained considerable discussion of the monetary aspects of financing investment. In this respect, it was probably superior to any subsequent public policy document. It was not, however, without its oversights. Thus, it proposed that domestic assets might be accepted as backing for *future* issues of Legal Tender Notes and that, *considerations of foreign borrowing aside*, "this proposal would obviate the immobilisation within the Legal Tender Note Fund of external reserves at present held by the commercial banks which would otherwise have to be surrendered to the Central Bank to pay for new Legal Tender Notes. Those reserves would be available to finance external deficits incurred to step up domestic capital formation".³⁸ The inference that such reserves would have been available to finance current account external deficits was not correct, for the following reason: It was stated that the net external assets of the Associated banks, at about 30 per cent of their domestic deposit liabilities, were "at a minimum safe level". Furthermore, it was not intended to run down the external reserves of the Central Bank or of Departmental Funds. Now it could be expected, with the proposed economic development, that the domestic deposit liabilities of the banks

³⁷*Economic Development*, Fr. 4803, Stationery Office, Dublin, 1958.

³⁸*Ibid.*, pp. 39, 40.

would increase; they would, therefore, have had to *increase* the absolute level of their net external assets in order to approximate the specified 30 per cent net external assets ratio. This would, in fact, have required current account international payments *surpluses*.

The *Second Programme* recognised, in general terms, the importance of balancing *ex ante* savings and investment; the Government would attempt to maintain “adequate”, not “excessive”, aggregate demand.³⁹ Little of a specific nature was said, however, of how a small or zero gap was to be brought about, and monetary policy received virtually no attention. Chapter 14 of the *Second Programme, Part II* was entitled “Financing of Investment”. Nevertheless, little discussion of the specific fiscal policies which would be employed to finance investment—in particular to balance *ex ante* savings and investment—was provided. The three-page Chapter 15, entitled “General Financial Policy”, had nothing to say of financial policy, other than in the context of such vague phrases as “remedial action”, “appropriate action”, “corrective measures” and the like. The net conclusion which emerges is that the *Second Programme* was too much concerned with projections, too little concerned with economic planning.

The methodology of the *Third Programme* was broadly in line with that of the Second. Again, monetary and fiscal considerations were given virtually no significance in its methodology. Like its predecessor, it failed to recognise that the ultimate sets of unknowns in any policy problem are not the projections or the targets, but rather the instruments. It appears to us only a slight over-statement to say that we in Ireland, in designing our plans, have tended to view economic policy with its head upside down: we have tended to focus on targets and projections as the ultimate unknowns, as though in many cases the policy instruments could be taken for granted.

³⁹These were the key words used to describe financial policy in the *Second Programme, Part I*, p. 62. Monetary policy and the monetary implications of the programme were discussed nowhere in that document.

A few more remarks may be appropriate concerning financial programming, or, rather, its relative absence in Ireland.⁴⁰

From 1965 onwards, the Central Bank placed great stress on the importance of controlling credit availability. As the Bank was ill-equipped with statutory policy instruments, it had to rely, until the Autumn of 1972⁴¹, on moral suasion in the form of credit advice to the banking system. In various issues of its *Report* and *Quarterly Bulletin*, however, it complained that such advice had not been adhered to. Had the monetary implications of the Irish programmes been seriously analysed (and in consequence the complementary policy alternatives been highlighted), the need for additional monetary policy instruments and appropriate legislation would almost certainly have been seen, at an early stage. Instead, monetary policy in Ireland proceeded very much on an *ad hoc* basis, with legislation on monetary matters being enacted years after the need for it had arisen. It seems highly probable, had monetary equilibrium exercises been conducted, that the need for flexible reserve ratios for the banking system, enforceable through legislation increasing the powers of the Central Bank, would have been recognised at an early stage. These considerations suggest that the failure to seriously analyse the monetary implications of the three programmes was a major flaw in our planning procedure. This view is reinforced by some further considerations which concern debt management and co-ordination of monetary and fiscal policy.

Debt management is a bridge between pure monetary and pure fiscal policy. Failures in financial programming also

⁴⁰Inadequate attention to the monetary equilibrium aspects of financial programming is probably one factor in explaining why, especially in the first half of the period under review, we tended to regard the balance of payments on current account as *the* criterion of "equilibrium" in the balance of international payments.

⁴¹What appear to be the first published official references to the existence of liquidity ratios can be found in the Central Bank's *Quarterly Bulletin*, Spring 1973. It seems, however, that such ratios were introduced in the Autumn of 1972. See "Banking in the Republic of Ireland", *Midland Bank Review*, November 1973, pp. 12-18. I am indebted to Miceál O Suilleabháin of University College, Cork for indicating this reference to me.

brought potential problems in this area. O'Donoghue,⁴² writing in 1968, noted that little attempt had apparently been made to create a graduated structure in the maturity of the debt. The resulting bunching meant that relatively large amounts could fall due for repayment and refunding at any one time. Tait,⁴³ writing in 1971, was concerned with the fact that the State would have to refund one-third of the National Debt within the five years from fiscal 1969/70. Such bunching could interfere with the operation of short-run monetary policies. On one hand, there might be problems of absorption by the market without stimulating large-scale international capital movements and consistent with prices for debt instruments which did not fluctuate very considerably, as the State sought to redeem and raise very substantial blocks of debt within short periods of time while, in other short periods, doing so only to a relatively minor degree. Also, there would be temptations not to implement restrictive monetary policies at times warranted by economic conditions if the authorities knew that within a short period they would be coming on the market seeking to re-borrow the bulk of the maturing debt.

