Taxation, Real Wage Rigidity and Employment
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TAXATION, REAL WAGE RIGIDITY AND EMPLOYMENT

by

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This paper presents a theoretical framework for analysis of the "tax-wage bargains" that have been proposed in Australia as a solution to the macro-economic problem. The paper is not written specifically for the Australian case, since proposals of this type have been considered in several O.E.C.D. countries. A companion paper - Corden and Dixon (1980), circulated as an IMPACT PROJECT Working Paper - applies the model specifically to Australia. It shows on the basis of macro-economic data for 1978-79 and of results obtained from the ORANI model of the IMPACT project whether a tax cut proposal designed to increase employment by 5 per cent (while avoiding reductions in government expenditure or investment or an increase in the current account deficit) might be feasible.
TAXATION, REAL WAGE RIGIDITY AND EMPLOYMENT

The view that "real wage resistance" inhibits the ability of demand management policy to increase employment is well known. It is also often argued that the real wages which unions seek to maintain are after-tax wage rates — that is wages as incomes — rather than pre-tax wages — that is, wages as cost. Reductions in tax rates would then tend to reduce pre-tax wage rates, or at least their rates of increase. Lower pre-tax real wages may, in turn, increase employment and output, and hence the tax base. The net result may be that tax revenue does not change while, at the same time, employment has been increased. Even if a fiscal deficit results, it may be financed by the extra savings generated by the higher incomes. This "tax-cut" approach to economic policy thus suggests a painless or "free lunch" solution to the central macro-economic problem. A "free lunch" is defined here as a policy which leads to more output and employment currently with a given level of government expenditure while not having an adverse effect on the future.

The purpose of this paper is to give these ideas somewhat more rigorous content. It is not suggested that the conditions for a "free lunch" exist in practice. The author doubts very much that they do. The aim is to present the theory needed for an empirical investigation of this issue. The central assumption initially is rigidity of the post-tax real wage. Hence there is neither money illusion nor tax illusion in wage determination. Of course, this does not mean that the trade unions are necessarily rational in creating wage rigidity: it is unlikely to be rational to keep a real price fixed irrespective of circumstances. A further development, mentioned briefly in section V, is to introduce a post-tax real wage function of some kind.

While the real wage resistance issue is particularly relevant when the balance of payments effects of an economic expansion are taken into
account, the main body of the present paper will assume a closed economy in order to limit the complications. Extensions to an open economy — where economic expansion requires a decline in pre-tax real wages through a terms of trade effect, and where a balance of payments deficit is possible — are also referred to in section V.

The focus of the paper is on real rather than monetary concerns. Rigidities are in real, not nominal, terms. It is assumed that targets are achieved and expectations are fulfilled. Hence the paper abstracts from well-known disequilibrium considerations which dominate modern macro-economics. It could be seen either as a theoretical exploration of a particular type of policy proposal or, more broadly, as a modest extension of policy-oriented macro-economic theory.4

I

THE DEMAND EFFECTS OF TAX REDUCTIONS: THREE CURVES

Pre-tax and Post-tax Real Wage

In Figure I the real wage is shown on the vertical axis and output on the horizontal. Initially the pre-tax real wage (wage as cost to firms) is $W_1$, and output is $W_1A$. There is a tax on wages of $W_1/2$ per person employed. Hence the post-tax real wage (wage as income) is $OV$. It is probably easiest to think of taxation as consisting purely of income tax, though the whole argument also applies to payroll taxes, social security contributions and indirect taxes on wage-goods.

Consider the implications of a reduction in the tax rate on wages. Suppose it is reduced to $W_2/2$. With the post-tax real wage fixed by the trade unions at $OV$, the pre-tax real wage falls from $W_1$ to $W_2$. It will be assumed here that the product price is fixed and that the tax cut causes the pre-tax nominal wage to fall so as to maintain the
same post-tax real wage as before. The assumption of a constant product price means that all nominal wage changes can be equated to real wage changes. Similarly, no distinction need be made between changes in nominal and in real output or money supply. In section V the alternative assumption will be explored that the pre-tax nominal wage is fixed. In that case the product price would have to rise so as to bring about the desired fall in the pre-tax real wage.

