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Tax Policy Design and The Role of a Tax-Free Threshold*

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Abstract

This paper examines the role of the tax-free income tax threshold in a complex tax and transfer system consisting of a range of taxes and benefits, each with their own taper rates and thresholds. Considering a range of tax and benefit systems, particularly those having benefit taper rates whereby some benefits are received by income groups other than those at the bottom of the distribution, it is suggested that a tax-free threshold is not a necessary requirement to achieve redistribution. A policy change involving the elimination of the tax-free threshold in Australia and designed to achieve approximate revenue neutrality is examined using the Melbourne Institute Tax and Transfer Simulator. The results demonstrate that it is possible to eliminate the tax-free threshold under approximate overall revenue and distribution neutrality, but that labour supply incentives cannot be improved at the same time.

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1 Introduction

This paper examines the role of a tax-free threshold in income tax structures. Such a threshold, below which the income tax rate is zero, is a feature of many tax systems and was initially motivated largely by equity considerations. However, this feature is not required in an integrated tax and transfer structure. Those countries without a tax-free threshold usually have some kind of tax rebate to deal with distributional objectives in low-income ranges. The simultaneous payment of income tax and receipt of benefits is a feature of modern tax and transfer systems which can only be avoided by raising the tax-free thresholds to a very high level. This would provide a tax cut for everyone, and so would require complementary adjustments to other features of the tax structure, if only to maintain revenue-neutrality, without which alternative policies cannot be properly compared.¹

In policy debates on tax and welfare reform, the tax-free threshold is often seen as a crucial equity component. Criticism of a lack of indexation of the threshold is accompanied by arguments in favour of raising it to a level which ensures that no individual in receipt of transfer payments actually pays income tax.² However, in a structure with many means-tested benefits involving taper, or benefit withdrawal, rates such that some benefits are not confined to the lower-income ranges, this could prove difficult to achieve. What really matters in a complex multi-tax and transfer structure is the overall redistributive effect: an early clear statement of this view was made by Hicks (1946, p. 150) who dated its realisation from the last quarter of the 19th century. Raising the threshold in order to help low-income groups actually has a low ‘target efficiency’ in that it involves at least the same absolute gains by those subject to higher marginal tax rates.

Careful consideration of practical design aspects of taxes and transfers, using a microsimulation model, makes it possible to achieve an elimination of the tax-free threshold which is both approximately distribution and revenue neutral, although marginal effective tax rates

¹For example, Saunders (2006, p. xxvi) argues that, ‘At the same time as the top marginal rate is reduced, the tax-free threshold should be raised to a level above the welfare minimum (subsistence) level ... it would mean that all taxpayers enjoyed a substantial tax cut’. He does not mention compensating changes to other forms of revenue or expenditure along with this revenue-reducing reform, so it is unclear how this policy change would be financed and what the impact of this alternative revenue-generating process would be.

²For example, Saunders and Maley (2006, p. 113) argue that, ‘The principled case for raising the threshold is that workers should be allowed to earn and retain enough money to meet their own subsistence needs before any tax is taken away from them.’ However, the principle involved (whether of a basic value judgement or an efficiency criterion) is not actually mentioned. A similar argument for raising the threshold was made by Veit-Wilson (1999), who showed that in practice in the UK there had been no coordination between those responsible for tax thresholds and those responsible for setting benefit levels.

for middle to higher incomes are increased.

In order to place the debate regarding the role of the tax-free threshold in perspective, Section 2 examines early views when income taxation was first introduced. In structures containing few – if any – transfer payments and a large number of individuals below the threshold who were considered to be at a subsistence level, and where income tax revenue formed a relatively low proportion of total tax revenue, the threshold played an important role. However, unlike current systems, the tax structure was designed to achieve proportionality at higher income levels, involving a type of rate ‘degression’ discussed in Section 2. Section 3 considers alternative tax and transfer systems, paying attention to the need to make revenue-neutral comparisons. The role of tax rebates is examined, along with the possibility of achieving a revenue- and distribution-neutral change involving abolition of the tax-free threshold. A policy simulation for Australia is reported in Section 4, using the Melbourne Institute’s behavioural microsimulation model MITTS. Conclusions are in Section 5.

2 Early Views on Income Taxation

In early discussions on income tax, considerably more attention was given to the subject of differentiation by income source rather than the question of progression.³ Indeed, the use of different tax rates according to the source of income (particularly with regard to ‘permanent’ and ‘temporary’ incomes) was discussed ‘with a sophistry comparable only to that of later scholastic logic’ (Shehab, 1953).⁴ Attitudes to progression were influenced by the dominance of an ‘ability to pay’ view of the role of taxation, concentrating on the sacrifice made. This is in contrast with a ‘benefit’ or *quid pro quo* view according to which taxation should relate to the benefits obtained from the resulting tax-financed activity.⁵ Given the huge importance for the classical economists of the concept of a ‘subsistence’ level, and since there was no significant system of transfer payments (as relief to the poor involved entry to the dreaded ‘workhouse’) it is not surprising that there was virtually universal support

³Five separate schedules for different sources, operated in the UK from 1803, when the income tax was first introduced as a temporary revenue-raising measure during the Napoleonic Wars. They lasted for 150 years.

⁴In the UK, much of the discussion was associated with various Select Committees appointed by Gladstone during his long attempt to repeal the income tax reintroduced by Peel in 1842. Later, debate was stimulated by two Royal Commissions (Colwyn, 1920; Radcliffe, 1955). For a survey of the history of public finance, see Creedy (1984), and for a collection of writings on taxation, see O’Brien (1999).

⁵Some people argued that these were equivalent because the state provided the protection and rights under which all incomes are obtained, while others believed that benefits were too difficult to assign.

for the idea of a tax-free income range. But, other than the acceptance of such a range, there was little acceptance of a redistributive role for income taxation.⁶ Clarification of the utilitarian arguments relating to decreasing marginal utility – which imply progression only under special conditions – was not provided until the work of Cohen Stuart (1889) and Edgeworth (1897).

