Moves to a Basic Income-Flat Tax System in Australia: Implications for the Distribution of Income and Supply of Labour*

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Abstract

Problems with work disincentives and poverty traps apparent in the Australian tax-transfer system have led to a renewed debate about the advantages of universal benefits relative to means-tested benefits. This paper examines the implications of moving to a system where benefits are universal and the marginal tax rate schedule is simplified to a constant rate, referred to as a basic income – flat tax system. The Melbourne Institute Tax Transfer Simulator (MITTS), a behavioural micro-simulation model of the Australian tax-transfer system is used to examine the distributional, labour supply and government expenditure effects of moving to a basic income – flat tax system. Providing basic income levels that coincide with current benefit rates is costly, with a marginal tax rate of over fifty per cent required for revenue neutrality. Such a system, while equitable, is found to reduce labour supply. If aversion to inequality is high, this system is found to be socially optimal, even after reductions in labour supply. Decreases in the marginal tax rate improve work incentives and increase the supply of labour, but increase inequality and impose a significant cost burden on government. A decline in the level of basic income of at least half is required to fund a reduction in the marginal tax rate to thirty per cent. While the distortions to behaviour are minimal with this final system, it is extremely inequitable and social welfare reducing, even after accounting for changes in labour supply.

1 Introduction

While it is argued that means testing allows for the targeting of benefits to the most needy it has had many undesired consequences in Australia. The combination of benefit withdrawal and the taxation of income can lead to high effective marginal tax rates for those on low levels of income, trapping individuals/families in cycles of low income and poverty. It is problems such as these that have lead to many advocates of a universally provided basic level of income with income taxed at uniform rates, referred to as a basic income – flat tax system. The more well known of these are Milton Friedman in his Negative Income Tax proposal, Lady Rhys Williams and Australia's own Ronald Henderson[1].

Provision of a universal basic income alongside a simplification of the tax system reduces distortions on the behaviour of the low-income population. However the provision of universal benefits is costly and a higher tax rate on higher income earners is required to fund schemes where poverty alleviation is a goal (for instance see (Barr 1975); (Atkinson 1983) and 1989 (Chapter 16); (Henderson 1975) and (Dawkins, Beer, Harding, Johnson and Scutella 1998)). This may in turn impact on the labour supply choice of higher income earners. It is difficult to therefore determine what type of scheme is socially optimal.

This has been the subject of a vast literature investigating the optimal structure of tax-transfer systems. In early studies a consensus seemed to be reached that basic income – flat tax type systems were social welfare enhancing relative to more targeted schemes: (Kesselman and Garfinkel 1978); (Sadka, Garfinkel and Moreland 1982); (Kesselman 1982); and (Creedy 1995, 1996a, 1996b and 1997). Other studies show that it may indeed be economically efficient to tax the low-income population at higher rates, an outcome consistent with means testing of benefits (for instance see (Tuomala 1984) and (Diamond 1998)).

Apparent from the literature is that the optimal structure of a tax-transfer

[1]For an example of discussion of a Negative Income Tax system see (Friedman 1962). The concept of a Citizens Income available to all citizens was seen to have originated by Lady Rhys Williams as an alternative for the Beveridge report in 1942. Ronald Henderson examined a Guaranteed Minimum Income system composed of a demogrant and uniform taxes in his report on poverty in Australia (see (Henderson 1975)).

system is sensitive to the labour supply elasticity and the distribution of skills. Increasing work incentives for low-income earners by reducing effective marginal tax rates may outweigh the costs associated with a reduction in work effort of high-income earners due to increasing marginal tax rates on them. This depends on the relative labour supply elasticities between the low-income and high-income groups. Using a simplified simulation model where individuals are homogenous in every respect other than in wages received (Creedy and Dawkins 2002) show that increases in workforce participation outweigh any adverse labour supply responses of the initially employed. However, as highlighted in this and other studies, it is important to use a labour supply model that captures population heterogeneity and differences in relative labour supply elasticities between various subgroups of the population. Value judgements also play an important role (Creedy 1998). This paper extends this analysis by using a behavioural microsimulation model of the Australian tax-transfer system that captures the full level of population heterogeneity to simulate the implications of replacing existing means-tested benefits with universal non-taxable benefits and replacing the current income tax system with a uniform tax rate on all other forms of income.

(Dawkins et al. 1998) used a static micro-simulation model, STINMOD, to examine the distributional outcomes and net government expenditure effects from moving towards a basic income – flat tax system in Australia. Providing individuals with a basic income level equivalent to the pension rate prevailing at the time, the marginal tax rate required in this experiment given a fixed government budget was found to be 57%. The analysis also experimented with alternatives of a basic income-flat tax system. The analysis was limited however in that the model only estimated immediate effects and did not control for any changes in labour supply behaviour. Much of the discussion around basic income – flat taxes deals with changes in work effort that may arise from simplifying the tax-transfer system thus it is important to account for such possible changes.

This paper extends this previous analysis by also estimating the labour supply response associated with moves to a basic income-flat tax system in

Australia. Another major difference with this analysis and that presented in (Dawkins et al. 1998) is in the level of basic income provided. While the earlier paper sets the basic income level at pension rates, in this paper the basic income level is reduced for those currently not eligible for pensions to current allowance rates. This reduces the cost of the system. Variants of the marginal tax rate and the level of basic income with effects on the distribution of income, the supply of labour and net government expenditure are presented.

It is found that the provision of basic income levels coinciding with current benefit rates is costly, with a marginal tax rate of over fifty per cent required to fund the system. Such a system places a high weight on redistribution and thus is quite equitable. However taxing the middle to high-income population at relatively high levels is found to have adverse labour supply responses notably increasing the cost burden of government once factored into budget estimates. Decreasing the marginal tax rate improves work incentives and increases the supply of labour. However, if basic income levels are to be preserved, a decrease in the marginal tax rate imposes a significant cost burden on government. To fund a substantial decline in the marginal tax rate, basic income levels need to be cut substantially. While this final system has favourable behavioural consequences with distortions on behaviour significantly reduced it is not appropriate if poverty alleviation is a goal.

The structure of the paper follows. The Melbourne Institute Tax Transfer Simulator is briefly described in Section 2. Section 3 outlines the details of the hypothetical reform systems to be simulated in further sections. The immediate distributional impact of the reforms is examined in Section 4, while implications for labour supply are the focus in Section 5. Section 6 provides concluding comments.

