IMPACT PROJECT

A TAX-WAGE BARGAIN AND THE DEMAND-SUPPLY BALANCE

by

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General Paper No. G-27 Melbourne April 1980

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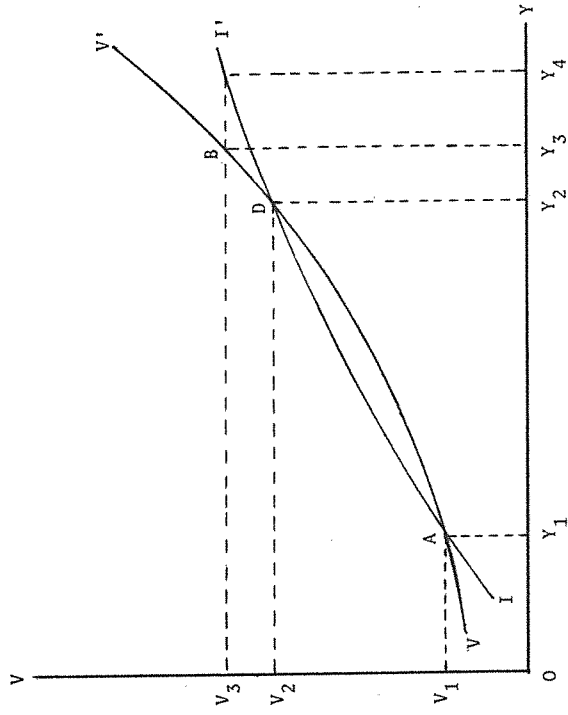of the participating agencies, nor of
the Commonwealth government.*

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Figure 2

A Tax-Wage Bargain and the Demand-Supply Balance [*]

by

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I   Introduction

One of the principal "alternative" macro-economic policy
proposals in Australia is the idea of a tax-wage bargain. It rests
on the two-fold effects of reductions in tax rates. Firstly there
is the familiar demand effect: with constant government expenditure
a reduction in tax rates increases aggregate demand, and hence
raises output and employment provided extra supply is available.
Secondly there is the cost or supply effect: the reduction in tax
rates may lead to a reduction in real pre-tax wages such that post-
tax real wages stay constant, or at least do not rise to the full
extent of the tax cuts. The reduction in pre-tax real wages lowers
the costs of firms and so brings forth the required extra supply in
response to the higher demand. If the demand and supply effects
are balanced, employment is increased without increased inflationary
pressures. The essential point is that tax cuts allow real wages
as incomes to stay constant while real wages as costs fall. If
these effects take place in a situation of continuous and expected
price inflation, the fall in pre-tax real wages would be brought
about not by an absolute fall in nominal wages but rather through a
temporary slackening of their rate of increase in relation to the
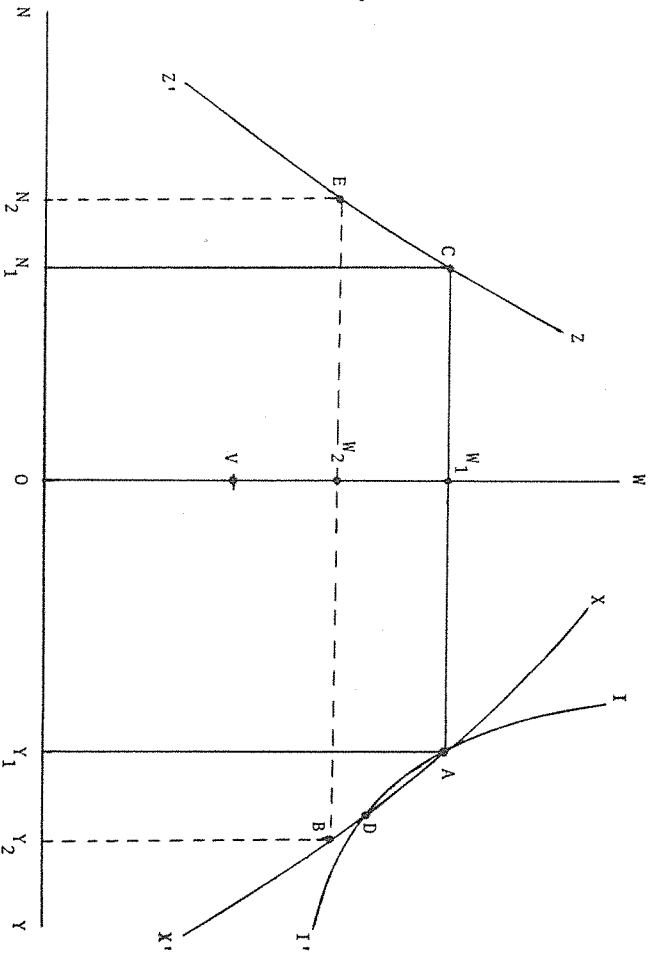rate of price inflation.

The purpose of this paper is to examine the proposal with some care and to show in what circumstances it would be feasible.

It is exploratory and we hope it will provide the basis for further theoretical and empirical work. The aim is to put the discussion of this and similar proposals on a more rigorous basis by bringing the implied assumptions and the nature of the empirical support required into the open. We would put more emphasis on the method of analysis used than on the precise answers obtained. The advocates of this proposal have not always been particularly clear, so that a number of possible models could underlie such a proposal.[1] We have chosen one model - the neo-classical one - as the basis for our main analysis, but alternative models are outlined briefly in section V. The empirical basis for our work rests on macro-economic data for 1978-79 and on results obtained from the ORANI model of the IMPACT project.

