BORROWING, SAVING AND TAXATION*

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and

CONSUMPTION TAX, COMPENSATION AND THE DISTRIBUTION OF INCOME**

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** Director, Centre of Social and Economic Modelling (COSEM), Department of Health, Housing and Community Services. The views expressed in this paper are the author's own, and do not necessarily represent the view of the Department of Health, Housing and Community Services or of the Minister.
CENTRE FOR ECONOMIC POLICY RESEARCH
CONSUMPTION TAX CONFERENCE
Monday/Tuesday, 24 and 25 February 1992
Convener: Dr. John Quiggin

PROGRAM OUTLINE

Opening Address: Mr Peter Reith
Deputy Leader of the Opposition and Shadow Treasurer

SESSION 1:  
Paper 1: *Consumption Tax: A Solution or New Problems?*
Terry Dwyer, Economic Consultant

Paper 2: *Economic Arguments for a New Consumption Tax*
John Freebairn, Monash University
Discussant (Papers 1 and 2): Fred Gruen, ANU

SESSION 2:  
Paper 3: *Borrowing, Saving and Taxation*
John Quiggin, ANU
Discussant: Robert Albon, ANU

PANEL DISCUSSION I:

*What Can We Learn From The New Zealand Experience with the GST, Micro-economic Reform and Macroeconomic Policy?*
Speakers: Alan Wood, The Australian
Alan Bolard, NZ Institute of Economic Research

SESSION 3:  
Paper 4: *Tax Reform and the Distribution of Income*
Anne Harding, Centre of Economic & Social Modelling
Dept of Health, Housing & Community Services

SESSION 4:  
Paper 5: *National Savings Policy for Australia*
Speaker: David Chessell, Access Economics

PANEL DISCUSSION II:

1. *GST and the Size of Government*
Geoff Brennan, Australian National University

2. *GST and the Inflation Rate*
Chris Murphy, Access Economics and ANU

SUMMARY SESSION
Opening Speaker: John Piggott
University of New South Wales
Open Discussion
### Borrowing, Saving and Taxation

John Quiggin  
Australian National University

**Introduction**

The choice between consumption and income taxes has generally been seen as one between efficiency and equity. Although income taxes, and particularly progressive income taxes, are more equitable, it is generally assumed that they involve efficiency costs which are not incurred when consumption is the base for taxation.

The purpose of this paper is to argue for a position directly at odds with this conventional wisdom. I claim that consumption taxes are inefficient precisely because they are inequitable. The argument is developed in the context of a life-cycle model. In order to focus attention on the efficiency issues, differences between individuals are disregarded. All individuals are assumed to have the same lifetime path of income and consumption, and differ only in age.

Although life-cycle models rely on capital markets to allocate the flow of consumption over time, they do not normally contain a financial sector which uses real resources to achieve this end. Indeed, the notion of a 'perfect capital market' is precisely one which involves no transactions costs and consumes no resources. It is rather as if a 'perfect agricultural sector' was one which required no inputs.

In Quiggin (1991), a life-cycle model with an explicit, costly, financial sector is developed. Individuals face higher interest rates when they are net debtors than when they are savers and the interest rate margin represents the costs of financial intermediation. Unlike the usual perfect capital market case, it is shown that individuals are not indifferent between income streams with the same present value (evaluated at the rate of return to savings). Rather, they prefer flatter income streams which involve lower levels of indebtedness and less costly borrowing.

The central element of the efficiency case against the use of income as a tax base has been that, by driving a wedge between the post-tax return to saving and the real rate of return to capital, the taxation of interest income distorts the intertemporal allocation of consumption and,
in particular, reduces net saving below its optimal level. Early estimates of this distortion based on two-period models (e.g. Arnold Harberger, 1962, 1964) suggested that the efficiency cost was small. More recent estimates such as that of Laurence Summers (1981), using a more sophisticated life-cycle model, and focusing on general equilibrium effects of changes in the capital stock, have suggested a significantly larger efficiency loss.

This analysis depends critically on the assumption of costless capital markets. If intertemporal transfers are a free good, it is natural that they should be consumed up to the point of satiation. This point occurs where the marginal rate of substitution between consumption in different time periods is equal to the real rate of interest which in turn is equal to the marginal productivity of capital. Any policy which reduces the volume of intertemporal transfers below this level is distortionary. Further, individuals are indifferent as the distribution of the tax burden over their lifetime provided its present value, discounted at the market rate of interest, remains constant. A number of other equivalences, for example between a consumption tax and a tax on wage income, follow from this fact.

The conclusions of the standard analysis break down when it is recognized that borrowing and lending are costly. Taxes that bear most heavily on people when they are young and relatively poor, such as consumption taxes, involve a higher burden than taxes which bear most heavily on people at peak income levels. It follows that individuals are not, and society should not be, unconcerned about the lifetime distribution of the tax burden. Any (revenue neutral) tax change which increases the tax burden in periods when individuals have low income and negative assets reduces taxpayer welfare and increases the demand for socially costly borrowing transactions.

The analysis presented here may be interpreted more generally as the basis of an efficiency case for progressive taxation. It is shown that the lifetime stream of post-tax income under a progressive system is strictly preferred to that obtained under a proportional or regressive system yielding the same revenue (in present value terms).

Model

The model used here is presented in detail by Quiggin (1991). Identical individuals have a known lifetime \([0, T]\). The population is constant and age is uniformly distributed across \([0, T]\) at all times. Individuals receive a known flow of lifetime wage income, given by a function \(W: [0, T] \rightarrow \mathbb{R}\). Wage income at time \(t\) is denoted \(W_t\).

The economy is open to flows of capital and small relative to the world market. Hence the real rate of return to capital equals \(r\) and this rate is determined exogenously in the world market. The individual's time-path of assets is denoted by \(V\) and total assets at time \(t\) will be denoted by \(V_t\). The time path of consumption is denoted by \(C\). Individuals may save, receiving returns at the internationally determined rate \(r\), or borrow at a rate \(p\). The margin \(m = \rho - r\) reflects costs incurred by the finance sector in assessing the credit-worthiness of borrowers and enforcing contracts. In the general case, examined in Quiggin (1991), \(m\) may depend on the level of outstanding debt. In this paper, attention is confined to the case of a fixed margin.

The object of capital market transactions is to maximize the expected utility of lifetime consumption

\[ Z = \max \int_0^T U(C_t) e^{\delta t} \, dt \]

subject to the endpoint constraints

\[ V_0 = 0 = V_T \]

and the accounting condition

\[ \delta V_t = W_t - C_t + \rho_t V_t \]

where

- \( W \) denotes wage income
- \( C \) denotes consumption
- \( V \) denotes total assets
- \( \delta \) is the pure rate of time preference
- and
- \( U \) is a utility function of the form
\( U(C) = \alpha(1- \alpha) C^{1-1/\alpha} \quad \alpha \neq 1 \)

\[ = \log(C) \quad \alpha = 1. \]

The main case of interest is where wage income rises until some retirement date \( T_R \), then falls to zero. The individual will initially consume in excess of her income, building up a debt. A period of saving will then commence, with the debt being repaid at time \( t^* \). Saving will continue to build up assets for the retirement period. When the retirement period commences, there is a switch from saving to dissaving, with assets being exhausted at \( T \). In Quiggin (1991), it is shown that the optimal solution takes the form

\[ C_t = C_r e^{(1-\delta) t} \quad 0 \leq t \leq t^* \]

\[ C_t = C_r e^{\delta(t^*-t)} \quad t^* \leq t \leq T \]

where

\[ \gamma = (\rho-\delta)/(1-\alpha); \]

\[ \eta = (\rho-\delta)/(1-\alpha) \]

and \( C_r \) and \( C_a \) are chosen to satisfy the requirements that \( V_u = V_r = V_p \) or

\[ \int_0^{t^*} (C_r e^{(1-\delta) t} - W_t) e^{\gamma t} dt = 0 \]

\[ \int_{t^*}^T (C_r e^{\delta(t^*-t)} - W_t) e^{\eta t} dt = 0 \]

The following simulated values are obtained by Quiggin (1991). In Table 1, the model presented above is solved for a range of values of the transactions cost parameter \( m \). Individuals are assumed to work for 40 years and be retired for 10 years. The initial wage is normalized to unity and wages are assumed to rise at a rate of 3 per cent per annum throughout the individual’s working life. The real rate of return on capital and the rate of time preference are set at 5 per cent. The inter-temporal substitution parameter \( \alpha \) is set equal to 1.