2 The Melbourne Institute Tax Transfer Simulator

The Melbourne Institute Tax Transfer Simulator, or MITTS, calculates net incomes for a representative sample of households based on the wage rates of individuals (either observed in the data or imputed using the estimated wage equations as described in (Kalb and Scutella 2002)), other income, and individual and household characteristics available.[2] The data used to form this base population is the 2000/01 Survey of Income and Housing Costs (SIHC) made available by the ABS as a confidentialised unit record file. The net incomes can be calculated imposing different tax and transfer systems, allowing hypothetical and real policy changes to be analysed. In this paper outcomes using the September 2001 tax and transfer system are compared to outcomes obtained by applying a number of hypothetical reforms to this system. All wages were adjusted to September quarter of 2001 using information on average weekly earnings and other forms of income using the consumer price index.

The information in the SIHC is used to calculate eligibility for the different social security payments. Detailed information on the different sources of income are available that help in determining this eligibility. However, we cannot check all requirements for eligibility with the available data. For example, information on assets is not available and the amount of assets may also influence eligibility. Fortunately, the group of households that would not be eligible based on their level of assets, but would be deemed eligible based on their level of income is relatively small. Particularly, because the SIHC records income from investments (like dividends or interest) and superannuation income, which are incorporated in the calculations, this is unlikely to be a major problem. Other requirements for eligibility, which cannot be observed in the data, are whether someone has been a resident for at least two years and is actively looking for work.

At the moment, MITTS does not allow for individuals who decide not to take

[2] More information on MITTS can be found in (Creedy, Duncan, Harris and Scutella 2002).

up the benefits for which they are eligible. This is likely to cause overestimation of expenditure on the different payments in our pre-reform scenario and thus changes in net expenditure caused by moving to a case of universal benefits will be understated to an extent.

The estimation of the expected labour supply changes is based on the labour supply model estimated in (Kalb 2002). The model is neoclassical and based on one common utility function for the household. A discrete model specification is chosen to enable us to deal with the full detail of the tax and transfer system, both for single person households and for couples.

To reduce the impact of prediction errors in the labour supply model on the simulation results, the starting point of the behavioural simulations carried out by the MITTS model is based on hours of work observed in the data. The difference between observed hours and predicted hours is picked up by the error term in the model. This error term is used to calibrate the model drawing from the error distribution and only using those draws that put the individual at their observed labour supply in the pre-reform situation.

As many groups in the population are expected to have different labour supply behaviour to the average working-age individual, the labour supply of such groups is kept constant. These are the self-employed, those on disability payments, those reporting to be permanently unable to work, full-time students and people over 65 years of age.

When simulating the effect of a reform, the error terms that are accepted in the base case are used to predict the changed labour supply. This provides us with the probabilities of changing from the observed labour supply point to any of the other labour supply points and the probability of remaining at the same labour supply level. These probabilities can then be used to calculate an expected value of labour supply or percentages of individuals moving from one category to another.

It is important to note that MITTS is a partial-equilibrium supply-side model of the labour market. It does not take into consideration the demand for labour. Thus the model assumes that all individuals who prefer to work more

hours after a reform are met by a sufficient demand for labour to enable them to actually do so. It is also assumed institutional constraints do not prevent individuals from reducing their hours of work. Also, the model captures the effects of reform at two distinct equilibrium points; it does not take into account the path of adjustment to the post-reform equilibrium point.

The labour supply parameters estimated underpredict the incidence of part-time work to an extent (Kalb 2002). As the underlying data shows a tendency for individuals to work standard full-time hours the estimation model accounts for this by estimating large parameters on the fixed costs of employment, particularly for married men. Thus, it takes a very large change for people to change their hours state, with moves from no work to work or work to no work typically resulting. This may mean that the modelling will significantly underpredict those moving to part-time hours and overpredict those dropping out of the labour force completely from full-time hours. This needs to be born in mind when examining the results of the simulations.

3 A basic income - flat tax for Australia: details of possible reform systems

This paper examines the possible implications of a hypothetical large-scale reform to the Australian tax and transfer system using microsimulation techniques. In the simulations that follow a basic non-taxable level of income is introduced that replaces all existing basic social security benefits, and additional payments such as rent assistance, pharmaceutical allowance and family payments. The existing tax structure (which includes the Medicare levy and all tax rebates) is replaced with a constant marginal tax rate on all taxable income (all non-benefit forms of income).

In an aim to minimise costs, and in order to ensure that there are minimal losers in the current benefit population, basic income rates are set at the benefit levels pertaining at September 2001. The basic income levels are provided in detail in table 1. Basic income levels differ by individual characteristics. Char-

acteristics that currently entitle individuals to a pension are used to determine whether an individual is entitled to a higher rate of basic income, which is here referred to as the *pension* rate. This group includes those of age pension age, those with a disability, carers, veterans and sole parents. This payment is then differentiated by marital status to reflect economies of scale present in the home.

The remaining subset of the population receives a basic income level set at current allowance payment rates. These payments then differ by age; singles aged 16-17 years receive a lower basic income than older individuals, with youths still living at home receiving a lower rate again. Also, those 60 years plus receive a higher level than the 18-59 year olds. Each member of a couple is entitled to a lower payment rate than the single rate, again reflecting economies of scale in the home.

Differentiating payments by characteristics retains an element of targeting apparent in the current system. This may be seen as undesirable. However in this analysis it was felt that the costs of providing everyone with a basic income at, say the current pension level, would be excessively high, as has been shown in previous studies such as Dawkins et al (1998). It can be argued that those groups falling into the pension category should not be expected to work and thus cannot supplement their benefit income with earnings. The remaining population are indeed encouraged to work and therefore can supplement their income by earnings. This distinction is open to debate but in this analysis it has been chosen to differentiate the basic income level between the two groups.