A fundamental assumption is that a wage-tax bargain is successfully struck. We shall suppose that income tax rates are reduced and that the Arbitration Commission with the support of the trade unions adjusts nominal wages appropriately so as to maintain average real post-tax wages at the levels they would have reached in the absence of the tax cuts. The key requirement is that the bargain is struck and is adhered to by the unions even when unemployment is substantially reduced as a result of the associated demand expansion. We do not concern ourselves with the industrial relations issue as to whether such an assumption is justified. Critics of the proposal might dismiss it at this very first stage. They might query the ability of trade union leaders and the Arbitration Commission to

Table 3 : ORANI Projections under Neo-Keynesian Assumptions[a]

Effect of Effect on	(1) a 1% increase in real private absorption	(2) a 1% reduction in the cost of a unit of labour
demand for labour in hours	0.42%	0.27%
the balance of trade (100 ΔBT/GDP)[b]	-0.13%	0.23%

(a) These numbers were derived from Table 3.4 in Dixon et al. (1979) and some subsequent computations. Table 3.4 shows the effects, under neo-Keynesian assumptions, of a one per cent reduction in real wage costs and a one per cent expansion in all real absorption. We have subsequently computed the effects of an expansion in real private consumption alone, and these effects are shown in column 1 of the table above.

(b) The change in the balance of trade is expressed as a percentage of GDP.

Table 2 : ORANI Projections under
Neo-classical Assumptions (a)

Effect of Effect on	(1) a 1% increase in real private consumption	(2) a 1% reduction in the cost of a unit of labour
demand for labour in hours	0.20%	0.51%
the balance of trade (100 ΔBT/GDP) (b)	-0.43%	0.30%

(a) These numbers were derived from Table 3.1 in Dixon
et al. (1979) and some subsequent computations.
Table 3.1 shows the effects, under neo-classical
assumptions, of a one per cent reduction in real
wage costs and a one per cent expansion in all
real absorption.   We have subsequently computed
the effects of an expansion in real private con-
sumption alone, and these effects are shown in
column 1 of the table above.

(b) The change in the balance of trade is expressed as
a percentage of GDP.

"deliver". The proposal is, after all, that something should be
brought about that has never been tried before in Australia. Hence
faith and optimism are required. For a government trying to reduce
inflationary expectations there might be some risk in giving away
on the taxation front without being sure to receive on the wages
front. But in this paper we assume these problems away and move
on to the next step, namely the implications of a successful bargain
for the aggregate demand-supply balance.

It might be noted that there are two alternative approaches
involving a tax-wage effect that do not require a new kind of bargain.
Firstly, it might be argued that - even without any formal bargain -
wage demands and Arbitration Commission awards are related to income
tax rates. But there is no conclusive empirical support for this in
Australia.[2] Secondly, the proposal might be - and often is - that
indirect tax rates, rather than income tax rates, should be cut.
It is generally thought that reductions in indirect taxes would lead
to reduced nominal wage increases through semi-automatic cost-of-living
adjustments reflecting either existing Arbitration Commission policy
of an "indexation package" accepted by the unions or a natural
tendency for wage demands to be related to the cost of living even
without any explicit "indexation package". We shall discuss the
possibility of indirect tax cuts in section V. The main conclusion
there is that adequate indirect tax cuts might not be possible and,
in any case, would be much less desirable from a micro-economic point
of view than income tax cuts. But the basic analysis to follow could
be restated in terms of indirect rather than income tax cuts.

Table 1 : Savings Requirements for a Free Lunch

Col. no.	1	2	3	4
Line no.	Description	Initial situation (1978/79) ($A billions) (a)	New equilibrium, neo-classical assumptions ($A billions)	New equilibrium, neo-Keynesian assumptions ($A billions)
1	Take home pay	41.43		
2	Tax refunds	1.04		
3	Supplements	3.01		
4	Disposable wage income	45.48	47.75	47.75
5	PAYE tax (net)	10.40		
6	Payroll tax	1.56		
7	Taxes on employing labour	11.96	7.94	9.58
8	Cost of employing labour	57.44	55.69	57.33
9	Other income tax (individuals)	2.41		
10	Other income tax (companies)	3.04		
11	Taxes on profits and self-employment	5.45	6.37	6.41
12	Other taxes less subsidies	11.47	11.96	12.28
13	Other disposable income	27.28	30.94	31.09
14	Total non-wage income	44.19	49.27	49.78
15	GDP	101.63	104.96	107.11
16	Total taxes	28.87	26.27	28.27
17	Total after tax income	72.76	78.69	78.84
18	GDP	101.63	104.96	107.11
19	Private consumption	62.09	65.42	67.57
20	All other absorption	40.47	40.47	40.47
21	Total absorption	102.56	105.89	108.04
22	less balance of trade deficit	-0.93	-0.93	-0.95
23	GDP	101.63	104.96	107.11
24	Unemployment benefits	0.91	0.57	0.57
25	Reduction in tax revenue		2.60	0.60
26	Reduction in unemployment benefits		0.34	0.34
27	Increase in budget deficit		2.26	0.26
28	Required marginal propensity to save		.40	.05

(a)   These numbers were derived from various Commonwealth Government publications including *Quarterly Estimates of National Income and Expenditure*, *Australian National Accounts* and *Budget Speech, 1979/80*. Details are available from the authors.

II   The Basic Theory[3]

The simple framework of the ideas of this paper can be expounded in terms of a model represented by Figure 1. It should be noted that it is an equilibrium model - in particular trade unions actually get the post-tax real wages they expect and the product market is always in equilibrium, with firms on their supply curves. Furthermore, it is concerned with the real economy and not with nominal magnitudes. Something will be said about the monetary implications of the policy proposal in section V, but these are not central to the main arguments. The most important single assumption is that the balance of payments on current account remains unchanged as a result of the tax-wage bargain and its consequences. In real terms this means that finally, after appropriate adjustments, real absorption expands in line with real output. As the model is neo-classical there is, of course, a negative relationship between the pre-tax real wage and both employment and output. Underlying productivity, represented by the positions of the curves, is determined exogenously and is held constant here.