The transactions cost parameter \( m \) ranges from 0 to 6 per cent. The first row of the table indicates the initial consumption level as a proportion of the initial wage level. The second row indicates the final consumption level. The third row is the crossover year \( t^* \). The fourth row indicates the welfare loss relative to the case of costless transactions. The fifth row represents the proportion of social resources consumed in transactions costs related to borrowing.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0 )</th>
<th>( m = 0.01 )</th>
<th>( m = 0.02 )</th>
<th>( m = 0.03 )</th>
<th>( m = 0.04 )</th>
<th>( m = 0.05 )</th>
<th>( m = 0.06 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Cons</td>
<td>1.50</td>
<td>1.37</td>
<td>1.29</td>
<td>1.17</td>
<td>1.10</td>
<td>1.05</td>
<td>1.00</td>
</tr>
<tr>
<td>Final Cons</td>
<td>1.50</td>
<td>1.61</td>
<td>1.76</td>
<td>1.81</td>
<td>1.89</td>
<td>1.93</td>
<td>1.94</td>
</tr>
<tr>
<td>Crossover</td>
<td>33.3</td>
<td>32.2</td>
<td>30.8</td>
<td>29.0</td>
<td>26.9</td>
<td>24.5</td>
<td>22.1</td>
</tr>
<tr>
<td>Welfare Loss</td>
<td>0</td>
<td>2.0%</td>
<td>3.6%</td>
<td>4.6%</td>
<td>5.3%</td>
<td>5.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Resource Use</td>
<td>0</td>
<td>1.7%</td>
<td>2.4%</td>
<td>2.3%</td>
<td>1.7%</td>
<td>0.8%</td>
<td>0%</td>
</tr>
</tbody>
</table>

In Table 2, the inter-temporal substitution parameter \( \alpha \) has been increased from 2 to 1, reflecting a greater aversion to variations in consumption.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0 )</th>
<th>( m = 0.01 )</th>
<th>( m = 0.02 )</th>
<th>( m = 0.03 )</th>
<th>( m = 0.04 )</th>
<th>( m = 0.05 )</th>
<th>( m = 0.06 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Cons</td>
<td>1.50</td>
<td>1.40</td>
<td>1.32</td>
<td>1.25</td>
<td>1.19</td>
<td>1.13</td>
<td>1.09</td>
</tr>
<tr>
<td>Final Cons</td>
<td>1.50</td>
<td>1.56</td>
<td>1.63</td>
<td>1.70</td>
<td>1.77</td>
<td>1.83</td>
<td>1.88</td>
</tr>
<tr>
<td>Crossover</td>
<td>33.3</td>
<td>32.7</td>
<td>32.0</td>
<td>31.0</td>
<td>30.0</td>
<td>28.6</td>
<td>27.1</td>
</tr>
<tr>
<td>Welfare Loss</td>
<td>0</td>
<td>4.3%</td>
<td>8.0%</td>
<td>11.0%</td>
<td>13.4%</td>
<td>15.2%</td>
<td>16.5%</td>
</tr>
<tr>
<td>Resource Use</td>
<td>0</td>
<td>1.9%</td>
<td>3.1%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.2%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>
Taxes

The taxation system provides one instrument through which government can influence the lifetime distribution of income. It will be assumed that the government is required to raise a fixed revenue, which may be expressed as a proportion of the present value of wage income at the real interest rate \( r \). In order to avoid issues of inter-generational redistribution, it will be assumed that the present-value of tax payments made by any individual is fixed. The revenue is spent in a way which does not affect inter-temporal consumption decisions.

The proportional wage tax provides a base for comparison with other tax systems. By the CRRA assumption on utility, a proportional reduction in \( W \) implies a proportional reduction in \( C_t \). The results in Tables 1 and 2 apply except that all consumption levels are reduced by an amount proportionate to the tax rate \( \tau \).

The comparisons here have been undertaken on the basis that the present value of the tax liabilities of each individual should be the same for each of the tax systems used. An alternative basis for comparison is that annual tax revenues should be the same for each system. Given the assumption that the population is uniformly distributed over the age range \([0, T]\), it is clear that the annual tax revenues are largest for the income tax and smallest for the consumption tax. Also annual revenues are higher for progressive taxes, imposed at the rates derived from (12) than for the corresponding flat-rate taxes. Thus, a comparison on the basis of annual tax revenues would reinforce the results derived here.

Nevertheless, I believe that the criterion adopted here is the correct one. This is because a shift from a consumption tax to an income tax at rates calculated to yield the same annual revenue, would involve a redistribution of income away from individuals living at the time of the change and towards future generations. Individuals alive, and earning income, at the time of the change would already have paid high taxes on their previous consumption and would be faced with higher than anticipated taxes over their remaining lifetime. Their losses would outweigh the benefits to individuals at or near retirement, for whom the real value of accumulated savings would rise. The apparent gain in annual revenue from an income tax reflects a once-off redistribution of this kind. The requirement that each individual should pay the same lifetime taxes (in present value terms) ensures that no inter-generational redistribution can take place.

In this model, the wage tax is lump-sum, while the properties of consumption and income taxes depend on individual saving and borrowing decisions. The usual equivalence between wage taxes and consumption taxes does not hold. Two variants of the consumption tax may be considered, depending on whether the services of the financial sector are subject to taxation. In most VAT systems of consumption tax, financial services have been exempted from taxation (see Andrew Chisholm, John Freebairn and Michael Porter 1990, Carl Bakker and Philip Chronican 1987). However the Canadian VAT system includes a tax on financial services. The case when financial sector services are not taxed is considered first. As in the case of a wage tax, the CRRA assumption means that the optimal solution will satisfy (5). The constraints (6) are replaced by

\[ \int_0^T (C_t (1/1-\tau)e^{-\alpha t} - W_t)e^rt \; dt = 0 \]

and

\[ \int_0^T (C_t (1/1-\tau)e^{-\alpha t} - W_t)e^rt \; dt = 0 \]

Since \((1/1-\tau)\) is a constant, imposition of a consumption tax at a rate \( \tau \) will yield the same pattern of consumption as imposition of a wage tax at a rate \( \tau \). This is in line with the intuition derived from the observation that an increase in the price of the consumption good will be equivalent to a corresponding reduction in the real wage. However, when transactions costs are present, the consumption tax will not yield the same revenue as the wage tax. The present value of the consumption tax will be lower by the difference between the present value of consumption and the present value of wages. As is shown in Quiggin (1991), this is equal to the present value of resources consumed by the financial sector. In order to raise a given present value from the consumption tax, it is necessary to raise the rate of taxation by an amount equal to the resource use of the financial sector. The welfare loss associated with a shift from wage taxation to this form of consumption tax is given by \( \Delta \tau \), where \( \Delta \) is the proportion of resources consumed by the financial sector. For example, given the parameter settings above, with \( m = 0.03 \), \( \alpha = 1 \), and \( \tau = 0.25 \), the resource cost is equal to 0.6 % of total income.
With \( m = 0.03 \), \( \alpha = 2 \), and \( \tau = 0.25 \), cost is 0.9% of total income.

