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Effective marginal tax rates: The New Zealand case

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Abstract

Effective Marginal Tax Rates (EMTRs) reflect the interaction of the personal income tax scale, main benefits, and supplementary benefits. They show how a dollar increase in gross income translates to an increase in income in the hand (after taxation and the withdrawal of income-tested assistance). This paper presents an algebraic approach to estimating EMTRs in New Zealand. EMTR profiles are then illustrated with examples of hypothetical families. This paper also discusses the design of family and working tax credits in five liberal welfare states, including Australia and New Zealand, as these programmes have at times been suggested as key instruments in addressing the problems associated with high EMTRs (poverty traps).

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Overview

It can be helpful to calculate effective marginal tax rates (EMTRs) when considering the likely outcomes of tax-benefit reforms. Consider an increase in the minimum wage. This may raise a worker's gross wage income (assuming no change in their employment or hours of work) but the change in their take home pay (net income) is less clear. In the case of a single parent with two young children the family would lose most of the increase in gross income from the increase in the minimum wage from \$15.75 to \$16.50 unless they work for 35 hours a week or more. This reflects abatement of the main benefit and, from 20 hours of work, the dollar-for-dollar withdrawal of the Minimum Family Tax Credit.²

This difference between gross and net incomes reflects the interaction of the minimum wage with the personal income tax scale, main welfare benefits, and supplementary assistance (e.g., tax credits). This interaction can be illustrated with EMTRs, which are the combination of taxation and abatement of transfers and are usually measured over the next dollar of income. In practise estimating EMTRs can be difficult, reflecting the complex interaction of tax-benefit programmes. Families with the same gross incomes but different hours of work, wage rates, numbers of earners, numbers and ages of children, civil status, and accommodation and childcare costs can face different EMTRs.

EMTRs are not a complete measure of the effect of tax-benefit reforms, e.g., they generally only measure change over the next dollar of income. Further, the analysis in this paper is static and several important tax-benefit programmes (including accommodation assistance, childcare subsidies, child support, student support/loans, parental leave, etc.) are not included. However, limiting coverage to main benefits, income and social security taxes (e.g., the ACC earners' levy), and tax credits allows the results to be more generalisable and provides useful insights. For instance:

- putting differences in wage rates between family types to the side, beneficiaries without children working for *small* numbers of hours (e.g., around 6 to 12 hours at minimum wage) face higher EMTRs than beneficiary parents. This reflects the higher earnings disregards (income that can be earned before abatement begins) facing beneficiary parents;
- however, as these disregards have changed little over the last decade and a half (Nolan, P., 2003; Nolan, M., 2018b) their real value (and thus the difference between family types) has fallen;
- nonetheless, for all beneficiaries, once full abatement of the main benefit begins there are few incentives to work until income is sufficient to exit the benefit; and
- the disincentives for parents take place over a wider range of hours of work, reflecting the lower abatement at lower hours of work (for sole parents), higher levels of assistance, and abatement of the Working for Families Tax Credits.

Thus, not only are there trade-offs between different objectives of the tax-benefit system (e.g., the trade-off between equity and efficiency in Okun's "leaky bucket" (Okun, 1975)) but there are trade-offs within objectives too. Efforts to improve incentives to work at one point, e.g., by increasing earnings disregards, can worsen incentives elsewhere (holding all else constant). An analogy can be drawn with a balloon. It is possible to squeeze a balloon downwards but – unless the overall volume of air in the balloon reduces – this will lead to it expanding out sideways.

These trade-offs mean that when evaluating EMTRs it is difficult to avoid being the archetypal "two-handed economist." As former US President Harry Truman once said: "give me a one-handed Economist. All my economists say 'on one hand', then 'but on the other'." Lowering EMTRs at one point will usually lead to them increasing somewhere else. The answer to this problem is to consider the

² These calculations are explained in more detail Section 3. They do not include a number of programmes (such as the Accommodation Supplement and Student Loan repayments), whose abatement can mean that families continue to lose most of the increase in gross income above 35 hours of work.

specific location of “notches” (areas of high EMTRs) and how these interact with wage rates and the distribution of hours of work.

In this regard a key question is the degree to which families find that they need to work longer hours because their wage rates are low. This can reflect the presence of poverty traps, as with lower wage rates long hours of work are needed to leap over areas of high EMTRs. Yet there does not appear to be a simple relationship between people having low gross wages and working long hours. It is also useful to recognise that the assessment of EMTRs often does not include factors like take-up rates, institutional features of welfare benefits, like work tests and stand-down periods, and characteristics of the labour market (such as labour market segmentation). Nonetheless, the interaction between the tax-benefit system, long hours, and low pay could be a potentially fruitful area for future work.

Box 1 **The Government’s Families’ Package**

- The Government’s Families Package largely took effect from the 1 April 2018 tax year. This package contained changes to the Working for Families Tax Credits, the introduction of a Best Start Tax Credit, changes to the Accommodation Supplement, and the introduction of a Winter Energy Payment. From 1 April 2018 the Adult Minimum wage also increased to \$16.50 from \$15.75.
- The changes to Working for Families included no longer varying the Family Tax Credit rates by age of child (different rates for the eldest and additional children remain), increasing the Minimum Family Tax Credit, and increasing the Working for Families abatement threshold and abatement rate. These changes are included in Sections 2, 3, and 4.
- The Best Start Tax Credit was introduced to replace the Parental Tax Credit. For children up to the age of 1 this provides a universal transfer and for children older than 1 and younger than 3 this provides a targeted transfer. Payments will only be made for children born after 1 July 2018 but in the modelling in this paper it is assumed this programme is now fully in place. This is included in the modelling in Section 3 but not in Sections 2 and 4.
- The Independent Earner Tax Credit was retained in the Families Package (the previous Government had planned to remove this programme). This programme is included in the modelling in Section 3 but not in Sections 2 and 4.
- Changes to the Accommodation Supplement and the introduction of the Winter Energy Payment are not included in the modelling in this paper. See Section 3.1 for an explanation for the exclusion of programmes like these.
- A more detailed description of the Working for Families Tax Credits can be found in Appendix B.

