AN EMPIRICAL ANALYSIS OF THE EFFECTS

OF A CHANGE IN THE MIX OF DIRECT AND INDIRECT

TAXATION ON THE AUSTRALIAN ECONOMY

by

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CONTENTS

NOTES

1. These ideas have been extensively canvassed in academic, industry and government circles since the publication of the report of the Taxation Review Committee (Asprey Committee) in 1974. In recent months they have come under renewed scrutiny in the context of the Government's prices and incomes policy. See, for example, the papers prepared by a range of interested organizations for the meeting of the Economic Planning Advisory Council, Canberra, March 1984.

2. Recent surveys of this literature can be found in Groenewegen (1983) and Head (1983).

3. Clearly, our specification of the change in the tax mix is not unique, an obvious alternative to our equivalence criterion being to hold real tax revenue constant. In that case, real disposable income would change and we would no longer be justified in assuming that real private consumption expenditure remains constant. A systematic comparative analysis of alternative specifications, while doubtless a project of some interest, is beyond the scope of the present paper.

4. The ORANI model is comprehensively described and documented in Dixon, Parmenter, Sutton and Vincent (1982). Some additional methodology for handling commodity tax calculations is set out in Meagher (1982). A more detailed discussion of the simulations reported in this paper can be found in Meagher (1983). The current data base for the ORANI model is for the year 1974/75, and this determines the base period from which we measure all changes.

5. The discussion in this section is adapted from Dixon, Parmenter and Powell (1982).

6. If pre-tax money wages remained constant following the increase in commodity taxes, the CPI would rise by 1.26 per cent. However, when pre-tax real wages are constant, the initial increase in the CPI sets off a wage-price spiral, which, in the case of scenario A, raises the CPI by a further 1.80 per cent (see Table 1, on page 6).

7. The paper of Corden and Dixon (1980) contains an analysis for this scenario of the effects of reducing taxes on the employment of labour.

8. See Dixon, Parmenter, Sutton and Vincent (1982), Table 45.4.

9. For an assessment of the sensitivity of ORANI projections to variations in the values adopted for the export demand elasticities, see Dixon, Parmenter and Rimmer (1982).

10. If post-tax real wages were cut by 0.28 per cent, pre-tax money wages would remain constant following the increases in commodity taxes (i.e., the wage-price spiral would be completely eliminated), and the five industries under discussion would drop to the bottom of the output ranking. However, the maximum reduction in output (for industry 53, Soap and detergents) would then be only 0.77 per cent.

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OF DIRECT AND INDIRECT TAXATION ON THE AUSTRALIAN ECONOMY

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1.   INTRODUCTION

During the last three decades, the effect of inflation on the progressive income tax scale has resulted in a considerable increase in the share of direct taxes in the total receipts of the Australian Government. This development is widely held to have eroded work incentives and promoted large scale avoidance and evasion of income taxes. Certainly, the share of PAYE taxes in total income taxes has also been rising sharply. At the same time, indirect taxes remain concentrated on a very narrow range of commodities, prompting numerous commentators to suggest a reform of the tax system in which some income taxes (and especially PAYE taxes) are replaced by a broadly based consumption tax.[1]

In discussions of taxation policy[2], the objectives of equity, efficiency and simplicity are generally considered to be important. It is argued, in particular, that economic efficiency requires a taxation system to be neutral in its effect on the allocation of resources. In this paper, we present some empirical evidence on the likely allocative effects, together with their implications for inflation, unemployment and the balance of trade, of a change in the mix of direct and indirect taxation.

Specifically, we consider an increase in commodity taxes which raises the wholesale prices of all manufactured inputs to household consumption by 2.5 per cent. Such an increase is roughly equivalent to the measures proposed (but never implemented) in the 1981/82 Federal Budget. We wish to simulate the effects of a change in the mix, as opposed to the level, of taxation. Hence the increase in commodity taxes must be accompanied by a reduction in direct taxes that can be considered equivalent in some sense. We have chosen to reduce PAYE taxes by an amount which maintains the real value of total disposable income.[3]

The analysis is based on simulations using the ORANI multisectoral model of the Australian economy.[4] Section 2 of the paper contains a discussion of some important features of the macroeconomic environment in which the change in the tax mix is assumed to occur. The results of the simulations are described in detail in sections 3 (for macro effects) and 4 (for structural effects), and summarized, together with the main conclusions of the analysis, in section 5.