On 31 March, 1974—the latest date for which figures are available—the total *official* National Debt⁴⁴ was over £1,622 million. Of this, about £1,454 million was internal, while over £167 million was borrowed externally.⁴⁵ As at 31 March 1974,

⁴²M. O'Donoghue, "Monetary Policy", Chapter 4 in J. Bristow and A. Tait (eds.), *Economic Policy in Ireland*, Institute of Public Administration, Dublin, 1968.

⁴³A. Tait, "Some Issues of Irish Debt Policy", Chapter II in A. Tait and J. Bristow (eds.), *Ireland; Some Problems of a Developing Economy*, Gill & Macmillan, Dublin, Barnes & Noble, New York, 1972.

⁴⁴The *official* National Debt is as defined in Accounts No. XXV and XXVI of the *Finance Accounts*, 1973/74. References to "the National Debt" in Ireland are normally confined to those categories of State liabilities.

⁴⁵These were the amounts due externally in terms of the international exchange rates prevailing at the times the loans were negotiated. Due to exchange rate changes since then, the actual official external debt was higher than the figure (£167 million) reported in the *Finance Accounts*. According to information kindly provided by the Department of Finance, the official external debt on 31 March, 1974, using the exchange rates prevailing on 29 March, 1974, was £200 million. By 31 December, 1974, the official external debt, in terms of the exchange rates prevailing late in December 1974, was about £360 million. See Central Bank of Ireland, *Quarterly Bulletin*, Winter 1974, Statistical Appendix, Table 5.

almost one half of the official internal debt will mature in the five years to 31 March, 1979; we have already remarked on the difficulties which this bunching may entail. It is understood that attempts have been made in recent years to effect a graduated structure in the official National Debt. As, however, bunching can be eliminated only in the longer-run, the present problem in this respect possibly reflects failures in consciously attempting to avoid such bunching in the not so recent past.

What one might call the *unofficial* National Debt is of greater concern to us. In Ireland these State liabilities are normally forgotten about in discussions of "the National Debt". The classification "unofficial" reflects the fact that the official Debt understates public liabilities. When, for example, a public enterprise such as Aer Lingus or the ESB negotiates a loan abroad, the resulting liabilities are not reckoned as part of the official National Debt. The State does, however, guarantee such loans. At 31 March 1974 the Government had guaranteed loans of which the amount outstanding was over £369 million. Over £130 million of this was in the form of external obligations—and such external indebtedness has risen very rapidly since then. The data in the *Finance Accounts* do not enable us to infer the overall maturity structure of these Government-guaranteed loans, and, so far as we have been able to ascertain, as of April 1974, nobody in the public service had analysed this matter. This observation was first raised by the present author in May 1974 when the main body of this paper was delivered as a public lecture. It is, however, consoling to note that the Central Bank has, since the Autumn of 1974, published statistics on the term structure of the external debt of State-sponsored bodies. However, the dangers are clear: unless we have conscious co-ordination to create a graduated structure in the *total* external public debt—and that includes the rapidly rising external debt of public enterprises—we are in danger of reaching a situation in which very substantial sums unexpectedly fall due for repayment abroad in a given year. The resulting strain on the basic international payments balance

could then lead to the application of demand deflationary policies to the domestic economy. In order to avoid such consequences, we require greater co-ordination between the Department of Finance, the public enterprises, and the Central Bank.

As in longer-run matters (in plan design and in the profile of the total National Debt) there has been serious lack of co-ordination in short-run monetary and fiscal policy. As previously remarked, the credit advice extended by the Central Bank to the Associated banks since the mid-'sixties had only very limited success, partly because of government requests for loans which the banks did not feel they ought to decline. This was the very antithesis of co-ordination in monetary and fiscal policy. In circumstances like this, the Central Bank could, and did, justly complain. In November 1967, Oslizlok, Economist at the Bank, wrote as follows:⁴⁶

A Central Bank does not exercise any discretion (and 'credit policy' is simply a misnomer) if the Central Bank waits for all the monetary demands by the public authorities, semi-state bodies and by various sections of the community at large to be freely formulated and then translates these demands into some kind of a directive, advice or ratio. The very purpose of discretionary action by the monetary authority is to influence spending decisions before they are formulated and not merely to accommodate itself to them.

The first rigorous theoretical analysis of the importance of co-ordination of short-run monetary and fiscal policies appears to have been presented by Bent Hansen twenty years ago.⁴⁷ But up to the 'seventies the moral does not seem to have been grasped in the formulation of Irish economic policy. We should point out, in this context, that it was indeed recognised in 1958

⁴⁶Central Bank of Ireland, *Quarterly Bulletin*, November 1967, p. 57, footnote

⁴⁷Bent Hansen, *The Economic Theory of Fiscal Policy* (Translation from the 1955 Swedish edition), Allen and Unwin, 1958, Chapter I. See also J. E. Meade, *The Balance of Payments, Mathematical Supplement*, Oxford University Press, 1951.

in *Economic Development* (p. 29) that "there should be the closest liaison between the Central Bank and the Minister for Finance so that by constant consultation and collaboration effect may be given to a financial policy favouring development to the utmost but avoiding any significant deficit in the balance of payments". The need for co-ordination was, however, overlooked in the three programmes. Although it did complain, it seems to us that the Central Bank, in the 'sixties at least, was expected to act as a rubber stamp for Government policies.