The alternative specification of the consumption tax is one in which the services of the financial sector are subject to taxation. This implies that the cost \( m \) in the optimization problem (1) must be replaced by \( m/(1-\tau) \). The associated welfare costs, relative to the wage tax, are tabulated below for the values \( m = 0.2, 0.3 \) and \( 0.4 \) and \( \alpha = 1, 2 \). The tax rate \( \tau \) is set at 0.25.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0.2 )</th>
<th>( m = 0.03 )</th>
<th>( m = 0.02m = 0.03m = 0.04 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare Loss</td>
<td>0.7%</td>
<td>0.7%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

The welfare losses for the case \( \alpha = 1 \) are generally similar to the case when financial sector services are untaxed. However, for \( \alpha = 2 \), welfare losses are increased substantially. This result arises because the welfare losses for the value \( \alpha = 2 \) are large in relation to the resources consumed in the financial sector.

The next case is that of a proportional income tax. Both wage and interest income are taxed. Interest payments to lenders are not deductible. Since \( \tau \), the real rate of return to capital, is determined by the international capital market and interest payments from all sources are taxed, the net interest rate for savers becomes \( \tau(1-\tau) \). Because the tax base is increased by the inclusion of interest income, the required tax rate is reduced. Since the level of interest income is determined endogenously by savings-consumption decisions, the required tax rate is also endogenous.

As is shown by Quiggin (1991), the profile of consumption during the period of indebtedness will be almost unaffected by changes in the rate of interest payable on savings.

Hence, over the period of indebtedness, the only difference between consumption under the wage tax and consumption under the income tax will arise from the fact that the income tax rate is lower than the wage tax rate. Welfare over this period will be increased unambiguously. The beneficial effect depends on the transactions costs associated with the financial sector. Correspondingly, consumption and welfare over the period in which asset holdings are positive will be reduced. Furthermore, the intertemporal allocation of consumption over this period will be distorted by the tax. The loss incurred over the period of positive asset holdings is essentially independent of the transactions costs associated with borrowing.

In Table 3, these effects and the net welfare impact are calculated for a range of values of \( m \). The tax rate is set at 25 per cent, the real rate of return on capital is 5 per cent, and the intertemporal substitution parameter is \( \alpha = -1 \). Because the effects are quite small, they are given to two decimal places.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0 )</th>
<th>( m = 0.01m = 0.02m = 0.03m = 0.04m = 0.05m = 0.06 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss</td>
<td>-0.57%</td>
<td>-0.58%</td>
</tr>
<tr>
<td>Tax Benefit</td>
<td>0.55%</td>
<td>0.62%</td>
</tr>
<tr>
<td>Net Effect</td>
<td>-0.02%</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

As would be expected \textit{a priori}, the net effect of shifting from a wage tax to an income tax is negative when transactions costs are absent. The total effect is small, however. This is partly due to the fact that all of the loss is incurred after \( \tau \). In the present value calculation, therefore, the loss is discounted by a factor of at least \( e^{-\tau} \) relative to first-period consumption. Second, the distortion in the relative prices of present and future consumption is small, and hence the associated Harberger triangle is second-order. Summers (1981) appears to suggest that the shift from a two-period model to a continuous-time model will greatly increase the estimated deadweight loss from an income tax. However, the critical feature which generates large losses in Summers’ model is not the use of continuous time but the endogeneity of capital stock.

When the value of \( m \) is not close to zero, the income tax outperforms the wage tax. This result is reversed, however, when \( \alpha = -2 \). The increase in aversion to inter-temporal variations in consumption raises the welfare loss associated with the tax. The effect on tax revenue is ambiguous. The rate of saving during the period of positive assets is higher. However, as shown in Table 2, the crossover date is later, so that the period of retirement is smaller. With the parameters used here, the second of these effects predominates. This arises...
from the fact that \( \delta = r \). Hence, for \( \tau = 0, \gamma = 0 \) and the profile of consumption after \( t^* \) is independent of \( \alpha \). For small \( \tau \), changes in \( \alpha \) have only a small effect on \( \gamma \), and hence on the tax revenue available.

Thus, the comparison between the efficiency effects of a wage tax and an income tax is ambiguous. However, the consumption tax is least efficient over the entire parameter space, except where \( m \) is very close to zero.

Thus far, several alternative tax bases have been considered. An equally important issue is the choice of tax schedule. The income tax has been fairly steeply progressive, although the existence of exemptions and avoidance schemes means that the actual degree of progression is less than that in the published tax schedules.

This question will be examined by simulating the effects of a switch from a flat wage tax to a progressive wage tax. It may be worth considering the implications of progression using the other tax bases considered here. If consumption taxes are levied at the point of sale, there is no scope for significant progression. Some progression may be achieved if goods with a high income elasticity of demand are more heavily taxed, but this involves additional distortions and administrative difficulties. An alternative form of consumption tax is an income tax with an exemption for savings. Such a tax could be progressive. Once again, it seems likely that substantial administrative difficulties would be encountered. The income tax is, of course, progressive. The main reason for not examining progressive income taxes in the present paper is one of analytical tractability. The problem is quite complex, whereas a very simple solution can be found for the wage tax.

Consider first a tax schedule specified so that the initial income level is tax-free and the income tax rate is an exponential function of income in excess of the tax-free threshold. That is

\[
\pi(Y) = 1 - Y^t
\]

When pre-tax income follows the increasing path \( e^{kt} \), post-tax income takes the form \( e^{(1-t)kt} \). Hence, the form of the solution derived above for the optimal consumption path is unchanged.

In order to make the progressive tax comparable to a flat rate tax, we require that the present value of revenue should be the same for the two systems. That is

\[
\int_0^{TR} (e^{kt} - e^{(1-t)kt}) e^{-rt} dt = \int_0^{TR} t e^{kt} e^{-rt} dt
\]

or

\[
\int_0^{TR} e^{(1-t)kt} e^{-rt} dt = \int_0^{TR} (1-t) e^{kt} e^{-rt} dt
\]

It would be possible to modify this tax system to be more or less progressive by changing the tax threshold. If the tax threshold is greater than the initial starting income, this would involve a negative income tax. An alternative approach is to examine a mixture between a flat-rate and a progressive tax system where the tax rate is given by a function of the form

\[
\pi(Y) = \tau_0 + 1 - Y^{-t}
\]

The progression parameter \( t \) is now determined by the condition

\[
\int_0^{TR} e^{(1-t)kt} e^{-rt} dt = \int_0^{TR} (1-t + \tau_0) e^{kt} e^{-rt} dt
\]

With \( t = 0.25 \), solution of (12) yields \( t = 0.59 \). The proportion of income paid in taxes rises over the individual's lifetime from zero to 37 per cent. For some parameter values, the steeply progressive nature of this tax system means that the optimal solution involves no borrowing. The critical question is whether \( \eta > \kappa(1-t) \), where \( \eta \) is the optimal rate of growth of consumption (for an interior solution) over the period \( [0, t^*] \) and \( \kappa(1-t) \) is the rate of growth of post-tax income. With \( \alpha = -1 \), the critical value of \( m \) is approximately 0.024. Above this level, changes in \( m \) do not affect the profile of consumption under the progressive tax. The welfare effects of a shift from a flat wage tax to a progressive wage tax are summarized in Tables 5 and 6. Table 5 deals with the case when \( \alpha = -1 \).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0 )</th>
<th>( m = 0.01 )</th>
<th>( m = 0.02 )</th>
<th>( m = 0.03 )</th>
<th>( m = 0.04 )</th>
<th>( m = 0.05 )</th>
<th>( m = 0.06 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossover</td>
<td>22.9</td>
<td>18.8</td>
<td>14.9</td>
<td>13.6</td>
<td>13.6</td>
<td>13.6</td>
<td>13.6</td>
</tr>
<tr>
<td>Welfare Gain</td>
<td>0</td>
<td>1.8%</td>
<td>3.2%</td>
<td>4.0%</td>
<td>4.7%</td>
<td>5.0%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