An additional non-taxable payment is available to those in private rental accommodation. This payment is set at current Rent Assistance rates, and like the current structure of Rent Assistance depends on the amount of rent paid. The maximum levels of this payment are presented in the table. Also, families with children are entitled to an additional non-taxable child related payment equivalent to the current Family Tax Benefit. The first 3 systems involve setting the basic levels of income at September 2001 payment rates. To finance this level of basic income, before accounting for any changes in work patterns, a marginal tax rate of 55 per cent is required, which represents the first system. System 2

Table 1: Details of Basic Income Levels in Reform System

	System 1	System 2 (46% of basic income)
Marginal tax rate	55%	30%
Basic income		
Pensioner group[1]		
Single	416.30	191.50
Couple (each)	345.50	158.93
Allowee group[2]		
Single: under 18 years, at home	158.80	73.05
Single: Under 18 years, away from home	290.10	133.45
Single: 18-59 years	364.60	167.72
Single: 60 years plus	394.30	181.38
Couple (each): all ages	328.90	151.29
Maximum rate of rent assistance[3]		
Couple (combined), no children	84.40	38.82
Single, no children	89.60	41.22
Couple (combined), Single: 1-2 children	105.00	48.30
Couple (combined), single: 3 children +	118.72	54.61
Single, in share accommodation	59.70	27.46
Additional payments for families with children		
Per child:		
Under 13 years	123.26	56.70
13 to 15 years	156.25	71.88
Additional payments for sole parents and single income earner families		
Age of youngest child		
Under 5 years	105.85	48.69
5 to 15 years	73.84	33.97

1) The pensioner group includes those who currently meet the eligibility requirements for a pension and consists of individuals over 65 years, individuals with a disability, carers, and sole parents.

2) The allowee group includes individuals who do not meet the eligibility requirements for any current pensions and thus cover the unemployed, individuals temporarily incapacitated from work, partnered parents, jobless individuals not falling under any other category and (as this is a universal payment) those employed who are not in the pension group.

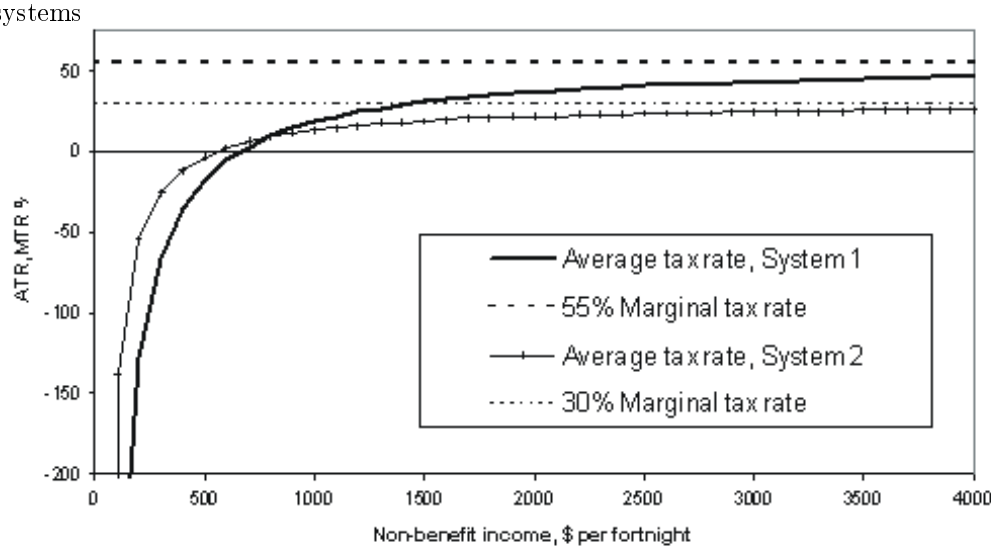
3) The amount of rent assistance for which individuals are eligible is also determined by the amount of rent paid. The minimum levels of rent paid necessary to be eligible for rent assistance and the shade-in rates have been left at current levels.

shows that to finance a marginal tax rate of 30 per cent, the basic income level must be at least halved. A reduction of 54 per cent in the basic income level is required to ensure revenue neutrality. The tax-transfer systems presented here are designed to explore the trade-offs between equity and efficiency. It is in no way advocated that benefit levels should be cut.

Replacing a progressive marginal tax rate structure with uniform taxes may appear to remove the progressivity of a tax-transfer system. However, as a basic level of income is provided universally progressivity is maintained as average tax burdens increase with pre-tax/transfer income. What is important in achieving redistribution is progressivity of the effective *average* tax rate, not the *marginal* tax rate. The effective average tax rate shows the average tax burden as a proportion of income. The effective average tax rate is calculated by dividing net taxes (tax paid minus benefits received) by total pre-tax income (non-benefit income). Examining the distribution of effective average tax rates over the population gives an indication of how equitable a tax-transfer system is. The effective *marginal* tax rate, on the other hand, impacts on work incentives, as it shows the proportion of an extra unit of income that is lost due to taxes paid or benefit withdrawal. In the systems examined here the marginal tax rate is equal to the effective marginal tax rate as all means testing is removed.

The effective average and marginal tax rates for a prime-age single person for the two systems simulated are presented in figure 1. The figure shows that provision of a universal non-taxable benefit retains the progressivity of the system in the presence of a constant marginal tax rate. At low earned income levels, effective average tax rates approach minus infinity as earned income approaches zero as positive benefits are obtained for little or no tax paid. As incomes rise, average effective tax rates approach the respective marginal tax rate. This diagram conforms the fairly intuitive result that higher marginal tax rates, in allowing for higher basic income levels, are more progressive systems with lower income individuals paying less tax and higher income people paying more.

Figure 1: Effective average and marginal tax rates for basic income-flat tax systems



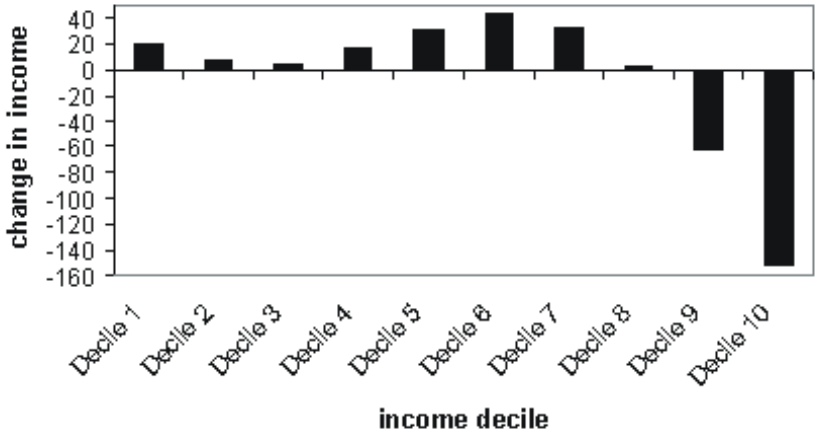
4 Effects of hypothetical reforms on the income distribution

Making such large-scale changes to the structure of the tax-transfer system is likely to have substantial impacts on the distribution of net incomes after the reforms. Emphasis on redistribution with high tax rates used to finance high basic income levels improves the financial circumstances of the least well off in the community. This comes at the expense of the most well off in the community. Lowering the tax rate given basic income levels reduces the proportion of losers in the community. This is a costly exercise. For the government to finance such schemes other areas of government expenditure would need to be reduced. This may not be desirable particularly if health and education services are affected. To be fully self financed, basic income levels would need to be cut by more than half which has major implications for income inequality and the depth of poverty in society.