Family and working tax credits have at times been suggested as key instruments for addressing the problems associated with high EMTRs. One advantage of tax credits is that they can provide tax relief on a more targeted (less fiscally costly) basis than changes to personal income tax scales. Further, as they can be delivered through personal income tax systems they are seen to more strongly reinforce work effort than main benefits and their use is often part of a reform strategy emphasising active labour market policies.

Yet a comparison of family and working tax credits in five liberal welfare states shows that different countries have taken quite different approaches to designing these programmes and that there are practical barriers to their use. Some practical questions include:

- How accurately should income be measured?
- How widely should income be measured? For instance, do we need to know who recipients share income or resources with?

- How important are fluctuations in circumstances?
- What role should administrative sanctions play?
- How should the costs of children be recognised?

And the issues go on. This highlights how tax-benefit reform requires hard choices to be made. As John Kay has written about a universal basic income: “it is simply not the case that there are simple solutions to apparently difficult issues which policymakers have hitherto been too stupid or corrupt to implement” (Kay, 2017).

1 Background

1.1 Trade-offs in reform

Tax-benefit reform has always required hard choices to be made. Consider the development of family allowances in liberal welfare states just after the Second World War. A major influence on these programmes was the Beveridge report (published in Britain in 1942). Yet:

in the preparation of this report Beveridge was confronted with a dilemma of reconciling an income transfer system ensuring income adequacy for families with children with a competitive labour market. A competitive labour market would not generally adjust wages (paid to individuals) according to the number of children in a worker's family. But to ensure families had adequate incomes financial assistance needed to be targeted according to family size. When wages were low and family sizes large the income from work could fail to provide an adequate family income and be less than the income from government transfers when not working. The design of family allowances therefore needed to balance the goals of ensuring adequate family incomes and encouraging labour supply. This balance had to be found within the constraint of limited government funds (Nolan, P., 2006).

Partly reflecting the challenge above – along with ideas of fairness of reward and socially acceptable incomes – governments have not simply relied on competitive labour markets to set wages. Indeed, New Zealand has a long history with national minimum wages (since the Industrial Conciliation and Arbitration Act 1894) and in recent years there has been interest in concepts like living wages, pre-distribution (e.g., reducing inequality in the distribution of gross incomes), and the labour income share (Conway, Meehan & Parham, 2015; Fraser, 2018).

But even with the help of wage policies governments have not been able to avoid hard choices when undertaking tax-benefit reform. Not only are wage policies themselves subject to trade-offs (e.g., potentially having an impact on employment (Dube, 2017; Gordon, 2018)) but the interaction between wage and tax-benefit policies is an important constraint on outcomes. There are two key dimensions to this:

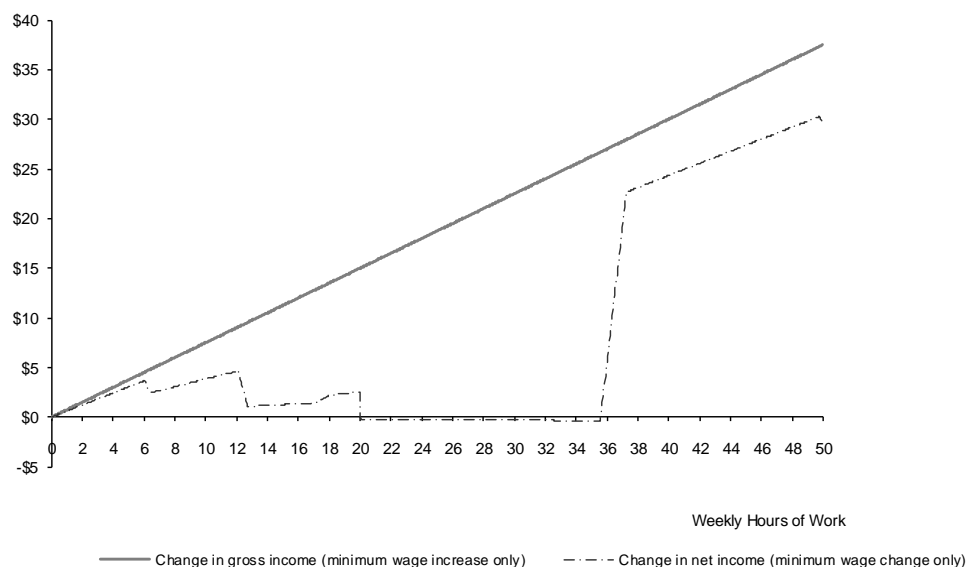
- wage levels are not independent of tax-benefit policies (there is some endogeneity). Tax credits may, for example, subsidise low wage work (Nichols & Rothstein, 2015); and
- an increase in gross wages may translate into little extra income in the hand due to taxation and the abatement of transfers that families are entitled to. This second dimension is the focus of this paper.

Individual policies that aim to lift gross wages will be affected by their interaction with the personal income tax scale and the abatement of tax credits and welfare benefits. This interaction can be illustrated with effective marginal tax rates (EMTRs), which are the combination of taxation and abatement of transfers and are usually measured over the next dollar of income.