In Figure 1 the real wage rate is shown on the vertical axis. OV is the fixed post-tax real wage (the wage as income), OW_1 is the initial pre-tax real wage (wage as cost) while OW_2 is the pre-tax real wage after the tax rates have been cut. For each level of employment N, the ZZ' curve in the left-hand panel shows the real wage (as a cost) at which employers will be willing to employ N, given that product demand is sufficient to absorb the resulting output. If competitive conditions are assumed, ZZ' traces out the marginal product of labour at various employment levels. The available labour supply at the given post-tax real wage OV is assumed to be greater than ON_2. The output-wage curve implied by ZZ' is shown

A. Okun, "Upward Mobility in a High-Pressure Economy", Brookings Papers on Economic Activity, 1 : 1973, pp. 207-252.

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P. Sheehan, B. Derody and P. Rosendale, "An Assessment of Recent Empirical Work Relevant to Macroeconomic Policy in Australia", Australian Economic Review, 1st Quarter 1979, pp. 33-61.

D.H. Whitehead, "The Economic Crisis in Australia: A Non-Monetarist View", Paper presented to 6th Conference of Economists, Hobart, 1977.

R.A. Williams, "Australian Household Savings and Consumption in the Seventies: An Empirical Overview", Paper presented at the Conference in Applied Economic Research, Reserve Bank of Australia, Sydney, December 1979.

in the right-hand panel as XX'. It shows the output firms are willing to produce at various levels of the real wage (as a cost) assuming that product demand is sufficient. In a simple one-production-function-perfect-competition model the ZZ' and XX' curves would be derived from this one production function. But, of course, it is not essential for the main argument to assume either a single production function or perfect competition. It should be noted, however, that because (among other things) the shapes of the marginal product curves vary across industries, in a multiproduct model the precise position of the ZZ' curve depends on the commodity composition of aggregate output. In this paper, the particular ZZ' curve that we have in mind is drawn on the assumption that investment, government expenditure and the balance of trade are constant and that as we move down ZZ' it is domestic consumption demand that is increasing sufficiently to absorb the additional output.

II' shows real aggregate demand at various levels of the pre-tax real wage. It is derived from the following two relationships. Firstly, as the tax rate is reduced while government expenditure, investment and the balance of trade all stay constant, real demand rises. The lower the marginal propensity to save, the more it rises. Investment and the balance of trade are held constant by appropriate changes in interest and exchange rate policy. Secondly, as the tax rate is reduced, the pre-tax real wage falls as a result of the tax-wage bargain, the post-tax real wage staying constant. Hence there is a negative relationship between the pre-tax wage and aggregate demand, represented by II', just as there is such a negative relationship between the pre-tax real wage and potential supply, represented by XX'.[4]

In Figure 1, the XX' and II' curves intersect below the initial equilibrium A at D. There need not be such an intersection below A, but if there is, it can be said that there is a "free lunch"

possibility. A tax-wage bargain can increase output and employment while maintaining product market equilibrium without any deterioration in the current account, and without either a fall in real government expenditure or in investment. There may, of course, be a case for a tax-wage bargain that increases employment even if it also involves a deterioration in the current account, a fall in private investment, or a fall in government expenditure, but then these adverse effects have to be taken into account. Here we limit ourselves to the pure "free lunch" case. Without further refinement, our model would not be a suitable framework for analysing a tax-wage bargain involving a trade-off of future welfare against current welfare or of government expenditure against employment.

The tax cut will worsen the fiscal balance. While the expansion of output will expand the tax base and reduce unemployment benefits, so that the net loss to the revenue will not be as great as would result from a tax cut with constant output, it can be readily shown that (subject to a most plausible assumption) finally, the increase in taxes owing to the higher tax base and the saving of unemployment benefits cannot be as great at the initial loss in revenue. The assumption is that the private marginal propensity to save is positive. Given no change in the current account balance, the increase in private savings (with investment constant) must be equal to the increase in public dissavings. For any given tax cut, the greater the marginal propensity to save, the greater the resultant fiscal imbalance, the less the increase in aggregate demand, and hence the greater the likelihood that the tax cut will not bring about an excess demand situation and stimulate inflation. In Figure 1, the greater the marginal propensity to save, the steeper the II' curve below A and hence the lower the point of intersection with XX'. As drawn the marginal propensity to save needs to increase (hence shifting

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P.B. Dixon, B.R. Parmenter, R.J. Ryland and J.M. Sutton, ORANI, A General Equilibrium Model of the Australian Economy, Australian Government Publishing Service, Canberra, 1977, pp. xi + 297.

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S.G.B. Henry, M.C. Sawyer, and P. Smith, "Models of Inflation in the United Kingdom", National Institute Economic Review, No. 77, August 1976, pp. 60-71.

D.S. Ironmonger, "Some Key Issues in the Macro Economic Debate in Australia", Australian Economic Review, 3rd Quarter 1978, pp. 19-23.

24. At the time this paper is being written there is much discussion about the disposition of the revenue from the oil levy. This raises all the issues dealt with in this paper and in Corden (1980). Import parity pricing for domestic oil has the same effect as an indirect tax. It would reduce employment if (1) it raises pre-tax wage demands, and (2) higher wages reduce employment (i.e. if the neo-classical assumptions apply). The adverse effects on employment would be partly offset if the revenue from the oil levy on domestic producers were refunded in a way that reduced wage demands again. Since some net gains to foreign producers must remain, and it is government policy to allow increased profitability of domestic producers, there cannot be a full offset of the indirect tax effect. If the revenue is used for increased government expenditure there is no offset.

The present paper should be regarded as a hypothetical exercise. It asks: what would have happened after a lag if in 1978/79 the tax-wage bargain has been implemented and all other things, including the world oil price and oil pricing policy, had stayed constant.

the II' curve) if the particular tax cut that leads to the fall in the pre-tax real wage from OW_1 to OW_2 is not to upset the demand-supply balance, i.e. if II' is to cut XX' at B.