For scenario B, pre-tax real wages fall by 1.09 per cent, significantly reducing the impact of the wage-price spiral. Pre-tax money wages rise by only 0.43 per cent (compared with 3.06 per cent for scenario A), but the consequent domestic inflation is still the most important influence on industry performance, and the results of the two scenarios are qualitatively similar.

If industrial relations considerations preclude the possibility of reducing post-tax real wages at the same time as PAYE taxes are being reduced, the analysis indicates unequivocatively that the change in the tax mix will increase inflation, reduce employment and push the balance of trade towards deficit. Furthermore it is the traded industries that are likely to bear the brunt of a reduction in output and employment, even though many traded commodities (e.g., the agricultural commodities) are not subject to the increase in commodity taxes. The changes will be greater the more wage earners are able to appropriate the reductions in direct taxes as increases in post-tax real wages.

More generally, the changes in industry outputs tend to even out under scenario B. The gainers and losers may broadly coincide with those for scenario A, but the range of the changes is considerably reduced. To that extent, the detailed ordering of the industries for scenario B is of less consequence.

5. SUMMARY AND CONCLUSIONS

In this paper the effects of a change in the mix of direct and indirect taxation are analysed using the ORANI model of the Australian economy. It is assumed that commodity taxes are increased so as to raise the base period (1974/75) wholesale prices of all manufactured inputs to private consumption by 2.5 per cent. The increase is accompanied by a reduction in PAYE income taxes which maintains the real value of total disposable income. Alternative assumptions are adopted for wage movements, with first pre-tax real wages and then post-tax real wages being held constant (scenarios A and B, respectively). In both cases, real aggregate absorption and the nominal exchange rate are fixed.

For scenario A, the change in the tax mix results in an increase in domestic inflation of 3.06 per cent, a decrease in aggregate employment of 1.13 per cent, and an increase in the balance of trade deficit equivalent to 0.62 per cent of GDP. The primary mechanism producing these changes is a wage-price spiral set in motion by the increase in commodity taxes. The competitiveness of the traded sector is eroded, with export industries suffering particularly large falls in output. Service and construction industries tend to be affected less because they are insulated from foreign competition and benefit from shifts in demand within the fixed investment and consumption budgets.

2. MAJOR ASSUMPTIONS UNDERLYING THE SIMULATIONS[5]

The ORANI model is used to generate conditional projections of the following form: given the shock to the tax structure, and assuming a particular macroeconomic environment, then in the short run variable X will differ by x per cent from the value it would have had in the absence of the shock. By the short run, we mean a period sufficiently long for changes in trading conditions brought about by the shock to work their way through the economy and for producers and consumers to adjust their production and consumption behaviour accordingly. The period is sufficiently short, however, to ignore changes induced by the shock in the quantities of plant and equipment available for use by the various industries. The responses of a number of the variables X to the shock are discussed in subsequent sections. Our immediate task is to outline our assumptions about the macroeconomic environment, three of which are particularly important for the outcome of the simulations.

Firstly, we assume that aggregate domestic absorption and each of its three components (private consumption expenditure, investment expenditure and government expenditure) are fixed in real terms. The assumption concerning private consumption follows from our criterion of equivalence between the direct and indirect tax changes, i.e., that real disposable income remains constant. In so far as real investment expenditure tends to vary with the tax mix, our assumption implies that the government employs policy instruments not modelled in ORANI to counteract such variations. This treatment reflects our primary interest in the allocative or structural effects of a change in the tax mix rather than its effects on the level or composition of absorption. It also means that any induced change in national income will appear as a change in the balance of trade.