5. *The Case for Rolling Plans*

THE final question we wish to consider is whether or not we should have another national plan, and if so, what form such programming should take. It may be felt that there is no need for national planning in Ireland. If that were the case, completely decentralised decision-making without any co-ordination would presumably yield the best attainable social and economic results both over time and at any point in time. The history of the economy as well as several of the considerations already raised in this paper convincingly suggest that decentralised myopic decision-making would not yield such results. The need for some kind of national planning beyond the fiscal year is obvious when we bear in mind that policy actions today have consequences in future years, while the attainment of objectives in future years requires public policy actions in the current year. In April 1972 the Government announced that the preparation of a Fourth Programme—which we have not yet seen—had been approved. According to the 1972 Budget Statement, this was to cover the three-year period 1973 to 1975. More recently, in his 1974 Budget Statement, the Minister for Finance announced that:⁴⁸

The preparation of an economic and social programme covering the four-year period ahead has been under active consideration for some time. This task could not be approached on the basis of blueprints of previous programmes . . . Uncertainty is the catchword of the present world-wide economic scene . . . These and other uncertainties are expected to have a profound and pervasive effect on the economy, and underline the necessity for a funda-

⁴⁸*Budget, 1974*, Stationery Office, Dublin, p. 13.

mental review of planning methods. As it is too soon yet to assess their likely full impact in the coming years, the Government have decided that it would not be possible to publish a meaningful programme pending a reassessment of medium-term planning in the light of the current unsettled world economic situation. Meanwhile, the Government will continue with its reappraisal of the strategies on which economic and social planning should be based.

The Minister reiterated these views in his 1975 Budget Statement, in the course of which he remarked that:⁴⁹

Of all the tasks which could engage my attention, the least realistic would be the publication of a medium or long-term economic plan based on irrelevancies in the past, hunches as to the present and clairvoyance as to the future.

We agree that medium-term plans (just like those short-run plans which we call budgets) should not be based on "irrelevancies" and "clairvoyance". What is upsetting is that our governments have spent over three years thinking about how to formulate medium-term policies in an environment of uncertainty. They have not yet come to a conclusion. Two questions are of particular relevance: what should the time horizon of the practical planner be, and how should he take account of uncertainty? Economic analysis has shed some light on these problems.

First, we side-step uncertainty and investigate the question of optimal time horizon. Much of the theoretical literature on optimal economic growth suggests that the rational planner should have an infinite time horizon. That is because otherwise the terminal conditions of the plan may be arbitrary. In a rolling plan, by contrast, the plan, of finite time horizon, is revised at the end of each year and an additional year is

⁴⁹Dáil Éireann, *Parliamentary Debates, Official Report*, Vol. 277, No. 2, 15 January, 1975, p. 220.

added to the list. The effect of such revision is *always* to maintain a planning horizon of approximately fixed length. Steve Goldman, an American economist, has investigated the dynamic properties of such plans in a deterministic environment.⁵⁰ He focused attention upon the effects of continual revision and compared those with the effects of plans of infinite duration.

We do not describe Goldman's contributions in detail because they are quite technical. What he did⁵¹ is roughly as follows: he constructed an aggregate growth model of the neo-classical type in which the objective of the planner is to maximise the sum of utility, U , over time. The planner's utility, in turn, is a strictly increasing function of *per capita* consumption, c . It is also assumed that the planner discounts the future at the exponential rate δ , so the Strotz problem of inconsistency⁵² does not arise. Thus, it is assumed that the objective of the planner is to maximise

$$\int_0^T U [c(t)] e^{-\delta t} dt.$$

subject to certain laws of motion in the economy, and subject to a constraint that capital per man must not be diminished. O is the base time and T the terminal time of the plan. Furthermore, Goldman assumed that the planner *always* maintains a horizon of T years, so that when an instant of time elapses, the planner simply *extends* the terminal date by that instant. Goldman's fundamental theorem is as follows:

Theorem: Suppose that, at each moment, growth is planned so

⁵⁰S. M. Goldman, "Optimal Growth and Continual Planning Revision", *Review of Economic Studies*, April 1968, and "Sequential Planning and Continual Planning Revision", *Journal of Political Economy*, July/August, 1969. Because Goldman's models are deterministic (no uncertainty is present) they do not take account of the fact that with planning revision, the planner can take advantage of the accumulation of information over time.

⁵¹S. M. Goldman, 1968.

⁵²R. H. Strotz, "Myopia and Inconsistency in Dynamic Utility Maximisation", *Review of Economic Studies*, Vol. 23, (1955/56), pp. 165-180.

as to maximise welfare over the next T years and to leave a remaining capital-labour ratio at least as large as at the inception of the plan. Suppose further that the plan is continuously revised and that the constraint on the terminal capital-labour ratio is altered to reflect the endowment at the moment of revision. The resulting programme of growth is. . . the same as would have occurred if the initial planning period had been for an infinite length of time (with no revision).

The relevance of this result is as follows. A standard objection to optimal growth models with finite time horizon is that the terminal conditions are arbitrary. The real-world planner, on the other hand, would say that he cannot in practice come up with a plan document embracing infinity. What Goldman has shown is that—at least in the particular model he analyses—by rolling plans we can side-step the practical problems of planning over an infinite horizon, while, at the same time, we can plan *as if* we were planning over infinity. Thus, even if the objective of the planner is to maximise some function of the welfare of all future generations, he may be able to do so by adopting rolling plans, continuously maximising over a finite time horizon, subject to constraints on the capital-labour ratio. These considerations lead, quite naturally, to the question: Granted that the decision-maker cannot, or need not, plan for infinity, precisely how long should his time horizon be?

