METHODOLOGY OR METHODOLOGY
Alan A. Powell
and
Peter B. Dixon
by
MODELS OF THE AUSTRALIAN ECONOMY
RESEARCHING A NON-EXPERIMENTAL SYSTEM: THE IMPACT

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Program (1980-1984)

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Program (1980-1984)
The OMB model

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1. In this section we borrow extensively from A.A. Powell, "The Major Streams of Economy-Wide Modelling", in J. Kamata and J.B. Hausay (eds), Large-Scale Macroeconometric Models (Amsterdam: North-Holland, 1981), pp.219-364.


5. For a catalogue, write to: Mr M. Kenderes, IMPACT Project Information Officer, Industries Assistance Commission, P.O. Box 59, BELCONNEN, A.C.T. 2616, Australia.

Higher level of development in Communist countries can be achieved on the basis of a planned and organized process of economic development. Communist countries have a high level of organization and control over their economies, which allows them to focus on long-term goals and minimize the impact of market fluctuations.

The economic system of Communist countries is characterized by a strong emphasis on state planning and control. This is evident in the way resources are allocated and production is organized. The government plays a dominant role in determining the direction of economic development, and this can lead to a more stable and predictable economic environment.

In the past, Communist countries have faced some challenges in terms of economic growth and development. However, recent years have seen a shift towards more market-oriented economic policies, which has led to increased economic freedom and growth. This shift has been driven by a desire to compete more effectively in the global economy and to improve the well-being of their citizens.
RESEARCHING A NON-EXPERIMENTAL SYSTEM: THE IMPACT MODELS OF THE AUSTRALIAN ECONOMY

by

Peter B. Dixon and Alan A. Powell

Preamble

In this address we attempt an exposition of some of the fundamental strategic issues facing a scientist in a non-experimental social science. These issues are not well understood by the community nor are best practice procedures for dealing with them uniformly followed by economists. An insusceptible fact of life in non-experimental sciences is the existence of a multiplicity of internally consistent, but different, rationalizations of any given body of factual evidence. Occam’s razor is not usually sufficient to reduce the set of such rationalizations to a solitary element. Coexistence among those holding competitive theories is thus both inevitable and desirable. It is, however, confusing to clients.

In Sections 1, 2 and 3 below we consider this problem in more detail. Given the state of the art and the costliness and/or impossibility of obtaining additional data which might discriminate between competing theories, users of research have no option but to take responsibility themselves for the selection of axiom sets. In Section 4 it is shown that a client of economic research has to be prepared to look inside the black box. It is what he finds there that will determine his choice among models. In non-experimental sciences the irreducible subjective element is therefore larger than in experimental sciences.

Entering a black box is unpleasant. No maintenance engineer would willingly attempt to do so without a manual written by the designer. Comprehension of the contents of the box depends on the quality and comprehensiveness of this documentation. Given that complete and accurate documentation is a precondition to their intelligent use, it is disappointing that many economic models are poorly documented. The success of the IMPACT Project, we believe, is in no small measure due to the relatively satisfactory state of the documentation of its models. In Section 5 we comment on the documentation of the ORANI model, prior to giving an example of its use to analyze a currently pressing policy concern; namely, the alleviation of high rates of unemployment. This discussion in Section 5 is largely self-contained. In Section 6 we offer concluding remarks.

stimulation in activity increase the tax base sufficiently to compensate the government for the reduction in the tax rate? This question is analyzed in a paper that one of us (Dixon) wrote with Professor Corden. The conclusion was that a successful wage-tax bargain would increase the government’s budget deficit. The increase would not, however, be disastrous and might be handled in a variety of ways; e.g., foreign borrowing and reductions in government spending. In round figures, we concluded that if take home pay per unit of labour could be fixed in real terms, then the government could cut taxes sufficiently to increase the demand for labour by 5 per cent at the expense of a two to four billion dollar increase in its annual deficit. This is not an overwhelming figure in relation to the Australian GDP of about $200 billion.

5.2 Summary

The main points of the policy simulations that we have presented this evening are:

(a) In Australia, it is highly doubtful if protectionism plays any useful role in macroeconomic policy. More likely, it merely shifts jobs from the efficient exporting sector to the inefficient import competing sector and at the same time adds to inflationary pressures.