III   The Requirements of the New Equilibrium

We shall consider a tax cut designed to increase employ-ment (in hours) by 5 per cent. All the relevant figures are in Table 1. The base figures for 1978-79 are in column 2 and the new equilibrium resulting from the tax cut is described in column 3. The fundamental approach at the first stage is to assume that the marginal propensity to save is at the level required for the new situation to be a demand-supply equilibrium. In other words, if in Figure 1, N_2 represents a 5 per cent increase in labour demand over N_1, then we assume that the II' curve crosses the XX' curve at B and describe the resulting equilibrium at B. Finally it can be asked whether this assumed or required marginal propensity to save is higher or lower than the actual marginal propensity that might be expected. Our calculations lead to the result that the required marginal propensity to save is 40 per cent. This is well above the actual marginal propensity - which might be around 20 per cent. The conclusion is therefore that a "free lunch" yielding a 5 per cent increase in employment is not possible on the basis of these figures: aggregate demand would expand more than supply, or, in terms of Figure 1, the II' curve either fails to cut XX' below A

or does so above B (as drawn). A 5 per cent increase in employment would thus require an increased balance of payments deficit, a fall in investment or a fall in government expenditure.

The story begins with the results of the ORANI model, the details of which are set out in the next section. The assumptions are neo-classical. It tells us that a 5 per cent increase in labour demand, with no change in the balance of payments on current account, can be achieved through a 5.37 per cent increase in real private consumption holding all other absorption fixed, combined with a 7.66 per cent reduction in the cost of employing a unit of labour. In Figure 1, starting at A and C ORANI defines the points B and E.[6]

We start off in line 19 with the change in private consumption, which ORANI tells us needs to increase by 5.37 per cent, i.e. to 65.42.[7] Holding all other absorption and the balance of trade deficit constant, we obtain (line 23) the new level of GDP, 104.96 (also filled in in lines 15 and 18). ORANI also tells us that when labour demand is increased by 5 per cent the cost of employing a unit of labour has to fall by 7.66 per cent. Thus the new level for the total cost of employing labour is 55.69 (line 8). Total non-wage income (line 14) is GDP minus the cost of employing labour, and becomes thus 49.27. Disposable wage income (line 4) has to increase by 5 per cent, to 47.75, since employment has increased by 5 per cent while disposable wage income per unit of labour employed (the post-tax real wage) is constant.

We now come to the tax side. By subtracting line 4 from line 8 we find that the new level for taxes on employing labour is

19. Under competitive assumptions and constant returns to scale, we know that the percentage change in output is a weighted average of the percentage change in primary factor inputs where the weights are factor shares in total primary factor costs. Equation (2) reflects the assumption that labour is the only variable factor.

20. Some arithmetic might make the point more clearly. Assume that

$$\xi = 1/2\ p_{NT} + 1/4\ p_m + 1/4\ p_e$$

and

$$p_g = 2/3\ p_{NT} + 1/3\ p_e$$

where ξ is the percentage change in the consumer price index, p_{NT} is the percentage change in the price of non-traded commodities, p_m and p_e are the percentage changes in the prices of importables and exportables and p_g is the percentage change in an index of local product prices -- e.g. a GDP deflator. Assume that under a demand increase, $p_{NT} = 5$ (say) whereas p_m and p_e are both zero. Then if $w = \xi$, we see that $p_g > w$, ($p_g = 3.33$ whereas $w = 2.5$). That is, real wages are fixed but an appropriate average of the prices of domestically produced goods rises relative to wages.

21. The initial level of absorption is approximately equal to the initial level of GDP.

22. At a constant average tax rate, P.A.Y.E. revenue would rise 5 per cent from 10.40 to 10.92 (line 5 in Table 1). Payroll revenue of 1.56 (line 6) would disappear, and finally taxes on employing labour must come to 7.94 (line 7). Hence the average rate of P.A.Y.E. tax must fall by 2.98/10.92 = 27.3 per cent.

23. See Corden (1980) for a fuller exposition.

bargain implies an increase in non-wage disposable income relative to disposable wage income, our figure of 20 per cent as the relevant marginal propensity to save must be regarded simply as a plausible guess.

14. ORANI is a multisectoral model of the Australian economy. It was built as part of the IMPACT project which is a cooperative research undertaking of several agencies of the Commonwealth Government and the University of Melbourne. Full documentation of the version of ORANI used in the present paper is contained in Dixon et al. (1977) and Dixon et al. (1979).

15. In the simplest case where there are no intermediate inputs, p_i is the percentage change in the price of product i. Where intermediate inputs are modelled (as in ORANI), p_i is the percentage change in industry i's output price minus a weighted average of the percentage changes in the industry's input prices. In other words, p_i is the percentage change in the price of value added.

16. This number was chosen after a detailed survey and review of the empirical literature by Caddy (1976). For a summary of Caddy's work, see Dixon et al. (1977, pp. 159-163).

17. The $(p_i - w)$ are highest for the export industries where p_i is determined independently of domestic costs. The S_w^i tend to be low for the major exporting activities, agriculture and mining.

18. Note that

$$\frac{\sum_{i=1}^{n} X_i Y_i}{n} \equiv \bar{X}\bar{Y} + cov(X, Y).$$

7.94 (line 7). This implies that the rate of tax per dollar of labour cost has had to be reduced from the initial rate of 20.82 per cent to 14.26 per cent. This reduction could be produced by various combinations of reductions in P.A.Y.E. (income tax on employees) and payroll tax. We assume that other taxes less subsidies (line 12) are proportional to private absorption and thus stay at 14.90 per cent, yielding 11.96.[8]

Next we come to taxes on profits and self-employment (line 11) which increase because capitalist income has increased. Capitalist income is total non-wage income (line 14) minus other taxes less subsidies (line 12). The rate of tax on capitalist income was 16.65 in 1978-79, but we shall assume that 20 per cent of the increase in capitalist income goes into tax, yielding 6.37 for the new level of taxes on profits and self-employment.[9] Several other lines can now be completed. Line 13 is line 14 minus the sum of lines 11 and 12. Line 16 is the sum of lines 7, 11 and 12. Line 17 is the sum of lines 4 and 13.