Take the example of an increase in the minimum wage. This may raise a worker's gross wage income (assuming no change in their employment or hours of work) but the change in their take home pay (net income) is less clear, being subject to a set of tax-benefit programmes. This can be shown in Figure 1, which shows how for a single parent with two young children the increase in net income can be much lower than the increase in gross income following an increase in the minimum wage from \$15.75 to \$16.50 per hour.

Indeed, many of the people that minimum wage increases aim to assist are the same people losing much of their wage increases through taxation and the abatement of main benefits and tax credits. This is not to say that there would be no point to increasing their wages – one of the advantages of a higher wage rate is that the abatement of transfers takes place over a shorter range of hours of work and so people may be more likely to leap over poverty traps (areas of high EMTRs). But it is not possible to simply say that an increase in a minimum wage (or introduction of a living wage) will always translate into proportionately higher incomes in the hand.

Figure 1 Increase in net income following minimum wage increase from \$15.75 to \$16.50 (sole parent, 2 young children)



Source: Author's calculations

Notes: To derive the figure the gross and net incomes at both wage rates are calculated and the results for the new wage rate are subtracted from the results for the old wage. The scenario is based on a sole parent with two children under 12 (one aged 2, one aged 5). The tax-transfer system modelled is that in place following the introduction of the Government's Families Package. Not all assistance the family would be eligible for is modelled (see Scenario 1 in Section 3 for further details). The calculations do not include a number of programmes (such as the Accommodation Supplement and Student Loan repayments), which can mean that families continue to lose most of the increase in gross income above 35 hours of work

1.2 Fairness and poverty

It is largely inevitable that anytime a government reforms the provision of a transfer or service, or levies taxes or charges to fund this, the question of fairness will be raised. Yet fairness is a difficult concept to define. It can be thought of in several different ways. As shown below it can sometimes be seen in relation to outcomes (e.g., is the distribution of income in the hand fair?) and sometimes opportunities (e.g., do people face a 'level playing field?') (Nolan, P., 2011; Nolan, M., 2018a):

- a level playing field: focussing on opportunity. Fair play or the application of a consistent set of rules to all;
- a tilted playing field: focussing on opportunity. Similar to above but where differences in endowments are considered;
- just desserts: focussing on outcomes. People receive (or pay) in proportion to what they have done;
- horizontal equity (Nolan, M., 2018a): focussing on outcomes. The equal treatment of equals, e.g., people with equal ability to pay taxes or grounds for receiving assistance should face the same tax burden or should receive the same level of public assistance. This can also relate to geographic considerations (e.g., 'postcode lotteries'); and
- vertical equity: focussing on outcomes. People with higher ability to pay should pay more than those with lower ability to pay. Horizontal equity is a prerequisite for the achievement of vertical equity.

And these are not the only relevant questions – with, for example, the treatment of different generations also requiring consideration. This paper does not, however, address these many dimensions of fairness but focusses on one dimension (poverty minimisation). This implies a greater concern with individuals at the bottom of the income distribution (e.g., in contrast to concerns with high pay). This poverty minimisation objective can be consistent with values often expressed in policy discourse and is discussed in greater detail below.

Poverty reduction effectiveness, targeting efficiency, and labour supply

Poverty needs to be measured against a poverty threshold, which defines the level below which a monetary income is deemed inadequate. Different levels of inadequacy are reflected in different income thresholds. The income threshold chosen can make a significant difference to measured poverty:

- an absolute (nominal) poverty threshold terms people poor if their incomes are below the level necessary to maintain a minimum standard of living that does not change over time. Unless an absolute poverty threshold is adjusted for economic growth a decreasing proportion of the population will fall below this threshold over time; and
- a relative (distributional) poverty threshold terms people poor if their incomes are judged inadequate in relation to those of other people in society. Relative poverty thresholds indicate the extent that people “are, in effect, excluded from ordinary living patterns, customs and activities” (Stephens & Waldegrave, 2001, pp. 77-107). Economic growth would not lead to a decrease in measured incidence of poverty with a relative poverty threshold, unless economic growth is also associated with a change in the distribution of income.

Usually these thresholds are measured according to annual income (over either the calendar, financial, or tax year). Yet annual income may provide both too long and too short a perspective on control over resources. People deemed poor on the grounds of their individual incomes may also reside in and have access to the incomes of other family members. Conversely individuals in families may have financial responsibility for other family members. Defining the income sharing unit and the degree of sharing (reflected in equivalence scales) are key (but often not straightforward) decisions.