Pure Fiscal Policy Curve

The first step is to show how demand for output increases as the tax rate is reduced. This requires no more than a summary and adaptation of standard textbook macro-economic theory. It will be assumed that (1) government expenditure and (2) the money supply are held constant. They are held constant both in nominal and in real terms; i.e. in terms of the single malleable product in the model. In addition it will be assumed that the rates of tax on wages and on incomes of non-labour factors (i.e. on profits), as well as the savings propensities of the two categories of factors, are always equal. The latter two assumptions are needed in order to analyse the effects on demand independently of income distribution changes and hence independently of the supply effects to be considered later. In a more complex analysis these two assumptions can be removed. For example, the tax rate on profits might be held constant when the tax rate on wages is reduced, and the two savings propensities might be allowed to differ.

The MM' curve is the pure fiscal policy curve drawn subject to these assumptions. When the tax rate is reduced to $\frac{W_A}{2}$, there will be an initial fiscal deficit that represents an injection into the income stream which sets off a multiplier process and finally raises demand for output from $W_A$ to $W_B$. If output were demand-constrained
this would represent the actual rise in output. The original injection of extra spending takes the form of spending out of profits since both government expenditure and post-tax wages are constant. Eventually, of course, profits rise further and post-tax wage income rises because of the higher employment.

Two issues important for the subsequent discussion arise.

(1) **What happens to private investment along the curve?** There are two opposing effects.

(a) With the money supply constant and real income higher owing to fiscal expansion, the rate of interest will rise and hence investment will fall. (In other words, the LM curve is constant while the IS curve has shifted to the right).

(b) The higher income, especially in the form of higher profits, may lead to more investment both through higher profit expectations (an accelerator effect) and through greater demand for equities raising their prices and hence inducing extra investment even with given profits expectations. It will be assumed that (a) outweighs (b) so that investment falls along the curve, though the alternative assumption would not alter the main argument of this paper, and its implications will also be noted.

(2) **What happens to the fiscal balance along the curve?** The fiscal deficit must be equal to the excess of private savings over private investment. Private savings must increase because disposable income rises owing to the initial tax cut and then the expansion in output. It has been assumed here that private investment falls, so that the excess of savings over investment must increase. Hence the fiscal deficit must increase. If there was initially fiscal balance the tax
cut would initiate a fiscal deficit. The fiscal deficit increases the more the tax rate is reduced. Of course investment could rise, in which case there would be at least a possibility that a deficit is reduced or a surplus is even generated. But, to repeat, it will be assumed in this paper that investment falls along MM' so that a fiscal deficit must be generated or must increase.

Fiscal Balance Curve

The next step is to allow for variations in the money supply through open market operations. An increase in the money supply lowers the rate of interest (compared to the situation with a constant money supply) and increases investment. At every tax rate there will be a particular monetary expansion that increases investment just sufficiently for the rise in investment finally to be equal to the rise in savings. Hence this monetary expansion will maintain fiscal balance (or a constant deficit, if there was one initially). For example, when the tax rate is reduced to $W_2/Y/W_2$, the fiscal expansion has raised output to $W_2$ and the supplementary monetary expansion raises it further, to $W_2^c$. The curve FF' is the fiscal balance curve. It shows various levels of demand for output as the pre-tax real wage declines (because the tax rate on wages has declined) when monetary policy is so adjusted as to maintain fiscal balance.

Constant Investment Curve

Along MM' private investment falls. Along FF' investment rises. Hence there must be some degree of monetary expansion at every tax rate that keeps private investment constant. Such a constant investment policy at each tax rate would yield the II' curve, which lies between the other two curves. As pointed out earlier, it is possible that
investment stays constant along MM'. In this case II' and MM' would coincide. If investment actually rose along MM', the constant investment curve II' would be below MM'; tax cuts would then have to be associated with monetary contraction to keep investment from rising.

II

DEMAND AND SUPPLY COMBINED. THE FREE LUNCH POSSIBILITY

Introducing Supply Considerations

So far we have been concerned with elementary demand-orientated Keynesian analysis. The three curves represent various levels of ex-ante demand given the assumptions of constant government expenditure, a constant product price and a rigid post-tax real wage. If output is demand-constrained they represent actual output. The analysis becomes interesting once supply considerations are introduced.