(b) Demand stimulation can create jobs, especially in the non-trading sectors. However, it adds to inflation and hurts the balance of trade.

(c) Reductions in the cost of employing labour stimulate all parts of the economy, especially industries closely connected with international trade. However, reductions in the costs of employing labour are politically difficult to implement.

(d) The required reductions in the costs of employing labour can be minimized by pursuing a combined Keynesian/neoclassical approach. This approach also has the advantage of providing the economy with a balanced stimulation.

(e) The wage-tax bargain offers an approach to both reducing the costs of employing labour and to expanding aggregate demand. In obtaining trade union acceptance of the bargain, it would be necessary to emphasize that no employed worker would suffer a reduction in his take-home pay while job opportunities would be created for many unemployed workers.
would have been, the balance of trade is projected to have moved towards deficit and inflationary pressures are projected to have been intensified. A more detailed consideration of the ORANI results than is possible here reveals that protection hurts exporting activities. In Australia, these activities are mainly in the agricultural and mining sectors. An increase in tariffs on footwear, textiles, automobiles, etc., increases the consumer price index. This increases money wages (we have fixed real wages in terms of the CPI). Increases in money wages lead to further increases in the CPI and to further increases in wages. With a general rise in costs, export industries are particularly adversely affected because they are constrained by international competition from raising their selling price. Thus, they are caught in a cost-price squeeze. According to ORANI, this causes a contraction in employment in exporting activities sufficient to outweigh the employment gains occurring in the import competing industries. With regard to the balance of trade, the contraction in exports is sufficient to outweigh the contraction of imports.

The second policy approach, demand expansion, has, according to ORANI, a useful stimulatory effect on employment. However, it also has two adverse side effects. First, it intensifies inflation and second it leads to a deterioration on the balance of trade. Detailed ORANI projections show that demand stimulation increases imports and reduces exports. Not only are potential exports diverted to satisfying domestic demands but the cost increases associated with demand stimulation reduce output and employment in the export-oriented activities. Thus, demand stimulation has uneven structural effects. It favours industries producing non-internationally tradeable goods. It provides only minor encouragement to the import-competing sector and harms the export-oriented industries. It is clear that macroeconomic recovery cannot be based on Keynesian demand stimulation alone.

The final approach, wage-cost reduction, scores high marks with respect to all three major macroeconomic variables. It increases the demand for labour, it moves the balance of trade towards surplus and it reduces the consumer price index. There are, however, two problems. First, wage-cost reduction introduces structural biases. It has very favourable effects on the internationally tradeable goods sector, especially exporters. Export prices tend to be determined in world markets independently of local costs. Thus, for exporters, cost reductions show up in increased profit and employment rather than in reduced prices. On the other hand, general cost reductions are not particularly stimulatory to industries producing goods which are not internationally tradeable. The second and more important difficulty with wages-cost reductions is how to introduce them. If we wanted to achieve a 5 per cent increase in the demand for labour by reductions in real wages alone, then according to Table 1, we would require a reduction of 9.7 per cent ($/0.514 equals 9.7).
Table 1: Approaches to Macroeconomic Recovery: ORANI Projections (a)

<table>
<thead>
<tr>
<th>Effect on</th>
<th>(1) a 25% increase in all rates of protection</th>
<th>(2) a 1% increase in real private absorption (Kynna)</th>
<th>(3) a 1% reduction in the real cost of a unit of labour (neoclassical)</th>
<th>(4) a 3.8% increase in real private absorption plus a 6.6% cut in the real cost of a unit of labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>demand for labour in hours</td>
<td>-0.001%</td>
<td>0.419%</td>
<td>0.514%</td>
<td>5.0</td>
</tr>
<tr>
<td>the balance of trade (100 ΔBT/GDP) (b)</td>
<td>-0.04 %</td>
<td>-0.53 %</td>
<td>0.30 %</td>
<td>0.0</td>
</tr>
<tr>
<td>the consumer price index</td>
<td>1.64</td>
<td>1.40</td>
<td>-1.28</td>
<td>-3.1</td>
</tr>
</tbody>
</table>

(a) These numbers were derived from Table 3.1 in P.B. Dixon, A.A. Powell and B.R. Parmenter, Structural Adaptation in an Ailing Macroeconomy, M.U.P. 1973. The effects of a 1% increase in private absorption were derived by subtracting the effects of a 1% increase in government absorption from the effects of a 1% increase in all absorption.

