



IMPACT OF DEMOGRAPHIC CHANGE ON INDUSTRY STRUCTURE IN AUSTRALIA

A joint study by the Australian Bureau of Statistics, the Department of Employment and Industrial Relations, the Department of Environment, Housing and Community Development, the Department of Industry and Commerce and the Industries Assistance Commission

Paper to be Published in
RURAL MARKETING AND POLICY
Vol. 9, No. 1, March 1979
Department of Agriculture and Fisheries,
South Australia

IMPACT - A FRAMEWORK FOR ANALYSING
AGRICULTURAL POLICY ISSUES
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General Paper No. G-16 Melbourne February 1979

The views expressed in this paper do not necessarily reflect the opinions of the participating agencies, nor of the Australian government.

that any model reflects these possibilities.

- (b) A regional (State) dimension has been added to the industry structure model so that, under various experiments, differing performances between States can be analysed. The importance of agricultural production and exports varies quite markedly between States and thus the effects of a mining boom or tariff change on agriculture would be expected to have different repercussions for each State.

Conclusion

Because it takes account of the linkages between the agricultural sector, the other non-agricultural industries and international trade, the IMPACT project is a valuable tool for the analysis of many agricultural policy issues. Its ability to disaggregate the projected effects of Government economic policies and world trade developments makes IMPACT particularly relevant for studying the way in which decisions taken elsewhere in the economy affect different agricultural industries.

More detailed results of these and the other IMPACT experiments undertaken have been documented in a number of IMPACT publications.¹

Recent developments

Much of the current development work being undertaken in the IMPACT project relates to the modelling of the agricultural sector. Among these research projects are the following:

- (a) The rural sector of the industry structure model has been redesigned in line with the zonal classification developed by the Bureau of Agricultural Economics (for example, "pastoral" and "high rainfall"). This has been done to reflect the fact that the production of the same agricultural commodity (for example wheat), can involve different production techniques according to its location within Australia. Rural industries are now modelled as producing bundles of agricultural commodities (such as wool, sheepmeat, and wheat). That is multi-enterprise production on farms (which characterizes so much of Australian agriculture) is explicitly recognized. Each industry's output mix is allowed to vary in response to changes in the relative prices of the commodities which it produces. Obviously for agricultural policy analysis, which can involve the manipulation of product prices, it is highly desirable

1. A full listing of all the IMPACT papers can be obtained by writing to: Mr. David Smith, Industries Assistance Commission, P.O. Box 80, Canberra, A.C.T. 2600.

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Rowen Craigie

Introduction

In formulating appropriate economic policies it is desirable to take account of the complex inter-relationships of industry structure, international trade, employment and population changes. This interaction often means that the intended effects of a particular policy action may be accompanied by unforeseen (and sometimes harmful) repercussions elsewhere in the economy.

For example while an increase in the tariff on motor vehicles may preserve employment in that industry in Australia, it will increase the costs of all industries using motor vehicles. Most non-exporting industries will attempt to pass on these higher costs by increasing their prices, thus raising the consumer price index. This in turn is likely to lead to additional wage increases through the wage indexation arrangements. However the rural industries, being predominantly export-oriented, are poorly placed to pass on all these cost increases. Thus a single policy action taken to protect employment in the motor vehicle industry could result in adverse effects on the rural sector's ability to trade in a competitive world market and hence on its profitability.

Without a framework that captures the interaction between sectors of the economy, the possible indirect effects of any individual policy action cannot be systematically analysed. Further, the failure to

take account of all the effects of policy options increases the possibility of inconsistent government economic policies. The IMPACT study, Australia's first major inter-agency economic research project, has been designed to provide such a framework for policy analysis.

What is IMPACT?

The IMPACT project aims to yield a coherent view of the economic relationships that exist between industry composition, international trade, the labour market and population trends. The participating agencies reflect these areas of concern. They are the Industries Assistance Commission, the Department of Employment and Industrial Relations, the Department of Environment, Housing and Community Development, the Department of Industry and Commerce (now represented by the Bureau of Industry Economics) and the Australian Bureau of Statistics. There are also two associate members of the project - the Department of Immigration and Ethnic Affairs, and the Department of Overseas Trade.

IMPACT has as its basis four economic models¹ with which to analyse the effects of interaction between policy induced and naturally occurring economic and social change. These are :

- (a) a small macro-economic model which is concerned with national levels of consumption expenditure, investment expenditure, government spending and the general price level ;

1. An economic model attempts to represent aspects of the economy in a system of mathematical statements (equations) of economic relationships. It is normally solved by a computer. The behaviour of the system and its applicability to "real-world" situations can be analysed by performing various experiments with the model. Other economic models in Australia have been developed (for different purposes) by the Reserve Bank and the Treasury.

increased by an amount equivalent to 15 per cent of the value of total exports. For the reasons discussed previously, those rural industries with high shares of exports in their total sales would be expected to suffer output reductions and income contractions. This in fact was the projected result. The industry groups "sheep", "cereal grains" and "meat cattle" experienced the most severe reductions in real farm income (ranging from 10 to 15 per cent) and output (ranging from three to five per cent). Despite the fact that overall employment in the economy was projected to rise by about one per cent, employment in the predominantly export oriented rural industries fell by up to eight per cent.