In Figure II the real wage is again shown on the vertical axis, but this time the horizontal axis shows employment. As before the rigid post-tax real wage is OV and the initial pre-tax real wage is OW'. A segment of the aggregate labour supply curve of private individuals (as distinct from that of trade unions) is drawn as SS'. At the post-tax wage of OV, labour supply available for work is VE ( = W,E'). The curve ZZ' traces out the value of the marginal product of labour at various levels of employment. It is drawn for a fixed capital stock and production function. It is assumed that firms' potential supply is determined by the level of production at which the value of the marginal product of labour is equal to the pre-tax real wage. With actual employment initially at W,J, private involuntary unemployment is JE'. From the point of view of the individual workers, employment is demand-determined. If the pre-tax real wage is maintained by trade unions
knowing the implications for employment, unemployment of \( J E' \) can be described as union-voluntary, even though it is private-involuntary. The union-determined supply curve to the labour market is the horizontal line \( W_{11} \). The post-tax union supply curve is \( VE \). It is this curve which is taken as given in this paper.

Figure III, like Figure I, shows the real wage on the vertical axis and output on the horizontal. The curve \( XX' \) traces out the marginal product of labour at various levels of output. It is derived from the production function, just like the curve \( ZZ' \) in Figure II and expresses the same idea of diminishing returns. It indicates potential product supply at various levels of the pre-tax real wage. While trade unions' wage demands depend in this model on the post-tax real wage (the wage as income) output and employment in equilibrium depend on the pre-tax wage (the wage as cost). Corresponding to each output point on \( XX' \) in Figure III there is an employment level to be read off \( ZZ' \) in Figure II. For example, output \( W_{1A} \) in Figure III is associated with employment \( W_{1J} \) in Figure II. If the tax on wages were abolished completely, potential supply would rise to \( WW' \) because of the fall in the pre-tax real wage to \( OV \). A wage subsidy could lower the pre-tax real wage (the cost of labour to firms) further, bringing output along \( XX' \) towards \( E' \). But the post-tax real wage would stay at \( OV \) and hence maximum labour supply determined by the private supply curve of labour would stay at \( VE \) in Figure II. Corresponding to this maximum labour supply in Figure II is maximum output at \( E' \) on \( XX' \) in Figure III.

Supply and Demand Combined

The \( XX' \) curve in Figure III has been drawn to intersect the various "demand" curves at \( A \), which is the initial position. Hence it is assumed that initially the product market was in equilibrium. In addition it
could cut the three "demand" curves below A in various ways. There could be multiple intersections, or it need not cut them at all below A. It is assumed here that it cuts all three curves between A and V'. It is also assumed that output cannot go to the right of XX' - that is, excess ex-ante demand relative to potential supply as indicated by XX' cannot generate any extra output. In fact, it is best to assume that demand policy avoids the creation of excess product demand. In other words, the net effect is to be neither inflationary nor deflationary. Various interesting results now emerge.

(1) Consider first pure fiscal policy (curve MM'). The maximum output and employment level that pure fiscal policy can attain is at K. Tax reduction beyond that would create excess demand. If the tax rate were reduced from its original level, but by less than is required to bring the system to K, there would be excess potential supply. For example, at B output is demand-constrained, potential excess supply being BD. A tax cut which lowers the pre-tax real wage from \( W_1 \) to \( W_2 \) is thus expansionary in the sense that it increases output from A to B, but is contractionary in the sense that potential output has increased further than demand.

The maximum output level attainable by pure fiscal policy (at point K) does not represent a "free lunch" for two reasons. Firstly, investment has fallen. Secondly, there is an increased fiscal deficit. The full implications of the latter will be discussed shortly. For the moment it will simply be assumed that a fiscal deficit imposes a burden on the future.

(2) Next consider a constant investment policy. This requires a combination of fiscal and monetary expansion (curve II'). The maximum possible output level is indicated by point D. A tax cut that lowers the pre-tax real wage to \( W_2 \) would bring output to B, incidentally lowering
investment. An associated monetary expansion could then restore investment and expand output by BD. But this is still not a “free lunch” because the fiscal deficit has increased.

(3) Finally, consider a constant fiscal balance policy. The maximum output level is attainable at H, and results from a combination of a tax cut and monetary expansion. It yields lesser output and employment expansions than the other two policies, but it is more than a “free lunch” since investment actually increases.