We have previously established that the important proximate determinant of the changes in the state of the economy under scenario A is the rise in money wages, which inflates domestic prices and reduces the competitiveness of the traded sector. Taken alone, a cut in pre-tax real wages has broadly the opposite effect. Indeed, were the increase in commodity taxes to be accompanied by a sufficiently large reduction in pre-tax real wages, the gainers for scenario A would become the losers and vice versa. The results for scenario B indicate, however, that a 1.09 per cent reduction upsets the rankings only moderately. Hence, although reduced in magnitude, the increase in money wages remains the major influence on the assignment of industries to the categories of gainers and losers.

Turning to some of the differences between the rankings, we note the emergence of industry 96 (Air transport) and its supplying industry 71 (Aircraft building) among the gainers for scenario B. Air transport is one of two industries (the other being Water transport) in the service sector that experience significant import competition, and both move up the ranking as their competitiveness improves.

The five manufacturing industries 53, 43, 83, 35 and 74 on the other hand, move down the ranking to become losers under scenario B. All are import-competing industries with a large share of their base period sales going to consumption. For these industries the direct inflationary impact of the increase in commodity taxes has become more important than the induced change in money wages in determining their competitiveness, and hence their ranking. Note that it is only their relative position that declines, the absolute reductions in their outputs actually being less than in scenario A.[10]

Turning now to the operation of the labour market, we begin by recognizing that a cut in PAYE taxes can cause a reduction in the pre-tax wage, an increase in the post-tax wage, or some combination of the two. We consider that this partitioning of the tax cut is the result of a centralized bargaining process over the pre-tax real wage. That is, the labour market is modelled by setting the pre-tax real wage exogenously and assuming that excess labour is available at that wage. Any induced change in the demand for labour then appears as a change in the level of employment. Given the pre-tax real wage, the post-tax real wage is determined by the size of the cut in PAYE taxes.

Finally we assume that any induced change in the real exchange rate appears as a change in the domestic relative to the foreign inflation rate and not as a change in the nominal exchange rate. Since we also assume that the change in the tax mix does not affect foreign rates of inflation, the assumption implies that adjustments in the real exchange rate are reflected by adjustments in the domestic consumer price index.

3.   MACRO EFFECTS OF A CHANGE IN THE TAX MIX

The economic effects of the change in the tax mix depend critically on the extent to which the cut in direct taxes is appropriated by wage earners as an increase in post-tax real wages or by producers as a reduction in pre-tax real wages, i.e., on the outcome of the bargaining process over real wages. We consider two possible scenarios.

Table 3   Gainers and Losers, Scenario B (Constant Post-tax Real Wages)

Rank	ORANI Code number and industry description		Trade category(a)	Projected output change (per cent)
1	111	Personal Services	NT	0.25
2	106	Health	NT	0.23
3	91	Motor vehicle repairs	NT	0.18
4	85	Gas	NT	0.16
5	96	Air transport	IC	0.13
6	109	Entertainment	NT	0.12
7	69	Ship and boat building	ER & IC	0.10
8	71	Aircraft building	IC	0.06
9	108	Welfare services	NT	0.04
10	107	Education, libraries	NT	0.03
11	88	Building n.e.c.	NT	0.03
12	60	Ready-mixed concrete	NT	0.02
13	61	Concrete products	NT	0.01
14	103	Ownership of dwellings	NT	0.00
15	87	Residential building	NT	0.00
16	105	Defence	NT	-0.00
17	104	Public administration	NT	-0.01
18	59	Cement	NT	-0.01
19	84	Electricity	NT	-0.02
20	99	Finance and life insurance	NT	-0.04
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93	50	Industrial chemicals	IC	-0.59
94	74	Household appliances	IC	-0.61
95	39	Footwear	IC	-0.62
96	35	Textile floor coverings	ER	-0.64
97	6	Other farming (export)	ER	-0.64
98	68	Motor vehicles, parts	IC	-0.68
99	31	Man-made fibres, yarn	IC	-0.69
100	83	Other manufacturing	IC	-0.69
101	1	Pastoral zone	E	-0.70
102	43	Furniture, mattresses	IC	-0.73
103	53	Soap and detergents	IC	-0.80
104	30	Prepared fibres	E	-0.83
105	25	Food products n.e.c.	E	-0.84
106	22	Flour and cereal products	E	-0.85
107	76	Agricultural machinery	IC & ER	-0.90
108	64	Other basic metals	E	-0.90
109	63	Basic iron and steel	E	-0.90
110	18	Meat products	E	-0.98
111	3	High rainfall zone	E	-1.09
112	4	Northern beef	ER	-1.41

(a)   These categories are defined in subsection 4.1.