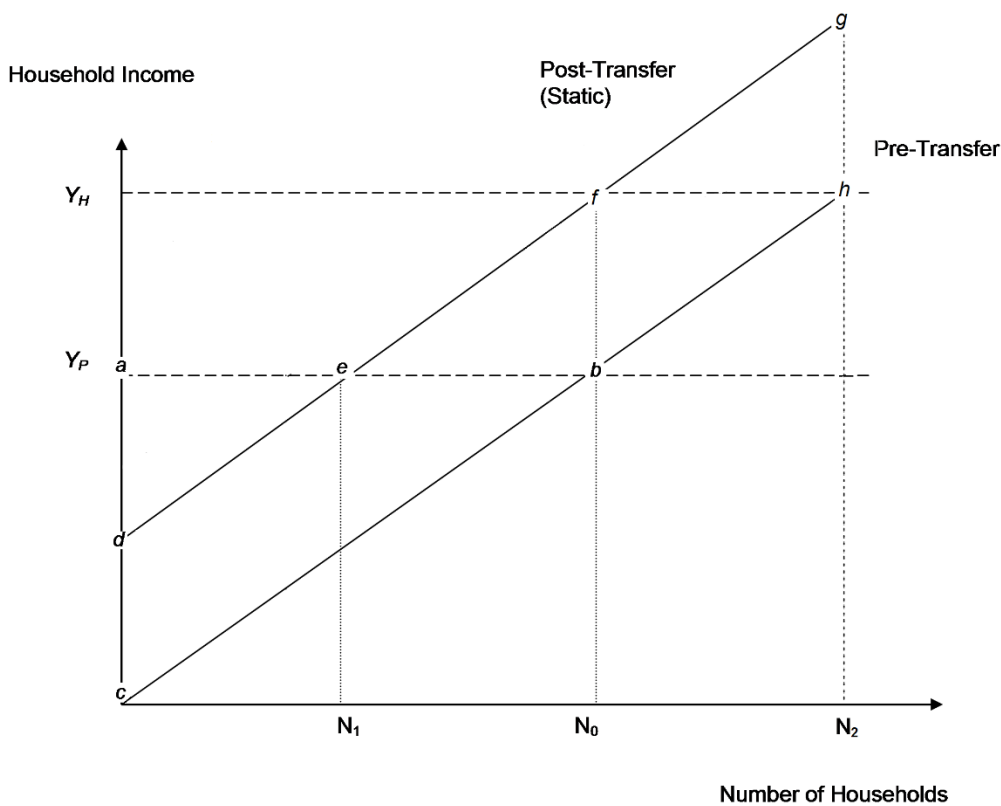
As well as these questions regarding the poverty threshold there are also different measures that illustrate different dimensions of the income distribution, e.g., poverty headcount or the poverty gap. For instance:

- poverty headcount: the simplest poverty measures are headcount measures, which state the number or proportion of families below the poverty threshold. These measures are only concerned with the question of whether these incomes fall below the poverty line and not how far they are below. Yet two societies may have the same headcount poverty rate but the total cost of bringing all the poor up to the poverty line may differ (Creedy, 1999, pp. 82-83);
- poverty gap and poverty depth: a poverty measure reflecting the actual incomes of the poor is the poverty gap, which measures the difference between families’ incomes and the poverty threshold. The extent to which families fall below the poverty threshold is the poverty depth;
- poverty reduction effectiveness: the ratio of benefits going to the pre-transfer poor to the total benefits needed by that group (Creedy, 1999, p. 83; Stephens & Waldegrave, 2001, pp. 83-85) and
- targeting efficiency: indicates the extent that expenditure goes to the poor. This is reduced by spill-over. Spill-over to the pre-transfer non-poor occurs when families with pre-transfer incomes above the poverty line receive some financial assistance. Spill-over to the pre-transfer poor occurs when the transfers received by the pre-transfer poor are greater than those needed to lift their incomes to the poverty threshold (Creedy, 1996, pp. 102, 104; Stephens & Waldegrave, 2001, p. 85).

Poverty reduction effectiveness, headcount poverty rates, and targeting efficiency are illustrated with hypothetical income distributions in Figure 2. The ordinate of the figure shows household income (as used for the targeting of assistance) and the abscissa expresses numbers of households (in this figure the terms families and households are used interchangeably). The figure includes a hypothetical pre-transfer income distribution and a post-transfer income distribution without labour supply effects (for an example that also includes labour supply effects see Nolan, P. (2005)). The comparisons between the pre-transfer and post-transfer distributions are for the same year. Y_p is the poverty threshold. Y_H is a hypothetical income above which families are assumed to be ineligible for a transfer (based on pre-transfer income). The transfer is assumed to have 100% take-up and a value of $d - c$. Thus:

- pre-transfer headcount poverty is the number of families at the point where the poverty threshold and the pre-transfer income distribution intersect (N_0). Post-transfer headcount poverty is the number of families at the point where the poverty threshold and the post-transfer income distribution intersect (N_1). The reduction in headcount poverty is thus $N_0 - N_1$;
- the benefits that go to the pre-transfer poor are the area bounded by the poverty threshold, the pre-transfer income distribution, the ordinate, and the post-transfer income distribution (in the static case the area $ebcd$). The total benefits needed by the poor are the area bounded by the poverty threshold, the pre-transfer income distribution, and the ordinate (the area abc in the figure), meaning poverty reduction effectiveness is the ratio of $ebcd$ to abc ; and
- spillover to the pre-transfer poor is given by the area bef . Spillover to the pre-transfer non-poor is given by the area $bfgh$. Total expenditure is $cdgh$, meaning targeting efficiency can be given by the ratio of $bcde$ to $cdgh$.

Figure 2 Poverty reduction effectiveness and targeting efficiency



Source: Based on Nolan, P. (2005)

The figure above does not account for any labour supply effects of taxes or transfers. As Blundell (1992, p. 16) argued labour supply can be defined several ways. The impact of tax-benefit programmes on labour supply is often seen in terms of transitions between employment and unemployment. The labour force participation rate is the proportion of the population willing to work (the employed and unemployed). The rate of work effort (the number of hours worked each week and the number of weeks worked per year) is narrower than participation in the labour force. The labour force participation rate is thus an indicator of potential labour supply while the rate of work effort is an indicator of actual labour supply (Brosnan, Wilson & Wong, 1989, p. 19). However, the full impact of tax-benefit programmes also depends upon transitions between employment and unemployment and the third labour market state of non-participation. The state of non-participation includes people undertaking education and training, domestic and voluntary work, leisure, retirement, and facing discouragement and incapacity (Atkinson & Micklewright, 1991, pp. 1681-1682; Wilson, 1996, p. 7). A significant proportion of the people who enter employment do so from the state of non-participation.