The open dynamic input-output model of Leontief can cast some light on the appropriate time horizon of the practical planner. The particular study by Leontief to which we refer⁶³ employed US data. It is a little technical, and is described in some detail in Appendix II. It expresses the gross outputs of the various sectors of the economy in any given year as a function of the levels of final demand (excluding investment demand, which is endogenously determined) for those sectors in future years. The dependence of the gross outputs of a given year on all future final demand vectors over the planning period

⁶³Wassily Leontief, "The Dynamic Inverse", Chapter I in A. P. Carter and A. Brody, (eds.), *Contributions to Input Output Analysis*, North-Holland, 1970.

is related, *inter alia*, to the following considerations: (i) The model is, by implication, constrained to avoid, in every year, excess capacity in the capital stock; alternatively, we can interpret it as implying an approximately constant percentage of slack in the capital stock in each year. (ii) Other things being equal, increased capital is necessary in order to increase gross output (which includes output of capital goods). (iii) Other things being equal, an increase in gross output is necessary to facilitate an increase in final demand. (iv) There is a lag in the installation of capital equipment. Thus, to increase output over time we need to increase the capital stock over time, and the increments in the capital stock must precede the increments in output. Furthermore, to make capital goods we need other capital goods, which in turn require other capital goods, and so on backwards in a virtual never-ending circuit of interdependence. Hence, it is fundamentally the lags in the installation of capital equipment which account for the dependence of the gross outputs in a given year on the level of final demand in future years.

Given that intertemporal interdependence of the kind just outlined exists, it is important to know how rapidly it converges toward zero. If, for example, we find that the coefficients relating final demands in time periods more than, say, six years from the beginning of the current year (the base year), to the gross output vector of the current year, are very close to zero, then we can argue that the basic plan of the practical planner should have a time horizon of no more than six years. That would be because the attainment of final demand targets for years more than six years into the future would, in effect, be irrelevant to decisions made in the base year.

Suppose we found that interdependencies of the form discussed were significant over periods of six years but that for years beyond the sixth year, they could in effect be treated as zero in the sense that the attainment of final demand targets in the seventh and later years had little or no implication for the level or composition of gross outputs in the first year. We

would then reach the important conclusion that the core or basic plan of the practical planner should have a time horizon of six years. But there is another vital inference which we would draw: At the beginning of the second year, when the first (previous base) year had become history, the rational planner would (unless he had good reasons to act as though the world were going to end at the termination of the sixth year) still maintain a six-year time horizon *from the second year*. That would be because, by assumption, the attainment of final demand targets in year seven would have implications for the level and composition of gross output in year two, which would become the *new* base year of another six-year plan. Extending this reasoning, the rational policy-maker would adopt *rolling plans* with a six-year time horizon, thereby *always* maintaining approximately the appropriate time horizon.

In the case of most of the industries in Leontief's study (which employed US data) changes in the final demand vector in any year t had relatively minor implications for the outputs of the various sectors in years before $t-4$. If the structure of the Irish economy were identical to that of the USA we would conclude, in the light of Leontief's findings, that the basic time horizon in Irish planning should be 5 or 6 years. However, the results in the US study cannot be applied directly to Ireland: in the Irish economy, the relatively small size of the capital-goods sectors and the importance of imports of capital-goods imply that the appropriate basic planning period might be shorter than that indicated by the US data. These and other considerations suggest that the basic planning horizon in the Irish context should be *about* 4 years, though clearly we would require a dynamic input-output model of the Irish economy before precision could be attached to that figure. In any case, it is obvious that, in order always to approximate the optimal basic time horizon, planning should be of the rolling form. Thus we conclude that in Ireland the basic plan of the practical planner should have a time horizon of about 4 years and that it should be of the rolling form; in order always to approximate

the optimal time horizon, a new year should be added to the horizon every time the previous base year elapses. Such rolling medium-term plans would, however, have to be integrated into some perspective planning framework. These perspective plans would take account of inter-temporal interactions significant over time periods of more than four years' duration. Standard examples of such lags can be found in manpower programming, project appraisal, and in debt management and external borrowing.

The case for rolling plans is even more convincing when we introduce uncertainty and recognise that an economy is in fact a stochastic system. A stochastic system (i.e. a dynamic system involving random variables) which evolves according to a rule which also involves variables or parameters under external control is called a stochastic control system. If these variables or parameters are determined so that the system behaves as well as possible by some specified criterion, one has achieved optimal control of the stochastic system. So far, we have hardly explicitly recognised that an economy is such a system, but doing so strengthens our argument for rolling plans.

Under varying assumptions regarding the objectives of the controller, and the information available to him, different optimal stochastic control policies result. These fall into three broad categories: optimal pure open-loop control, optimal closed-loop feedback control, and a control scheme intermediate between those two, open-loop optimal feedback control. We recall from the early part of this paper that an open-loop control system is one in which the sequence of controls to be applied over time is decided in advance, as a function of time. Thus, with an open-loop control scheme, the decision-maker commits himself in advance to making various specific decisions at specific points in time. In a closed-loop (feedback) system, by contrast, the decision-maker works out a strategy for the future in which the decisions to be made at all points in time over the relevant horizon are made dependent on the state of the system at the time that each decision must

finally be made. One could spend a long time cranking out solutions for a long list of possible examples to indicate the general superiority of closed-loop (feedback) control schemes; these can be found in the literature.⁵⁴ We have already discussed what closed-loop feedback control implies for economic planning. Thus, consider a planner who, by manipulation of policy instruments, seeks to maximise the expected performance of the economy over a period of X years. Taking certain practical considerations into account,⁵⁵ we can say that his best strategy is approximately as follows. At time zero, the beginning of the planning period, he should devise that X year plan for use of his instruments which seems best to him given the information he has at time zero, and recognising that he shall have opportunities to revise this plan at subsequent points in time. At time one, the beginning of the second year, he should devise that $X-1$ year plan which seems best to him given the information he has then (including the outcome of the first decision) and recognising that further information will unfold over time—and so on, until the beginning of year X . By planning in this manner, the decision-maker anticipates (forecasts) his expected future actions. That enables him to make advance preparations. At the same time, however, he may revise his anticipations (forecasts) to take account of the accumulation of information over time. Note that there would be no such accumulation of information over time if we lived in a world of certainty.

