The Government/Democrats' package of changes in indirect taxes[†]

Peter B. Dixon and Maureen T. Rimmer*

Australia is faced with a comprehensive package of changes to its indirect tax system, including the introduction of a GST. The Government's only quantitative analysis in formulating the package employed PRISMOD, an archaic input–output price model. PRISMOD sheds dim light on a very limited range of policy-relevant variables. This article explains how PRISMOD works; this is of continuing relevance because PRISMOD results are a benchmark in negotiations concerning the price effects of the tax package. Then an assessment of the package is made using MONASH, a comprehensive dynamic general equilibrium model. Overall, the conclusions are negative: the package is welfare-reducing and unnecessary.

1. Introduction

With support from the Democrats the Government will impose a goods and services tax (GST) in July 2000. In round figures, the GST will raise A\$30 billion a year and will replace various other indirect taxes (principally the wholesale sales tax, WST) worth about A\$24 billion a year. Combined with these changes in indirect taxes, the Government/Democrats' package provides cuts in income taxes of about A\$12 billion a year. In broad terms, the package can be thought of in three parts: (a) the substitution of A\$24 billion of GST for A\$24 billion of WST; (b) the substitution of A\$6 billion of GST for A\$6 billion of income taxes; and (c) the granting of a A\$6 billion cut in income taxes.

In the lead-up to the Federal election of October 1998, the Government claimed that its planned tax changes (known as a new tax system, ANTS, see Costello, 1998) would significantly improve the equity and efficiency of the Australian tax system, and that they were necessary to generate sufficient tax revenue for Australia's future needs. In the Senate Inquiries held later in

1998 and in the first half of 1999, the Government's claims were largely refuted. It emerged that the tax package will:

- generate a significant risk of reduced employment in the short run;
- not increase employment in the long run;
- harm Australia's exports of tourism;
- worsen the terms of trade;
- not significantly increase the revenue-raising power of the tax system; and
- have a negligible long-run effect on Australia's overall economic welfare.

This leaves us with the question of how the Government came to propose the ANTS package. We think that the Government was poorly advised by the Treasury which relied largely on PRISMOD, an input-output price model. In the second section considerable space is devoted to the PRISMOD calculations for the original ANTS package and how the PRISMOD results would be changed if the model were re-run to take account of the modifications imposed by the Democrats in June 1999. Although the tax package has now settled and there seems to be no further prospect of influencing Government policy on this matter, PRISMOD remains of importance to many Australian businesses. This is because the PRISMOD results have created a benchmark for negotiations between businesses and between businesses and government concerning prices in 2000/2001 and beyond. In the third section results from MONASH, a dynamic general equilibrium model are reviewed. These results have appeared elsewhere (Dixon and Rimmer 1999 a, b) and discussion is concentrated on the intuition behind the points listed above. Concluding remarks are made in the final section.

2. The PRISMOD analysis of the Government's tax package

Nearly sixty years ago Wassily Leontief[1] performed an input-output price calculation at Harvard with the world's first computer. This was path-breaking. In 1998 when the Treasury made essentially the same calculation, it could only be described as unnecessarily crude and incomplete. All that the Treasury's analysis has to recommend it is simplicity.

To understand the Treasury calculation we assume that the economy consists of one industry, with the following cost structure:

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[1] See Leontief (1953) which describes input-output price calculations that he performed in the early 1940s.

	%
domestically produced intermediate inputs	38.7
imported intermediate inputs	10.6
sales taxes on intermediate inputs (e.g. the WST)	1.7
labour	33.9
costs of using capital (depreciation, interest and dividends)	15.1
	100.0

This is the average cost structure over all Australian industries.

We define quantity units so that in 1999/2000 the price (P) received by producers for a unit of output is one. Similarly we assume that the price of imported goods (Θ) and the wage rate (W) are one. With regard to capital, we assume that the user cost per unit of output is the product of the gross rate of return (R) and of the asset cost of capital used per unit of output (Π). With these assumptions we know that $R\Pi$ in 1999/2000 is 0.151. Again we can define units so that R is initially one and Π is initially 0.151.

Under the assumption that capital is made from domestic goods, the asset cost of capital per unit of output reflects the cost of domestic goods and the sales taxes charged on inputs to capital creation. In 1999/2000 sales taxes were 3.3 per cent of the asset cost of capital. We represent this by assuming that Π is made up of 0.146 units of domestic good (initially costing A$0.146) and of sales taxes initially set at A$0.005 [$100^*0.005/0.151 = 3.3$].