Each of these labour market states can be measured in different ways. Measures of unemployment can, for example, be based upon administrative conditions, such as the registration for or receipt of assistance, or upon observed or reported labour market behaviour, such as job search activity (Atkinson & Micklewright, 1991, p. 1683). All measures are likely to contain some degree of inaccuracy. For instance, measures based upon numbers of people receiving assistance would fail to measure those people seeking work but not eligible for or receiving a benefit. Further, measures of the numbers of people receiving assistance would include some people not actively seeking work (Atkinson & Micklewright, 1991, p. 1683). There is also significant heterogeneity within each of the three labour market states. Within the unemployed there are discouraged workers (who have ended their search for employment), those who have already secured a future job, part-time workers, and temporary lay-off workers (who intend to return to their previous employer). Within the employed there are the self-employed, wage and salary earners, full-time workers, part-time workers, those in permanent jobs, and those in temporary jobs. Within the non-participants there are people sick or disabled, caring for children and other dependents, engaged in unpaid work, retired, and engaged in education and training (Atkinson & Micklewright, 1991, pp. 1684-1686).

1.3 Incentives to work

Transitions between labour market states are influenced by financial incentives to supply labour. These financial incentives occur on two margins (Blundell, Bozio & Laroque, 2013). The extensive margin relates to choices about labour-force participation and the intensive margin relates to choices about hours or weeks of work:

- the strength of incentives on the extensive margin reflects the income effect of the tax-benefit system. The income effect is the income available for consumption that is independent of the labour supply decision itself; and
- the strength of incentives on the intensive margin reflects the impact of the tax-benefit system on the net hourly wage rate.

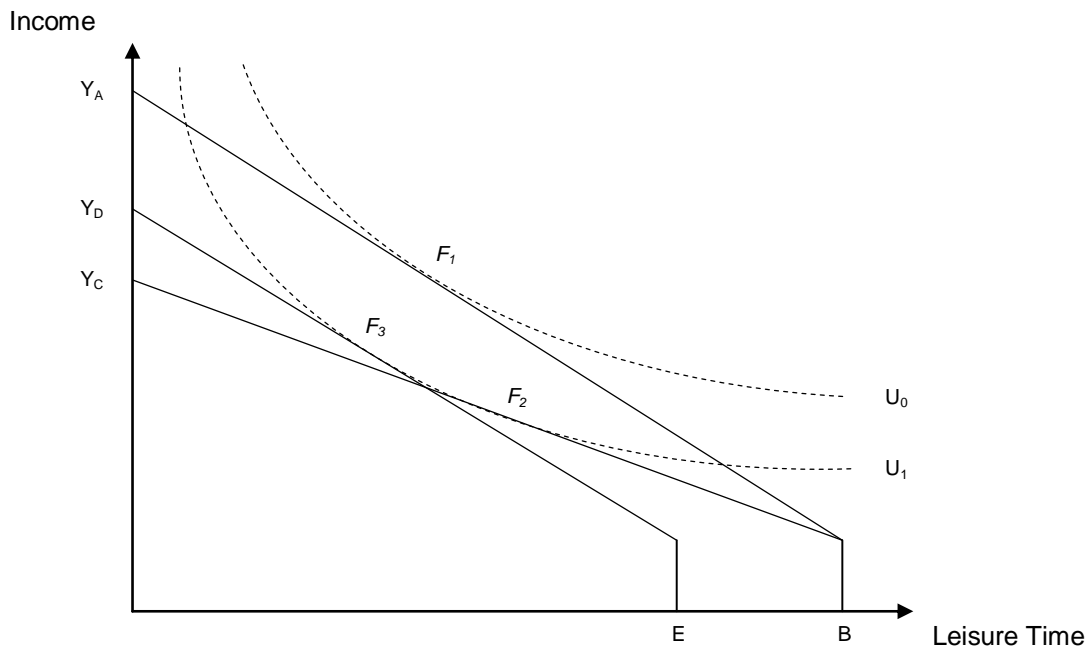
Budget constraints show the net income after taxation and the payment of abated assistance that is received at different levels of time in paid employment. Net income when out of work is the height of the budget constraint at zero hours of work. The height of the budget constraint illustrates the income effect. The slope of the budget constraint is equal to the marginal rate of substitution between time in paid employment and time in other activities. The slope of the budget constraint illustrates the substitution effect. Whether these two effects reinforce or offset each other depends on the case at hand and requires empirical analysis.

Income and substitution effects are illustrated with stylised budget constraints and indifference curves for an individual in Figure 3. The horizontal axis is expressed in hours of leisure time, which is time in activities other than paid employment. The line $Y_A B$ is the individual's pre-tax budget constraint. It is assumed that a small amount of income is unearned income (such as a demogrant).

The individual's utility is illustrated with indifference curves, which show different combinations of the ways that they could spend their time that they would be indifferent between. The slopes of these curves reflect factors such as in-work costs and the availability of childcare and thus vary between different family types. The further from the origin the indifference curve the greater the individual's utility. The slope of the indifference curve is equal to the marginal utility from one additional unit of paid employment.

The indifference curve U_0 is the individual's pre-tax indifference curve. The time in paid employment that would maximise a person's utility is that where the additional utility from an additional hour in work is equal to the rate at which this person could substitute this hour of work for an hour in other activities. People are at this point when they have an indifference curve that just touches their budget constraint. If the indifference curve was within the budget constraint then the person would not be maximising their utility and an indifference curve above the budget constraint would be unobtainable. The point of tangency between the indifference curve and budget constraint is at F_1 .