Finally we come to the reduction in unemployment benefit payments (line 24). It has to be remembered that (a) not all the extra employed will come out of the unemployment pool, and (b) not all unemployed persons receive benefits. With regard to (a) let n be the proportion of the increase in labour demand which is satisfied by the recruitment of the unemployed. We do not have Australian estimates of n. Drawing on an American estimate (Okun, 1973), we assume it to be 0.5.[10] Turning to (b), 76 per cent of unemployed persons receive benefits.[11] Thus, bringing together these two results, we find that a 5 per cent increase in labour demand generates the

equivalent of 300,000 extra jobs (a 5 per cent increase on an employed civilian labour force of 6 million), giving employment to 150,000 persons previously unemployed of which 115,000 were receiving unemployment benefits. The average rate of benefit per year in 1978/79 was $2929,[12] so that the savings in unemployment benefits would be $337 million, bringing total payments (line 24) to 0.57. All the necessary figures in column 2 of Table 1 up to line 24 are now filled in and we can draw some conclusions.

The net result of the exercise is that tax revenue is reduced by 2.60, which is only slightly offset by a reduction in unemployment benefit payments of 0.34, yielding an increase in the budget deficit of 2.26. (These three figures are shown in lines 25 to 27; line 25 is obtained by comparing the entries across line 16, and line 26 by comparing the entries across line 24.) Line 17 shows that the increase in after-tax income is 5.93. The private sector has, however, lost 0.34 in unemployment benefits, leaving a net increase in private disposable income of 5.59. The required increase in private hoarding (= increase in budget deficit) is 2.26, giving a required marginal propensity to hoard of 0.40. With investment constant this is equal to the required marginal propensity to save.

Given an actual marginal propensity to save of, perhaps, 20 per cent, the "free lunch" is not on.[13] If investment and government expenditure did stay constant, and the actual marginal propensity to save were 20 per cent, then for equilibrium in the commodity market, our tax-wage bargain would need to be accompanied by an increase in the balance of payments deficit. From a national point

9. The rate of tax on capitalist income was unusually low in 1978/79 because of a sharp acceleration in the growth in capitalist income in that year. Taxes on capitalist income, especially company taxes, tend to be lagged, so that in a year of accelerating income growth, taxes as a proportion of current income will fall. The rate of tax on capitalist income was 20.17 per cent in 1977/78, 21.00 in 1976/77 and 21.74 per cent in 1975/76. Capitalist income grew by 8.7 per cent from 1976/77 to 1977/78 and then by 18.8 per cent from 1977/78 to 1978/79. Average tax rates of around 20 per cent may seem low in relation to company tax rates of 40 to 50 per cent. However, they are calculated on gross (i.e. before depreciation) capitalist income whereas rates of 40 to 50 per cent are calculated on net company income.

10. Okun found that a 2.10 per cent increase in labour input (in a situation of 5 per cent unemployment) would be provided as follows: jobs for the unemployed 1.05; lengthened work week 0.40; increased labourforce participation 0.65. We are indebted to Sheila Bonnell for suggesting the Okun paper.

11. The Labour Force Survey (see Treasury Round-Up of Economic Statistics) gives the average (over the 12 months of 1978/79) number of unemployed persons as 406,170. According to Budget Speech 1979/80, Statement no. 3, the average number of people receiving benefits was 310,702.

12. $910 million divided by 310,702 recipients.

13. For an excellent survey of recent empirical work on the Australian savings function, see Williams (1979). Unfortunately, there seem to be no estimates distinguishing marginal propensities to save out of wage income and non-wage income. Because the wage-tax

4. A problem concerning the definition of II' which we have not resolved in the text concerns the underlying level and distribution of income. One possibility is to assume that for each level of real wages, II' shows the level of demand corresponding to the wage and capital income levels implied by ZZ' and XX'. Another possibility is that for each level of output, Y, the II' curve shows the pre-tax real wage rate at which the implied wage and other disposable income is just sufficient to generate a real aggregate demand of Y. Although these possibilities will produce different II' curves, it is not necessary for us to distinguish between them. II' curves drawn under either assumption are negatively sloped and they coincide at points of intersection with XX'. It is these points of intersection (the points of equilibrium in the product market) which are the concern of this paper.

5. In each year from 1974-5 to 1978-9 the ratio of private gross fixed capital expenditure to total private expenditure has been between 18.9 and 19.5 per cent.

6. This is explained more fully in section IV. In the meantime we note that to obtain point B we must translate the increase in consumption into an increase in total absorption: a 5.37 per cent increase in real private consumption represents a 3.25 per cent increase in total absorption.

7. All figures in this section (other than percentages) are in Table 1 and are in $ A billion.

8. Although not shown in Table 1, the increase in real private absorption is from 77.00 to 80.33, i.e. 4.32 per cent.

of view there would not be a "free lunch" because of the increased debt incurred to foreigners, whether through extra private capital inflow or official borrowing abroad, or alternatively because of the running-down of foreign exchange reserves.

The source of the problem is that the tax-wage bargain designed to increase employment by 5 per cent has required a net reduction in the tax revenue from employing labour (P.A.Y.E. tax and payroll tax) of 33.6 per cent (line 7). Since these taxes are about 41 per cent of total taxes, this has translated into a 13.8 per cent loss in total revenue. At the same time the increase in revenue from other taxes (lines 11 and 12) is only 8.3 per cent, producing an increase in total revenue of about 4.9 per cent. All these results hinge, of course, completely on the output of the ORANI model, with which we began, and to the details to which we now turn.

IV   The ORANI Details

In the previous section we used the result from the IMPACT project's ORANI model[14] in its "neo-classical model" that a 7.66 per cent reduction in the real costs of employing a unit of labour combined with a 5.37 per cent increase in real private consumption (holding all other absorption fixed) would increase the demand for labour by 5 per cent with no change in the balance of trade. In terms of Figure 1, ORANI's role in the calculations was

Footnotes

*   We are greatly indebted to Sheila Bonnell, John Sutton and Tony Lawson for comments and assistance.