Bringing all of this together, we write

$$P = 0.387^*P + 0.106^*\Theta + T_1 + 0.339^*W + R^*\Pi \tag{1}$$

and

$$\Pi = 0.146^*P + T_2 \tag{2}$$

where

T_1 is taxes on intermediate inputs per unit of output (initially A$0.017) and

T_2 is taxes on the creation of the capital required per unit of output (initially A$0.005).

On combining equations 1 and 2 and expressing the result in change form, we obtain

$$\Delta P = 0.387^*\Delta P + 0.106^*\Delta\Theta + \Delta T_1 + 0.339^*\Delta W \\ + \Delta R^*0.151 + 0.146^*\Delta P + \Delta T_2 \tag{3}$$

The original ANTS package eliminated about 40 per cent of taxes on intermediate inputs and two-thirds of taxes on capital creation. We represent these tax changes as:

$$\Delta T_1 = -0.0068 \text{ and } \Delta T_2 = -0.0033 \qquad (4)$$

What does this mean for prices?

PRISMOD does not go beyond a pricing equation such as equation 3. Thus, to answer this question, the Treasury was forced to make assumptions concerning the price of imports (Θ), the rate of return (R) and the wage rate (W).

It is reasonable to suppose that tax changes in Australia will not affect the foreign-currency prices of imports. Thus, movements in Θ can be thought of as movements in the A\$/\$Foreign exchange rate. Treasury assumed that if tax changes reduce costs in Australia by 1 per cent, then the exchange rate will appreciate by about 1 per cent,[2] that is they assumed that

$$\Delta\Theta = \Delta P \qquad (5)$$

For rates of return and wage rates, Treasury assumed that

$$\Delta R = 0 \qquad (6)$$

and

$$\Delta W = 0 \qquad (7)$$

The importance of assumption 5 has been lost on the prime minister and other senior members of the Government. They have argued that general reductions in costs associated with cuts in input taxes will boost Australia's exports. A more sensible assumption, consistent with 5, is that the effects on competitiveness of general reductions in costs will be eliminated by exchange rate movements. Export industries which experience greater than average cost reductions will benefit from the package but export industries which experience less than average cost reductions will be harmed. There should be no presumption of a general stimulation of exports.

As we will see, assumption 6 is critical to the Treasury's PRISMOD calculations. This assumption is suitable only for calculating long-run effects. In the long run it is reasonable to suppose that rates of return in Australia are determined by world interest rates and risk premiums, independently of indirect taxes. However, for determining price movements over the next few years, assumption 6 is unsuitable. With the elimination of most of the taxes applying to capital creation, the asset price of capital (Π) in 2000/2001 is likely to fall quite sharply. Under assumption 6 the user cost of capital ($R\Pi$) must also fall quite sharply. However, the user cost of capital is determined by the demand for and supply of units of capital. We expect the tax package to have quite small short-run effects on economic activity and consequently

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[2] This is not explicit in Costello (1998) but a Treasury official confirmed to us that it is a reasonable representation of the PRISMOD exchange rate assumption.

on the demand for capital. The supply of capital is altered only slowly via investment. Thus we conclude that the user cost of capital will change very little in the short run and that R will rise. The idea that rates of return will rise in the short run is consistent with the Government's claims (e.g. Costello 1998, pp. 17–18) that the package will stimulate investment.

The Treasury recognises that the imposition of a GST will increase consumer prices. Thus, assumption 7 implies a reduction in real pre-tax wage rates. The Treasury hopes that wage earners will accept the substantial cuts in income taxes offered in the tax package as compensation for the GST-induced jump in the consumer price index (CPI). A risk of the package, discussed in the third section, is that wage rates will increase to at least partially match the increase in the CPI.

Accepting temporarily the Treasury assumptions 5–7 and using 4 we can solve equation 3 for ΔP. This gives

$$\Delta P = -0.028 \tag{8}$$

That is, under Treasury assumptions the original ANTS package generates a reduction in producer prices of 2.8 per cent.

PRISMOD is a generalisation of equation 3, giving the effects of tax changes on the producer prices of 107 commodities. Nevertheless, the essence of PRISMOD is encapsulated by equation 3. In Costello (1998), Treasury reported the average reduction in the model's 107 producer prices as 3.2 per cent, close to our 2.8 calculated from equation 3.