4.1 Winners and losers

Figures 2 and 3 present the average net income changes by income decile for each of the systems. The income deciles are based on the distribution of net income under the current tax-transfer system. The concept of income used in the analysis is of total current income unit income after taxes and transfers. Thus, at this point, no adherence is made for differences in income unit size through the use of equivalence scales. In order for a system with basic income levels consistent with current benefit rates to be self-financed, a tax rate of 55 per cent is required (System 1). This type of system places an emphasis on equity considerations with incomes redistributed from the better off to those less fortunate. Figure 2 shows how this system uses the additional revenue from higher taxes on the better off in society to improve the financial condition of the lower income deciles. If one places a high weight on efficiency with thoughts that such high tax rates will lead to adverse labour supply responses, the aim will be to decrease tax rates.

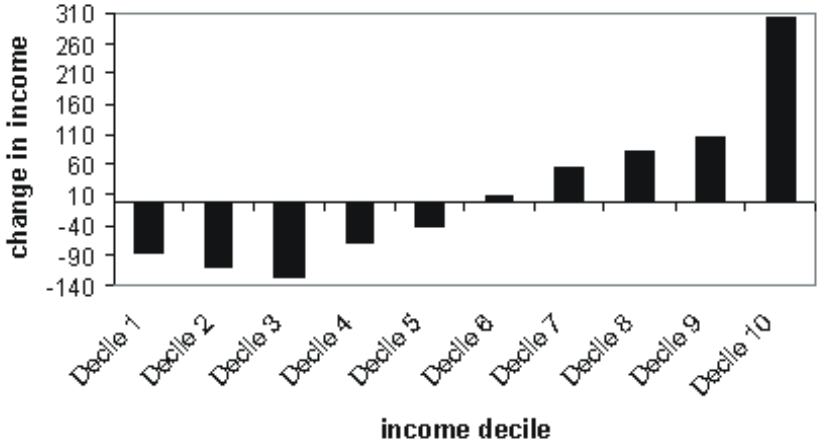
Figure 2: Average income change by income decile, System 1 (high marginal tax rate, high basic income level)



To completely fund a system that places a high weight on efficiency, basic

income levels need to be cut quite significantly. As outlined above a tax rate as low as 30 per cent will only fund a basic income level of less than half the original level (System 2). Figure 3 shows the average changes in income associated with such a system. This system is inequitable with the highest income deciles made much better off at the expense of the lower income deciles.

Figure 3: Average income change by income decile, System 2 (low marginal tax rate, low basic income level)



4.2 Inequality

Two widely used measures of inequality, the Gini coefficient and Atkinson Index of inequality, are used to estimate summary information about the distribution of income both before and after each of the reforms discussed in the previous section.[3] The Gini coefficient provides a summary of the degree of concentration of income, the higher the coefficient the more unequal the concentration of income. The Atkinson Index explicitly allows for normative judgements about social welfare through a user specified aversion to inequality parameter, epsilon.

[3]See appendix for formulae used.

This parameter reflects the strength of an independent observers preference for equality, and can take values ranging from zero to infinity. As the parameter rises, the judge attaches more weight to income transfers at the lower end of the distribution and less weight to transfers at the top. Typically used values of epsilon include 0.5 and 2. Again, the income measure used is that of the income unit. Unlike the previous analysis on average income changes, differences in the size of income units are accounted for through the use of equivalence scales. Two adults living as a couple and a single person living alone on the same level of income cannot be thought of as having the same level of financial wellbeing, and simply taking a per capita adjustment is not sufficient as multi-adult households share expenses thus gaining from certain 'economies of scale'. Here the equivalence scales used are those proposed by (Whiteford 1985) and use the scaling 1 for the first adult, 0.52 for second and subsequent adults and 0.32 for each child. Apart from the population weights, no other weighting method is used to account for the number of individuals in each income unit. The choice of weighting may have an affect on outcomes as is seen in (Creedy and Scutella 2003), however the general results on distributional outcomes are robust. The choice of weighting is more likely to have an affect on social welfare changes.

The changes in the associated Gini coefficients and Atkinson indices for each of the reform systems are presented in Tables 2 and 3 below. System 1 with relatively generous benefit levels financed by heavily taxing the working population is the most equitable system reducing inequality levels. As couples make up a substantial part of the population with significantly varied incomes, couples make up most of this reduction. Lowering tax rates increases inequality due to an increase in after tax incomes at the top end of the income distribution. Reducing the basic income level exacerbates this inequality as incomes are lowered at the bottom end of the income distribution. Providing a relatively high financial support base for the low-income population by taxing the high income population quite heavily is much more equitable than less redistribute systems with lower tax rates and lower basic income guarantees. The next part of the

analysis investigates the implications of the reform systems for social welfare.

Table 2: Change in Gini coefficients of inequality, by income unit type

Income unit type	Pre-reform Gini coefficient	Change in Gini coefficient due to reform System 1	System 2
Couple	0.3187	-0.0326	0.1042
Couple with dependents	0.2609	-0.0432	0.0580
Single females	0.2895	-0.0305	0.1350
Single males	0.3188	-0.0459	0.0911
Single with dependents	0.1967	-0.0095	0.1741
Total	0.3039	-0.0331	0.1055

Table 3: Change in Atkinson inequality, by income unit type

Income unit type	Pre-reform Atkinson index	Change in Index due to reform System 1	System 2
Inequality aversion parameter=0.5			
Couple	0.0796	-0.0142	0.0713
Couple with dependents	0.0560	-0.0159	0.0312
Single females	0.0657	-0.0136	0.0800
Single males	0.0807	-0.0215	0.0631
Single with dependents	0.0302	-0.0029	0.0767
Total	0.0734	-0.0147	0.0671
Inequality aversion parameter=2			
Couple	0.2626	-0.0392	0.2486
Couple with dependents	0.1851	-0.0489	0.1382
Single females	0.2326	-0.0515	0.2284
Single males	0.2909	-0.0820	0.2132
Single with dependents	0.1054	-0.0115	0.2168
Total	0.2523	-0.0485	0.2280