1. The proposal has been made by the Melbourne Institute of Applied Economic and Social Research in many issues of the _Australian Economic Review_, for example the issue of the 2nd Quarter 1978, pp. 14-16. The fullest statement of the Institute view is in Ironmonger (1978). See also Sheehan, Derody and Rosendale (1979). The ideas are also advocated in various writings of J.O.N. Perkins, including Perkins (1979), and earlier in Whitehead (1977). The Institute has usually advocated <u>indirect</u> tax cuts and has sometimes argued not explicitly on the basis of a negative relationship between real wages and employment but rather on the basis of the anti-inflationary effects of the tax cuts. The formal model presented here is probably fairly close to the implicit Institute model, especially as put in Ironmonger (1978).

2. There is some empirical support for this in Britain. See Henry, Sawyer and Smith (1976) and Henry and Ormerod (1978).

3. This section is based on Corden (1980) where the theory and various implications of the model are explored more fully, especially with emphasis on monetary implications and on the adverse effects of a bond-financed deficit for later periods. A model which allows for the effects of taxation on wage demands and incorporates the neo-classical negative relationship between pre-tax real wages and employment can also be found in Argy and Salop (1979).

to provide estimates of the elasticities of the ZZ' and XX' schedules. We now explain the features of ORANI in "neo-classical mode" which are responsible for these estimates. It has to be stressed that they are only estimates, and the results hinge on the particular assumptions made. Alternative figures - for example for elasticities of substitution between capital and labour - could be fed into the ORANI model. ORANI only compares equilibria and nothing is said here about the timing of movements between equilibria. Perhaps the sorts of effects discussed in this paper might appear after one or two years. We have also used ORANI to make some estimates on neo-Keynesian assumptions. These are briefly set out, and the results presented, in the next section. Henceforth, in this section, all references are to the neo-classical case.

ORANI gives the results shown in Table 2. Column 1 shows the effects of a 1 per cent increase in real private consumption holding constant investment, government absorption and the pre-tax real wage. Column 2 shows the effects of a 1 per cent reduction in the pre-tax real wage, holding constant real absorption. We can use the figures in Table 2 to build up an estimate of the elasticity of ZZ' (Figure 1) by thinking of movements along ZZ' as being in two parts: (a) the effect on the demand for labour of a reduction in the pre-tax real wage rate, holding real absorption fixed but assuming that additional output can either replace imports or be exported, and (b) the effect on the demand for labour of the change in real private consumption required to eliminate the balance of trade surplus resulting from (a).

Finally, a simple point must be noted. Demand expansion without extra inflation is possible if a government is willing to allow an increased balance of payments deficit. An appropriate exchange rate policy - possibly requiring appreciation - can always bring this about. In terms of Figure 1, it is possible to go well beyond D if a government is willing to run down its foreign exchange reserves, borrow abroad or allow a fiscal deficit to be financed indirectly via private capital inflow. The issue then becomes one of the optimal degree of foreign borrowing when the level of domestic investment is constant - a matter of relating the social rate of time-preference to the real rate of interest at which funds can be borrowed abroad.[24]

Suppose that the pre-tax real wage rate is reduced by 7.66 per cent holding absorption constant. Then, according to Table 2, this will induce an increase in the demand for labour of 3.92 per cent (i.e. 0.51 x 7.66). It will also increase the balance of trade surplus because employment and output have been raised without any change in absorption. According to Table 2, the increase in output (which is also the increase in the balance of trade surplus) is 2.3 per cent of GDP (i.e. 0.30 x 7.66). Now imagine that we attempt to eliminate the balance of trade surplus by increasing private consumption holding all other absorption and real wages constant. If we increase real private consumption by 5.37 per cent the effect on the balance of trade is a movement towards deficit representing 2.3 per cent of GDP (- 0.43 x 5.37), exactly eliminating the balance of trade surplus caused by the reduction in real wage costs. At the same time there will be a 1.08 per cent increase in employment (i.e. 0.20 x 5.37). The two changes together represent a movement along ZZ' (Figure 1) from C to E. A 7.66 per cent reduction in the pre-tax real wage rate has led to a 5 per cent (3.92 + 1.08) increase in labour demand, implying an elasticity for ZZ' of 0.65. With the 7.66 per cent reduction in the pre-tax real wage requiring a 3.25 per cent rise in total real absorption (see footnote 6) if the balance of trade is to stay constant, the elasticity of the XX' curve over the range from A to B is 0.42.

Our task now is to explain where the figures in Table 2 come from.

(a) The effects of real wage reductions.

We assume that each industry i has a fixed capital stock. The industry chooses its labour input (which is combined with the capital stock via a neo-classical production function) to maximize short-run profits. Under the CES production functions employed by ORANI, the demand function for labour in industry i takes the form

$$u_i = \frac{\sigma_{KL}^i}{1 - S_w^i} (p_i - w) \qquad (1)$$

where u_i is the percentage change in industry i's demand for labour, p_i and w are percentage changes in prices[15] and money wages, S_w^i is the share of wages in total primary factor (labour and capital including agricultural land) costs in industry i and σ_{KL}^i is the elasticity of substitution between capital and labour. The S_w^i have typical values of 0.6 in the ORANI data base and the σ_{KL}^i were set at 0.5.[16] As an initial approximation, equation (1) gives a value of 1.25 per cent (i.e. 0.5 x 2.5 x 1) for the change in employment in the average industry arising from a 1 per cent increase in prices relative to wages. However, in ORANI computations a reduction in real wages causes decreases in the output prices of labour intensive industries relative to those for capital intensive industries.[17] Where industry i is labour intensive, $(p_i - w)$ tends to be less than one, whereas for capital intensive industries it tends to be more than one. Thus there is a strong negative correlation over i between $1/(1 - S_w^i)$ and $(p_i - w)$. Use of averages for these terms in (1) therefore overstates the average value for u_i[18] which in fact turns out to be only 0.51.

interest will, on balance, tend to rise. If it rises more than is required to keep investment constant, open market operations which increase the money supply somewhat will be needed. In that case the tax-wage bargain would be associated with some monetary expansion, essentially to satisfy the increased demand for money resulting from the higher real incomes. In effect, the fiscal deficit could be partly money-financed and partly bond-financed.