No further PRISMOD calculations have been made public since the Democrats' modifications of ANTS. Under these modifications only 23 per cent of taxes on intermediate inputs are removed. We suspect that if the Treasury ran PRISMOD with the modified package, they would obtain an average percentage reduction in producer prices of about 2 per cent. This is obtained from relationships 3 to 7 but with ΔT_1 set at -0.0039, rather than -0.0068.

The Federal Government, via the ACCC, is requiring large businesses to provide evidence that they are passing on cost reductions associated with cuts in taxes on inputs to production and capital creation. In budgeting, Federal and State Governments are requiring that each Department estimate its cost savings from the tax changes. All of this is generating consulting work for us and for other model builders. On the basis of our experience so far, we think that the PRISMOD number of 3.2 has set up unrealistic expectations as to likely reductions in costs. Not only have the Democrats' modifications eliminated a large part of the original cost reductions but, because of assumption 6, PRISMOD applied to any set of cuts in taxes on business inputs is likely to give an exaggerated idea of the short-run effects on producer prices.

In standard MONASH simulations of the Government/Democrats' package, we have accepted the PRISMOD wage assumption 7. However, for 2000/2001 we find that rates of return will, on average, rise by 3.7 per cent ($\Delta R = 0.037$) and the exchange rate will appreciate by 0.9 per cent ($\Delta\Theta = -0.009$). Using these values in equation 3 with ΔT_1 set at its post-Democrats' value of -0.0039, we obtain

$$\Delta P = -0.0055 \tag{9}$$

This is consistent with results from MONASH which show, under assumption 7, that the Government/Democrats' package will lower producer prices in 2000/2001 by about half a per cent. This is not seriously in conflict with Treasury's assumption 5.[3] The big problem is Treasury's assumption 6.

Even in the long run, we expect reductions in producer prices to be considerably less than the 2 per cent which would be forecast by PRISMOD for the Government/Democrats' package. For example, MONASH indicates that the reduction in average producer prices in 2005/2006 will be only about 0.8 per cent. Under the package, rates of return in 2005/2006 will still be above the levels they would have had without the package. However, this is not the only reason for the muted reduction in producer prices. As will be explained in the third section, the package is likely to cause a long-run deterioration in Australia's terms of trade and an associated weakening of the exchange rate.

The PRISMOD price estimates were unrealistic for the original ANTS package and if they were revised in light of the Democrats' modifications, we think that the results would still be misleading. By providing PRISMOD results, the Treasury has caused considerable confusion in the business community. Nevertheless, the major failing of the Treasury is not what it has *done* but what it has *not done*. In the policy formulation process it appears that the Treasury gave the Government no worthwhile guidance on the likely effects of the ANTS package on employment, trade, the industrial composition of GDP and overall economic welfare. Analysis of these variables did not become available until the Senate Inquiries, long after the Government was irrevocably committed to the package.

3. Overview of MONASH results

Together with several other modelling groups we were invited to present an analysis of the ANTS package to the Senate Inquiries. Here we summarise

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[3] MONASH implies a short-run appreciation greater than would be expected on the basis of the reduction in producer prices. This is associated with short-run stimulation of investment, see the third section.

that analysis and some subsequent analysis of the final package as modified by the Democrats.

3.1 Aggregate employment

The effect of the ANTS package on aggregate employment depends on wage reactions. Under the assumption of no wage increase, MONASH implies that ANTS would have a small (0.3 per cent or 30 000 jobs) expansionary effect on aggregate employment in the short run. This effect does not arise from changes in the tax mix. It arises from the overall cut in taxes (about A\$6 billion). A short-run expansion in employment similar to that likely to follow from the ANTS package could be generated simply by cutting income taxes by A\$6 billion, without changing indirect taxes. Similarly, short-run employment gains could be achieved by other fiscal expansions of A\$6 billion, for example, an unfunded increase in public expenditure.

Under the alternative assumption that wages follow the CPI, the ANTS package generates a significant short-run reduction in employment (1.2 per cent or 120 000 jobs). The substitution of indirect taxes for income taxes raises consumer prices relative to the prices net of indirect taxes received by producers. If wages follow the CPI, then wages must rise relative to net producer prices. This will squeeze profits and cause reductions in investment and employment.