4.3 Social welfare

Assuming that net income is a suitable measure of living standards, a measure of social welfare can be constructed around μ, mean income, and standard inequality indices:

$$W = \mu(1 - I) \tag{1}$$

Table 4 presents the results of using equation 1 with Atkinson inequality for inequality aversion set at 0.5 and 2. Like the previous subsection on inequality, the unit of analysis is the income unit with income unit income per equivalent adult the income concept used. According to this social welfare measure reducing the marginal tax rate to 30% and offering a universal basic income level of less than half current benefit levels generally reduces social welfare, obviously this is more acute when there is a greater aversion to inequality. With an inequality aversion parameter of 0.5 some groups do exhibit an increase in social welfare: couples with dependents and single males, overall however, the effect is negative. On the other hand, providing the more generous basic income levels associated with the current levels of income support financed by the higher tax rate of 55% is social welfare enhancing for all groups apart from couples without children if there is a large distaste for inequality (epsilon=2).[4] Changes in labour supply are likely to have an effect on the distribution of income and social welfare. For instance if people prefer to increase their hours of work in the light of a reduction in basic income levels, which occurs in the second reform system looked at here, their associated incomes may increase diminishing, or possibly eradicating, any decrease in inequality and/or social welfare. This is examined in the next section.

5 Labour supply effects

Simplifying the tax schedule and removing all means testing has a significant effect on work incentives. To see this Figure 4 presents the net income schedule, or budget constraint, pre and post reform for a hypothetical couple income unit without children. Net incomes are shown over the range of the reference person's hours of work assuming the spouse is not in paid employment. The wage rate

[4]It is difficult to place too much emphasis on the results on social welfare as (Creedy and Scutella 2003) show that the results can be sensitive to the choice of equivalence scale used and the unit of analysis chosen.

Table 4: Change in social welfare by income unit type

Income unit type	Pre-reform social welfare	Change in Index due to reform System 1	System 2
Inequality aversion parameter=0.5			
Couple	463.87	-17.92	-44.98
Couple with dependents	452.78	39.00	29.48
Single females	335.42	-9.11	-60.57
Single males	396.40	-7.85	-31.89
Single with dependents	331.56	3.54	-103.92
Total	406.24	-0.32	-35.48
Inequality aversion parameter=2			
Couple	371.40	-1.05	-130.57
Couple with dependents	390.79	51.68	-33.42
Single females	275.09	6.40	-102.05
Single males	305.68	20.94	-94.50
Single with dependents	305.78	6.31	-133.18
Total	327.63	15.53	-103.63

of the reference person has been increased $19.65 an hour in this scenario. The unbroken line represents net incomes available with the current (September 2001) structure of the tax-transfer system while the broken line shows the net incomes available under System 1 with a relatively generous basic income level and tax rate of fifty four per cent. Replacing the current complicated system with a basic income – flat tax system linearises the budget constraint smoothing out all kinks and discontinuities, removing distortions to behaviour. At zero hours, the unit receives the same level of income in both scenarios. For a very small range of hours worked the unit receives a slightly lower level of after tax-transfer income than in the current system. Once the reference person works 5 hours a week or more however, the reform system provides higher levels of net income, with quite substantial differences for general part-time hours of work. The gap is then reduced when approaching full-time hours. With a higher offered wage rate, this unit would be worse off under the reform system at full-time hours of work as the marginal tax rate is significantly higher than the 47% top marginal tax rate in the current system.

The removal of means testing reduces the disincentives to work for those on low incomes as EMTR's are significantly reduced, however as net incomes are higher at lower levels of income certain individuals/families may reduce their hours of work. The result depends on preferences. Also high taxes imposed at the top of the hours/income distribution may however have an adverse effect on the labour supply of higher income earners. A lowering of basic income levels, although inequitable, is expected to increase the labour supply of low-income groups, as they will need to increase hours of work to compensate for the loss of income. Lowering the marginal tax rate has two opposing effects: a lower tax rate would induce substitution out of leisure and into work, as the price of leisure is higher. However as net incomes are higher for a given hours level the income effect may cause certain individuals to reduce their labour supply. As preferences determine the direction of the labour supply response it is important to allow for heterogeneity of preferences across the population.

Figure 4: Net income schedule over hours of work

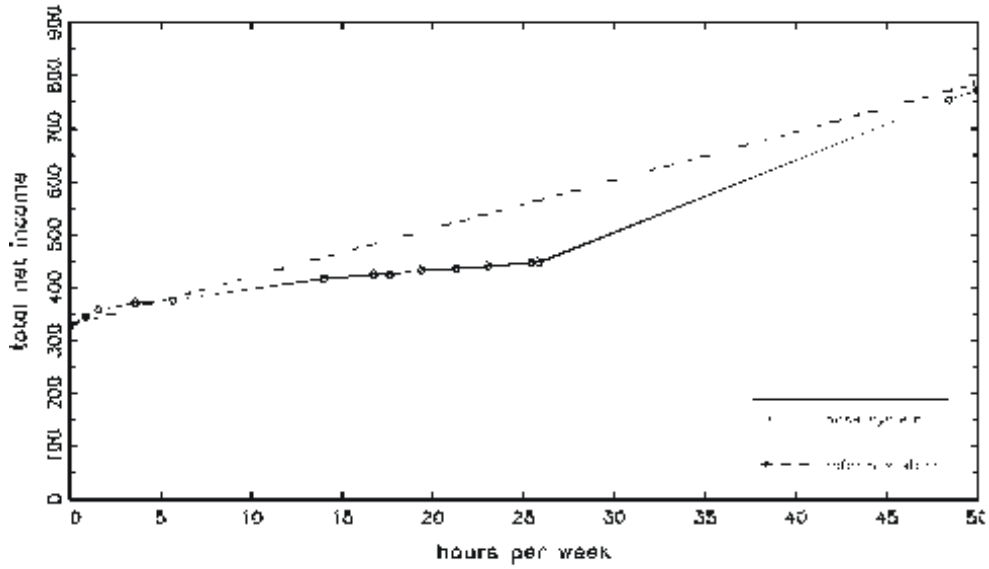


Table notes: Net income unit income over reference persons hours of work, spouse not working, hourly wage rate $19.85, pre-reform=September 2001 tax transfer system, reform=System 1.