Figure 3 Income and substitution effects with stylised indifference curves and budget constraints



Source: Nolan, P. (2005)

If an income tax is only imposed on earned income the individual's budget constraint pivots and falls to $Y_C B$. The new optimal position along this budget constraint is the new tangency with the highest attainable indifference curve. The new budget constraint is tangential to the indifference curve U_1 at point F_2 , which indicates that this person consumes more leisure and has a lower income due to the tax.

The hypothetical budget constraint $Y_D E$ illustrates the point at which the individual receives the same utility as the post-tax position but at the pre-tax prices. The shift from F_1 to F_3 illustrates the income effect and the shift from F_3 to F_2 the substitution effect. There is thus a reduction in the individual's welfare due to the move to the lower indifference curve. Not all people face the same income and substitution effects from this tax change:

- people with incomes below the change would be unaffected;
- people with incomes within the range of the change would face a fall in income encouraging work effort and a change in the relative financial return from work discouraging work effort. Whichever effect would dominate is an empirical question; and
- people with incomes above the range over which the change applies would face an income effect and no substitution effect and thus would be encouraged to work more.

The overall effect of the change would therefore be to (a) reduce the labour supply of people facing the higher tax rate and (b) increase the labour supply of people above the range of the change. If the reduction in labour supply from group (a) exceeds the increase in labour supply from group (b) then the total effect on labour supply would be negative. Likewise, if the increase from group (b) exceeds the reduction from group (a) then the total effect on labour supply would be positive. The sizes of the responses of the two groups depend on the uncompensated elasticity of labour supply and the numbers of people in the groups. Thus, when the uncompensated elasticity of labour supply (the concern is with uncompensated elasticity as both income and substitution effects are in operation) is high and the number of people above the abatement increase is low, the total labour supply would be likely to fall from an increase in a tax rate.

The discussion above was based on stylised budget constraints and indifference curves. In practise budget constraints are usually highly complex, reflecting the complexity of the interaction of personal income tax policies, main welfare benefits, and supplementary welfare assistance. A consequence of this complexity is that marginal tax rates will often vary by hours of work, so that individuals with the same gross income (reflecting both gross wage rates and hours of work) may face different labour supply incentives. Differences in labour supply responses may thus reflect differences in individuals' preferences or differences in the marginal tax rates that individuals face. Modelling changes in budget constraints by hours of work for fixed gross wage rates can isolate the impact of marginal tax rates on financial incentives for labour supply decisions.

2 Calculating EMTRs

It can be helpful to calculate effective marginal tax rates (EMTRs) when considering the outcomes of tax-benefit reforms (see, for example, Nolan (2005), Spier (2010), and Creedy, Mercante & Mok (forthcoming) in New Zealand and Kalb (2007), Whiteford (2013), the Australian Productivity Commission (2014 and 2015) and Ingles & Plunkett (2016) in Australia). Effective marginal tax rates (EMTRs) reflect the interaction of the personal income tax scale, main benefits, and supplementary benefits. As Nolan (2003) showed, for many people the interaction of the income tax and benefit systems is relatively straightforward. But for a sizeable number of other people (e.g., who have children, experience multiple spells out of work, etc.) this interaction results in complex EMTR schedules.³ AMP (2006) reached similar conclusions in Australia.

EMTRs are defined as the change in net income from a dollar increase in gross income. They vary by a range of family characteristics and hourly wage rates. An algebraic approach to estimating EMTRs is shown below. This is based on an approach first developed by Matthew Bell and Ivan Tuckwell at the New Zealand Treasury (Nolan, P., 2005). The key variables used are shown in Table 1. This table does not include every conceivable programme – exclusions include childcare subsidies, child support, accommodation assistance, parental leave, student assistance, pensions, and funding for long term care. Note that the Independent Earner Tax Credit and Best Start Payment are also not included (these two programmes are, however, included in the modelling in Section 3).

Table 1 Notation for EMTR calculations

Notation	Explanation	Notation	Explanation
ACC _F	Family ACC Earner Levy Liability	H _F	Family Hours of Work
ACC _P	Primary Earner ACC Earner Levy Liability	H _P	Primary Earner Hours of Work
ACC _S	Secondary Earner ACC Earner Levy Liability	H _{ST}	Statutory Hours Threshold for In Work Assistance
ACC _R	ACC Levy Rate	H _T	Effective Hours Threshold for In Work Assistance
ACC _T	Threshold for Maximum ACC Levy Liability	IWTC _A	In Work Tax Credit Add-on to Base Rate
BEN _A	Abatement of the Main Benefit	IWTC _B	In Work Tax Credit Base Rate
BEN _{ED}	Earnings Disregard for Main Benefit	IWTC _U	Unabated Value of the In Work Tax Credit
BEN _{EXIT}	Benefit Exit Point (Expressed in Hours of Work)	MFTC	Net Abated Value of the Minimum Family Tax Credit
BEN _{GA}	Gross Abated Main Benefit	T _{BEN}	Income Tax Rate on the Main Benefit
BEN _{NA}	Net Abated Main Benefit	T _F	Family Income Tax Liability
BEN _{NU}	Net Unabated Main Benefit	T _P	Tax on Primary Earner Income
BEN _{RH}	Higher Rate of Main Benefit Abatement	T _S	Tax on Secondary Earner Income

³ The New Zealand welfare system is often seen as having three tiers: 1. Main benefits (or first tier programmes) provide basic income support. Main benefits differ in the degree to which they emphasise short-term fluctuations in need, such as temporary loss of employment, versus support for caregiving or longer-term incapacity to work due to invalidity or sickness. 2. Non-discretionary supplementary assistance (second tier programmes) provides additional assistance to cover circumstances in which needs are considered to be higher than those covered by main benefits alone. Family and employment tax credits are an example. 3. Discretionary supplementary assistance (third tier programmes) provides further and discretionary assistance for a limited set of circumstances (Stephens, 1999, p. 240).