A simple ‘equal sacrifice’ approach was taken, particularly by Mill (1848), in the context of an ‘ability to pay’ approach. He provided an early argument for the use of a single tax rate applied to all incomes measure in excess of the subsistence level, and in this he was strongly supported by McCulloch (1845).⁷ This system gives rise to an increasing average tax rate for those above the threshold, so that despite a constant marginal tax rate it is progressive (and inequality reducing). However, the principle that the tax-free threshold should apply to all incomes was not actually adopted in the UK until after the Royal Commission of 1920: see Shehab (1953, pp. 93, 246) for details. The system in use for many years involved taxation of gross income above the threshold, but with a gradual ‘shading in’ of the tax rate until the point where a fixed rate applied.⁸ Hence many higher-income taxpayers were subject to a constant marginal and average tax rate. Another similar system involves a gradual reduction in the tax-free threshold as income increases, until it is ‘exhausted’ and the tax is proportional. Hence the UK system for many years was more strictly described, using the now unfamiliar term, as ‘degressive’ rather than progressive, because it implied a fixed average rate beyond a certain amount.⁹

As redistribution came to be accepted as a legitimate role of government, most income tax schemes not only applied a common tax-free threshold to all income levels (as well as introducing various personal ‘allowances’, often positively related to income), but also introduced a progressive (‘graduated’) tax rate scale. This often involved a large number of marginal rates, increasing to very high levels: for an historical overview of the Australian

⁶Sabine (1980, p. 130) states, ‘Until 1894 its only real concession to equity was a comparatively high threshold’, and Blum and Kalven (1953, p. 4) suggest that, ‘it is almost unanimously agreed that some exemption keyed to at least a minimum subsistence standard of living is desirable’. It should also be remembered that tax rates were initially very low, there was no pay-as-you-go collection mechanism and income declarations were difficult to monitor.

⁷The later utilitarian approaches redefined Mill’s ‘equal sacrifice’ to mean ‘equal marginal sacrifice’, thus implying minimum aggregate sacrifice.

⁸This is similar to the current Australian low income tax offset, where low-income individuals in essence receive additional tax-free income, which is taken away at higher income levels by increasing the marginal tax rate.

⁹On degression, see for example Bastable (1903, pp. 316-317), de Viti de Marco (1936, pp. 289-290). Goode (1964, p. 226) refers to a ‘vanishing exemption’. Cassel (1901) suggested that the tax-free threshold should actually increase as income increases, because expenditure on necessities increases, while still maintaining a structure that can be described as being progressive.

system, see, for example, Groenewegen (1990). The income tax structure also came to exist alongside a complex range of (usually means-tested) transfer payments. The latter feature means that there is often an overlap between the tax and benefit systems, so that many benefit recipients are also liable to pay income tax. The overlap has in turn led to the introduction of tax ‘rebates’, also subject to what are variously called taper, withdrawal or abatement rates. In attempts to improve the ‘target efficiency’ of tax and transfer systems, effective marginal tax rates (allowing for all tax rates and tapers) are typically highest for the low-income benefit recipients, although their average tax rates are negative.

An increase in the tax-free threshold, while moving some individuals out of the tax ‘net’, provides a benefit to all taxpayers so that, as a way of helping the poor, it is not well-targeted. Furthermore, in a tax and transfer system consisting of a range of taxes and benefits, what matters is the overall effect rather than that of a single tax, so it is far from clear that the role of the tax-free threshold corresponds to its original one of helping low-income individuals at a subsistence level. The fact that many benefit reforms are introduced independently without full consideration of the overall effects can easily lead to unintended consequences, such as discontinuities in the relationship between gross and net income and ranges where marginal tax rates can exceed 100 percent.

In modern tax and transfer systems it is therefore by no means unusual for individuals both to pay income tax (which for some people is partly compensated by income tax rebates) and receive benefits.¹⁰ Given the presence of income tax rebates, the need for a tax-free threshold is not as strong as formerly. The simplest tax and transfer system is an integrated ‘basic income – flat tax’ structure (or BI–FT) which has no role for a tax-free threshold but instead combines a universal (non-means-tested) basic income with a proportional tax applied to all income: for an extensive discussion of this option, see Atkinson (1996). Nevertheless, although there has been a general movement towards flatter rate scales over the last 15 or so years, very few countries have adopted an income tax structure without a tax-free threshold. An exception is New Zealand. However, the use of personal allowances meant that there was an effective tax-free threshold from the introduction of the income tax in 1891 until 1972. There is now a relatively broad base, with a range of tax rebates for low incomes, a combination of different means-tested transfer payments and a progressive, or graduated, marginal income tax rate structure. For discussion of the tax reform changes in

¹⁰Bastable (1903, p. 319) suggested that ‘In any country where legal provision is made for poor relief, it would seem that to tax those at the point of minimum subsistence would be simply to drive them into the ranks of pauperism, and to take with one hand in order to give back with the other’. But there is no longer anything unusual about giving with one hand while taking with another.

New Zealand, see Stevens (1990).

In Australia, no indexation has taken place from 2000/2001 up to 2003/2004, when the tax thresholds were increased slightly, and again in 2004/2005. In 2005/2006 and 2006/2007 larger increases were introduced, particularly for the top two tax thresholds. The tax-free income threshold has not changed since 2000/2001. Before the July 2000 change, there was no indexation over a long period. Hence there have been calls to increase the tax-free threshold as a way of helping low-income groups. But, as mentioned above, such an increase gives the same support to higher-rate taxpayers. The question is how might elimination of the Australian tax-free threshold be achieved with minimal impacts on lower-income groups? One alternative may be to abolish the tax-free income range and replace this with a similar amount in rebates for lower income individuals. The remaining funds could be used to pay for a reduction in the middle income tax rates to compensate those on middle and higher incomes (outside of the range of the new rebate) at least partly. Such a policy change could be expected to result in labour supply effects, since high-level rebates extend further up the income scale and thus lead to higher effective marginal rates for all people who have income in the extended rebate withdrawal range. In addition, higher taxes are expected for high income groups if the increase in tax base is not sufficient to allow tax rates to be reduced by a large enough amount to compensate each individual fully for the loss of the tax-free income range.

Determining a revenue-neutral policy change that abolishes the tax-free income range is complex, as is the determination of potential labour supply responses with a range of effects working in opposite directions. A proper analysis requires a microsimulation model to evaluate the hypothetical policy options and enable full inclusion of all aspects of the reform. However, before reporting a policy simulation using a behavioural microsimulation model for Australia, the following section considers some basic aspects of integrated tax and transfer systems.

3 Comparison of Alternative Tax Structures

This section considers, using a simple framework, the potential implications of a reform involving elimination of the tax-free threshold in a range of different income tax systems. In particular, it raises the question of whether a revenue-neutral and distribution-neutral reform is possible in principle, and considers potential labour supply responses and welfare implications arising from alternative reforms. This discussion assists in designing sensible policy options for investigation.