A summary of the estimated labour supply responses across demographic groups is presented in tables 5 to 7. Table 5 summarises the results for couples, table 6 for singles and table 7 for sole parents. The first two columns in each table present the estimated effect on net government annual expenditure (expenditure minus revenue), with the first column showing the results when labour supply is fixed while the results in the second column take into account labour supply responses. The third column (or third and fourth columns for couples) presents the net percentage change in workforce participation. For instance introducing a non-taxable, non means tested basic income level at around September 2001 payment rates fully financed by taxing other income at a rate of 55 per cent is estimated to lead to a 0.1 per cent decrease in workforce participation of married males. The final column (final two columns for couples) presents the predicted average hours change. For instance in the above scenario married men decrease their hours of work by 0.2 hours on average.

The responses differ greatly across the groups. Married males and singles without children behave similarly, married women tend to have larger income effects thus the tendency for this group is to reduce their labour supply with an increase in household income. Married females and sole parents are by far the most responsive of the groups.

Let us initially concentrate on couples (table 5). Under a self-financed system with basic income levels comparable to current benefit levels, both married males and females have adverse labour supply responses. Women reduce their labour supply much more than men, mainly through a reduction in participation levels due to the income effect associated with increases in household income. Male labour supply falls slightly, but remains fairly stable. As the marginal tax rate and the basic income level are lowered the substitution and income effects work in the same direction to generate favourable labour supply responses. This time it is married men who are more responsive, increasing their labour supply due to a mixture of the compensation for their loss of household income and the substitution out of leisure into labour due to the reduction in the distortionary effect of the marginal tax rate. It appears that while married women are more

likely to decrease labour supply when incomes rise, married men on the other hand are more likely to increase labour supply when incomes are cut.

Table 5: Summary of labour supply response for couples

	Cost - fixed LS	Cost - with LS	Participation		Average hours	
	$ billions	$ billions	men	women	men	women
System 1	-4.2	2.2	-0.1	-5.0	-0.2	-2.1
System 2	6.6	4.5	3.0	1.5	1.3	0.4

Table 6 shows that singles without children exhibit labour supply responses very similar to those of married men. Singles however appear more likely to reduce their work effort due to the income effect than married men. Under the more equitable system 1, workforce participation and average hours of work decrease in response to the reform, single males more so than their female counterparts. Reducing the tax rate and basic income level increases labour supply for both groups, again single males more responsive with larger increases in participation and average working hours.

Table 6: Summary of labour supply response for singles

	Cost - fixed LS	Cost - with LS	Participation	Average hours
	$ billions	$ billions	%	
Single men				
System 1	1.8	3.6	-2.7	-1.3
System 2	0.8	-1.0	6.0	2.4
Single women				
System 1	2.1	3.2	-1.3	-1.0
System 2	-2.8	-3.7	4.6	1.7

Sole parents behave in similar ways to married females (see table 7). Current payments to sole parents are withdrawn very gradually and thus a tax rate of over fifty per cent is higher than the effective marginal tax rate currently faced by them at low income levels, reducing their incentive to work in System 1. Thus in a system with a relatively generous basic income level and thus high

tax rate a small proportion of sole parents tend to prefer to drop out of the work force. Lowering the tax rate to levels lower than current benefit withdrawal rates substantially increases the supply of labour by sole parents. Reducing the basic income level further increases the labour supply of sole parents to compensate for the loss of out of work income. Overall, the increase in labour supply for this group is quite large with an increase in the participation rate of 21 per cent and average hours increasing by 11 hours. Note however that sole parents are a relatively small group in the population and what are large percentage changes in this groups participation rates only amounts to a small proportion of the total population and has little effect on the overall cost of a system.

Table 7: Summary of labour supply response for sole parents

	Cost - fixed LS	Cost - with LS	Participation	Average hours
	$ billions	$ billions	%	
System 1	-0.2	0.0	-4.2	-0.7
System 2	-4.0	-5.2	21.0	11.0

But what about the distribution of labour supply changes? Perhaps even with a high marginal tax rate as in system 1, the reduction in effective marginal tax rates at the bottom end of the income and skills distribution leads to a substitution into work for those most in need, even though the more well off are reducing working hours due to their income windfall. To a degree this pattern is evident when examining average labour supply changes across education and occupation groups as is shown in table 8. Under the first system the more educated exhibit larger decreases in labour supply than the less educated, but only slightly so. Obviously the group currently not working will only exhibit positive changes in labour supply. Clerks and salespersons exhibit the largest decrease in workforce participation and average hours worked, while managers the least likely to decrease hours worked. However if we examine average changes in labour supply across the income distribution as in Figures 5 and 6 it appears that the driving force for those at the bottom end of the income distribution is the income effect rather than any substitution effect associated with reductions

in effective marginal tax rates. Most of the action comes from those in the lower income deciles, with larger reductions in labour supply when basic income levels are higher and larger increases in labour supply when basic income levels are reduced.

Table 8: Changes in labour supply by education level and occupation group

	System 1		System 2	
	Participation (%)	Average hours	Participation (%)	Average hours
Education				
University	-2.7	-1.5	2.4	1.3
Other post secondary	-2.7	-1.3	4.0	1.8
No post secondary	-2.4	-1.0	4.9	2.0
Occupation				
Not known (not working)	1.9	0.6	10.8	4.1
Not known (working)	-4.8	-1.7	-0.2	0.6
Manager	-3.0	-1.6	-0.5	-0.2
Professional	-4.7	-2.3	-0.3	0.3
Para-professional	-4.1	-2.1	-0.4	0.0
Clerk	-7.2	-3.0	-0.8	0.2
Sales	-8.0	-3.1	-0.5	0.2
Tradesperson	-4.8	-2.2	-0.2	0.0
Labourer	-5.5	-2.0	-0.2	0.3
Plant worker	-4.0	-1.8	-0.3	0.0

What are the implications of these labour supply responses for government expenditure? An increase in aggregate workforce participation and hours of work generates more income tax revenue reducing the net effect on government expenditure. To explore this table 9 presents the total effects on annual net government expenditure, before and after labour supply responses are taken into consideration. This highlights the expense involved in implementing a universal tax-free benefit at any sort of reasonable level. As has been highlighted earlier, to fully fund a reasonable basic income level, a tax rate of 55 per cent before labour supply responses are taken into account would be required. To fund a