Notation	Explanation	Notation	Explanation
BEN _{RL}	Lower Rate of Main Benefit Abatement	T _{T1} , T _{T2} , T _{T3}	Personal Income Tax Thresholds 1, 2, and 3
BEN _{TH}	Threshold for the Higher Rate of Main Benefit Abatement	T _{R1} , T _{R2} , T _{R3} , T _{R4}	Personal Income Tax Rates 1, 2, 3, and 4
Child _N	Number of Children in Family	WFF	Working for Families Entitlement
Child _T	Threshold Number of Children for Large Family Add-On	W _{PG}	Primary Earner Gross Wage Rate
Civil	Family Civil Status (Partnered, Sole)	W _{SG}	Secondary Earner Gross Wage Rate
FTC_IWTC	Abated Value of the Family Tax Credit and In Work Tax Credit	Y _{AG}	Assessable Gross Household Income
FTC_IWTC _A	Abatement of the Family Tax Credit and In Work Tax Credit	Y _{GNBE}	Gross Non-Benefit Earnings
FTC_IWTC _{AR}	Abatement Rate for the Family Tax Credit and In Work Tax Credit	Y _{NH}	Net Household Income
FTC_IWTC _{AT}	Abatement Threshold for the Family Tax Credit and In Work Tax Credit	Y _{NS}	Net Specified Household Income (Following WFF Adjustments)
FTC _{RA}	Family Tax Credit Rate for Additional Children	Y _{PGNBE}	Primary Earner Gross Non-Benefit Earnings
FTC _{RO}	Family Tax Credit Rate for Oldest Children	Y _{SGNBE}	Secondary Earner Gross Non-Benefit Earnings
FTC _U	Unabated Value of the Family Tax Credit		

Source: Author

An EMTR measures how a dollar increase in gross income translates into a change in income in the hand. In other words:

$$(1) \text{EMTR} = 1 - \Delta Y_{NH}$$

In both cases (before and after earning an extra dollar) Y_{NH} can be calculated as:

$$(2) Y_{NH} = Y_{AG} + WFF - T - ACC$$

Where Y_{AG} is assessable gross income, WFF is Working for Families entitlement, T is income tax liability, and ACC the ACC levy liability. These items are each explained in more detail in the sections below.

Assessable Gross Income (Including Main Benefits)

Assessable gross income (Y_{AG}) equals:

$$(3) Y_{AG} = BEN_{GA} + Y_{GNBE}$$

Where BEN_{GA} equals the gross abated benefit and Y_{GNBE} equals gross nonbenefit earnings. The calculation of the BEN_{GA} requires explanation. When beneficiaries receive gross non-benefit earnings their net unabated benefit (BEN_{NU}) abates against this income. Benefit abatement (BEN_A) equals the net benefit abatement rate multiplied by the level of the gross non-benefit earnings above the gross threshold at which abatement begins (the level of the earnings disregard (BEN_{ED}) below which non-benefit earnings do not reduce the net benefit).⁴ Note that in some cases there are two benefit

⁴ It is not shown in these calculations but the earnings disregard for sole parent beneficiaries can be increased by \$20 a week at the discretion of a case manager to account for childcare costs.

abatement rates (BEN_{RL} and BEN_{RH} for the lower and higher rates, respectively) which vary based on one threshold (BEN_{TH} for the threshold at which the higher rate applies). The net benefit after abatement is grossed up by adding the tax paid on the net abated benefit (T_{BEN}). Thus:

$$(4) \quad BEN_{GA} = BEN_{NA} + T_{BEN}$$

Where:

$$(5) \quad BEN_{NA} = \text{Max}(0, BEN_{NU} - BEN_A)$$

And where:

$$(6) \quad BEN_A = \text{IF}(Y_{GNBE} > BEN_{ED}, \\ \text{IF}(Y_{GNBE} > BEN_{TH}, \\ \left(\frac{Y_{GNBE} - BEN_{TH}}{* BEN_{RH}} \right) + \left(\frac{BEN_{TH} - BEN_{ED}}{* BEN_{RL}} \right), \\ \left(\frac{Y_{GNBE} - BEN_{ED}}{* BEN_{RL}} \right), \\ 0)$$

The implied tax on this net abated benefit (T_{BEN}) can be estimated as:

$$(7) \quad T_{BEN} = \text{IF}(BEN_{NA} > (T_{T1} * (1 - T_{R1})), \\ ((BEN_{NA} - (T_{T1} * (1 - T_{R1}))) / (1 - T_{R2})) \\ + ((T_{T1} * (1 - T_{R1})) / (1 - T_{R1})), \\ BEN_{NA} / (1 - T_{R1}))$$