Suppose, first, that the direct tax cut produces no change in pre-tax real wages (scenario A). Then pre-tax money wages must rise, since the change in commodity taxes will increase the consumer price index[6]. This tends to increase costs of production in all sectors of the economy, and firms will continue to supply the existing levels of output only if they can raise their prices. In the traded sectors, an increase in the prices of domestically produced goods reduces international competitiveness and causes a switch in demand in favour of foreign goods. Rising domestic money wages, therefore, tend to be associated with decreasing exports, increasing imports and a fall in output and employment in the traded goods sector. The macro results for scenario A reported in Table 1 are largely explained by this mechanism.

Now suppose that wage earners do not capture the entire income tax cut as an increase in post-tax real wages. Then the corresponding fall in pre-tax real wages (i.e., in real wage costs) will tend to lower the supply prices of existing levels of output and improve the international competitiveness of traded industries. Thus the contraction of the traded sector due to the increase in commodity taxes, with its accompanying effects on employment and the balance of trade surplus, will be offset to an extent determined by the magnitude of the fall in real wage costs. A useful benchmark is the wage-tax bargain scenario[7] (scenario B), in which an agreement is established with the trade unions to maintain post-tax real wages at their existing level, notwithstanding the cut in income taxes, for the sake of improved employment opportunities. In that case, the magnitudes of the projected changes in the macro-variables (also reported in Table 1) are considerably reduced, but the directions of change remain the same and the offset is not complete.

Table 1. Projected Effects(a) of the Change in the Tax Mix on Selected Macroeconomic Variables

Description	Scenario A (Constant pre-tax real wage)	Scenario B (Constant post-tax real wage)
Pre-tax real wage	0(b)	-1.09
Post-tax real wage	1.73	0(b)
Consumer price index	3.06	1.52
Aggregate employment	-1.13	-0.26
Commodity tax revenue(c)	11.81	11.25
Balance of trade surplus	-0.62	-0.10
Total tax revenue	0.29	1.12

(a) Projections in this table are expressed in percentage changes except for the balance of trade surplus which is expressed as a percentage of gross domestic product (GDP).

(b) Note that these values are set exogenously and are not projections.

(c) The small difference in the commodity taxes collected under the two scenarios reflects the difference in the composition of consumption expenditure.

The ORANI model is linear in percentage changes of its variables. Hence on the basis of the two benchmark simulations described above, it is possible to derive projections for all other possible dispositions of the direct tax cut between wage earners and employers. For three key variables, those projections are represented by the straight lines in Figure 1. The figure shows that the values of the balance of trade surplus and aggregate employment which existed

All the losers that do not rely on exports (i.e., industries 39, 31, 50, 68 and 32) are import-competing industries. They are highly competitive with imports because of high import-domestic substitution elasticities and/or high levels of import penetration in their markets. In some cases (industries 31, 32 and 50), they are large suppliers of intermediate inputs to other manufacturing industries, and hence the size of their markets, as well as their market share, is contracting.

The decline in the traded sector is sufficiently pronounced to carry over into the nontraded sector, with only four of the "gainers" actually enjoying an increase in output. Under scenario A, industries which rely on intermediate demand tend to contract whatever their trade category. No less than half the gainers are accounted for by service industries. In addition to being relatively insulated from foreign competition, the service industries derive some benefit from a reallocation of aggregate consumption expenditure due to the increase in commodity taxes on manufactured commodities. Aggregate investment expenditure also undergoes a reallocation, in this case due to changes in industry rates of return. Most high-ranking industries outside the service sector, including all four absolute gainers (i.e., industries 69, 88, 60 and 61), derive their relative growth from this source.