Figure 5: Changes in labour supply over income distribution, system 1

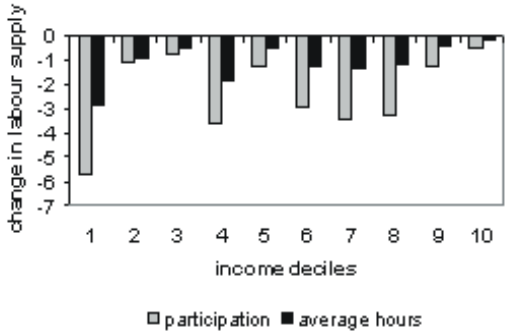
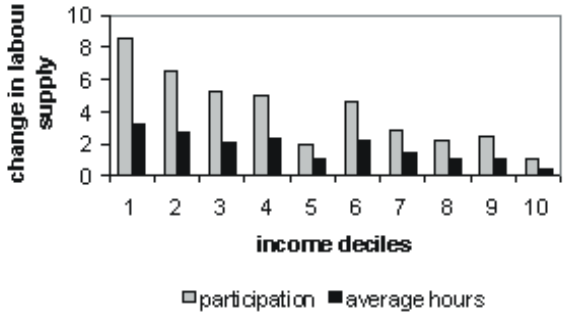


Figure 6: Changes in labour supply over income distribution, system 2



reduction in the marginal tax rate to 30 per cent, it is necessary to cut basic income levels by more than half (54 per cent).

The positive labour supply responses associated with lower tax rates, while reducing the level of net government expenditure required, do not come anywhere close to eliminating the cost. With lower tax rates of course, aggregate hours of work need to increase by a much greater amount to generate the same amount of revenue than higher tax rates, and thus even the positive labour supply responses associated with System 2 does not generate a substantial amount of income tax revenue to fund the reasonably generous basic income level. In fact it was found that the basic income level could only be increased to just under half (49%) of the initial basic income level for revenue neutrality after labour supply adjustments.

The adverse labour supply responses associated with higher tax rates, however, impose quite a large increase in government expenditure as a much larger share of each individuals income is paid in tax, thus a reduction in labour supply reduces the revenue collected by the government quite considerably.

Table 9: Total effect on annual net government expenditure, with and without labour supply responses

	Cost - fixed LS	Cost - with LS
	$ billions	$ billions
System 1	-0.5	8.9
System 2	0.6	-5.3

5.1 Income distribution after labour supply response

Generally, net incomes are affected by changes in hours worked thus changes in labour supply have implications for the distribution of income across society. The effect of the two revenue neutral systems on income inequality after taking account of labour supply changes are examined in tables 10 and 11 by presenting the change in the Gini coefficients and the Atkinson inequality index once estimated changes in work patterns after each reform have been taken account of. The method used to generate these results is outlined in (Creedy, Kalb and

Scutella 2003). Taking account of reductions in labour supply associated with the first reform system (high basic income level, high marginal tax rate) does not make much of a difference to overall income inequality levels. This is reasonable as it is not likely that people will put themselves in a position where they are worse off financially and thus are more likely to reduce labour supply if there incomes remain similar or rise after the reform not significantly affecting the overall distribution of income. When basic income levels are cut however, represented by the two final columns in the table, the difference in inequality is much more apparent. To offset the large reduction of incomes at the bottom end of the income distribution, not surprisingly people want to increase their labour supply, thus decreasing inequality once labour supply changes are accounted for. This does not however completely eradicate the extra inequality, with an overall increase in inequality still apparent after this reform.

Table 10: Change in Gini coefficients of inequality after changes in labour supply

		Change in Gini coefficient			
	Pre-reform	System 1		System 2	
Income unit type	Gini coefficient	Fixed LS	Variable LS	Fixed LS	Variable LS
Couple	0.3192	-0.0326	-0.0357	0.1042	0.0943
Couple with dependents	0.2609	-0.0432	-0.0471	0.0580	0.0460
Single females	0.2905	-0.0305	-0.0312	0.1350	0.1118
Single males	0.3185	-0.0459	-0.0390	0.0911	0.0547
Single with dependents	0.1972	-0.0095	-0.0091	0.1741	0.1254
Total	0.3041	-0.0331	-0.0329	0.1055	0.0804

5.2 Social welfare after labour supply response

Using the same social welfare measure as was used in the previous section we can see what the implications of any labour supply changes are on overall wellbeing in society (see table 12). Prior to doing this however a caveat must be noted. It can be argued that the living standard used here, net income unit income per equivalent adult, may not be the appropriate welfare metric with variable labour supply. Although the labour supply modelling explicitly involves utility being attached to leisure, the benefits of any increases in leisure (or costs of reductions) are not captured by the living standard measure. The production of

Table 11: Change in Atkinson indices of inequality after changes in labour supply

Income unit type	Pre-reform Atkinson Index	Change in Atkinson Index System 1 Fixed LS	System 1 Variable LS	System 2 Fixed LS	System 2 Variable LS
Inequality aversion parameter=0.5					
Couple	0.0799	-0.0142	-0.0157	0.0713	0.0650
Couple with dependents	0.0560	-0.0159	-0.0169	0.0312	0.0246
Single females	0.0662	-0.0136	-0.0138	0.0800	0.0667
Single males	0.0807	-0.0215	-0.0187	0.0631	0.0418
Single with dependents	0.0304	-0.0029	-0.0026	0.0767	0.0533
Total	0.0735	-0.0147	-0.0146	0.0671	0.0522
Inequality aversion parameter=2					
Couple	0.2633	-0.0392	-0.0467	0.2486	0.2398
Couple with dependents	0.1853	-0.0489	-0.0550	0.1382	0.1115
Single females	0.2341	-0.0515	-0.0549	0.2284	0.2148
Single males	0.2911	-0.0820	-0.0767	0.2132	0.1772
Single with dependents	0.1058	-0.0115	-0.0108	0.2168	0.2016
Total	0.2528	-0.0485	-0.0503	0.2280	0.2022

money metric welfare measures based on the preference functions of households is however beyond the scope of the present paper.

Under the first system, as overall labour supply is reduced, the implication is for social welfare to also decrease after reductions in work effort are factored in. With higher inequality aversion social welfare still increases with this system, however after reductions in labour supply are accounted for, the increase is not as great. On the other hand, the decreases in social welfare apparent after system 2 (with lower taxes and lower levels of basic income) are much smaller after increases in labour supply. The overall effect however remains negative, particularly with higher aversion to inequality. Thus even after taking account of increases in overall hours worked, social welfare remains lower when basic income levels are more than halved.