(b) The change in the balance of trade is expressed as a percentage of GDP.
The Reasons for Using Formal Models

A model first and foremost is a device for organizing one's thinking. Complex entities, such as a communications network, a human body, or an economy, are not really amenable to detailed analysis except in a systems framework. A model of such a system provides a taxonomy to organize our knowledge about it. Without such a taxonomic device the accretion of knowledge is haphazard, and the inter-relationships between different parts of the system are likely to remain obscure.

In evaluating models we should keep in mind that 'there are horses for courses': the value of a model can only be assessed relative to the purpose for which it was constructed. A 'good' model is one which achieves the purposes for which it was designed. A tailor's dummy is a good model of the human body with which to display a suit; one would not use it to teach anatomy to medical students. Economic models are built for a wide variety of purposes. These include forecasting, policy analysis, and teaching.

Given a well-defined use for a prospective economic model, there exist the following general arguments in support of actually proceeding with its construction:

(1) A formal model forces its builder to identify in a systematic, precise and explicit way the range of concepts necessary to address the issue in question.

(2) Equally important, a formal model identifies the factual evidence (i.e., data base) needed to support analysis, and often leads to recognition of important gaps and inconsistencies in the available information.

(3) Models improve communication. Although some effort is usually required to understand the language in which any particular model is constructed, of necessity any adequately documented model gives a clear statement of every assumption.

(4) Models form the basis for formally articulated (as distinct from intuitive) knowledge, which can be taught and learnt.

(5) Models provide a framework for learning from experience.

return to full employment would require an extended pause in the growth of real wages.

Apart from the Keynesian and neoclassical philosophies on macroeconomic policy, there is the protectionist view. Not many economists are found in the protectionist camp. However, at a political level, protectionists in Australia argue that to save jobs, we must restrict imports by using tariffs and quotas. Otherwise the Australian footwear, textile, clothing and automobile industries (among others) will no longer be able to cope with competition from cheap foreign imports. According to the protectionists, vigilance in controlling imports is especially important in times of job scarcity.

How can we try to reach conclusions on these different approaches to employment creation? That is, how can we decide whether the appropriate policy in the present situation should be Keynesian (demand expanding), neoclassical (wage reducing) or protectionist (import restricting)? One method is by the use of economic models.

5.1 Analysis of alternative macro strategies by use of the ORANI model

The ORANI results shown in Table 1 are for two year response period. For example, in column (1) we see that a 25 per cent increase in protection is projected to increase the consumer price index by 1.64 per cent; that is, after about two years we would expect the consumer price index to be 1.64 per cent higher with the increase in protection than without it. In looking at Table 1, it is also important to keep in mind the ceteris paribus assumptions, that is, what is being held constant. In column (1) we are looking at the effects of increasing protection holding constant the real level of aggregate demand (or absorption) and the real cost of a unit (man-hour, say) of labour. In column (2) we are looking at the effects of increasing the level of real private demand holding constant the level of protection and the real cost of a unit of labour. In column (3) we are looking at the effects of reducing the real cost of a unit of labour holding constant the level of protection and the level of real aggregate demand. Thus, in column (1) we are concerned with the effects of protectionism alone as a macroeconomic policy. In column (2) we are concerned with the effects of Keynesian demand expansions alone and in column (3) we are concerned with neoclassical wage reduction alone.

The first implication from the results is that protectionism is not a useful approach to macroeconomic policy. Two years after the increase in tariffs, employment is projected to be slightly lower than it otherwise
4. Pharmacological棹的rops

The pharmacological properties of drugs can have a profound impact on the body, affecting various systems and processes. This can be observed in the way they interact with specific receptors, enzymes, or transporters. Understanding these properties is crucial for the development of effective and safe medications.