Subsection 3.1 discusses the case of income tax in isolation, while subsection 3.2 introduces transfer payments in the simplest possible system, that of a proportional income tax combined with a basic income. Variations involving means-tested benefits are then examined in subsections 3.3 and 3.4. Means-tested transfer payments form an important part of the tax structures of many countries.

3.1 Income Tax Only

Consider first the income tax system in isolation, and suppose that initially there is only one (positive) marginal tax rate of t and a tax-free threshold of a .¹¹ Hence income tax paid on an income of y , denoted $T(y)$, is given by:

$$\begin{aligned} T(y) &= t(y - a) & y > a \\ T(y) &= 0 & y \leq a \end{aligned} \tag{1}$$

For taxpayers, the average tax rate is $t(1 - a/y)$, which clearly increases towards t with increasing y . Marginal and average rates for this income tax structure are illustrated in Figure 1. This system has an increasing average tax rate and is thus progressive, for incomes over a . Overall it is inequality reducing (the inequality of post-tax is less than that of pre-tax income) so long as a is not too high.¹² It is this characteristic that provides the basic motivation for the use of a tax-free threshold. Indeed, when income tax was first introduced, there were typically no transfer payments. However, in modern systems with many different types of benefit, what matters is the overall effect, rather than the effect of a single tax in isolation.

In fact, the income tax with a tax-free threshold shares characteristics of a combined tax and transfer scheme. This is because, for taxpayers, net (after income tax) income, z , is:

$$z = at + (1 - t)y \tag{2}$$

For $y > a$, this income tax system is equivalent to a BI-FT tax and transfer system (a linear tax) with a basic income of at and a flat tax rate t . This characteristic provides a motivation for eliminating the tax-free threshold. With a tax-free threshold, any attempt to help the very low paid taxpayers – those close to, but above, the threshold – by raising the threshold

¹¹A system of personal allowances is equivalent to a tax-free threshold, though allowances may vary by household size and composition.

¹²If t is held constant and a is increased, inequality gradually falls. However, if for already high tax-free thresholds a , the threshold is further increased, very few people remain to pay tax, so that inequality increases, since the post-tax distribution again moves closer to the pre-tax distribution. For inequality to fall continuously, the tax rate must be increased as a is increased.

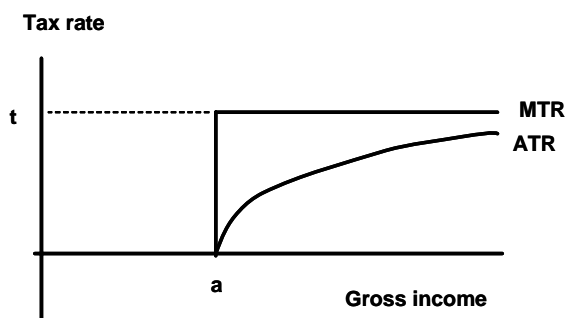


Figure 1: Marginal and Average Tax Rates with a Tax-free Threshold

and taking them out of the ‘tax net’ is accompanied by a simultaneous increase in the implicit transfer given to all taxpayers. Furthermore, if there is marginal rate progression and increasing the threshold shifts all the other income tax thresholds up by the same amount as the tax-free threshold increase, then the increase is highest for the higher rate-payers. A further motivation for eliminating the tax-free threshold is that the accounting period and the unit of analysis are no longer relevant.¹³

Expected total revenue per person from the income tax, R , is:

$$R = t \int_a^{\infty} (y - a) dF(y) \quad (3)$$

where $F(y)$ is the distribution function of pre-tax income and $0 \leq y < \infty$. This can be written as $R = t\bar{y}G(a)$ where \bar{y} is expected income $\int_0^{\infty} y dF(y)$ and:

$$G(a) = \{1 - F_1(a)\} - \frac{a}{\bar{y}} \{1 - F(a)\} \quad (4)$$

and $F_1(a)$ denotes the first moment distribution function, that is the proportion of total income in the population obtained by those with income below a .¹⁴ Clearly, $G(0) = 1$, and a proportional, or flat, tax raises $R = t\bar{y}$ per person.

Eliminating the tax-free threshold therefore obviously increases the revenue raised from the income tax. A revenue-neutral elimination of the threshold allows a reduction in the constant marginal tax rate, now applying over all $y > 0$, to be made. If the new rate is denoted t' , then:

$$t' = tG(a) \quad (5)$$

¹³Considerable energy is involved in treating the accounting period for tax purposes as a single year, when individuals have fluctuating incomes and other circumstances during the year, and are subject to pay-as-you-go tax collection.

¹⁴The function $G(\cdot)$, and extensions, has a fundamental role in the analysis of tax and transfer systems; see Creedy (1996).

However, such a change involves a move from a progressive income tax to one having a constant average rate t' . This affects the income distribution, benefiting high-income individuals relative to lower-income individuals.

Some progression can be re-introduced by the explicit introduction of a transfer payment or rebate which is given to low-income individuals, or a transfer applying over the whole range of incomes. In principle it would be possible to eliminate the tax-free threshold while retaining precisely the same relationship between gross and net income, by giving a transfer of at to all those with $y > a$, and introducing a means tested benefit of $B(y) = ty$ for those with $y < a$. This is effectively a tax rebate which cancels the effect of the income tax. Such a change in administration would make no sense where there is no well-developed tax administration, poor monitoring of incomes, a large number of individuals in the lower income groups, and low tax revenue. It is thus not surprising that a ‘degressive’ system was used in the UK for many years in order to achieve proportionality for the higher-income groups: a tax rebate (taking with one hand and giving with the other) would have been extremely cumbersome. However, in the modern context, a rebate for low-income groups is feasible as one component of a range of income transfers.

3.2 Basic Income–Flat Tax System

Instead of a means-tested benefit, consider the use of an unconditional basic income; that is, a BI–FT system. Suppose a non-means-tested transfer payment of b is introduced, and the flat-tax rate is t^* . Net income for all individuals is thus:

$$z = b + (1 - t^*)y \tag{6}$$

This system is unambiguously progressive as total tax paid, $T(y) = t^*y - b$, and the average tax rate, $t^* - b/y$, increases over the whole range of income. The latter is initially negative, becomes zero at $y = b/t^*$ and asymptotically approaches t^* as y increases. Average and marginal rates for this structure are shown in Figure 2. With its negative tax for incomes below b/t^* and with its higher tax rate t^* (compared to t in the previous section), this system is clearly more progressive than the income tax alone so the reform is not distribution-neutral.