Those rural industries that sell a large proportion of their output for domestic consumption however (for example poultry) tended to be cushioned from these adverse effects. This was so because in the simulation real consumption was allowed to expand as a result of the increased income earned from the additional export receipts.

A general tariff increase and the agricultural sector

Another experiment was to simulate a 20 per cent across the board increase in tariffs. The results indicated that while the import competing industries were projected to increase their real output, the output of rural industries was adversely affected. The aggregate employment effects were small but employment in the group "rural workers" was projected to decline. As was the case with the mining boom simulation, the export oriented rural industries suffered greater reductions in profitability than did those supplying predominantly to the Australian market.

of all the domestic inter-industry linkages. That is, the effects on the cost structure of each industry that uses the products affected by the tariff change must be fully traced through before the net effect on the costs of the rural industries can be determined.

IMPACT can make a contribution to the analysis of these and other issues affecting agriculture because it focuses on the whole economy by means of economic models which encompass hundreds of relationships between industry, employment and international trade.

IMPACT experiments and the agricultural sector

A number of experiments or applications using the industry structure model have already been completed and the results published.

The effects on industry output, employment, prices of goods and services and the balance of trade have been studied for:

- a devaluation
- a uniform across the board increase in tariffs
- an increase in export revenue (say from a mining boom)
- the wage explosion and equal pay for women
- changes in world prices.

In all of these experiments the performance of about ten different rural industry groups can be analysed. The broad results of two of these experiments using the IMPACT model are discussed below.

A mining boom and the agricultural sector

To work out the short-run economy wide implications of a mining boom, an experiment was undertaken which assumed that export income

- (b) an industry structure model which decomposes the national aggregates into 109 industry groups and determines the relative prices of commodities, the levels of domestic output, employment, imports and exports for each group, and the demand for labour classified by nine occupations ;
- (c) a labour force model which is concerned with the supply of labour to these nine occupations, taking into consideration various economic-demographic factors such as fertility, family formation, workforce participation, immigration, education and mobility between occupations ;
- (d) a long term (15-25 years) model which is concerned with the effects on the structure of the economy of long term changes in technology, trading patterns and demography.

What can IMPACT do?

At their present stage of development the IMPACT models can handle the following sorts of questions :

- What would the effects be (say in one or two years time) of changes in :
 - the tariff level of a particular industry
 - the exchange rate
 - real wage rates
 - export prices

- the level of national consumption expenditure
 - the level of national investment expenditure
- ON
- production levels of each industry
 - imports and exports of each industry
 - relative prices of goods and services
 - employment of each occupation
 - balance of trade
 - profitability of each industry."

As well IMPACT can be used to analyse longer-term policy issues such as :

- the effects on industry structure and employment of changes in the pattern of world trade
- the effects of changing demographic patterns (for example a declining birth rate) on the demand for the products of particular Australian industries.

What IMPACT can't do

Of course no economic model can capture all of the operations of a system as complex as the Australian economy. Neither is it claimed that IMPACT is applicable to all aspects of policy evaluation nor that it will solve all the problems involved in formulating policy advice in these areas. However, with proper regard for the assumptions and limitations inherent in the models, the IMPACT analyses can provide valuable insights into the likely effects of different policy decisions in the fields of industry development, trade and manpower.

It should also be noted that IMPACT does not provide forecasts (that is, predictions of what will actually happen at some future time). To do so would require judgments of what future Government policy changes would be forthcoming in response to movements in the economy. Rather, IMPACT provides projections which indicate the consequences that would result from a particular economic or social change in the light of any given policy stance by the Government.

Agriculture in an economy-wide framework

The agricultural sector has important linkages with other Australian industries. It is affected by developments in international trade and by the Government's tariff and exchange rate policies.

For example, another mining boom (such as future uranium development) could have an adverse effect on the rural sector through the resulting cost-price squeeze on exporting industries. A rapid expansion in mining activities would result in Australia earning very large amounts of foreign currency. This means that our foreign reserves would increase and our balance of trade would go into surplus. This situation could not persist indefinitely. Balance would be restored either by inflation in Australia continuing at a higher rate than in the countries with which we trade or by an upward revaluation of the exchange rate. In either case the consequent cost-price squeeze on the rural sector would reduce the profitability of its exports.

In the case of tariff changes, the effects on the agricultural sector can only be systematically analysed in a framework which takes account