The relatively simple scheme which we have just described is in the spirit of that which we recommend for medium-term planning in Ireland. We add only one further complication, namely, rather than planning over a fixed calendar time horizon (as in the above example), planners should sequentially *add* a year to the calendar horizon every time the base year of the plan elapses. Thus, we envisage medium-term plans, *each*

⁵⁴See the works by S. Dreyfus cited in footnote 10 above.

⁵⁵The reasons why we qualify in this manner will be apparent to the reader who consults the literature on applications (examples) of stochastic dynamic programming.

with a time horizon of about four years, sequentially rolling forward in time.

It may be objected that our general preference for feedback schemes in stochastic control stems from particular examples in that literature⁵⁶. That is not correct. An optimal feedback scheme performs at least as well as an optimal open-loop scheme on the average⁵⁷. This is because the set of all open-loop control schemes is a subset of the set of all possible feedback schemes: the same decision, for an open-loop system, must be associated with all possible states of the system at a given time. Thus, even when the assumptions of that particular feedback control scheme best known to economists—the application of dynamic (period by period) certainty equivalence⁵⁸—break down, we will still generally prefer a stochastic control system with feedback to one without.

There are thus two vital conclusions which we reach from these considerations of plan design. First, rolling plans, rather than doing so, say, every four years, allow the planner *always* to approximate the appropriate time horizon. Second, rolling plans give ample opportunity for feedback control. On the basis of *both* of these considerations, *the conventional fixed-time-horizon plan must be regarded as generally sub-optimal*—and that conclusion holds without having to know the precise form of the planners' objectives, or criterion function. We are therefore led to the conclusion that *both considerations of intertemporal dependence and the uncertainties underlying Irish planning, due in large measure to the openness of the economy, present a very strong case for the adoption of rolling plans with a time horizon of about four years to the rolling terminal date*. Such rolling plans would have to be integrated into some perspective planning framework. The case for rolling plans must be qualified, however, with regard to the additional costs involved in

⁵⁶Dreyfus, *op. cit.*

⁵⁷Dreyfus, *op. cit.*, 1968, gives some examples of stochastic problems in which, by the criterion of minimising expected loss, it makes no difference whether optimal open-loop or feedback control are used.

⁵⁸See for example H. Theil, *op. cit.*, 1964.

designing such plans. It is believed that such costs would be relatively small. Economic research is an ongoing matter in the Department of Finance and at the ESRI, and the CSO has the task of providing the most up-to-date statistical data each year in connection with the formulation of budgetary policy. One may also object that a drawback of such planning might be the absence of sufficient discipline in ensuring that serious effort is made to achieve the targets once they are initially set; with rolling plans, there might be no day of reckoning when targets are compared with performance. It should be noted, in this context, that there is no reason why, with rolling plans, targets *cannot* be compared with performance. We are willing to concede, however, that frequent comparisons of targets and performance may in practice be less likely to occur when plans are revised from time to time (as with rolling plans) than would be the case with conventional fixed terminal date planning. The objection concerning the possible absence of sufficient discipline in ensuring that serious effort is made to achieve the targets once they are initially set is important, and underlines the need for periodic comparisons of past targets and performance, and assessment of that performance.

The case for rolling plans is intuitively appealing. Such a procedure enables planners to react relatively quickly to new information while maintaining a planning period sufficiently long to highlight the intertemporal effects of their actions and to enable structural or other major changes in the economy to be realistically sought by policy. We know of only one public decision-making body in Ireland which has explicitly recognised the logic of rolling plans. Thus, in announcing a five-year expansion programme, the Chairman of AnCO stated that "we look on this as a rolling plan which will have to be constantly updated in the light of experience and changing circumstances".⁵⁹ It is understood that rolling plans have been proposed for The Netherlands, a highly open economy

⁵⁹*AnCO News*, February 1974, p. 1.

like Ireland (and hence also subject to great uncertainty regarding the external environment), but one in which the volume of serious policy-orientated economic research has been substantially greater than in Ireland.

General Conclusions

WE have travelled a long way—from the static theory of economic policy to stochastic control theory—in this critique of economic planning and policy formation in Ireland. Rather than summarise we will simply outline the more important conclusions.

In general, the greater the number of relevant instruments that are available to policymakers, the larger the number of targets that can be attained, or, alternatively, if the objective is to maximise some objective function, the higher the level of welfare attainable. In this context, economic policy in Ireland has been inefficiently pursued. That appears to be due, in large measure, to the fact that little analysis was made of the monetary and fiscal implications of our three programmes in the past. Had such analyses been conducted, it is likely that the need for effective monetary policy instruments, along with appropriate legislation, would have been seen in advance—rather than years after the need for them had arisen. The lack of co-ordination between monetary and fiscal policy can also be explained by failures in financial programming.

Regarding the form of planning rationally appropriate to Ireland, both theoretical and immediately practical considerations lead us to conclude that the degree of openness of the economy, the uncertainty regarding the environment, and considerations of optimal time horizon—all of these provide a very strong case for the adoption of rolling plans, always maintaining a time horizon of approximately four years to the rolling terminal date.

We in Ireland have been analytically impatient—so impatient in fact, that in our hasty concern for “getting ahead” we have focused on targets and projections of endogenous

variables without due recognition of the fact that the instruments rather than the targets are the ultimate unknowns in any policy-orientated exercise. We have tended, in too many respects, to regard policy instruments as data (or as variables which could be "assumed away") rather than as variables which decision-makers can control. A few economists have recently called attention to the insufficient analysis which has been given to the question whether the exchange rate *vis-à-vis* Sterling could profitably be manipulated as a policy instrument⁶⁰ Our argument is that such lack of concern on that specific question has been only one aspect of a more *general* problem.