It is not possible to predict the wage effect of the ANTS package (or the modified package) with any certainty. However, the possibility that wages will respond at least partially to the GST-induced jump in the CPI cannot be ruled out. The ACTU (1999) has signalled that it regards the income tax cuts in the ANTS package as an overdue adjustment for bracket creep. ACTU policy is to fight for maintenance for real pre-tax wage rates.

We expect tax changes to have little long-run effect on aggregate employment. In the long run, aggregate employment will be determined mainly by supply factors that are largely independent of current tax changes.

3.2 Trade and the industrial composition of GDP

Figure 1 shows illustrative sectoral results for the ANTS package from the main MONASH simulation presented to the Senate Inquiries. As explained in the second section, the package will increase rates of return and stimulate investment in the short run. This is reflected in the deviation path for output in the construction sector.

With a strong short-run increase in investment, MONASH implies a short-run real appreciation. This harms the export-oriented sectors, mining
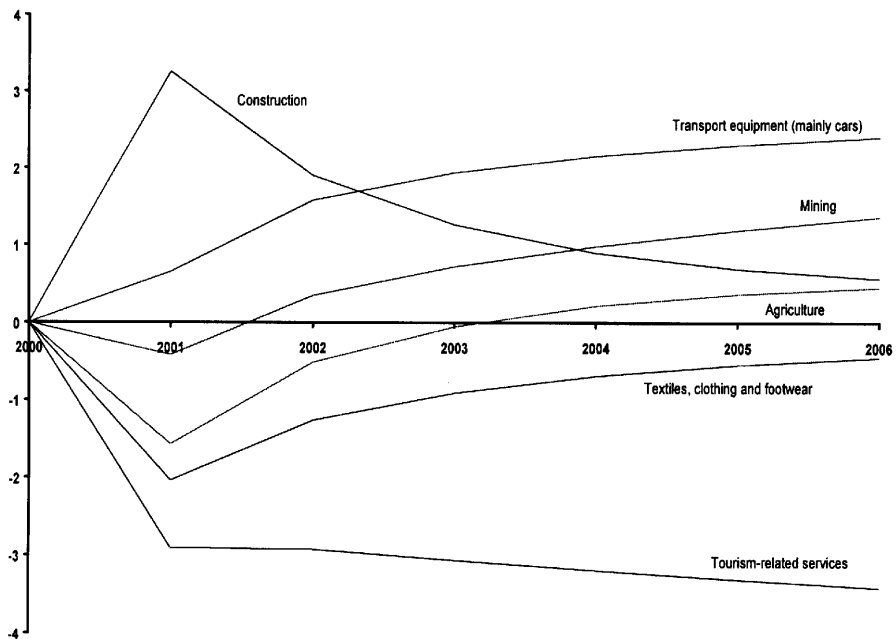
Figure 1 Effects of the ANTS package on sectoral outputs (percentage deviations from base-case forecasts)

and agriculture. As the investment surge weakens, the real exchange rate falls and agriculture and mining recover. Both sectors are eventual winners from the package. The current set of indirect taxes raises the costs of inputs to mining more than they do to agriculture. Thus with the substantial removal of these taxes, mining outperforms agriculture.

The price of cars to both businesses and households would fall sharply with the implementation of ANTS, as it will with the modified package. Cars are currently subject to very high taxes. The negative effect on car prices of the removal of these taxes strongly outweighs the positive effect on car prices of the imposition of the GST. With lower car prices, the transport equipment sector is shown in figure 1 as a winner. For the textile, clothing and footwear (TCF) sector the reverse is true. This is currently a low-taxed sector and the prices of its products to consumers will be sharply raised by the GST.

The greatest loser from ANTS and the modified package is tourism. This reflects the different treatment in the packages of service exports from that of goods exports. Goods exports will not be subject to GST. For these exports there will be a reduction in A$ costs largely, but not completely, offset by exchange rate appreciation. On the other hand, foreign tourists will find that most of their purchases in Australia are subject to GST. We

estimate that the foreign currency price of their Australian visits will rise by about 3.6 per cent. In addition there will be a reduction in the costs to Australians of holidaying overseas relative to holidaying in Australia. Both these effects will have negative implications for tourism-related services such as hotels, restaurants and entertainment.