One might say that the true “free lunch” possibility is represented by some point on XX’ between H and D, such as L, where the favourable effects for the future of an increase in investment are just balanced by the unfavourable effects of an increased fiscal deficit.

III

IMPLICATIONS FOR THE FUTURE

Full Employment at the Expense of Investment

It is certainly possible to increase output beyond D, but this would be at some cost to the future compared with the initial situation at A. Assuming that positive net investment was taking place at A, or that further technical progress is expected, this may, of course, be justified. A “free lunch” policy is one that achieves some gain for the present without any loss for the future (relative to the policy represented by the initial situation at A). But an optimal policy may require some transfer of income from future to present.

Output can be brought as far as K with pure fiscal policy. Beyond that some monetary contraction would be required to supplement the tax cuts. As long as monetary contraction succeeded in reducing gross
investment (possibly requiring negative net investment) output and employment could be increased by tax cuts, and eventually by wage subsidies, until full employment were attained at $E$. The current gain in output and employment would be traded-off against mortgaging the future.

The Implications of a Fiscal Deficit for the Future

The level of government expenditure determines the position of the three "demand" curves. If government expenditure increased they would move to the right. Government expenditure includes transfer payments, provided recipients of the transfers spend at least a part of the transfers received. Furthermore, the initial government expenditure which is held constant includes interest payments on debt incurred as a result of fiscal deficits in previous periods. If the "free lunch" concept is to be maintained, any additional debt would require total government expenditure to be increased, to incorporate the extra interest payments. If total government expenditure were held constant while growing interest obligations were incurred by the government, other elements of expenditure would have to be reduced - and that would not be a "free lunch".

It is thus possible to bring out the nature of the burden on the future imposed by a fiscal deficit when it is bond-financed. Suppose that a constant investment policy is being followed, so that the starting point is at $D$. For the moment, also assume that the $XX'$ curve stays unchanged (inspite of investment and technical progress). In the next period, as interest payments increase, the $II'$ curve shifts to the right, and hence $D$ moves upwards along $XX'$. Hence the tax rate has to be raised somewhat and employment must be reduced. This would continue until $II'$ became tangential to $XX'$. After that it would not be possible to maintain simultaneously post-tax real wages, government expenditure other than interest payments, investment and product market equilibrium.
Something would have to give.

The matter can be resolved by a steady movement to the right of XX' owing to investment and technical progress. But this must not be offset by a rise in the post-tax real wage demanded. In any case, it remains true that, for any given position of the XX' curve, given post-tax real wage, given government expenditure (excluding interest payments), and given investment, the greater the bond-financed fiscal deficit and hence the level of output and employment today, the less output and employment can be tomorrow. Hence an inter-temporal trade-off decision is required.

Open Market Operations

It has to be noted that this analysis is incomplete because it does not allow for the effects of open market operations on the future burden of interest payments. An expansion of the money supply through open market operations (purchase of bonds) reduces interest payments in the future. To that extent a benefit is passed on to the future.

Let us consider two cases.

(1) Constant fiscal balance policy (point H in Figure III): A once-for-all increase in the money supply is required, leading to a permanent reduction in the interest burden, and so allowing the FF' curve to move in the next period once-for-all to the left. Hence a policy which brings the system to H is more than a "free lunch" not only because investment has risen but also because of the reduction in the interest burden.

(2) Constant investment policy (point D in Figure III): A permanent sale of bonds to finance the fiscal deficit is combined with a once-for-all purchase of bonds to increase the money supply. In other words, temporarily the fiscal deficit can be money-financed, in
which case it imposes no burden on the future through higher interest payments, though once the money supply has expanded appropriately, the deficit must be bond-financed, leading to a continuous shift to the right of the II' curve. It thus remains true that at D there is not a "free lunch", though the fact that it involves a monetary expansion makes it less expensive.

IV

THE CENTRAL ISSUE

The central issue concerns the likelihood that the XX' curve and the relevant "demand" curve cross below A in Figure III. A relevant consideration is the relationship between slopes of curves at point A. Let us define the II' (constant investment) curve as the "free lunch" curve, though the same argument would apply to the FF' (constant fiscal balance) curve. In the diagram, with the XX' curve's second differential consistently negative, a "free lunch" is possible only because the II' curve is steeper at A than the XX' curve. In other words, a small reduction in the tax rate increases potential supply through the favourable cost effect more than it increases aggregate demand (when monetary policy is simultaneously adjusted to keep investment constant). For particular discrete reductions in the tax rate it may be possible to make rough estimates of the cost and the demand effects, and as long as the latter does not exceed the former, this particular tax rate would yield a "free lunch", at least ignoring the adverse effects of the fiscal deficit.