5. Economic Impact and Market Forces

Economic forces play a significant role in the availability and accessibility of drugs. Market forces, such as competition and demand, influence pricing and availability. Governments and regulatory bodies also play a role in ensuring the safety and efficacy of drugs through policies and regulations.
therefore, subjective. How should such a judgement be made?

Any theory consists of a set of basic maintained assumptions (or axioms) and a set of derived propositions (or theorems). If there are no logical lapses, the theorems follow inexorably from the axioms. This does not establish their relevance to the real world. To do this, the observable consequences of the theorems have to be confronted with factual evidence. Let's consider two theories A and B, both of which have survived this confrontation with the available real world data. The only grounds for choosing between them is the plausibility of the assumptions and derived propositions. It goes without saying, therefore, that both of the latter (as well as evidence of their successful confrontation with the available data) must be properly documented if the client is to make a rational choice.

The need for complete technical documentation is recognized by most of the major model building groups in Australia, including the Reserve Bank, the Treasury/ABS and the IMPACT Project. Unfortunately, this need for complete technical documentation is not understood by some economic commentators and businessmen. Whereas sections of the media concentrated on alleged political and ideological explanations of the recent controversy surrounding the appointment of one of us (Dixon) to the Directorship of the Institute of Applied Economic and Social Research, we believe that the real issue was, in fact, the lack of adequate public documentation of IMP, an economic model developed over the last decade at the Institute with strong support from the Australian business community. Many commentators have remarked on the dramatic differences between policy prescriptions based on IMP and on IMPACT's ORANI model and understandably have been mystified about how to resolve these differences.

Consonant with our arguments above, a necessary first step in understanding the different policy results produced by the two models was to close the documentation gap which had plagued IMP since its inception. The programme initiated by the Institute's management in March 1984 for expeditious remedial work in the area of IMP's documentation followed when the builders of IMP chose instead to leave the Institute.¹ Without the necessary documentation, choice between IMP and other models will not be possible either objectively (on the basis of comparative performance of the models in their confrontation with the data) or subjectively (on the basis of the plausibility of explicitly stated axioms and propositions). Nevertheless, many clients (perhaps for commercial or political reasons) continue to opt for IMP. One fears that at least in some cases, the client has no interest whatsoever in the left hand side of our basic research equation. To put it bluntly, if you were to ask such a client which model he prefers, and if he were to answer candidly, he would reply "whichever model gives me the results favoured by my boss", be it a chairman of the board or a Minister of the Crown.

A selective filtering by clients of economic evidence along the above lines is reminiscent of the practices routinely followed by lawyers on behalf of litigants. There is nothing immoral about this but it cannot be expected to lead to scientific progress. Whilst it is true that there may remain substantial subjective elements in the way that different economists perceive the world, the particular set of maintained hypotheses embraced by any economist aspiring to the status of a social scientist should not be generated by his predilections for particular policy results.

5. An Example of Some Policy Results from the ORANI Model

The IMPACT Project was set up by Federal Government agencies in 1975 under the conwiorship of the Chairman of the Industries Assistance Commission. The aim of the Project was to improve the policy information system available to various government agencies whose domains of action overlapped in the following sense: the prosecution of a policy action taken in one of their respective areas (say manpower) could be expected to have consequences for the development of appropriate policy elsewhere (say tariffs). Once the official policy advisers had begun to perceive that the economy is a system, it became clear that nothing less than a comprehensive suite of models, structurally detailed and spanning the economy, would suffice.¹ The largest and best known of the subsequently developed IMPACT models is ORANI, a model of industry structure, international trade, and labour demand.¹

The documentation of the ORANI model runs to well over 4,000 pages; of these, about 84 per cent describes theory, data bases, parameter estimates and computer systems; the remaining 16 per cent gives accounts of illustrative applications in the policy field. All of this documentation is publicly accessible, and much of it is freely available.¹

ORANI has been used to analyse a great diversity of policy issues. Among others, these include the effects on industries, occupations and regions of the exploitation for export of mineral resources, changes in world commodity prices, changes in the exchange rate, changes in the pricing policy for domestic crude oil, subsidies to allig industries, the movement towards equal pay for women, changes in tariffs, the adoption of home-price schemes for agricultural export commodities, changes in the costs of employing labour, the adoption of Keynesian demand stimulation