With \( m = 0 \), there is no gain, since individuals are indifferent as to the lifetime distribution of their post-tax income. Note that although the time-profile of consumption under
the progressive income tax is unchanged for \( m \geq 0.03 \), welfare gains keep increasing because
the loss associated with transactions costs in the base situation is rising. The comparison for
\( m = 0.06 \) represents the case when no borrowing takes place under either tax regime, and
individuals consume their post-tax income over the interval \([0, r^*]\). As would be expected, the
effects are greater when \( \alpha = -2 \). This is shown in Table 6.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( m = 0 )</th>
<th>( m = 0.01 )</th>
<th>( m = 0.02 )</th>
<th>( m = 0.03 )</th>
<th>( m = 0.04 )</th>
<th>( m = 0.05 )</th>
<th>( m = 0.06 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossover</td>
<td>22.9</td>
<td>20.3</td>
<td>17.5</td>
<td>15.0</td>
<td>12.8</td>
<td>11.3</td>
<td>11.3</td>
</tr>
<tr>
<td>Welfare Gain</td>
<td>0</td>
<td>3.8%</td>
<td>6.5%</td>
<td>9.1%</td>
<td>10.9%</td>
<td>13.5%</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

These comparisons are made relative to a flat wage tax. To compare a progressive wage tax to
a consumption tax, it is necessary to add the welfare gain reported in Table 6 to the welfare loss
reported in Table 3. For the preferred set of parameter values, \( m = 0.03 \), \( \alpha = 1 \), the total
efficiency loss associated with the consumption tax is 4.7%, or 19 cents per dollar of revenue
raised. For the case \( \alpha = 2 \), the loss is 8.9% or 36 cents per dollar of revenue raised.

Thus, the equity case for progressive taxation appears in the life-cycle setting as an
efficiency argument. Even in a community of identical individuals, a progressive income tax
may be preferred to a consumption tax when borrowing is costly.

Qualifications and generalizations

As with the majority of the life-cycle models which have been employed in the analysis
of tax policy, the model presented here is a highly simplified representation of reality. It is
natural therefore, to consider the qualifications which must be placed on the policy implications
of the model and possible generalizations which might overcome these problems.

A major difference between the model presented here and a number of those in the
literature (eg Summers 1981) is that the economy is assumed small and open. Hence, the real
return to capital and the capital stock are determined on the world market. Tax policy affects
only the holdings of capital stock by residents of the country concerned. The large benefits
found by Summers to arise from a consumption tax are due the fact that increased saving
increases the capital stock and hence raises the marginal (and average) product of labor. The
model presented here also omits an analysis of the effects of tax policy on capital accumulation
and on the equilibrium growth path of capital stock.

The relevance of this qualification depends partly on the country to which the analysis
is applied. The small open economy assumption applies naturally for Australia, but is less
clearly appropriate for the US. The effects of taxation on capital stock are very sensitive to
assumptions such as the role of international capital markets (Joel Stremmel 1988).

A more critical objection to the Summers analysis is the fact that it fails to take account
of public sector saving (or dissaving). Implicit in the Summers model is the assumption that
public sector saving is independent of the private sector capital stock and of the choice of tax
base. As has been pointed out by critics such as Barry Bosworth (1988), an increase in public
sector saving would seem to be a far more reliable tool for building capital stock than would a
move to consumption taxes. At a theoretical level, the main point is that any model in which the
private sector capital stock is endogenously determined by taxation policy must also include an
account of the determination of public sector saving. The critical issue is the extent to which
public saving adjusts to offset the reduction in private savings associated with capital taxation
(Ian Little and James Mirrlees 1974).

A second feature of the model presented here is that it includes no incentive effects of
taxation on labor supply. It may be noted that, for the flat rate tax systems, the substitution
effect on the labor-leisure choice is essentially unaffected by the choice of tax base. Since the
consumption tax is less efficient, the tax burden, and the incentive effect, will be larger for a
given revenue. A full-scale treatment of this issue requires an analysis of jointly determined
lifetime consumption and labor supply decisions. This is beyond the scope of the present
paper.

Progressive tax systems potentially involve more severe incentive effects than flat-rate
systems. In principle, these could be incorporated into the model presented here, so that both
labor supply and consumption were determined in an optimizing framework. A rough and
ready approach to policy analysis may be made by comparing a preferred estimate of the
efficiency losses associated with the incentive effects of a shift from flat-rate to preferred
taxation with the inter-temporal efficiency losses derived here for the flat-rate consumption tax.
Concluding Comments

The fact that capital markets consume resources is obvious. Yet it is rarely taken into account in formal economic analysis. Even when the assumption of perfect capital markets is dropped, it is often replaced with an assumption that borrowers are liquidity constrained, so that capital markets are still costless, and financial institutions still do not exist.

It has been argued here that the fact that financial transactions are costly invalidates several of the central conclusions of the recent taxation literature arising out of the life-cycle hypothesis, and bolsters the traditional case for progressive taxation. This is not an isolated instance. For example, comparisons of the performance of private and publicly owned firms rarely include the costs associated with the imposition of discipline through the market for corporate control.

References


Consumption Tax, Compensation and the 
Distribution of Income

Ann Harding
Department of Health, Housing and Community Services

Introduction

A revenue neutral tax mix change, where personal income tax cuts are exchanged for consumption tax increases, potentially has major adverse consequences for income distribution, unless other appropriate compensatory measures are also taken. Even less sweeping measures, such as the removal of the current Australian wholesale sales tax (WST) and its replacement with a broad-based consumption tax (BBCT), would increase inequality in the absence of sophisticated compensatory policies.

The first part of this paper explains why a tax mix change or simply the replacement of the WST with a BBCT would reduce income equality without countervailing measures, and canvases why even those primarily concerned with the possible efficiency gains resulting from a BBCT should be deeply concerned about the adequacy of any compensatory package. The second section discusses the possible approaches to compensation, while the third examines the level of income unit that we should seek to compensate. Part four lists the specific compensation mechanisms which should be used. Finally, section five analyses the deficiencies of the only source of data which can be used for aggregate distributional analysis of indirect tax changes - the Household Expenditure Survey - and suggests that improvements are urgently needed so that informed decisions can be made about distributional outcomes.

Consumption Taxes and Income Distribution

There are a number of reasons why tax mix changes or indirect tax rationalisation would increase the degree of income inequality if compensatory measures were not taken. First, lower income groups have different consumption patterns to higher income groups. Such households typically spend more on necessities such as food, which are currently exempt from wholesale sales tax but would be brought into the tax base if a BBCT was introduced. Similarly, they spend less on ‘luxuries’ such as sports cars, which are currently taxed at a higher rate than any BBCT would be introduced at.

As a result, simulations with the new Treasury/DSS model, PRISMOD, showed that even a revenue neutral replacement of WST with a BBCT would not be distributionally neutral, but would increase the price of a typical basket of goods currently consumed by lower income groups by more than that purchased by higher income groups. If a shift in the tax burden from higher to lower income earners was not to accompany such indirect tax changes, initiatives to channel money towards lower income groups would thus have to be introduced.

A second factor, which is only important in the case of a change in the tax mix from reliance on direct to indirect taxes, is that lower income groups cannot have any new indirect tax burdens offset by income tax cuts, because they do not pay sufficient income tax. This is the source of many of the difficulties involved in designing adequate compensatory measures but, without such measures, the tax burden would again be shifted away from higher and towards lower income earners.

Even for those who are most interested in the possible efficiency gains resulting from tax changes, there are a number of important reasons to be concerned about the effect of such changes on the income distribution. First, recent Australian experience has demonstrated that major tax mix changes have to be politically acceptable, and that such acceptability rests in large part upon the perceived fairness of the distributional outcome.

Second, one of the three major objectives of the tax system is the achievement of equity or, more concretely, a post-tax-transfer distribution of income which has broad acceptance within society. A tax mix change without satisfactory compensation amounts to an implicit decision that the pre-tax-change income distribution was too equal - and that the degree of inequality within Australia should be increased.