To ensure that a reform, involving replacement of the income tax in subsection 3.1 with the linear tax, is revenue-neutral, consider total net government revenue per person. This becomes:

$$R^* = t^*\bar{y} - b \tag{7}$$

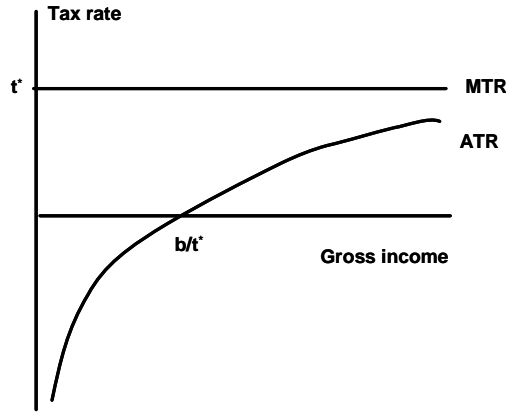


Figure 2: Tax Rates in the Linear Tax Structure

and the new tax rate is given by:

$$t^* = \frac{b}{\bar{y}} + tG(a) \quad (8)$$

Everyone receives b rather than only those above a receiving an implicit transfer of at , so it is not possible to have $b = at$ and $t = t^*$ without reducing total net revenue. Thus it is possible to have a revenue-neutral but not a distribution-neutral reform involving a move from a tax-free threshold to a basic income with a flat tax.

The above results apply for a fixed distribution of pre-tax income. However, in addition to distributional effects, the reform may also be expected to have labour supply effects. This complicates matters further; for example to remain revenue neutral, further adjustments to the tax parameters b and t^* would be required. The direction of the labour supply effects is ambiguous and needs to be determined empirically. High-income groups face a lower marginal rate if $t^* < t$, giving rise to a substitution effect, while at the same time also facing an income effect. Due to the income effect of receiving a basic income b and the higher marginal tax rate t^* , the labour supply of some of those previously having an income $y < a$ is likely to fall, in some cases to the non-participation corner of the budget constraint.

3.3 Income Tax with a Minimum Income Guarantee

Consider now an income tax having a tax-free threshold of a combined with a minimum income guarantee such that all those with y below a have their net income brought up to the level a . Hence, for $y < a$, benefits are given by $B_1(y) = a - y$ and the MIG involves means-testing with a taper rate of 100 percent. The relationship between net and gross income is shown in Figure 3 as the line ABC.

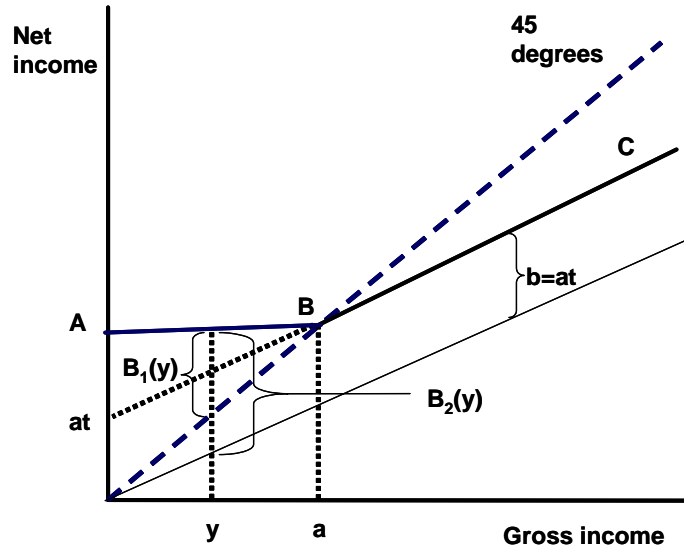


Figure 3: A Minimum Income Guarantee

Suppose the tax-free threshold is eliminated but the MIG still guarantees a minimum income of a for those with $y < a$. Hence for $y < a$:

$$z = y - ty + B_2(y) = a \quad (9)$$

and benefits are given by:

$$B_2(y) = a - (1 - t)y \quad (10)$$

Abolishing the tax-free income therefore involves a reduction in the benefit taper rate, from 1 to $1 - t$, to allow for the fact that each extra dollar of income also attracts income tax. Of course, the overall effective marginal tax rate continues to be 100 percent. Those with $y > a$, who initially receive an implicit transfer of at while being taxed implicitly at the flat rate of t on all their income, can now be given an explicit unconditional basic income of $B(y) = b = at$.

Hence in this special case it is possible to combine the elimination of a tax-free threshold with a slight reform of the benefit structure in order to maintain precisely the same relationship between net and gross income. This involves a relatively minor change in administration in view of the fact that means testing was initially applied to low-income groups, thereby requiring an existing sophisticated tax and benefit structure. The change is revenue- and distribution-neutral and would simply be a change in the administrative arrangements.

However, elimination of the tax-free threshold is motivated by a desire to flatten the income tax structure and to take away the implicit transfer given to those higher-income

individuals who pay tax. An alternative reform, instead of maintaining the effective status quo of the MIG with a tax-free threshold, might not introduce a basic income for tax payers but, keeping the MIG at the level a , extend the income range over which individuals are entitled to the means-tested benefit. Suppose the tax-free threshold is eliminated, the marginal and average income tax rate applying to everyone becomes t' and the MIG is received by all those with income below y_T , where $y_T > a$. This is illustrated in Figure 4.

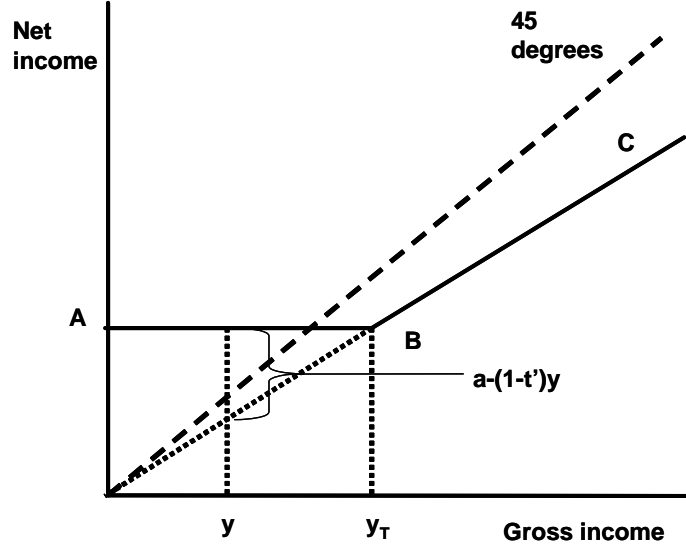


Figure 4: An Alternative Reform

For continuity in the relationship between z and y it is required to have:

$$a = (1 - t') y_T \quad (11)$$

so that:

$$y_T = \frac{a}{1 - t'} \quad (12)$$

The above reform is clearly not distribution-neutral. However, it can be made revenue-neutral. Consider the effect on the tax rate t' , needed to achieve revenue neutrality given a fixed distribution of y . Under the pre-reform tax structure, suppose that non-transfer expenditure of E per person must be financed from the income tax system, in addition to the MIG. The government's budget constraint is thus:

$$E + \int_0^a (a - y) dF(y) = t \int_a^\infty (y - a) dF(y) \quad (13)$$

It can be shown, using the expression $G(a)$ from (4), that:¹⁵

$$t = \frac{E/\bar{y} + \{G(a) - (1 - a/\bar{y})\}}{G(a)} \quad (14)$$

Under the reformed system, the government's budget constraint becomes:

$$E + \int_0^{a/(1-t')} \{a - (1-t')y\} dF(y) = t'\bar{y} \quad (15)$$

After some re-arrangement, this can be written as:

$$t' = 1 + \frac{E/\bar{y} - \left\{1 - \frac{a}{\bar{y}} F\left(\frac{a}{1-t'}\right)\right\}}{1 - F_1\left(\frac{a}{1-t'}\right)} \quad (16)$$

This expression does not provide a closed-form solution for t' as it is highly nonlinear, with terms in both integrals F and F_1 depending on t' , along with their limits of integration. However, it seems likely that $t' < t$.

In practice the above results would be modified by labour supply responses to the change in the tax structure, since the expressions assume a fixed distribution of y . The extension in the range of y for which means testing applies (with a taper rate of $1 - t'$) means that more lower-income individuals, who previously simply paid income tax, now receive means-tested benefits and thus face a higher marginal tax rate (since in practice $t' < 0.5$ and the taper rate exceeds the income tax rate). Hence their labour supply is likely to fall. Higher income individuals face a lower marginal tax rate if $t' < t$, giving rise to a substitution effect in favour of higher labour supply, and simultaneously there is an income effect in the same direction because of the elimination of the implicit transfer of at . The overall effect at the population level is thus unclear.

3.4 A Modified Minimum Income Guarantee

In practice, tax and transfer systems do not usually have the simple MIG form examined in the previous subsection. Benefits typically have a taper rate s , where $t < s < 1$, and a range of 'free' income before the taper begins to apply. Furthermore, the receipt of the transfer payment extends beyond $y = a$. A simplified form of tax and transfer system, referred to as a modified MIG, is shown in Figure 5, where the relationship between net (after-tax-and-transfer) income and gross income is shown by the piecewise-linear schedule

¹⁵When $a = 0$, and there is no MIG nor a tax-free threshold, this reduces to the simple expression, $t = E/\bar{y}$.

ABCD. The diagram concentrates on the lower ranges of the income distribution. To reduce the number of parameters involved, the form illustrated assumes that the taper-free range of the benefit is the same as the tax-free range of the income tax structure, equal to a . Although in practice, tax and transfer systems are usually highly complex, with numerous overlapping benefits, each with its own threshold, the simple form shown in Figure 5 is a reasonable approximation, which captures the issues relevant to a more complex system.

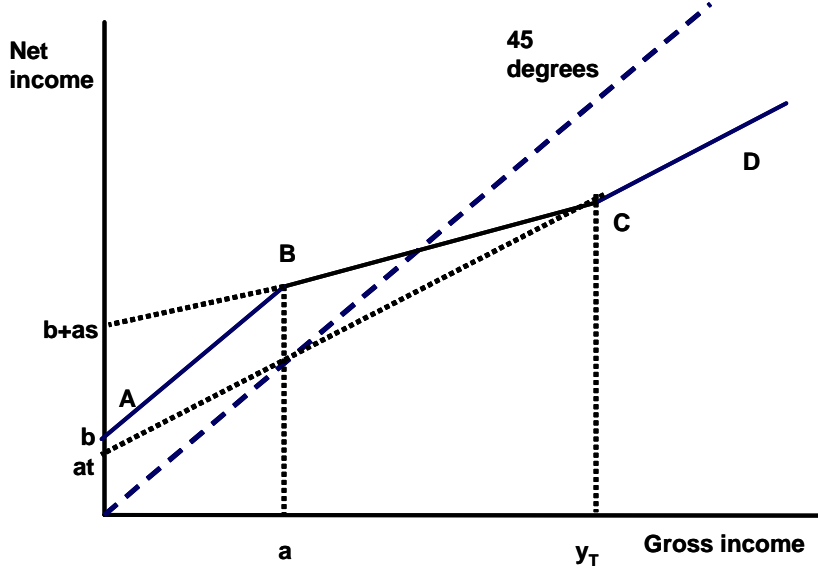


Figure 5: A Modified Minimum Income Guarantee

In the pre-reform situation, suppose the benefit received when $y = 0$ is equal to $B(0) = b$. As continuity is imposed on the relationship, the point B in Figure 5 must correspond to a net income of $z = a + b$. The segment BC, when continued to the net income axis, must have an intercept of $b + as$.¹⁶ Furthermore, the threshold income y_T , above which the means-tested benefit is exhausted and individuals only pay income tax, is given by the constraint imposing continuity between sections BC and CD:

$$(b + as + at) + (1 - s - t) y_T = at + (1 - t) y_T \quad (17)$$

so that:

$$y_T = \frac{b + as}{s} \quad (18)$$

¹⁶This is because it must be the case that if q is the intercept, $a + b = q + a(1 - s)$, which can be solved for q .

For those between B and C, the net transfer, defined as the difference between their net income z and their gross income y , is given by:

$$\begin{aligned} z - y &= \{b + as + at + (1 - s - t)y\} - y \\ &= b - (t + s)(y - a) \end{aligned} \quad (19)$$

For this tax and transfer system the government's budget constraint is therefore given by:

$$\begin{aligned} E + b \int_0^a dF(y) + \\ \int_a^{(b+as)/s} \{b - (t + s)(y - a)\} dF(y) = t \int_{(b+as)/s}^{\infty} (y - a) dF(y) \end{aligned} \quad (20)$$

This is clearly highly nonlinear because s affects the limits of integration.