It has to be stressed that a "free lunch" may not be available. Readers should not be misled by the way the diagram is drawn. The II'
curve might be tangential to XX' at A, or it might cut XX' from the left. Even in those cases a further intersection of the two curves below A is possible, though not with an XX' curve as drawn. Nothing can be said in general about the likelihood of II' cutting XX' below A.

The discussion in this paper is closely related to the old idea of the maximum revenue tax. If a tax rate is above the maximum revenue tax, a tax cut to bring the tax rate down to the maximum revenue level will raise revenue through the resultant rise in the tax base, while a further tax cut can restore revenue to the original level. As long as a tax rate is above the maximum revenue level there is always the opportunity of a "free lunch". In Figure III a map of II' curves, each representing the same level of investment but a different level of government expenditure, may be imagined. One II' curve will be tangential to XX' at some point between A and D (say at D'), and this represents the highest level of government expenditure attainable compatible with constant investment and with product market equilibrium. The tax rate and the money supply have to be adjusted appropriately to attain this point. Starting at A the possibility of a "free lunch" only exists because the tax rate is above this maximum-expenditure level. Of course, if the objective is to maximise employment while keeping investment and government expenditure constant, the tax rate should be reduced further, to bring the system to D.

Some Elaborations and Complications

The preceding model can be elaborated in many ways so as to make it more realistic. The following notes sketch out some possibilities, drawing attention to limiting assumptions contained in the main analysis
of this paper.

Change in Government Expenditure

Government expenditure has been kept constant throughout the discussion, apart from changes in interest payments. It is interesting to note the two different ways in which the effects of a change in government expenditure might be looked at.

(1) Starting in product market equilibrium, if the tax rate and either the money supply or investment are kept constant, a fall in government expenditure will reduce output and employment. This is the standard Keynesian result. For example, starting at D in Figure III, a fall in government expenditure would shift the II' curve to the left and might lower output to B.

(2) Starting in product market equilibrium with the tax rate so adjusted as to maximise output and employment at the original level of government expenditure, a fall in government expenditure associated with the appropriate reduction in the tax rate would increase output and employment. For example, starting at D in Figure III, a shift to the left of the II' curve would bring output to some point on XX' below D. The analysis could be extended by making government expenditure a variable. Changes in government expenditure could be traded-off against employment effects or against reductions in future welfare through reduced private investment or extra interest burdens incurred.

Downward Rigidity of the Nominal Wage

It has been assumed that the product price is held constant while the pre-tax nominal wage falls when the tax rate on wages is reduced. This assumption was designed to abstract from inflationary effects, and to focus on real rather than monetary concerns. A nominal wage change
has been a real wage change to the same extent. But an absolute fall in the nominal wage is rather hard to imagine. Consider two alternative approaches.

(1) The tax-cut policy is superimposed on a given and expected rate of product price inflation associated (in the absence of the tax cut) with nominal wage inflation to the same extent. The tax cut then reduces temporarily the rate of nominal wage inflation, bringing about a permanent fall in the pre-tax real wage and in employment.

(2) The pre-tax nominal wage is rigid downwards. Hence there are two downward rigidities: in the post-tax real wage and in the pre-tax nominal wage. The decline in the pre-tax real wage must then be attained by a nominal demand expansion which raises the product price sufficiently. Initially, before expenditure increases, the tax cut raises the post-tax real wage, since the nominal wage stays constant. Then output expands owing to extra demand, and the product price is pushed up because of diminishing returns. The rise in the product price causes the pre-tax real wage to fall while the post-tax real wage is returned to its original level.