6 Concluding comments

This paper addresses the likely implications of moving to a system of universal benefits with a simplified tax structure. A behavioural micro-simulation model, MITTS, which captures the full level of heterogeneity apparent in the population is used to examine distributional, labour supply and government expenditure

Table 12: Change in social welfare after changes in labour supply

Income unit type	Pre-reform Social Welfare	Change in social welfare System 1 Fixed LS	System 1 Variable LS	System 2 Fixed LS	System 2 Variable LS
Inequality aversion parameter=0.5					
Couple	463.87	-17.92	-24.06	-44.98	-29.25
Couple with dependents	452.78	39.00	29.17	29.48	44.46
Single females	335.42	-9.11	-16.44	-60.57	-38.24
Single males	396.40	-7.85	-20.58	-31.89	5.29
Single with dependents	331.56	3.54	1.12	-103.92	-41.67
Total	406.24	-0.32	-8.95	-35.48	-9.10
Inequality aversion parameter=2					
Couple	371.41	-1.05	-3.21	-130.57	-118.84
Couple with dependents	390.79	51.68	45.43	-33.42	-10.47
Single females	275.08	6.40	1.20	-102.05	-86.22
Single males	305.68	20.94	9.10	-94.50	-62.30
Single with dependents	305.78	6.31	3.89	-133.18	-86.64
Total	327.63	15.53	9.04	-103.63	-80.05

effects of moving to a basic income – flat tax system in Australia, examining the implications of changes in the marginal tax rate and the basic income level. A measure of social welfare is also used to examine overall levels of wellbeing.

Providing basic income levels coinciding with current benefit rates is costly, with a marginal tax rate of over fifty per cent required to ensure revenue neutrality in the first instance. Such a system while more equitable and in certain circumstances social welfare enhancing than the current system, is found to have likely adverse labour supply responses confounding the cost of the system. This result highlights how important it is to take into consideration labour supply effects. What can initially be thought of as being a self-financed system actually may turn out to increase required government expenditure in the longer term due to decreases in workforce participation rates and aggregate hours worked.

It is clear that a tax rate of over fifty per cent is excessive if efficiency is to be valued, not to mention the fact that such a tax rate is almost certain political suicide for any government advocating such a system. However in order to maintain the basic income level, decreases in the marginal tax rate, while improving work incentives quite considerably, impose a significant cost burden on government. The question then arises, how would such a system be financed without reducing expenditure on essential health and education

services. Increasing indirect taxes is an option but has significant implications for equity, as indirect taxes tend to be regressive. To be fully self-financed, the level of basic income needs to be cut quite substantially to fund a significant reduction in the marginal tax rate. While this may impact quite favourably on efficiency, it is incredibly inequitable, decreasing overall social welfare and not something that should be seen as desirable for a tax-transfer system in a country such as Australia.

The analysis presented here leads to some different outcomes to that of (Creedy and Dawkins 2002) who, in a highly simplified model, found that the introduction of a basic income – flat tax system the increase in workforce participation outweighed the reduction in hours of the working population although the experiment undertaken was a rather different one in that case. A hypothetical means-tested system with individual based benefits was used as a comparison rather than the current tax-transfer system as was used here. The current system is very complicated with an array of payments available on an individual level and at the family level. It is very difficult (and expensive) to ensure that the current benefit population are not made worse off. Also, individual utilities were maximised whereas in MITTS couples jointly maximise their utility. The other major difference is that individuals are treated as homogenous in the (Creedy and Dawkins 2002) study.

An important caveat to the modelling in this paper is that the labour supply model is estimated on the structure of the tax-transfer system and labour market environment in the mid to late 1990s. Moving to a basic income-flat tax system is a large-scale change to the structure of the system in which no individual in the population has been exposed to before. Thus it is questionable as to whether a behavioural model based on the current structure of the system will accurately capture the full impact of the changes. For instance, high-income earners have never been taxed at rates of over fifty per cent so it is difficult to determine what their likely labour supply response would be in this situation. Thus, the results presented provide a general indication of the likely effects. Evidence from large scale controlled experiments run in the US and Canada in

the 1960s and 1970s are however broadly consistent with the major findings in this paper.[5]

A system with relatively generous basic income levels and a high marginal tax rate is found to be socially optimal if there is a high aversion to inequality, even after reductions in labour supply are taken into consideration. With a lower aversion to inequality and less tolerance for distortions raised through the tax system, a system with lower basic income levels and a lower marginal tax rate would be optimal. Neither of these extremes is likely to be a socially acceptable alternative to the current system. As it is important to lower the high effective marginal tax rates on low-income households, variants of the basic income – flat tax system must be considered. Such variants may to investigate various marginal tax rate structures such as a progressive, declining or U-shaped structure[6]. A gradual form of means testing may also be investigated.[7]

[5]For information on the Seattle and Denver Income Maintenance Experiments (SIME/DIME) see (Robins, Speigelman, Weiner and Bell 1980) and (Munell 1986).

[6]SIME/DIME experimented with a declining marginal tax rate structure. For more information see (Robins et al. 1980). A U-shaped structure was found to be optimal under certain assumptions by (Diamond 1998).

[7](Creedy and Dawkins 2002) indeed suggested that a move towards universal payments by gradually lowering EMTR's may enhance social welfare.

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A Measures of inequality and social welfare

For the distribution of y, where w_i refers to population weights, $\bar{y}_w = \frac{\sum_{i=1}^{n} w_i y_i}{\sum_{i=1}^{n} w_i}$ is weighted average income over the population and ρ_i refers to the ranking of each observation in the population from richest to poorest and is calculated recursively to take account of the population weights: $\rho_{i+1} = \rho_i + w_i$, the Gini coefficient, G_y, can be calculated directly by:

$$G_y = \frac{N+1}{N-1} - \frac{2}{N(N-1)\bar{y}_w} \sum_{i=1}^{n} \rho_i w_i y_i$$

Atkinson's inequality measure is linked to a social welfare function, W, defined as:

$$W = \sum H(y_i) = NH(y_\varepsilon)$$

The function, H(y), is given by:

$$H(y) = \frac{y^{1-\varepsilon}}{1-\varepsilon} \;\; for\, \varepsilon \neq 1$$
$$H(y) = \log(y) \;\; for\, \varepsilon = 1$$

where ε is a measure of relative inequality aversion. Combining gives:

$$y_\varepsilon = \left(\frac{1}{N} \sum_{i=1}^{n} w_i y_i^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}}$$

The term y_ε is the equally distributed equivalent income and is that level which, if obtained by everyone, produces the same social welfare as the actual distribution. The Atkinson inequality measure, A, is the proportional difference between arithmetic mean income and the equally distributed equivalent level. Hence:

$$A = \frac{\bar{y}_w - y_\varepsilon}{\bar{y}_w}$$