5. Final Remarks

Is the proposal practical? Clearly taxes can always be cut. After a lag this is likely to lead to an increase in demand, though the econometric arts hardly allow us to forecast with any certainty how long the lags will be and precisely by how much demand will expand. Savings and investment behaviour have consistently surprised our forecasters. No doubt after a longer lag firms will respond with extra output, and they may find that this can be produced without inflationary effects because of the moderation of wage demands induced by the tax cuts - if this is successfully brought about. But there may well be an interval when an acceleration of inflation can only be avoided by allowing the balance of payments to go into deficit - i.e. by satisfying some of the extra demand out of foreign resources. Thus there are great uncertainties, both about the lags and about the equilibrium responses. While ORANI calculations yield plausible results it would be easy enough to argue with some of the assumptions. We have aimed to make the assumptions quite clear. The virtue of ORANI is that it provides a rigorous framework for analysing this subject.

reductions if a 5 per cent rise in labour demand is desired and the assumptions of the ORANI neo-classical model are accepted. Using the data of Table 1, it can be calculated that if payroll tax were eliminated and the total tax revenue on employing labour were to be reduced by 33.6 per cent, the average rate of P.A.Y.E. tax would have to fall by 27.3 per cent.[22]

4. <u>Monetary Implications</u>[23]

Nothing has been said so far about the monetary implications of the tax-wage bargain proposal. We shall assume a flexible exchange rate here. If investment is to stay constant and there is to be no net change in the rate of price inflation monetary policy becomes endogenous. We can suppose a two-stage operation: (1) the fiscal deficit is wholly financed by borrowing from the non-bank public. (2) Open market operations are conducted so as to keep the rate of interest at a level that maintains investment constant. If the expansion of output and demand leads to an increase in investment at a constant (real) rate of interest through an accelerator effect, it becomes necessary to allow some rise in the rate of interest if investment is to be maintained constant.

The first step - the sale of bonds to the non-bank public to finance the fiscal deficit - tends to raise the rate of interest, while increased hoarding by the public resulting from the higher incomes (the amount of this hoarding being exactly equal to the fiscal deficit) leads to an increased demand for bonds and thus tends to lower the rate of interest. Since the public will also want to hold more money, given the higher real incomes, the rate of

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The increase in GDP arising from the 0.51 per cent increase in employment is shown in column 2 of Table 2 as 0.30 per cent. It will be recalled that absorption is fixed so that the increase in GDP is the increase in the balance of trade. This figure can be explained by the equation[19]

$$gdp = S_w n$$
$$\approx .6 \times .51 \approx 0.3 , \qquad (2)$$

where gdp is the percentage increase in GDP, n is the percentage increase in employment and S_w (= .6) is the labour share of GDP.

(b) The effects of increases in absorption.

When we turn to column 1 of Table 2 we see that increases in absorption generate increases in employment. This requires some explanation in the context of ORANI in neo-classical mode.

The ORANI theory implies that producers will respond to demand increases with an increase in output and employment only if the demand increase allows an improvement in their price/cost situation (see equation (1)). With fixed real wages, prices and costs tend to move together. There is, however, some limited opportunity for improvement in price/cost ratios. In ORANI, many domestic products are modelled as either non-traded or as imperfect substitutes for foreign products. Therefore, increases in local demand allow the prices of domestically produced goods to rise relative to those of imports. Thus, because of the import component in both the consumer price index and in material input costs, the appropriate index of wages and materials costs shows a smaller

increase than the index of prices of domestically produced commodities.[20] In terms of equation (1), the average value for the p_i's is higher than w, despite the fact that wages are fixed in real terms. This is the principal explanation of why ORANI, in neoclassical mode, produces a Keynesian employment response to an increase in aggregate demand under conditions of fixed real wages. A reinforcing factor causing the increase in employment is the configuration of capital intensities across Australian industries. Industries producing non-traded goods and goods which are only weakly substitutable for imports are on average more labour intensive than industries producing traded goods, especially exports. Thus, with reference to equation (1), there is a positive correlation across i between the terms $\sigma_{KL}^i/(1 - S_w^i)$ and $(p_i - w)$. That is, where $(p_i - w)$ is high (i = non-traded industry), $\sigma_{KL}^i/(1 - S_w^i)$ is also high because S_w^i is high.

Finally we note that given an increase in employment of 0.20 per cent (see Table 2), we would expect an increase in GDP of about 0.12 per cent (i.e. 0.20 x .6, see equation (2)). The effect on the balance of trade of a 0.12 per cent increase in GDP combined with a 0.60 per cent increase in total absorption (private consumption is about 60 per cent of total absorption) is a deterioration equivalent to about 0.48 per cent of GDP (i.e. 0.60 - 0.12).[21] This result corresponds closely with the actual ORANI result for the balance of trade shown in column 1 of Table 2.

There seems no way of avoiding income tax cuts if the general policy approach is to be followed. Total indirect tax revenue in 1978/79 was about $11 billion, of which about $4 billion came from State and local taxes which are clearly not available for any bargain. The main revenue items within this category are local government rates and taxes on the ownership and operation of motor vehicles. Of the $7 billion of Federal indirect tax revenue, only $1.8 billion consists of sales tax revenue, where the largest single source of revenue is the tax on motor vehicles and parts. The rest consists of the crude oil levy ($1.2 billion, but, of course, higher this year), tax on petroleum products (0.9 million), excise on beer, spirits, and tobacco ($1.7 billion), and customs duty revenue ($1.4 billion). Surely, there are some micro-economic and social considerations that make cuts in the various excise taxes undesirable, and, in fact, there may well be a case for increases. It is surprising that the advocates of indirect tax cuts have not explored this matter in more depth.