**Real Wage Related to Unemployment Level**

The central assumption of post-tax real wage rigidity might be regarded not as representing an inevitable trade union response - unions adjusting nominal wages to achieve their post-tax real wage target - but rather as a minimum element in a "social contract" bargain. It may be the best that the trade union movement can offer - insofar as its leaders can offer anything that they can deliver. Alternatively it could be regarded as an approximation to describing actual union behaviour, in which case it should be testable. But no such simple assumption about nominal or real wage behaviour is likely to be realistic
and get unambiguous empirical support. 6 Operating within the framework of this simple model, with its focus on post-tax real wages, there are at least three assumptions alternative to wage rigidity one might consider.

(1) The trade unions' real wage target might be the highest post-tax real wage consistent with not raising the unemployment rate above a certain level. By unemployment is meant here "private-involuntary" unemployment. Given that the unions achieve their target, fiscal policy would then be unable to affect the rate of unemployment. This might be called the "natural rate", being neither amenable to monetary nor to tax-cutting fiscal policy. Tax reductions would, in this case, still raise the level of employment provided the private supply curve of labour is positively-sloped.

(2) The target post-tax real wage aimed at by the unions may vary negatively with the rate of private-involuntary unemployment. Hence it will vary positively with the level of employment for two reasons: first, because the higher the real wage, the higher the "full employment" (absence of private involuntary unemployment) level of employment; and secondly, because a higher real wage goes with a lower unemployment rate (more employment for any given full employment level). The resultant QQ' curve in Figure II looks like a supply curve, but is really a "real wage demand curve".

Its logic can be summarised as follows:

\[
\begin{align*}
    u &= \text{unemployment rate} \\
    V &= \text{post-tax real wage demanded} \\
    N^* &= \text{full employment labour supply} \\
    V^* &= \text{post-tax real wage obtained} \\
    N &= \text{actual employment}
\end{align*}
\]
\[ V = f(u) \quad f' < 0 \quad (1) \]
\[ N^* = g(V^*) \quad g' > 0 \quad (2) \]
\[ u = \frac{N^* - N}{N^*} \quad (3) \]
\[ V = V^* \quad (4) \]

From (1)
\[ u = h(V) \quad h' < 0 \quad (5) \]

From (2), (3), (4) and (5)
\[ N = (1 - h(V)) g(V) \quad (6) \]

From (6)
\[ N = j(V) \quad j' > 0 \quad (7) \]

(7) is the relationship represented by the union supply curve ("real wage demand curve") QQ' in Figure II.

The upward-sloping QQ' curve of Figure II could be translated into an upward-sloping \(VV'\) curve in Figure III (though this translation could not be made independently of the production function). This would flatten the three "demand" curves, for example bringing the point \(H\) closer to \(A\). Therefore it would become less likely that a reduction in the tax rate is possible while excess demand in the product market is avoided, the point being simply that some of the benefits of the tax cut would be dissipated by a rise in the post-tax real wage. In general, the lower the elasticity of the union supply curve (i.e. the higher the real post-tax wage response to an increase in employment), the flatter the FF', II' and MM' curves.

(3) The post-tax real wage target might be thought of, more subtly, as the outcome of a trade union trade-off between employment and the real wage at various given tax rates. A curve such as QQ' in Figure II might then emerge, tracing out union choices at various given tax rates. An increase in the tax rate would have both an income and a
substitution effect. For the unions it would represent a fall in real income or utility. Some of this fall they would take out in lower post-tax real wages and some in higher unemployment. It should be noted that they attach disutility to private involuntary unemployment. In addition, the tax on wage income will induce them to substitute employment for real wages. Taking both effects of a rise in the tax rate together, the post-tax real wage must fall, while, just conceivably, employment could rise.

**Unemployment Benefits**

Government expenditure includes the cost of unemployment benefits. When output and employment increase, benefit payments presumably decline, and the assumption maintained so far of constant government expenditure (apart from increases in interest payments) has implied an appropriate rise in other government expenditures. But it would be consistent with the "free lunch" concept to assume the latter constant, and to treat the reduction of unemployment benefits paid in the same way as marginal tax payments. Both reduce the multiplier and make the $M'$ and $I'$ curves in Figure III steeper. They reduce employment for a given tax cut but increase the possibility of a "free lunch" and the level of employment attainable when the tax rate is cut appropriately.

**Tax on Profits**

Suppose that the rate of tax on profits were raised while the rate of tax on wages is reduced. Consistent with the simple model presented, assume that this has no effect on the supply of capital. It has to be stressed that this assumption could not be maintained in a more elaborate and realistic model. The higher tax on profits will make the various "demand" curves steeper because it reduces aggregate demand. Hence it
will increase the "free lunch" possibility, or the extent of the possible increase in employment.