3.3 Overall economic welfare

Proponents of the GST refer to textbook ideas concerning efficiency gains to be derived from levelling indirect tax rates, that is raising low rates and lowering high rates. Both the ANTS and modified packages have some levelling effects. For example, they raise taxes on electricity, currently a low-taxed item, and lower taxes on cars, currently a high-taxed item. On the other hand, they lower the relative rates of taxes on health, education and welfare, currently low-taxed items, and raise taxes on beer and tobacco, currently high-taxed items. Our calculations suggest that the welfare gains in the packages from tax rate levelling are negligible.

Two comparatively large welfare negatives from the ANTS and modified packages are deterioration in the terms of trade and increased compliance costs. As explained earlier, the GST will change the composition of Australia's exports in favour of agriculture and mining and against tourism. Consistent with historical trends, we forecast that prices of agricultural and mineral products on world markets will decline over the next decade relative to prices of tourism services. Thus, by reducing the tourism share of exports, the tax changes are likely to worsen Australia's future terms of trade.

With regard to compliance costs, the main issue is the cost to the community of handling GST procedures relative to those of the WST. Binh (1999) has considered this issue by looking at evidence from New Zealand and Canada. He concludes that a bedded-down GST system will cost the community between A$1 billion and A$2 billion a year more than the existing WST system. This does not include the cost of introducing the GST. The main element in Binh's argument is that the GST system will involve 1.6 million Australian businesses in extra record keeping. The number of businesses paying WST is only 75 000.

We find that the terms of trade and compliance effects of the ANTS and modified packages far outweigh the welfare gains associated with tax levelling. For the long run, MONASH shows reductions in economic welfare from the packages equivalent to a loss each year of between 0.6 and 0.8 per cent of household expenditure (between A$1.8 billion and A$2.4 billion).

Our conclusion that the welfare impact of the tax changes is likely to be negative is not shared by Murphy (1999). In detailed calculations he estimated a long-run annual welfare gain from ANTS equivalent to 0.2 per

cent of household expenditure (about A\$0.6 billion). However, Murphy failed to consider compliance costs and, in our view, underestimated the deterioration in the terms of trade by failing to recognise the significance of the long-term trends in the relative prices of exported goods and services.

4. Conclusion

The Government's original ANTS package involved a significant shift in income distribution in favour of wealthy Australians and perhaps this was the Government's main motivation for the package. A more charitable view is that the Government was badly advised and irrevocably committed itself to an unsupportable position. If the Government had formed its policy with the Senate evidence at hand, it is difficult to believe that it would have chosen a GST as the central component of tax reform. The GST runs a significant short-run risk of increased unemployment resulting from wage hikes linked to movements in the CPI, and it offers little prospect of long-run welfare gain. Among quantitative economists, even the supporters of the package estimated the long-run welfare gain to be small, less than the annual budget of our university.[4] Factoring in compliance and terms of trade costs, we found that the long-run welfare effects of ANTS and of the Government/ Democrats' package are negative.

The estimates of compliance costs that we used in our modelling refer to ongoing costs of a bedded-down system. Over the last few months we have been advising businesses on price changes likely to flow from the tax package. This requires assessments of the PRISMOD results described in the second section and comparisons with MONASH results. In performing this work we have found that each of our clients has GST-implementation budgets of millions of dollars. While we cannot provide an overall estimate, we suspect that Australia's once-off preparation costs for the GST must be several billion dollars. These costs are not included in our quantitative assessment of the package or that of any other model-building group participating in the Australian tax debate.

The Government has claimed, without quantitative evidence, that fundamental changes in Australia's system of indirect taxes are necessary because the present system will raise insufficient revenue for Australia's future needs. Contrary to this, separate forecasts by the Centre of Policy Studies and Access Economics for the next 10 years suggest that the present system of indirect taxes would produce revenue growth within a percentage point of that of GDP (see Richardson 1999).

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[4] The Monash University budget is about A\$0.7 billion.

In formulating the ANTS package, the Government adopted an in-house approach, apparently seeking advice only from the Treasury. This approach left the Government committing itself to a tax policy without the benefit of independent analysis which became available subsequently as a result of the Senate Inquiries.

In the area of microeconomic reform, the Government can refer potential policy changes to the Productivity Commission. The Commission collects information and opinions in transparent processes involving draft reports, public hearings and final reports. The Government need not commit to a policy change until all the relevant data and analyses are available. It is unfortunate that a similar approach was not adopted with respect to the tax package.

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