It is but a small over-statement to say that we have tended to approach economic policy with its head upside down. This has led to failures to recognise what objectives imply for use of instruments and goes a long way in explaining why we have been unable to decide on how we should rationally approach policy questions over time, under conditions of uncertainty.

An oft-quoted passage in Keynes⁶¹ warns about the dangers of falling into accepted modes of thought and the resulting aversion to new ideas. We have not realised that this is what *in fact* has happened to us. In our Anglo-Saxon insularity, we have paid scant attention to the theory of economic policy and its associated techniques. This important area of Political

⁶⁰See Moore McDowell, "Ireland: The Control of Inflation in a Small Open Economy", *Studies*, forthcoming (Spring 1975), and Louis Smith, "What We Should Do About Sterling", *Management*, Journal of the Irish Management Institute, January 1975. We are not necessarily in agreement with *all* of the arguments advanced by those authors.

⁶¹Recall the (perhaps exaggerated) closing sentences of the *General Theory* where Keynes suggests that "the ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any academic influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas. Not, indeed, immediately, but after a certain interval; for in the field of economic and political philosophy there are not many who are influenced by new theories after they are twenty-five or thirty years of age, so that the ideas which civil servants and politicians and even agitators apply to current events are not likely to be the newest".

Economy is, significantly, of non-British vintage, with the seminal research emanating from The Netherlands, Scandinavia, the USA and the USSR. What we need then, in our universities and elsewhere, is more, not less, Political Economy. But this "new" Political Economy will have, within its domain, not only the study of the sociological and political context in which economic policy decisions are made, but also the more rigorous modern theory of economic policy. The conclusions inferred from that body of analysis, it may be argued, are common sense. We have argued, by contrast, that in Ireland they have been quite uncommon.

One final set of remarks in closing. We have touched on a large number of sub-topics in this paper. If we are correct in thinking that the various issues raised are of importance, then we reach one final conclusion: our tendency to focus on objectives rather than policies (instruments) may be partially explained by the fact that we in Ireland have not been sufficiently interested in serious policy-orientated economic research. If this is the case, then surely some re-thinking of our teaching and research priorities is desirable⁶².

⁶²In a paper read at the *Conference of Irish Economists*, Ballymascanlon, 28-30 March, 1974, Louis Smith noted that "we (in Ireland) do not have the research results to hand on which to base an informed policy (regarding the exchange rate with Sterling). Even our teaching lays little stress on this topic".

APPENDIX I

On Consistent Policy Problems

WE recall from elementary algebra that if we have a system of non-contradictory and independent equations, with the number of unknowns, K , exceeding the number of equations, L , then there exist an infinity of solutions to those equations. Under such circumstances we can, however, solve (uniquely if the system is linear) for L of the unknowns as functions of $K-L$ of the unknowns. In particular, we can set $K-L$ of the unknowns at arbitrary values (perhaps at zero levels) and find a finite number of solutions (a unique solution if the system is linear) for the remaining L unknowns.

If the equations in our system are non-contradictory and independent, and if the number of equations equals the number of unknowns, then a solution, which we can be sure is unique if the system is linear, exists.

If, however, there are more independent equations than unknowns, no solution exists.

Consider now the static deterministic policy problem with *fixed* targets.

A consistent policy will then constitute a set of absolute targets and a set of instruments which enables those targets to be attained. Let u_i , $i=1 \dots, I$ denote instrument variables; let d_k , $k=1 \dots, K$ denote data; let x_n , $n=1, \dots, N$ denote target variables; and let r_s , $s=1, \dots, S$ represent irrelevant variables. An economy can then be represented by the structural equations:

$$(1) \quad f_m(x_1, \dots, x_N; r_1, \dots, r_S; u_1, \dots, u_I; d_1, \dots, d_K) = 0$$

where $m = 1, \dots, M$, and $N+S = M$.

We thus have a model with M endogenous variables, and have assumed that the government has assigned fixed target values to N of them, namely, the x_n . The system of M equations then contains $M-N+I$ unknowns, viz., the r_s and the u_i . If the equations (*which may be linear or non-linear*) are independent and, in those cases where there are no more equations than unknowns, if they are not contradictory, we can have three possible cases:

- (a) $M-N+I > M$, i.e., $I > N$, more unknowns than equations, more instruments than targets. There are then an infinity

of ways to satisfy the structural equations for given values of the target variables. Many sets of instruments are consistent with the specified targets.

- (b) $M - N + I = M$, i.e., $I = N$, number of unknowns equals number of equations, number of instruments equals number of targets, so a solution, which we can be sure is unique if the system is linear, exists. In this case, all policy instruments must be employed in order to attain the targets.
- (c) $M - N + I < M$, i.e., $I < N$, more equations than unknowns, more targets than instruments. No solution exists. There is now no set of instruments consistent with the specified targets.

The general need for co-ordination of instruments is obvious when we bear in mind that the values of the instruments to attain given values of the target variables are found by solving a system of simultaneous equations. For example, suppose that we have eliminated the irrelevant variables from the model by algebraic means, and that the model is then of the almost trivial linear form:

$$x_1 = d_{11}u_1 + d_{12}u_2 + d_{13}$$

$$x_2 = d_{21}u_1 + d_{22}u_2 + d_{23}$$

Clearly, so long as the data, the d_{ij} , are all non-zero, varying either instrument will affect both target variables. Thus, as a generalisation, we can say that the instruments must be co-ordinated: The whole set of targets together determines the whole set of instruments to be employed, and no single instrument can be attached to a specific target. If, however, $d_{11} = 0$ and $d_{22} = 0$, we have the most trivial type of system: u_2 can be assigned to attain x_1 and u_1 can be assigned to attain x_2 .