Finally, decent compensation increases the chance of introducing a fully comprehensive BBCT with minimal exemptions. If people are not convinced that the government will ensure a fair distributional outcome, the pressure to exempt food and other necessities will be much greater. As the Canadian experience demonstrates, such an outcome should be avoided if possible, as the consequent creation of artificial divisions between various types of products and the increased complexity in administering the BBCT fritter away efficiency gains. It seems clear that it is desirable to achieve equity goals through specific and well targeted compensatory initiatives, rather than through badly targeted exemptions from a BBCT tax base. In this sense, a comprehensive compensatory package is a prerequisite to achieving maximum efficiency gains.

The Aim of Compensation

Discussion of compensation, as Whiteford and Saunders put it, has always focussed on the ‘morning after’ approach (1990:26). That is, compensation seeks to restore income relativities to those prevailing immediately before the tax mix change, and takes no account of the possible behavioural effects of the change - even though such effects might be regarded by some as one of the most important reasons for undertaking the tax change. However, the uncertainty surrounding the likely magnitude of any behavioural responses, and the difficulty of including any such effects in the distributional balance sheet, have so far precluded a more sophisticated approach.
The idea of compensation initially appears very simple. In the context of a substantial but deficit neutral shift in the tax mix, one might imagine that a distributionally neutral shift would simply involve returning to individuals the extra consumption tax which they were now going to pay. Thus, if a single person with an after-tax income of $400 a week spent only $300 of this income on goods and services, a new BBCT which raised prices by 10% would require spending of $330 to buy the same basket of goods and services. A $30 income tax cut would thus allow this taxpayer to buy the same consumption bundle, and at first glance this would appear to provide adequate compensation for the effects of a new BBCT (Table 1).

However, in the longer term this would mean that this taxpayer would be disadvantaged, because the general increase in prices caused by the BBCT would mean that fewer goods and services could be bought with their savings (out of current income) when they were spent in the future. Thus, maintaining the real disposable income of this taxpayer would require a $40 rather than a $30 income tax cut. As Table 1 illustrates, the ‘maintenance of real disposable income’ approach to compensation implies a totally different pattern of income tax cuts or cash transfer increases to that inherent in the ‘maintenance of consumption’ bundles approach (Harding, 1985:28).

Both the Draft White Paper (DWP) issued by the Labor Government in 1985 and the recent Fightback package issued by the Liberal and National Parties’ (1991) primarily adopted the maintenance of real disposable income approach to compensation. There are, however, major problems with a pure version of this approach, which require additional measures to correct.

One problem is created by the existence of dissavers - that is, people whose expenditure exceeds their income. Much dissaving is the product of lifecycle factors - for example, as the aged run down savings, shares or other assets acquired during their years in the workforce. Other dissaving is due to (possibly more temporary) misfortune or circumstances, such as when the unemployed go into debt or spend severance or redundancy payouts or students spend money earned during previous years or university holidays. (Another group who frequently dissave are the self-employed, but doubts about the extent to which their declared taxable income correlates with their real economic circumstances means that less attention is given to their potentially disadvantaged position in designing BBCT compensation.)

As Table 1 demonstrates, the maintenance of disposable incomes approach disadvantages dissavers, as they do not receive sufficient in income tax cuts or transfer increases to compensate them for their new indirect tax burden. Thus, in the absence of other measures, the disposable incomes approach to compensation effectively amounts to the transfer of income from dissavers to savers - or from the poor to the rich. To offset this effect, the DWP proposed cash transfer increases which exceeded the anticipated increase due to the introduction of a BBCT in the prices facing pensioners and beneficiaries (1985:140). The Fightback package also proposed cash transfer increases which exceeded the expected price effect, although this appeared to be regarded as either a safety margin or over-compensation, rather than as a measure designed specifically to deal with possible dissaving (1991:158).

A second issue is the possible effect of a switch to a BBCT upon assets. While most assume that the real value of assets not held in dollar terms (such as property) will be maintained after a tax mix change (with the impact upon shares being less certain), the real value of assets held in the form of deposits with financial institutions can be expected to decline - on average, by the effect of the tax mix change on prices.

It is very difficult to ascertain the extent of any compensation required for these possible wealth effects. The DWP pointed out that even though the real value of financial assets might fall, the accompanying reduction in income tax rates would make the nominal income streams from income-producing assets more valuable in after-tax terms (1985:150). In addition, the above indexation increases in pensions and benefits to compensate dissavers would provide some compensation for the loss in purchasing power for pensioners and beneficiaries who were financing their...

Table 1: Illustrative Effects of Alternative Approaches to Compensation

<table>
<thead>
<tr>
<th></th>
<th>Single Taxpayer</th>
<th>Pensioner Couple</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saver</td>
<td>Dedicator</td>
</tr>
<tr>
<td></td>
<td>Exp = Saver =</td>
<td>Exp = Saver =</td>
</tr>
<tr>
<td>Weekly disposable income</td>
<td>$400 $400 $400</td>
<td>$250 $250 $250</td>
</tr>
<tr>
<td>Weekly expenditure</td>
<td>$300 $300 $300</td>
<td>$20 $25 $30</td>
</tr>
<tr>
<td>Effect of BBCT (1)</td>
<td>$30</td>
<td>$40 $50</td>
</tr>
<tr>
<td>Tax cut or pension increase required to:</td>
<td>$30</td>
<td>$40 $50</td>
</tr>
<tr>
<td>- maintain consumption</td>
<td>$30</td>
<td>$40 $50</td>
</tr>
<tr>
<td>- maintain disposable income</td>
<td>$40</td>
<td>$40 $50</td>
</tr>
</tbody>
</table>

(1) For purely illustrative purposes, the BBCT is assumed to increase prices by 10 per cent.
dissaving from financial assets. The LNP Fightback document proposed a wealth compensation rebate, to be paid to those aged 60 and over with taxable incomes of less than $30,000 a year and assets held in the form of financial deposits (and, possibly, equities) (1991:170). This measure would extend assistance to both age pensioners and those elderly outside the age pension system.

Another critical implication of the above discussion is that a package which provides adequate compensation cannot be deficit neutral, if the maintenance of real disposable incomes is accepted as the goal of compensation for most people. Thus, maintaining real disposable incomes necessarily involves compensating savers now for the loss in the future purchasing power of their savings, even though the consumption tax which will finally be received when these savings are spent might not enter government coffers until years later. This problem is further exacerbated by the political necessity of returning to dissaving pensioners and beneficiaries all of the new additional consumption taxes paid (even though other dissaving groups will continue to help subsidise the gains made in the short term by savers). Finally, the magnitude of the problem is again increased by any wealth compensation initiatives, which again channel compensatory funds now to those who may not spend their financial assets for many years.

Thus, as the LNP noted, the real disposable incomes compensation method for a shift to a BBCT is 'front end' loaded (1991:152), which means that for some years compensation dollars flow out at a greater rate than BBCT dollars flow in (unless there is a very large fiscal dividend or extremely strong behavioural effects, which increase economic activity and revenue). As a result, at least initially, a shift to a BBCT is either not deficit neutral or has to be accompanied by large cuts in government expenditure.

If the incidence of these expenditure cuts can be attributed to individual households, then they can be included in the balance sheet for households in those Australian microsimulation models which simulate taxes and expenditures. In such a case, households which appear to be fully compensated when only taxes and cash transfers are considered might emerge as losers when the combined impact of taxes, transfers and expenditure cuts is calculated. A shift to a BBCT therefore appears to require expenditure cuts in public goods, whose incidence cannot be readily attributed.

The Income Unit for Compensation

Even if it has been agreed that the maintenance of real disposable incomes (with appropriate modifications) is the goal of any compensatory measures, the level of income unit at which this goal has to be achieved still has to be specified (Whiteford and Saunders, 1990:23). For example, does adequate compensation mean that every individual in Australia has to be exactly compensated, or that ABS income units (1), families, households or demographic groups have to be compensated? Such concerns link in with the continuing debate in economics about the appropriate level of income unit to use in income distribution studies, with the adoption of any given income unit involving the implicit assumption that resources are shared equally between all individuals within that income unit.