Finally, something should be said about payroll tax. If payroll tax were cut or eliminated it would not be necessary to have an explicit wage-tax bargain and, given the neo-classical assumption, employment should increase as a result. But payroll tax is a State tax. Its abolition would require the Commonwealth Government to replace the revenue. This is conceivable, but means that the States would be involved in any bargain, complicating the matter. It has to be stressed that even the complete elimination of payroll tax would not obviate the need for a tax-wage bargain involving income tax

fixed. The schedule II' shows aggregate demand as the tax rate falls, with government expenditure and investment constant, and a given marginal propensity to save. It is identical in concept to the II' curve in Figure 1. Starting at A, with a post-tax real wage of V_2, a tax cut that leads to a post-tax real wage of V_1, and brings the system to D would maintain demand-supply balance in the product market. If the tax rate were reduced further, to bring the post-tax real wage to V_3, demand (at Y_4) would exceed actual output (Y_3). A higher marginal propensity to save would be needed to sustain output at Y_3. Estimates would be needed of the responsiveness of real wage demands to higher output (i.e. of the relevant parts of the VV' schedule) if an empirical analysis of the feasibility of a "free lunch" demand expansion is to be made. We have no basis for making such an estimate.

3. Indirect Tax Cuts

Some advocates of the tax-wage bargain have proposed cuts in indirect taxes rather than in income taxes. The advantage of using indirect taxes as the policy instrument is that there may be no need for a special tax-wage bargain with trade unions to obtain the desired results. This would be so if, as recently, there is already an operating wage indexation system whereby nominal wages are adjusted to the cost-of-living but not to direct taxes. Indirect tax cuts reduce the cost of living and thus automatically lead to reduced pre-tax real wages.

Closer examination suggests that sufficient cuts in indirect taxes may be impractical or, at least undesirable.

V Variations and Elaborations

1. Neo-Keynesian Assumptions

If the ZZ' and XX' curves in Figure 1 were very flat, so that, for given rises in output and employment, only a small fall in the pre-tax real wage were required, the possibility of a "free lunch" for any given employment expansion would become greater. In the limiting "Popular Keynesian" case where the curves are completely flat, unlimited demand expansion would be possible - at least until the curves ceased to be flat. We now explore a model which is close to this extreme "Popular Keynesian" case.

In Dixon et al. (1979, pp. 36-40) a model is set out which is called "Neo-Keynesian". The assumptions are as follows.

(1) Short-run supply curves are horizontal rather than upward sloping, for all but the agricultural industries.

(2) Product prices (in all industries apart from agriculture) are set so as to maintain constant the real value of the markup on variable costs per unit of output.

(3) Short-run elasticities of substitution between labour and capital are zero (for all but the agricultural industries) rather than 0.5.

(4) There is no short-run sensitivity of exports to domestic costs, i.e. export volumes and prices are set exogenously for all products rather than being determined by the interaction of international demand functions and domestic supply functions.

These assumptions imply that there is sufficient excess capacity in industries producing import-competing and non-traded

commodities such that they can meet demand expansions without cost increases. However, given a non-zero marginal propensity to import, a demand increase would, in the first instance, cause the balance of trade to deteriorate. Restoration of balance of trade equilibrium would require a reduction in real wages to lower the prices of domestically produced goods relative to those of imports so that there would be an import-saving switch in demand. Thus, even with horizontal supply curves, expansions in employment and output with a constant balance of trade require both an increase in demand and a reduction in real wage costs.

We do not regard the specified assumptions (1) - (4) as realistic, other than possibly in the very short-run. The tax-wage bargain concerns a policy which is expected to yield effects after a lag and the appropriate model must be, at least, medium-run. Hence ORANI "in neo-Keynesian mode" does not seem the right model to use. Nevertheless, we have worked through this case, since others may regard the assumptions as more appealing.

The relevant ORANI results are shown in Table 3. It shows an elasticity of 0.27 for labour demand with respect to real wage reductions compared with the corresponding figure of 0.51 for the neo-classical case in Table 2. A 5 per cent increase in labour demand, with no change in the balance of trade, can be achieved through a 8.82 per cent increase in private consumption (holding all other absorption fixed) combined with a 4.94 per cent reduction in the pre-tax real wage rate. The net results are shown in column 3 of Table 1. Only a 5 per cent marginal propensity to

hoard (save) is required to make the "free lunch" possible for this case. Thus it certainly seems possible, given the assumptions.

2. Real Wage Demands Rise with Employment

Some advocates of the tax-wage bargain do not believe that the evidence supports a neo-classical negative relationship between the pre-tax real wage and employment. Let us then assume that the pre-tax real wage does not change at all as employment expands ("Popular Keynesian" assumption). In that case a bargain designed to expand employment would simply require (a) an agreement by the trade unions to keep the pre-tax real wage constant provided tax rates do not rise, and (b) an agreement by the government to expand real demand. The latter could be achieved by increasing government expenditure, with no need for tax cuts. To make sense of a proposal for tax cuts in a case where the pre-tax real wage does not need to fall when employment expands it is necessary to assume, no doubt realistically, that post-tax real wage demands would inevitably rise as unemployment is reduced, and hence as output is raised. Tax cuts are then needed to reconcile a constant pre-tax real wage with a rising post-tax real wage. In this way one can construct an alternative model. It is represented in Figure 2.

The vertical axis shows, V, the post-tax real wage rate, and the horizontal axis, output, Y. Output is positively related to employment, and hence negatively to unemployment. The schedule VV' describes a reduced form relationship: as output rises, the post-tax real wage demanded rises. An upward movement along the vertical axis means a reduction in the tax rate, since the pre-tax real wage is