A fuller model would have to allow for the rate of profits tax to differ from the rate of tax on wages and permit changes in both simultaneously in various ways. Up to a point the rate of profits tax could be increased while wages tax is reduced so as to get any desired net demand expansion. If, unrealistically, effects on the supply of capital were ignored, the limit would be set by a 100% tax on profits. If such a tax on profits (or on rents) yielded more than enough revenue to finance all government expenditure, the wages tax could be replaced by a wages subsidy. More realistically, account might be taken of the supply response of capital to the after-tax profits rate. In that case it might be assumed either (1) that an optimal rate of profits tax, related to the elasticity of supply, is consistently imposed, or (2) that the rate of tax on profits is constant.

Once profits and wages tax rates differ, the effects of an output expansion on income distribution between profits and wages becomes relevant for determining the demand effects of changes in tax rates. Hence the demand effects, like the supply effect, would depend on the production function. This is true even when the profits tax rate stays constant while the wages tax rate is reduced. It should be added here that the unemployment benefit effect mentioned above also depends on the relationship between increases in output and employment and hence on the production function.

Dynamic Analysis

There is scope for a fuller dynamic analysis, one which takes into account more than just the future interest obligations generated by a
fiscal deficit. Allowance might be made for (1) some given expected rate of growth of the post-tax real wage target, and (2) expected labour productivity growth (shift of the ZZ' and XX' curves upwards to the right), this depending to some extent on current investment - which, in turn, depends partly on the equilibrium of the static system. If the real wage target is expected to rise more slowly than the XX' curve is expected to shift upwards (at a given level of employment) there may be a case for taxing the future through a bond-financed deficit in order to raise current employment. In addition (3), expectations of future unemployment (depending, among other things, on interest obligations incurred currently) may conceivably influence current private savings.

Open Economy

A lengthy article of its own would be required to extend the preceding model adequately to the open economy. The following considerations are relevant.

(1) It is necessary to depart from the single product assumption; at the minimum there must be a home-produced and a foreign product (or a tradeable and a non-tradeable). In Figure II, the variable along the horizontal axis (Y) must be redefined as an indicator of utility or absorption derived from some bundle of home-produced and imported goods. Inevitably there is an index number problem. For given home-produced output, and with absorption equal to income, a deterioration in the terms of trade would lower Y. When this translation is made, the preceding analysis can be applied.

(2) In a two-commodity model, with home-produced goods and imported goods (home-produced goods also being exported), a deterioration in the terms of trade resulting from extra exports
associated with economic expansion would make the ZZ' curve (Figure II) and the XX' curve (Figure III) steeper, since the marginal value product of labour will fall more than the marginal physical product when employment and output rise. Hence, even if the marginal physical product of labour stayed constant as employment expanded, the basic analysis of this paper— which hinges on diminishing value returns— would stand.

3) If there is no intervention in the foreign exchange market and there is zero capital mobility, the balance of payments on current account must stay in balance. Hence absorption must equal output, and it is not possible for the economy to rest to the right of XX' (Figure III) without generating domestic excess demand and hence inflation. Product market equilibrium must remain on XX'. But the possibility of a current account deficit, whether financed through private capital inflow or through intervention in the foreign exchange market (and hence through running down of reserves or public borrowing abroad) alters the analysis considerably. It removes the static product market equilibrium constraint.

If unlimited foreign borrowing were always possible (and were always expected to be possible in the future) there would be no limit to the excess of absorption over income. A fiscal deficit could always be financed, and it would certainly be possible to restore full employment, if necessary through wage subsidies. In the absence of such unlimited possibilities, there is still scope for a deficit, allowing the system to go to the right of XX'. It would involve an inter-temporal trade-off.

Alternatively, a short-term balance of payments target might be established. A given deficit in the balance of payments would be
represented by a curve to the right of XX', parallel to it, the horizontal distance between it and XX' representing the deficit. The intersection of this curve with the relevant "demand" curve would yield the maximum employment point attainable with a tax cut given the various targets and constraints.