As Whiteford and Saunders observe, adoption of the ABS income unit implies that the aim of compensation is to maintain the living standards of that unit, so that 'personal' tax cuts benefiting fathers would be one possible method of compensating the income unit for the higher prices faced by mothers as a result of the BBCT, with the implied redistribution 'from purse to wallet' being a matter left to the income unit members themselves to adjust to' (1990:24). They suggest that the ABS income unit is implicitly adopted as the target for most of the DWP proposals but that, at times, the broader family unit is adopted; for example, the possible disadvantage faced by low income junior full-time employees from the BBCT was seen as less important in the DWP, because many would still be receiving some support from their parents.

Whiteford and Saunders also note that much of the debate and disagreement that surrounded the adequacy of the DWP proposals in 1985 was due to differing perceptions within the community of the income unit which should be targeted for compensation (1990:25). Women's groups, for example, remained unconvinced that part-time employed married women who could not be compensated via their own income tax cuts would be adequately compensated through their husband's income tax cuts.

It is extremely difficult to disentangle these issues. Apart from anything else, the achievement of political acceptability now appears to require that the individual be the income unit targeted for compensation where possible, in the sense that individuals (even those with low taxable incomes) should be individually compensated, rather than compensated through tax cuts to another family member. However, this does not seem to imply that compensation should be directed, for example, to the spouse who has no income but undertakes the family's shopping and thus experiences the effects

(1). The Australian Bureau of Statistics defines an income unit as single adults or couples, in both cases with or without dependent children (ie. children aged less than 15 years or aged 15-20 and a full-time student). A 17 year old son in full time employment still living with his parents would be regarded as a separate 'ABS income unit', even though they all three individuals would comprise only one income unit if the 'family' was the income unit under study.
of the BBCT more directly, rather than to the other spouse who earns that income. While this involves an implicit shift to the ABS income unit and an assumption of income sharing within that unit, any other solution would seem to be very controversial.

**Mechanisms for Compensation**

In devising a compensation framework, it is helpful to divide the population into four major groups (Figure 1). The first step is to partition the population into those who are and are not receiving income support cash transfers from the government. (Individuals receiving only family allowance or family allowance supplement can thus be placed in the latter 'not receiving' group).

For those not receiving such cash transfers, the next division is into those who can and cannot be fully compensated for the effects of the BBCT through income tax cuts (and family allowance increases). Whiteford and Saunders have demonstrated how to calculate an effective compensation threshold for each taxpayer (1990:33), with the relevant formula being:

\[ GY = \frac{R(1+PE)}{[FTR(1+PE) - PE]} \]

where

- GE = gross income
- R = the sum of all relevant tax rebates (including the tax free threshold, which is treated as a rebate which has a value of the tax threshold times the first marginal tax rate)
- FTR = the first marginal tax rate in the income tax scale
- PE = the price effect of the BBCT introduction.

**Figure 1: A Framework for Compensation**

<table>
<thead>
<tr>
<th>Population to be Compensated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Those not receiving government income support payments</td>
</tr>
<tr>
<td>Those receiving government income support payments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be fully compensated through income tax cuts and family allowance or FAS increases</td>
<td>Taxable incomes too low for full or partial compensation via income tax cuts. Tax credits or new transfers needed.</td>
<td>Have no private income, and are fully dependent upon income support payments. Increases in cash transfers by relevant price increases needed.</td>
<td>Have private income and also receive income support transfers from govt. Also need tax credits or cash transfer increases to compensate for BBCT paid from private income.</td>
</tr>
</tbody>
</table>

Plus special measures needed for those with assets held in the form of financial deposits, whose real value will decline after introduction of a BBCT.
Compensating Group A

All taxpayers with gross incomes above their effective compensation threshold can be fully compensated through income tax cuts for the additional consumption tax they will pay. Once it has been agreed that the aim of compensation is to maintain real disposable incomes, Wright and Henry have calculated the minimum amount by which the zero rate tax threshold and the various marginal tax rates have to be increased to achieve this (see below). The tax thresholds above the first zero rate threshold require no adjustment. The various tax rebates, such as the dependent spouse rebate and the sole parent rebate, also need to be indexed by the average increase in prices - as does family allowance and all its related payments, such as family allowance supplement.

Wright/Henry Income Tax Compensation Formula.

The new zero rate tax threshold has to be:

\[ NT = [(1+PE)OMTR / NMTR] OT \]

where
- \( NT \) = the new zero rate threshold
- \( PE \) = the average rate of increase in consumer prices
- \( OMTR \) = the old marginal tax rate applying immediately above the old zero rate threshold
- \( NMTR \) = the new marginal tax rate applying immediately above the new zero rate threshold; and
- \( OT \) = the old zero rate threshold.

The adjustment to each marginal tax rate has to be:

\[ NMTR = OMTR - PE (1-OMTR) \]

where
- \( NMTR \) = the new marginal tax rate; and
- \( OMTR \) = the old marginal tax rate.

While the above formulas provide adequate compensation on average for those with taxable incomes above their new tax thresholds, real disposable income might still not be maintained for those who do not have average expenditure patterns or who are dissaving. For example, the indicator of average prices is likely to be the CPI, which incorporates only the lower 90% of average prices for individuals, and which does not take into account the different living costs for different groups of taxpayers. Thus, even if the CPI records only a five per cent increase in prices of goods in the year, those taxpayers who do not have average expenditure patterns might still experience an increase in prices of greater than five per cent. Thus, even if one is seeking to compensate all individuals, differing expenditure patterns mean that compensation based upon the CPI will lead to some taxpayers making windfall gains and others windfall losses.

There is no obvious mechanism for preventing this outcome, with the exception that if a tightly defined losing group can be identified the problem can be addressed through higher than average increases in any tax rebates or transfers received solely by that group. For example, if families with children faced higher than average price increases, then family allowance might be increased by more than the CPI. Similarly, if people in remote areas appeared to be particularly affected, then an above average increase in zone rebates might be considered.

It is also worth checking at the time the BBCT is introduced that the CPI provides an adequate measure of average price change. It is conceivable that the average price increase recorded by the Private Final Consumption Deflator or by households in the Household Expenditure Survey might be higher than that recorded by the CPI, in which case the former might be more appropriate inflators.

Compensating Group B

Compensating taxpayers in Group A is thus relatively easy. Those taxpayers in Group B, however, with taxable incomes below their effective compensation threshold, pay insufficient income tax to be fully compensated via a cut in their income tax liability, so that another compensatory mechanism must be found. It is this group who create the greatest difficulties for those designing tax mix change.

The characteristics of this group have been analysed extensively, both in the DWP and since, and include:

- married women both with and without children, generally working part-time or with limited investment income;
- juniors and students, working in low paid work or part-time; and
- low income self-employed, including farmers (Whiteford and Saunders, 1990; DWP, 1985:146).

There has been continuing debate about whether complex compensatory measures should be introduced for these groups in the event of a tax mix switch. It has been argued that many are in a transitional or temporary state (e.g. recipients of business
income in a poor year, or persons who have chosen to temporarily forgo employment in order to travel or study (DWP, 1985:146). Questions also arise about whether the low recorded incomes of the self-employed accurately reflect their true standard of living. One study which imputed income on the basis of housing expenditure suggested that the "true" annual income for the self-employed was understated by between about $12,000 and $17,000 in the 1981-82 Income Survey (Bradbury et al, 1988).

One group below the effective compensation threshold who could be readily compensated through an existing mechanism is low income earners with children. However, while this group could be given increases in Family Allowance Supplement (FAS) which exceeded the estimated price effects of a BBCT, the cost of such a solution has increased dramatically since 1985, due to the extension of FAS to those on incomes approaching or exceeding average weekly earnings. Many FAS recipients could now be fully compensated via income tax cuts for any new consumption tax burdens, so that a sharp increase in FAS would lead to over-compensation for these families.

Perhaps because of this, the recent 'Fightback' compensation package did not suggest compensating low income families with children via above average increases in FAS but, instead, flagged the introduction of a tax credit (1991:159-167). Two categories of tax credit were proposed for those not receiving social security pensions or benefits and who had incomes below their effective compensation threshold.