4.2 Scenario B: Constant Post-Tax Real Wages

In scenario B, the increase in commodity taxes is accompanied by a 1.09 per cent cut in pre-tax real wages, with post-tax real wages remaining constant. When the industries are sorted again according to the projected changes in their outputs (see Table 3), it becomes evident that those which gain (lose) under scenario A also tend to gain (lose) under scenario B.

Table 2   Gainers and Losers, Scenario A (Constant Pre-tax Real Wages)

Rank	ORANI Code number and Industry description		Trade category(a)	Projected output change (per cent)
1	69	Ship and boat building	ER & IC	0.26
2	88	Building n.e.c.	NT	0.10
3	60	Ready-mixed concrete	NT	0.06
4	61	Concrete products	NT	0.04
5	103	Ownership of dwellings	NT	0.00
6	87	Residential buildings	NT	0.00
7	105	Defence	NT	0.00
8	107	Education, libraries	NT	-0.02
9	85	Gas	NT	-0.03
10	106	Health	NT	-0.03
11	111	Personal services	NT	-0.06
12	104	Public administration	NT	-0.07
13	59	Cement	NT	-0.08
14	23	Bread, cakes	NT	-0.16
15	19	Milk products	NT	-0.16
16	109	Entertainment	NT	-0.16
17	91	Motor vehicle repairs	NT	-0.19
18	29	Tobacco products	IC	-0.23
19	108	Welfare services	NT	-0.26
20	110	Restaurants, hotels	NT	-0.26
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93	9	Services to agriculture	ER	-2.21
94	13	Other metallic minerals	E	-2.26
95	14	Coal	E	-2.32
96	32	Cotton, silk, flax	IC	-2.36
97	68	Motor vehicles, parts	IC	-2.37
98	50	Industrial chemicals	IC	-2.38
99	49	Chemical fertilizers	ER & IC	-2.51
100	31	Man-made fibres, yarn	IC	-2.77
101	39	Footwear	IC	-2.84
102	6	Other farming (export)	ER	-3.13
103	1	Pastoral/zone	E	-3.48
104	30	Prepared fibres	E	-3.73
105	64	Other basic metals	E	-4.00
106	25	Food products n.e.c.	E	-4.13
107	22	Flour and cereal products	E	-4.30
108	76	Agricultural machinery	IC & ER	-4.46
109	63	Basic iron and steel	E	-4.69
110	18	Meat products	E	-4.72
111	3	High rainfall/zone	E	-5.14
112	4	Northern beef	ER	-6.81

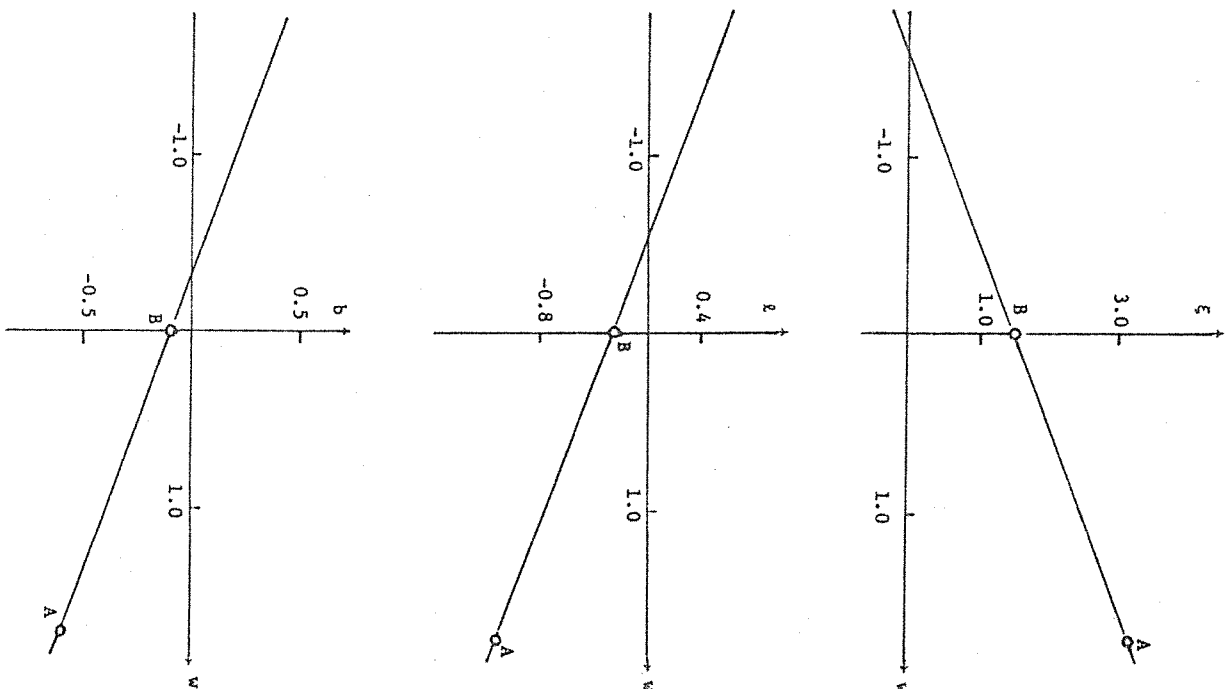(a)   These categories are defined subsection 4.1.