VI

CONCLUSION

This paper is a theoretical exploration of the idea that trade unions bargain for and attain after-tax real wage targets and that, for this reason, tax rate reductions may reduce pre-tax real wages which, in turn, would increase employment and the tax base. In the main body of the paper the assumption of rigidity of the post-tax real wage is maintained, but in section V the post-tax real wage target is related to the level of employment. The paper may be interpreted either as exploring the implications of a particular type of wage equation (unions bargaining for real disposable wages) or as setting out the conditions required for certain types of "social contracts" that are sometimes proposed. The focus is on the two-fold nature of a tax cut: the demand effect and the cost effect. If payments balance is to be maintained, excess demand in the product market must be avoided, so that the demand effect must not exceed the cost effect. The novelty of the paper, if any, is in integrating the neo-classical negative relationship between the pre-tax real wage and employment with the tax-wage link assumption and in attempting to define more precisely the conditions for a "free lunch".

Three "demand" curves are presented - respectively assuming pure
fiscal policy, fiscal balance and constant investment. The latter two policies require monetary expansion in association with the tax cut. Public expenditure is held constant. A "free lunch" is defined as a policy which leads to more output and employment while not having an adverse effect on the future. The constant investment policy has some adverse effect through the increased interest burden resulting from the fiscal deficit, these obligations making it necessary to raise taxes - and hence to lower employment - in the future. The fiscal balance policy avoids this, and has a favourable effect for the future through the extra investment associated with monetary expansion. Various complications are briefly discussed in section V: a real wage target function, the rate of tax on profits varying from the tax on wages, unemployment benefits, and open economy considerations, among others. Finally, even if the condition for a "free lunch" is defined as a constant investment policy, rather than as fiscal balance, it seems to me unlikely that it would be fulfilled. But this view rests on a casual empirical judgment, and there is scope for empirical work using the framework of this paper, as in Corden and Dixon (1980) for the Australian case.
FOOTNOTES

1. I am indebted to John Black, George Fane, John Fleming, Geoffrey Kingston, Ian McDonald and R.M. Sundrum for helpful comments and criticisms.


3. These views are generally only hinted at, being implicit in those "social contract" proposals advanced in various countries which involve tax reductions as an inducement to wage restraint without specifying public expenditure cuts. But I have not been able to find explicit quotations. The Cambridge Economic Policy Group's model involves wage bargaining "as establishing an ex ante disposable real wage on the basis of taxes and prices that prevail at the time of settlement" (Cripps and Godley, 1976, p. 341) and this view seems to underlie some of their expansionary proposals. In Australia the Institute of Applied Economic and Social Research regularly advocates tax cuts as anti-cost-inflationary expansionary measures to resolve the familiar macro-economic dilemmas. This is the principal "alternative" policy proposal in Australia, rather equivalent to the Cambridge Economic Policy Group's advocacy of import restrictions in Britain. See also Perkins (1979).
4. For alternative models incorporating the wage-tax link, see Brennan and Auld (1968), Blinder (1973), Dernburg (1974), Pitchford and Turnovsky (1975), Pitchford and Turnovsky (1976), Cripps and Godley (1976), Blackwell and Santomero (1978), Argy and Salop (1979), and McDonald (1979). The present paper is distinctive in focusing on employment, rather than inflation, in making the neo-classical negative relationship between employment and the pre-tax real wage the central feature of the analysis, and in seeking to specify more precisely the "free lunch" concept.

5. This might be regarded as a statement of the central theme of Bacon and Eltis (1978) in terms of the present model. Of course Bacon and Eltis focus on the effects of higher tax-financed government expenditure on inflation, rather than employment, but in their terms inflation results from the incompatibility of real claims on the national product.

6. See Henry and Ormerod (1978) for recent U.K. wage equation estimates for the period 1961-77. Broadly, they confirm the earlier conclusion in Henry, Sawyer and Smith (1976) "that pressure for money wage increases from workers in order to reach some target for growth in take-home pay has been a decisive influence in the current inflation" (p. 69). Furthermore, unemployment is not found to have a significant effect, and the effects of incomes policies are only temporary. But the conclusion concerning unemployment does not necessarily apply to other countries (and might be disputed even for the U.K.). In Australia there are fairly clear indications of a Phillips curve effect. See Corden (1979, pp. 4-5) and the references cited therein.
REFERENCES


Fig. II
Fig. III