The first was for people in employment. Those with incomes below their pre-BBCT income tax threshold were to receive a credit of 4.8% of their taxable income (with 4.8% being the estimated effect on the CPI of the introduction of a goods and services tax). Those with incomes between their old tax threshold and their new post-BBCT tax threshold were to receive a tax credit which phased out as taxable income approached the post-BBCT tax threshold and whose value was given by:

\[
(4.8\% \text{ of } TI) \times \left[1 - \frac{\text{TI-OTR}}{	ext{NTR-OTR}}\right]
\]

where

TI = taxable income
OTR = old tax threshold, and
NTR = new tax threshold.

In an attempt to assist those who had retired but were not yet of age pension age, a second tax credit was proposed for retired non-pensioners below 60 years of age. Where married, both partners had to be aged under 60, not in the workforce, and not in receipt of any pension or benefit. (This appears to make a couple in which the husband was aged 60 but the wife aged 59 eligible for the tax credit, even though age pension could not be received by the husband for another five years.) This tax credit was to be paid at a rate equal to 7.25% of taxable income, up to a limit of $20,000 income.

Both of these tax credits were to be applied for annually and paid quarterly, to avoid problems of the BBCT being paid long before compensation was received.

Compensating Group C

Moving now to the issues involved in compensating those people receiving income support payments from the government, it is useful to deal separately with those who do and do not have other income of their own. For those who have no other income apart from the income support received from the Department of Social Security, Education, Employment and Training or Veterans' Affairs, compensation is simpler.

If the relevant payment is non-taxable, or is taxable but no tax is due because even the maximum payment is below the tax threshold or protected by special tax rebates such as the pensioner rebate, then as a minimum the payment and all associated allowances have to be indexed due to the BBCT introduction. If research has demonstrated that the price effects faced by low income groups will be higher than the average, then an appropriate higher rather than average price effect should be used as the indexation factor.

Appropriate treatment of the various income tests for these payments is more problematic. Taking AUSTUDY for a 19 year old student as an example, this payment is income-tested on gross taxable parental income and there appears to be no need to change the relevant income test threshold, as gross parental income should remain unchanged by the introduction of a BBCT (even if net income changes). Similarly, it has been suggested in the past that the pension income test free areas should be indexed by the BBCT-induced price movement, to compensate for the decline in the real value of the free area (Harding and Whiteford, 1985:36). However, if the BBCT only causes changes in net rather than gross incomes, then indexation of the free area does not seem to be required.
Compensating Group D

Income support recipients with private incomes, from such sources as part-time work or investments, present additional difficulties. The pensioner and beneficiary rebates protect maximum-rate, full-year recipients with little or no private income from income tax. Those with moderate private incomes consequently cannot be fully compensated via income tax cuts for their BBCT burden - a problem which is exacerbated when the basic payments are not taxable, as with disability pension.

Possible options for compensating pensioners and beneficiaries with private income include an increase in the base pension rate (which is not well-targeted and thus very costly) and a targeted tax credit, which phases out as private income increases. Such a tax credit for pensioners and beneficiaries was proposed in the Fightback package, with the credit reducing in value to zero at the relevant pension or benefit cut out point (1991:164).

A final point is the timing of compensatory increases in all cash transfers. While many (but not all) cash transfers are indexed annually or biannually, all payment rates would need to be indexed at the time income taxes were cut, to maintain distributional neutrality. It would not be fair to expect low income groups to bear the burden of additional consumption taxes for many months until the standard indexation payment increase finally arrived.

The framework for compensation outlined above is summarised in Figure 2. While this provides a guide to the mechanisms which can be used to achieve adequate compensation, it does not always shed light on the precise level that specific measures should be set at. For example, suggesting that pensions should be indexed by the increase in prices faced by pensioners as a result of the introduction of a BBCT presupposes that such an effect can be measured.

The only data source currently available in Australia for such a purpose is the Household Expenditure Survey (HES) conducted by the Australian Bureau of Statistics. This is also the only data source available for drawing conclusions about the aggregate distributional impact of a tax mix change, or about the average impact of a change upon a particular demographic group (such as single income couples with two children). The reliability and quality of the HES data is thus of critical importance, as it is potentially being used to formulate policies which affect the lives of millions of Australians.

Figure 2: Summary of Compensatory Mechanisms

**Income Tax / Family Assistance**

- minimum compensatory changes to zero rate threshold and all marginal tax rates, calculated using Wright/Heery formula
- increase in all rebates by appropriate price inflator
- increase in family allowance and all associated payments, including Family Allowance Supplement and multiple births payment
- possible above-average targeted increases in particular rebates or transfers, if recipients can be shown to face above-average price effects
- for those not receiving income support and whose incomes fall below their effective compensation threshold, all or part of their compensation has to be delivered through new refundable tax credits or through new transfer payments
- the individual is the income unit targeted for compensation where feasible

**Income Support**

- cash transfers, such as social security and veterans' pensions and benefits, AUSTUDY, employment training grants etc., and all their associated allowances, need to be indexed by the average increase in the prices facing these groups, plus a margin to allow for dissaving
- those with private income in addition to their income support can generally not be fully compensated via income tax cuts for the additional tax paid out of their private income, leading to need for new tax credits, or higher base rate increases
- cash transfer increases to be initiated at the same time as income tax cuts, with commitment to further increase non-indexed payments if price effects turn out to have been underestimated

**Wealth Effects**

- tax credit or cash transfer for those with monetary assets whose real value will fall after introduction of BBCT, perhaps limited to the aged or other disadvantaged groups such as those who have been retrenched and received large cash payments.
The Household Expenditure Survey and Distributional Analysis

The HES is a detailed survey of the expenditures, income, demographic and labour force characteristics of a sample of Australian households, and the results from it can be grossed up to derive a picture for all of Australia. The Australian Bureau of Statistics (ABS) has traditionally run the HES so that it could work out what weights different types of expenditure should be given in the Consumer Price Index. Since the mid 1980s, however, huge improvements in computer technology, and the release by the ABS of the individual responses to the HES on computer tape (with modifications to preserve the confidentiality of respondents), have caused a revolution in social and economic policy making.

During the past six years, for the first time, researchers have been able to undertake very detailed analyses of the distributional impact of tax and other policy changes. For example, the release of the HES unit record computer tape allowed analysis of the effect of an income tax cut on, say, families with different numbers of children, or on those living outside rather than within capital cities. While this type of analysis can also be conducted using another major ABS survey (the Income Distribution Survey), the HES is the only survey which collects information about expenditure patterns - and is thus the only survey which can be used to simulate the distributional impact of any indirect tax changes.

The Treasury and the Department of Social Security have recently completed the construction of PRISMOD - the Price, Revenue, Income Simulation MOdel. This model allows the simulation of changes to direct and indirect taxes and to cash transfers, and its distributional arm is based upon the 1988 HES. Similarly, the Fightback document derived its distributional results from Neil Warren's STAX model, which is also based on the 1988 HES. The ABS itself recently published its latest study of the incidence of government expenditures and taxes (including indirect taxes), again based on the 1988 HES (1992). Now that the HES is thus influencing policy making and research, both within and outside government, it seems timely to review its reliability.

The major problems with HES are identified by the ABS itself, in the notes accompanying the release of publications based on the HES, which state:

"... the HES does not purport to be an income-expenditure balance sheet. The collection of income data is primarily undertaken to allow households to be classified into groups for expenditure analysis. It is not expected that income and expenditure will balance, either for an individual household or even when averaged over a group of households. The difference between expenditure and income is not necessarily a measure of savings or dis-savings" (1990:57).

In other words, the ABS believes that either the income or expenditure data (or both) collected in the HES are extremely unreliable, so that when the expenditure of a household is subtracted from household income, what is left cannot be regarded as an accurate measure of either savings or dissavings.