Consider now the policy problem with flexible targets. The problem might then be of the form:

$$(2) \quad \text{Max } W = W(x_1, \dots, x_N) \text{ subject to (1).}$$

We assume that the equations in (1) are non-contradictory and independent. Since x_1, \dots, x_N must here be regarded as unknowns, we now have in (1) M equations and $M + I$ unknowns, which means that there must now be infinitely many solutions to the structural equations (1). It follows that we can solve for the target variables as functions of the I instruments, the u_i :

$$(3) \quad x_n = \psi_n(u_1, \dots, u_I); \quad n = 1, \dots, N$$

Substituting (3) into (2) yields

$$W(x_1, \dots, x_N) = W(\psi_1, \dots, \psi_N) = \hat{W}(u_1, \dots, u_I)$$

Maximising W then requires, as first order conditions,

$$(4) \quad \frac{\partial \hat{W}}{\partial u_i} = 0; \quad i = 1, \dots, I$$

(4) represents I equations which (assuming that (4) really has a solution and that the second order conditions are satisfied) enables us to solve for the I instruments which maximise (2) subject to (1). Note that the number of equations in (4) adapts itself automatically to the number of unknowns. Thus, in contrast to the case of fixed targets, the policy problem with flexible targets is almost always solvable.

In the above exposition of the flexible target problem we assumed that the number of instruments available to the policymaker was *fixed in advance*, and that $I \cong N$. This leads to the question: Is there an optimal number of instruments? To give meaning to the question, we assume that W really does have a maximum. The problem, then, is to find a condition on the number of instruments which will enable us to get to the summit of the welfare mountain.

For a maximum of (2) we require

$$(5) \quad \frac{\partial W}{\partial x_n} = 0; \quad n = 1, \dots, N$$

But given the constraints (1), the feasibility of the x_1, \dots, x_N which satisfy (5) requires that those x_n also satisfy (1). Thus, what we require for the attainment of a "bliss" level of welfare is:

$$\frac{\partial W}{\partial x_n} = 0; \quad N \text{ equations in } N \text{ unknowns, } x_1, \dots, x_N.$$

$$f_m(x_1, \dots, x_N; r_1, \dots, r_S; u_1, \dots, u_I; d_1, \dots, d_K) = 0;$$

M equations, $M - N + I$ additional unknowns.

We assume that these equations are non-contradictory and independent. So we have $N + M$ equations, and $N + M - N + I = M + I$ unknowns. For a solution (i.e. for the "bliss" level of welfare to be attainable) we require the number of unknowns to be at least as great as the number of equations, or $M + I \geq N + M$,

which implies $I \geq N$; the number of instruments must be at least as great as the number of variables entering the objective function.

Finally, consider the more general problem in which the politician may not be indifferent regarding the instruments he employs. (In this case, some policy instruments are also target variables.) Eliminating the irrelevant variables by algebraic means, the problem is then of the form:

$$(6) \quad \text{Max } W = W(x_1, \dots, x_N; u_1, \dots, u_I) \text{ subject to}$$

$$(7) \quad f_n(x_1, \dots, x_N; u_1, \dots, u_I; d_1, \dots, d_K) = 0; \quad n = 1, \dots, N$$

We can normally solve in two ways:

(a) Solve (7) for the x_n as functions of the u_i , insert the resulting expressions into (6) yielding

$$(6') \quad W = \hat{W}(u_1, \dots, u_I)$$

and maximise (6') with respect to u_1, \dots, u_I . This will give us I equations to solve for the I unknown instruments which maximise (6) subject to (7).

(b) Alternatively, set up the Lagrangian

$$L = W(\dots) - \sum_1^N \lambda_n f_n(\dots)$$

As first order conditions for a maximum we then have:

$$\frac{\partial L}{\partial x_n} = 0 \quad (n = 1, \dots, N)$$

$$\frac{\partial L}{\partial u_i} = 0 \quad (i = 1, \dots, I)$$

$$\frac{\partial L}{\partial \lambda_n} = 0 \quad (n = 1, \dots, N)$$

This procedure gives us $(2N+I)$ equations to solve for the $2N+I$ unknowns, the x_n , λ_n , and u_i . Thus, even if the instruments appear in the objective function, in the case of flexible targets the number of equations to be solved is always equal to the number of unknowns so that (provided it is otherwise well behaved) the policy problem is always soluble.

If there are explicit boundary conditions on the use of instruments, the problem becomes one of linear or non-linear programming. Formal discussion of such problems, as well as those involving uncertainty and optimisation over time, would take us very far afield; the interested reader is accordingly urged to consult some of the references cited in the text. Brief though it has necessarily been, it is hoped that this appendix has given some readers a flavour of the formal structure of an economic policy problem.

APPENDIX II

The Leontief Study

It was stated in the text that the open dynamic input-output model of Leontief can cast some light on the appropriate time horizon of the practical planner. The model is of the form:

$$x_t = A_t x_t + B_{t+1}(x_{t+1} - x_t) + y_t$$

where the subscript t denotes time and
 x = vector of total gross outputs.

A = matrix of flow coefficients. Any element, a_{ij} , of this matrix shows the amount of commodity i directly required as a current input to produce one unit of commodity j .

B = matrix of capital stock coefficients. Any element, b_{ij} , of this matrix shows the amount of the i th commodity needed by the j th industry as new capital in order to facilitate an output increment of one unit in the j th industry. Capital goods produced in year t are assumed to be installed and put into operation in the next year, $t+1$.

y = vector of final demands, excluding investment demands.