A reform involving the elimination of the tax-free threshold in the income tax would generate extra revenue. The latter could be used to reduce the income tax rate to t' . In addition, a tax rebate could be introduced in order to maintain the section AB. Individuals, who previously paid no tax as they were below the tax-free threshold a , would need to receive a tax rebate of $t'y$ up to a maximum of $t'a$. The tax rebate would have a taper rate s_{tr} applying above a . This taper rate can be chosen so that the tax rebate is exhausted at the same time as the benefit b at threshold y_T .¹⁷ This reform implies that individuals with gross income between a and y_T face a higher effective marginal tax rate than before; that is, people formerly subject to the means-tested taper rate s now face an additional taper rate s_{tr} corresponding to the withdrawal of the tax rebate. This system is shown in Figure 6. The point C moves downward to C' due to the introduction of the new taper rate s_{tr} , which needs to be larger than the reduction in the income tax rate. Again the reform is not completely distribution-neutral. The overall effect on net income inequality is not obvious as it depends on the pre-tax income distribution.

The condition required for revenue-neutrality is complex in this case, again because of the nonlinearities involved. As mentioned above, the marginal income tax rate is changed to t' when the tax-free threshold is abolished. The continuity of the section BC' and $C'D'$ requires the following condition:

$$(b + as' + at') + (1 - s' - t')y_T = (1 - t')y_T \quad (21)$$

where $s' = s + s_{tr}$. Hence:

$$y_T = \frac{b + as' + at'}{s'} \quad (22)$$

¹⁷This is not a necessary constraint but it limits the number of parameters involved.

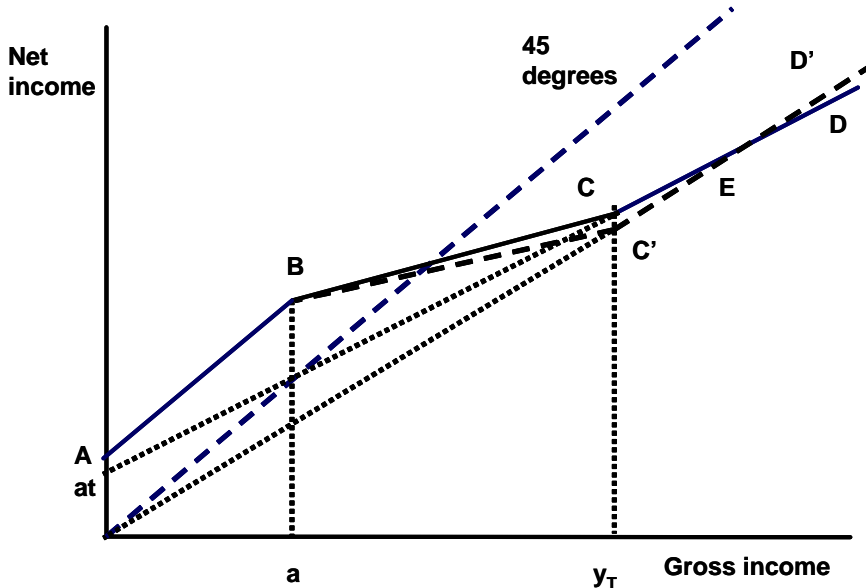


Figure 6: The Modified MIG without a Tax-Free Threshold

By combining equations (22) and (18), it is possible to solve for s_{tr} to ensure that both benefits and tax rebate are exhausted at the same threshold:

$$s_{tr} = \frac{sat'}{b} \quad (23)$$

The net transfer received by those with pre-tax income between a and y_T becomes:

$$\begin{aligned} z - y &= \{b + as' + at' + (1 - s' - t')y\} - y \\ &= b - (s' + t')(y - a) \end{aligned} \quad (24)$$

and this is smaller than in the pre-reform situation because $(s' + t')$ has to be larger than $(s + t)$ in order to satisfy the government budget constraint. That is, extra government revenue has to be generated by individuals on the section BE to finance the cost of the tax cut for high-income individuals on section ED'. Hence the new government budget constraint is:

$$\begin{aligned} E + b \int_0^a dF(y) + \\ \int_a^{(b+as'+at')/s'} \{b - (s' + t')(y - a)\} dF(y) = t' \int_{(b+as'+at')/s'}^{\infty} y dF(y) \end{aligned} \quad (25)$$

Again a closed-form solution for t' is not available.

The labour supply implications of this type of piecewise-linear tax and transfer system are complex, particularly because there is an increase in the effective marginal tax rate over

a range (section BC) combine with a decrease above y_T as entitlement to the means-tested benefit and tax rebate is exhausted.¹⁸

Again the above results are likely to be modified by labour supply responses to the tax reform. Their overall effect is unclear *a priori* as it depends on the initial distribution of income and the balance of income and substitution effects. This reform involves a minimum of changes – adjusting t while keeping net incomes of the low-income people unchanged by introducing a tax rebate – and of course it would be possible to modify other parameters.

4 A Policy Simulation for Australia

The previous section shows that, even in simple stylised structures, it is not easy to design policy changes involving elimination of the tax-free threshold which are both revenue and distribution neutral. This may be further complicated by labour supply responses. Practical policy analysis requires the use of a behavioural microsimulation model, capable of dealing with the full complexity of the many elements of the tax and transfer system and the considerable degree of population heterogeneity, as well as labour supply behaviour.

The Melbourne Institute Tax and Transfer Simulator (MITTS) provides such a policy tool.¹⁹ It is used in this section to examine the effects of a hypothetical policy change in Australia, involving the abolition of the tax-free threshold. The Survey of Income and Housing Costs (SIHC) for 2003/2004 was used as the database in the analyses in this paper. Hence the tax and benefit changes examined apply to rates and thresholds in that year. The policy change is described in subsection 4.1. Summary results are reported in subsection 4.2.

4.1 The Hypothetical Policy Change

The policy change examined involves eliminating the tax-free threshold, using (approximately) revenue-neutral tax rates, obtained from a process of trial and error. Adjustments were made to the rates, rather than the tax thresholds, and only integer tax rates were considered. The costs of reducing each of the marginal tax rates separately by one percentage point were found to be approximately 1.4 billion dollars for the 17 per cent tax rate,

¹⁸See Creedy and Kalb (2006, 2005) for discussion of labour supply modelling in continuous and discrete hours models.