Figure 1   The percentage change in the consumer price index (ξ), the percentage change in the level of employment (ℓ) and the balance of trade surplus as a percentage of GDP (b), plotted as functions of the percentage change in the post-tax real wage (w).

before the change in the tax mix would be restored if the change is accompanied by moderate cuts in post-tax real wages (0.29 and 0.53 per cent, respectively). The inflationary impact of the change, however, would only be offset by a much larger cut of 1.70 per cent.

4. STRUCTURAL EFFECTS OF A CHANGE IN THE TAX MIX

The ORANI model identifies 112 industries and 114 commodities and provides projections for a wide range of variables at the disaggregated level. The range includes commodity prices, factor prices, commodity usage (for current production, capital creation, consumption and exports), factor usage, commodity imports, capital costs and rates of return. However, we shall restrict our attention to the effects of the change in the tax mix on industry outputs, our purpose being to confirm the general analysis of the preceding section from the more detailed results.

4.1 Scenario A: Constant Pre-Tax Real Wages

The projected changes in industry outputs for scenario A, in which pre-tax real wages are held constant, are presented in Table 2. The industries have been sorted into a group of twenty "gainers" whose outputs expand the most or contract the least, and a group of twenty "losers" whose outputs contract the most or expand the least, i.e., the terms gainers and losers are used in a relative and not an absolute sense. Following Dixon et al.[8], we have also assigned each industry to one of the following trade categories.

Import-competing industries (IC) are those which sell in markets where the

level of import penetration is significant and where imports and domestic output are close substitutes. For export industries (E), exports constitute a significant proportion of total sales and the levels of those exports are endogenously determined in the simulations. The export-related category (ER) includes industries producing commodities that are not exported directly but which are sold largely to export industries. The final classification, nontraded (NT), is applied to all the remaining industries.

Clearly, the industry results in Table 2 support our earlier contention that the most important effect of the change in the tax mix, under the conditions of scenario A, is the deterioration in the international competitiveness of the economy. All the losers for this scenario are traded industries and eighteen of the twenty gainers are nontraded.

Among the losers, fifteen depend heavily on exporting in one way or another. Most export commodities are subject to fairly elastic[9] foreign demand and export industries suffer rapid falls in sales when domestic costs and prices rise. Thus their ability to pass on the increases in money wages to selling prices is strictly limited and they become caught in a cost-price squeeze as a result of the change in the tax mix. The agricultural sector is particularly affected by falling export demand, both directly via industries 3 (High rainfall zone) and 1 (Pastoral zone), and indirectly via the food processing industries 18 (Meat products) and 25 (Food products n.e.c.) which it supplies. The general reduction in activity in the agricultural sector is, in turn, mainly responsible for the low output ranking of the agricultural suppliers 76 (Agricultural machinery), 49 (Chemical fertilizers) and 9 (Services to agriculture).