This seems an extraordinarily honest admission by the ABS, and is prompted by the results produced by the HES. For example, in 1988-89 the HES suggested that, on average, Australian households were saving 1.24% of their income. Yet the Australian National Accounts, after adjustments to make its definitions comparable to those employed in the HES, indicated a savings ratio of about 9.5% in that year. Similarly, about 32% of all households in the HES reported that their expenditure on goods and services was higher than their regular income, while a further 19% reported total expenditures that were higher than their total income. Essentially, therefore, about half of all Australian households appeared to be dissaving - spending more than their income. Worse, the gap between reported income and expenditure was often very high, with about one tenth of all households reporting spending that was greater than 150% of regular income (McDonald et al,1992:1).

The Expenditure Side of the Equation

There are a number of problems with the expenditure data collected in HES. First, we know that people underestimate their expenditure on 'sin' goods, such as alcohol, tobacco and confectionary. While the ABS uses the HES to rebase the CPI it is clear that it does not believe some of the expenditure data produced from HES, as the current weights used in the CPI differ substantially from those found in the HES.

This has a number of implications when the HES is used for modelling changes to excises and other indirect taxes. For example, if the reported expenditure on alcohol in the HES is totalled, expenditure per capita is about 65% of the national accounts estimate. Accordingly, the total amount of excise paid on alcohol is far too low if estimated from HES expenditure - which raises questions about how accurately the distributional impact of any indirect tax changes involving excises can be modelled. Is the underestimate due, for example, to those who report alcohol expenditure reporting too little, or is it due to those who report no such expenditure actually enjoying a quiet tipple - or a combination of both? Each of these would suggest a quite different pattern of alcohol excise incidence.

A second issue is the recall period and the treatment of 'lumpy' or 'big-ticket' expenditures. For example, HES respondents are questioned about their purchase in the preceding two weeks of frequently purchased items such as food, but are asked about their spending on fridges and TVs in the preceding three months, and of houses in the preceding two years. These different reference periods are justified on the
grounds that they produce a representative average. In other words, people purchase houses so infrequently that if respondents were only asked about their house purchases during the past two weeks, housing would appear to be far too unimportant in the average household budget.

A related issue is that expenditure data in the HES is collected on an acquisitions rather than a payment basis. That is, if a household purchases a $2000 fridge with a credit card and pays off the fridge over two years, the entire $2000 is attributed as expenditure at the point of initial purchase in the HES, and the monthly credit repayments are not counted as expenditure.

While this sounds reasonable, major difficulties are created by these approaches. As discussed later, 'lumpy' income items are frequently not included within the HES and the recall periods for income are shorter, so that this one-sided procedure exacerbates the income/expenditure gap. Enormous problems are also created for any distributional analysis of tax changes because, although this procedure works well when large sub-groups of the population are analysed (such as 'all married couple households'), it produces absurd results for small subgroups (such as 'all married couples with four children earning between $20,000 and $30,000'). This is because the sample size is fairly small, so that it only requires one household with these characteristics to have purchased a house - and thus be a massive disavow for the average results for all households with these characteristics to appear suspect.

The Income Side of the Equation

The maximum recall period of 12 months on the income side of the questionnaire is shorter than that for expenditure. Worse, many 'lumpy' income sources are not included, even though they undoubtedly finance expenditure. For example, excluded items include inheritances, lump-sum compensation for injury or damages, windfall gains from gambling and lotteries, and maturity payments on insurance policies and superannuation. Equally importantly, details of assets and liabilities are not included, even though the sale of assets may explain households with apparently very high expenditures. Thus, withdrawals from savings, new loans, and the sale of assets are not counted in the balance sheet.

A second issue is that particular types of income are frequently under-reported in the HES, in comparison to other benchmark data sources such as the Australian National Accounts. These include investment and self-employment income. Although these incomes sources are always under-reported in surveys, perhaps the ABS could consult some of the large accountancy firms about whether its current questions about self-employment income are the best ones for deriving accurate estimates of income.

Other Issues

The HES estimate of the size of the population is about 10% lower than that in the Australian population surveys. About half of this shortfall is due to the scope of the HES being restricted to individuals in private dwellings, so that those in institutions and caravan parks are excluded. The other half of the shortfall is due to the weights attached to each person interviewed in HES, while the estimated number of households in the HES correlates well with that found in other data sources, the estimated number of persons within those households is too low.

In addition, particular segments of the population are not well sampled. For example, in the 1988 HES the number of unemployment beneficiaries was far too low, and there are about one million fewer wage and salary earners than actually pay tax to the Australian Taxation Office. In summary, parts of the population are excluded and other parts are undersampled, so that the HES cannot be used for accurate costings of policy change and there is some doubt about the reliability of any aggregate distributional results.

Apart from the scope of the HES, another extremely important issue is the relatively small sample size. A larger sample size would reduce the magnitude of the problems associated with lumpy expenditures, and would allow reasonably detailed distributional analysis. In the recent Fightback document, for example, one table showed the weighted number of households in each of the 14 'community groups' (1991:156). This suggests that the results for groups 1, 12, 13 and 14 were subject to major sampling error as, for example, the 148,000 households in group 1 would actually have been derived from the 170 or so households with these characteristics who were sampled in the original HES survey - so that the apparent results for each decile in group 1 would have rested upon the answers of about 17 households. It seems an important omission that, for example, the HES sample size is too small to allow statistically reliable conclusions to be drawn about the impact of tax mix change upon deciles of sole parent and widow pensioners.

A final issue is that of the frequency of the HES survey. The last HES survey was conducted in 1988 and the next is not planned until 1993-94. This means that those attempting to simulate what the impact of a tax mix change would be at the moment have to undertake a series of complex measures to attempt to make the HES look more like the current world. These measures include inflating incomes to account for income growth since 1988 and reweighting the sample to allow, for example, for change in the number of secondary earners or age pensioners. The longer the time period which has elapsed since the conduct of the survey, the greater the margin for error introduced by these procedures. Differing procedures could also lead to quite different estimates of the distributional impact of a tax change, even if different models were feeding in exactly the same price changes.
Conclusion

If a new indirect tax such as a comprehensive consumption tax was introduced, the new revenue collected would have to be given back to taxpayers if the tax burden was not to increase dramatically. The procedures to be used to return such new taxes to individuals - and to ensure the post-change distribution of income is not markedly less equal than the pre-change distribution - are now well established. In designing such a package it was argued that it is helpful to divide the population into the following four groups:

- those who do not receive an income support payment from the government and can be fully compensated via income tax cuts (and family allowance increases);
- those who do not receive an income support payment and whose income is too low for them to be compensated via income tax cuts, necessitating tax credits or new transfer payments;
- those who receive income support and have no other source of private income, who can be fully compensated by appropriate increases in cash transfers; and
- those who receive income support and have some private income, who have to be compensated via a combination of transfer increases and tax credits, or other targeted measures.

However, to design such a package effectively, data about the effects of the new tax on the prices faced by such groups as pensioners, or families with children in comparison to those without, is needed. Further, assessment of the combined impact upon each household or upon particular types of households of a given package requires estimation of the new indirect taxes paid by each household, the reduction in income tax paid, and the additional cash transfers or tax credits received. Analysis of the methodology of the Household Expenditure Survey, the only possible data source available for these purposes, raises severe doubts about the accuracy with which these effects can be estimated.

The ABS received a barrage of complaints during the Tax Summit year of 1985 about the difficulties in reconciling the 1984 HES expenditure and income estimates, but no major changes appeared to have been made in the methodology used in the 1988 HES. The task of reconciling the gap between income and expenditure is becoming increasingly urgent and, in particular, there is a need to:

- broaden the definition of income to include 'lumpy' income items such as inheritances, and further improve the comparability of the income and expenditure data, by monitoring changes in assets and liabilities which finance expenditure;
- standardise the recall period for income and expenditure; and
- examine the implications of including expenditure items on a payments rather than an acquisitions basis.

Equally importantly, the HES needs to be conducted more frequently and with a larger sample size, which more accurately grosses up to reflect the characteristics of the Australian population.
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