The time subscripts attached to both structural matrices, A and B , provide the possibility of using different sets of flow and capital coefficients for different years, thereby incorporating technical change into the dynamic model.

For a planning horizon of T years, we have a set of difference equations which, defining $G_t = I - A_t + B_{t+1}$, are:

$$\begin{array}{rcl} G_0 x_0 & - & B_1 x_1 = y_0 \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ G_t x_t & - & B_{t+1} x_{t+1} = y_t \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ G_{T-1} x_{T-1} & - & B_T x_T = y_{T-1} \end{array}$$

Defining $R_t = G_t^{-1} B_t$, the system can be transformed to:

$$\begin{array}{c}
 \begin{array}{|c}
 x_0 \\
 x_1 \\
 \cdot \\
 \cdot \\
 \cdot \\
 x_{T-4} \\
 x_{T-3} \\
 x_{T-2} \\
 x_{T-1}
 \end{array} \\
 \parallel \\
 \begin{array}{|c}
 G_0^{-1} \quad R_1 G_1^{-1} \quad \dots \quad \cdot \quad \cdot \\
 0 \quad G_1^{-1} \quad \dots \quad \cdot \quad \cdot \\
 \cdot \quad \cdot \quad \dots \quad \cdot \quad \cdot \\
 \cdot \quad \cdot \quad \dots \quad \cdot \quad \cdot \\
 \cdot \quad \cdot \quad \dots \quad \cdot \quad \cdot \\
 0 \quad 0 \quad \dots \quad G_{T-4}^{-1} \quad R_{T-3} G_{T-3}^{-1} \quad R_{T-3} R_{T-2} G_{T-2}^{-1} \quad R_{T-3} \dots R_{T-1} G_{T-1}^{-1} \\
 0 \quad 0 \quad \dots \quad 0 \quad G_{T-3}^{-1} \quad R_{T-2} G_{T-2}^{-1} \quad R_{T-2} R_{T-1} G_{T-1}^{-1} \\
 0 \quad 0 \quad \dots \quad 0 \quad 0 \quad G_{T-2}^{-1} \quad R_{T-1} G_{T-1}^{-1} \\
 0 \quad 0 \quad \dots \quad 0 \quad 0 \quad 0 \quad G_{T-1}^{-1}
 \end{array} \\
 \begin{array}{|c}
 y_0 \\
 y_1 \\
 \cdot \\
 \cdot \\
 \cdot \\
 y_{T-4} \\
 y_{T-3} \\
 y_{T-2} \\
 y_{T-1}
 \end{array}
 \end{array}$$

We shall refer to the large complicated matrix of sub-matrices as the dynamic inverse. Every element of this matrix is itself a square matrix. If a delivery to final demand at some specified future date is required, the dynamic inverse determines the gross outputs of the various sectors necessary in the current year, and in every intervening year. Phrased otherwise, we can say that it expresses the gross outputs of any year as a function of the final demand vectors of the given year and of all future years in the planning horizon. It states, for example, that:

$$x_0 = G_1^{-1} y_0 + (R_1 G_1^{-1}) y_1 + \dots + (R_1 \dots R_{T-1} G_{T-1}^{-1}) y_{T-1},$$

$$x_1 = G_1^{-1} y_1 + \dots + (R_2 \dots R_{T-1} G_{T-1}^{-1}) y_{T-1},$$

and so on. Thus, if planners set final demand targets for, say, the next ten years, those targets will have implications for gross outputs in the current year, and in all future years up to and including the tenth.

What we are interested in is whether the coefficients of the final demand vectors, i.e. of the y_t , are in effect, zero for years far into the future. If, for example, we find that the coefficients relating final demands in time periods more than, say, six years beyond the base year, to the gross output vector of the base year, are close to zero, then we can argue that the basic plan should have a time horizon of no more than six years. That would be because final demand targets for years more than six years into the future would, in effect, be irrelevant to decisions made in the base year.

This model embodies the assumption that the state of the economy in years beyond the end of the planning period is irrelevant from the standpoint of decisions made in the base year. If the planning period is a long one, the terms in the upper right hand corner of the dynamic inverse may be small in magnitude, and since it is likely that the plan will be revised before the end of the planning period, the assumption just mentioned may not be as pertinent as it at first appears. Whether or not the terms in the upper right hand corner of the dynamic inverse are small in magnitude is an empirical question about which we do have some information.

The empirical evidence of Leontief¹ is that the dynamic inverse is, in the present context, very nicely behaved. He constructed an open dynamic input-output system with 52 endogenous industries and computed its inverse on the basis of two sets of A and B matrices, one describing the structure of the US economy in 1947, the other in 1958. A third system was inverted on the assumption that

¹Wassily Leontief, *op. cit.*

technical change occurred gradually over the years 1947-1958. He then let each of the components of the final demand vector for 1958 increase by one million dollars. In all three cases the dynamic inverse turned out to be well behaved; all time series of which it consisted converged quite rapidly toward zero. In some instances, however, the convergence was much more rapid than in others. These findings led Leontief to conclude.²

In recent contributions to the pure theory of economic growth the problem of the so-called 'terminal conditions' has attracted much attention. According to the evidence presented above, the time horizon upon which we could base our plans or make our projections should vary from sector to sector. The time-shape of the elements of the Dynamic Inverse that governs direct and indirect requirements for the products of one particular industry might be such that its output in a given year depends primarily on the composition and the level of the final demand vector of the same year. For another industry, that shape might be such that the level of its output in a given year reflects final deliveries, say, four or five years later.

If structure of the Irish economy were identical to that of the USA, Leontief's findings would lead us to conclude that the basic plan of the practical planner should have a time horizon of about six years. Reasons are given in the text why, in the case of Ireland, it probably should be a little shorter than that.

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