¹⁹For details on MITTS, see Creedy *et al.* (2002). Creedy and Kalb (2006) describe some of the more recently introduced features of MITTS, and Kalb and Lee (2007, 2008) report updated wage and labour supply estimates underlying the labour supply responses in the behavioural simulations.

1.5 billion dollars for the 30 per cent tax rate, 200 million dollars for the 42 per cent tax rate and 500 million dollars for the 47 per cent tax rate. These are indicative values at the margin and they assume fixed labour supply. The cost of further reducing the marginal tax rates is not expected to be linear. Table 1 gives the marginal tax rates applying between the relevant thresholds in the current structure and in the alternative policy.

Table 1: Marginal Tax Rates (in Per Cent)

	Income range	Initial tax rate	Alternative tax rate
1	0 - 6000	0	17
2	6000 - 21600	17	17
3	21600 - 52000	30	27
4	52000 - 62500	42	42
5	over 62500	47	47

The tax-free threshold is eliminated and everyone earning less than \$21,600 in 2003/04 is compensated with an additional Low Income Tax Offset of \$1,020 (added to the \$235 that was available in 2003/04). This policy corresponds to going from Figure 5 to Figure 6 in Section 3.4. This off-set of \$1,020 corresponds to 17 per cent of \$6,000, which is paid in additional tax under the new tax system. The remaining excess revenue collected from the higher-income earners is used to reduce the middle income tax rate from 30 to 27 per cent. This policy change is designed to be approximately revenue neutral under fixed labour supply.

Assuming fixed labour supply, the amount of Pension Rebates decreases by \$19.6 million for couples. Furthermore, 63,000 fewer individuals receive it.²⁰ This arises from the fact that unlike other rebates, excess Pension Rebate (relative to income tax payable) can be transferred from one partner to the other within a couple family. This is done without taking other rebates into account; details of the Pension Rebate and the Low Income Tax Offset are given in the Appendix.²¹ Based on the 2003/04 SIHC sample, 127,000 persons on an individual gross income below \$21,600 are expected to experience a decrease in their individual net income following the decrease in their Pension Rebate (the unweighted number in the SIHC is 187). This is due to the fact that less Pension Rebate can be transferred to them by their partner after the tax increase. To compensate for this small reduction in

²⁰These aggregate figures are obtained by multiplying the samples numbers by their sample weights, provided in the SIHC.

²¹For details of the wide range of benefits in Australia, see Australian Government Department of Family and Community Services (2004). For details on taxes and rebates, see Australian Taxation Office (2006).

Table 2: Summary of Aggregate Results (Million Dollars per Year)

	Couples	Single men	Single women	Single parents	All
Change in:					
Net govt revenue (fixed labour supply)	92	-32	-38	-9	13
Net govt revenue (variable lab. sup.)	61	-29	-33	0	-1
Average hours (in hours per week)	0.00/0.00	0.01	0.01	0.05	0.01
Aggregate net income	-130	30	37	18	-44
Compensating variation (CV)	91	-32	-38	-9	11
Equivalent variation (EV)	91	-32	-38	-9	12

the Pension Rebate for some low-income couples, low-income partnered pension recipients could be given a Pension Rebate top-up. However, this would mean some other pension recipients would be overcompensated as a result.

4.2 Summary of Effects of Policy Change

Table 2 summarises the aggregate results, separately for four demographic groups. Separate econometric estimates of preference functions are available within MITTS for each of the demographic groups. For couples, the first figure for average hours change relates to the male partner while the second figure is for the female partner.

Aggregate effects of the policy changes are calculated by adding equivalent variations (EV), compensating variations (CV) and net incomes across all income units, using the survey weights provided with the SIHC data to obtain population level results. A positive value for the compensating or equivalent variation indicates a welfare loss. In terms of social evaluations, the focus on aggregate amounts can be regarded as equivalent to the assumption of zero relative inequality aversion.

The results show very small changes. This is because low-income households are almost fully compensated by the additional Low Income Tax Offset. As a result, their labour supply responses are negligible and the policy change is approximately revenue neutral under both fixed and flexible labour supply assumptions. Couples appear to be the only demographic group losing from the policy change in terms of aggregate net income and welfare. As explained in Section 4.1, this is due to the Pension Rebate being held constant. In addition, couples are more likely to be on a higher income than other groups and are therefore less likely to be fully compensated.

Summary information regarding winners and losers by income unit decile, while taking

into account the predicted labour response, is reported in Table 3. Virtually none of the income units in the bottom three deciles lose, while the proportion of losers goes up with income level. For high-income households, the elimination of the tax-free threshold is not entirely compensated by the tax cuts. The net income gains for low-income households are achieved through an increase in labour supply, which explains the limited welfare gains. By contrast, the decrease in net income for high-income households is partly caused by a reduction in labour supply, which limits their welfare losses.

Table 3: Winners and Losers by Income Unit Decile

Decile ^a	Percentage of population who:			Ave. change in adult-equivalent (in \$/year)		Number of individuals (000s)
	Lose ^b	Stay equal	Win ^b	Net income	EV	
1	0.0	80.3	19.7	32.08	-0.06	1,188
2	0.0	90.2	9.8	10.95	-0.25	1,569
3	0.7	73.6	25.8	20.11	-6.98	1,836
4	11.8	37.1	51.1	2.61	3.93	2,322
5	28.9	10.4	60.7	-5.80	7.82	2,207
6	33.1	4.0	62.9	38.89	-38.81	2,122
7	39.7	1.2	59.1	21.26	-28.02	2,204
8	48.7	1.1	50.1	1.55	-13.23	2,108
9	68.3	2.5	29.2	-51.64	28.31	1,973
10	89.2	0.4	10.4	-102.31	71.15	1,986
Total	34.1	25.7	40.3	-4.45	1.96	19,516

Notes: a) Income unit deciles are based on net income unit income per adult equivalent (before the policy change).
b) Winners are individuals whose net income unit income per adult equivalent goes up by more than \$1 per year. Likewise, losers experience a decrease in their net income unit income per adult equivalent of more than \$1 per year.

The policy change is very close to being distribution neutral. The decrease in the Gini coefficient is limited to 0.2 per cent (the Gini decreases from 0.2186 to 0.2184 for the money metric and from 0.2851 to 0.2845 for net income). This slight decline in net income inequality is essentially due to the reduction in net income for some high-income households.

Table 4 summarises the labour supply responses. The increase in the labour supply of low-income households is influenced mainly by the reduction in the middle income tax rate from 30 to 27 per cent. For higher-income deciles this effect is likely to be offset by the impact of the elimination of the tax-free threshold, as the additional rebate is withdrawn

at a rate of 4 per cent once individuals earn more than \$21,600 per year. Hence, for higher income deciles, the proportions of individuals reducing their labour supply become larger than the proportions of those increasing their labour supply. Middle-income households are also more likely to face a higher effective marginal tax rate since the increased Low Income Tax Offset is tapered out over a larger range of their income.

Table 4: Labour Supply Responses by Income Unit Decile

Decile	Men				Women			
	Change in hours (per cent)			Number (000s)	Change in hours (per cent)			Number (000s)
	Less	None	more		Less	None	more	
1	0.0	81.5	18.5	552	0.0	85.7	14.3	524
2	0.0	94.3	5.7	601	0.1	94.2	5.7	772
3	0.4	93.8	5.8	574	0.3	90.1	9.6	754
4	5.5	89.0	5.5	700	1.3	89.7	9.0	833
5	9.9	85.9	4.3	701	3.1	88.0	8.9	779
6	9.2	87.8	3.1	729	5.2	87.4	7.4	713
7	14.7	81.9	3.4	756	11.7	79.4	8.9	739
8	16.0	80.7	3.3	805	13.8	78.7	7.5	750
9	21.7	75.0	3.2	811	19.6	74.0	6.4	744
10	18.1	79.0	2.9	891	20.3	76.1	3.6	753
Total	10.6	84.3	5.1	7,122	7.7	84.4	8.0	7,361

5 Conclusions

This paper has examined the role of the tax-free income tax threshold in a complex tax and transfer system consisting of a range of taxes and benefits, each with their own taper rates and thresholds. When considering the introduction of income taxation in societies which had no significant transfer payments and with many individuals regarded as being at a subsistence level, it is not surprising that a tax-free threshold was used. However, particularly in the UK, a ‘degressive’ rate structure was used to produce proportionality at the higher-income levels: progressivity was not a primary objective of the tax system. Considering a range of tax and benefit systems, particularly those having benefit taper rates whereby some benefits are received by income groups other than those at the bottom of the distribution, for which a sophisticated revenue collection and benefit payment system is in place, it was suggested that a tax-free threshold is not a necessary requirement to achieve

redistribution. The simultaneous payment of tax and receipt of benefits does not generate excessive difficulties. What matters is the overall effect of the system.

A policy change involving the elimination of the tax-free threshold in Australia, designed to achieve approximate revenue neutrality, was examined using the Melbourne Institute Tax and Transfer Simulator. The policy ensures that low-income individuals are fully compensated through an extension of the Low Income Tax Offset. In addition, the extra revenue raised from higher incomes as a result of the extension of the tax base was used to reduce the middle (marginal) income tax rate. The policy was close to being both revenue neutral and distribution neutral. A range of implications were examined, including labour supply responses to tax changes. As a result of the small changes, labour supply incentives hardly changed and therefore labour supply remained nearly the same as before the policy change. Hence it is possible to eliminate the tax-free threshold under approximate overall revenue and distribution neutrality, but labour supply incentives cannot be improved at the same time.

Appendix: Rebates

In Australia, a number of rebates (or offsets) are available to reduce the tax payable for specific groups. The rebates can only be used to offset taxes that are payable; they cannot be paid. Rebates reduce the tax payable by a certain amount rather than the taxable income. This appendix discusses the two rebates that are most relevant in the policy change analysed in this paper: the Pension Rebate and the Low Income Tax Offset.

The Pension Rebate

All recipients of taxable social security and Veterans Affairs service pensions, including the parenting payment (single), may be eligible for the pensioner rebate. Once taxable income reaches a threshold of y_T the rebate is shaded out at 12.5 cents for each dollar above the threshold. The maximum rebate level is calculated as the difference between the threshold level of income, y_T , and the tax-free (or first) threshold y_{TFT} (AU\$6,000 per year) multiplied by the lowest marginal tax rate, τ_L (17 per cent). Thus the maximum rebate, $\max PR$, is given by:

$$\max PR = \tau_L(y_T - y_{TFT}) \quad (\text{A.1})$$

The threshold amount is the sum of the maximum annual base pension payable, P_B , plus the income-free area for the pension per person, P_F/n (where n is 1 or 2, depending on whether the individual is single or partnered). These two amounts differ depending on the type of pension and the composition of the household. Thus:

$$y_T = P_B + P_F/n \quad (\text{A.2})$$

The pensioner rebate is thus calculated as:

$$\begin{aligned} PR &= \max PR && \text{if } y < y_T \\ &= \max[0, \max PR - 0.125(y - y_T)] && \text{if } y \geq y_T \end{aligned} \quad (\text{A.3})$$

Partnered pensioners can transfer the unused portion of their rebate to their partner if the partner has a tax liability. However, the calculation of the unused portion of their rebate does not take the presence of other rebates into account. If the amount of the Pension Rebate is less than the amount of income tax to be paid, no transfer takes place.

In the policy examined in this paper, y_{TFT} is kept at AU\$6,000 since the Low Income Tax Offset takes over the role of the tax-free income range for low-income households. The tax rate in the first income range is in effect raised from 0 to 17 per cent, while keeping the first tax threshold, although there is no longer a tax rate change at this level. The problem

(as mentioned in Section 4.1) under this policy arises because low-income individuals now transfer less rebate to their partners, since they start paying tax from the first dollar of earnings. Although the additional tax payment is compensated by the increased Low Income Tax Offset, the pension rebate calculation does not take into account this increased Low Income Tax Offset and assumes that the low-income individual pays enough tax to offset the Pension Rebate against. At the final stage of rebate calculation, when all rebates are added together, there is more rebate than tax payable for these low-income individuals. As a result, less than the full sum of rebates is paid out and the higher income partner does not benefit to the same extent as before from a transfer in the Pension Rebate, resulting in a decrease in net income.

The Low Income Tax Offset

Individuals with annual taxable income below AU\$21,600 are entitled to the Low Income Tax Offset (LITO). The maximum level of the rebate is AU\$235 per year and is reduced by 4 cents for every dollar of taxable income above the threshold. Denoting the individual's income by y , the annual amount of Low Income Tax Offset is calculated as:

$$\begin{aligned}
 LITO &= \$235 && \text{if } y < \$21,600 \\
 &= \max[0, \$235 - 0.04(y - \$21,600)] && \text{if } y \geq \$21,600
 \end{aligned}
 \tag{A.4}$$

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