Where T_{T1} is the lowest personal income tax threshold, T_{R1} is the lowest personal income tax rate, and T_{R2} is the second personal income tax rate. Note that simplifying assumptions have been made to this calculation. The tax on the net benefit is assessed as if the benefit income is held by one adult only. This is unlikely to make a significant difference but to more correctly calculate the taxation on the benefit for a couple it would be possible to substitute $BEN_{NA}/2$ for BEN_{NA} and to then multiply the result by 2 (in other words, to allocate half of the benefit income to each adult). Similarly, it is assumed that benefit assessment is based on family income (Y_{GNBE}), which is a function of primary and secondary earner gross non-benefit income ($Y_{PGNBE} + Y_{SGNBE}$). In other words:

$$(8) \quad Y_{GNBE} = Y_{PGNBE} + Y_{SGNBE}$$

Working for Families

There are three main Working for Families (WFF) Tax Credits discussed in this section: the Minimum Family Tax Credit (MFTC), the Family Tax Credit (with an unabated value of FTC_U), and the In-Work Tax Credit (with an unabated value of $IWTC_U$). These credits are paid to principal caregivers in families (the approach to accounting for changes in the principal caregiver (e.g., the “eligible period”) throughout the year is not discussed in this paper (see Nolan, P., 2005)). Abatement of the Family Tax Credit and In Work Tax Credit is $FTC/IWTC_A$ (explained below). The Independent Earner Tax Credit and the Parental Tax Credit (Best Start Programme) are not included in these calculations. Given this:

$$(9) \quad WFF = MFTC + FTC_U + IWTC_U - FTC_{IWTC_A}$$

There are two WFF abatement regimes; that applying to the MFTC and that applying to the FTC and the IWTC. The MFTC ensures families who work have Family Hours (H_F) that satisfies an hours-based threshold (H_T) – including both primary hours (H_P) and secondary hours (H_S) of work in partnered families – and who do not receive a main income tested benefit receive a guaranteed minimum net

income. The guaranteed minimum net income is based on net specified income (Y_{NS}). The unabated MFTC ($MFTC_U$) abates dollar-for-dollar against increases in this net specified income. Thus:

$$(10) MFTC = \text{Max}(0, IF(H_F \geq H_T, Y_{NS} - MFTC_U, 0))$$

Where the effective hours based threshold can be calculated as the higher of the statutory threshold (H_{ST}) or the benefit exit point (expressed in hours of work) (BEN_{EXIT}). Thus:

$$(11) H_T = \text{Max}(H_{ST}, BEN_{EXIT})$$

It may be useful to explain why H_T is not simply calculated as H_{ST} (e.g., 30 hours per week for couples) but also accounts for receipt of an income tested main benefit.⁵ It is assumed that if the family would have a higher net income in receipt of a main income tested benefit rather than being off benefit and in receipt of in-work tax credits then they remain on the benefit, even if they would otherwise satisfy H_{ST} . To estimate this BEN_{EXIT} (expressed in terms of hours of work) is calculated. This is based on the larger of the statutory threshold or the hours of work at which the abated net benefit is equal to the in-work assistance off benefit.

The other WFF abatement regime is that applying to the Family Tax Credit and the In Work Tax Credit. Note that while these programmes share an abatement regime, there is some variation in their entitlement regime. The programmes differ in the ways in which they account for the numbers of children in the Family ($Child_N$). The unabated Family Tax Credit (FTC_U) is calculated per child, but with a higher rate for the oldest child (FTC_{RO}) in the family than for other children (FTC_{RA}). The In Work Tax Credit is calculated as a family rate, but with an add-on for the 4th and additional children (where the threshold is $Child_T$, the base rate is $IWTC_B$, and the add-on is $IWTC_A$). The unabated In Work Tax Credit ($IWTC_U$) is also, like the Minimum Family Tax Credit, based on satisfying the Hours Threshold (see equation (11)). Thus, the unabated value of the two credits can be calculated as:⁶

$$(12) FTC_U = IF(Child_N > 0, FTC_{RO} + (FTC_{RA} * (Child_N - 1)), 0)$$

And:

$$(13) IWTC_U = IF(H_F \geq H_T, \\ IF(Child_N \geq Child_T, \\ IWTC_B + (IWTC_A * (1 + Child_N - Child_T)), \\ IWTC_B), \\ 0)$$

For abatement purposes, the Family Tax Credit and the In Work Tax Credit are added together and this total figure abates against Assessable Gross Income. The Family Tax Credit is the first payment to abate, followed by the In Work Tax Credit. The abatement (FTC_IWTC_A) is the WFF abatement rate (FTC_IWTC_{AR}) multiplied by the assessable gross income (equation 3) over the gross abatement threshold (FTC_IWTC_{AT}). In other words:

$$(14) FTC_IWTC_A = (Y_{AG} - FTC_IWTC_{AT}) * FTC_IWTC_{AR}$$

Giving abated FTC/IWTC of:

⁵ The MFTC is currently set at a level so that at the statutory hours threshold eligible families are better off receiving the MFTC and the IWTC than being on the main benefit. This has not, however, always been the case (e.g., see Nolan, 2003). Nonetheless, this current practice means that, for example, an increase in an earnings disregard would be accompanied by a higher MFTC.

⁶ Note the WFF credits are refundable tax rebates and so they are not limited to the recipient's tax liability. This means it is not necessary to account for the income tax that the family is paying on their assessable income in the assessment of eligibility of the programmes.

$$(15) FTC_{IWTC} = Max(0, (FTC_U + IWTC_U) - FTC_{IWTC_A})$$

And resulting in the WFF entitlement shown in equation (9).

Income Tax and the ACC Levy

Unlike main benefits and Working for Families, income tax and the ACC Levy are assessed on an individual basis in New Zealand. This does not create any additional complexity for single people (with or without children) but for couples half of the gross abated benefit needs to be included in their taxable income along with their individual gross earnings.

Equation 8 separated gross family nonbenefit earnings into gross primary non-benefit earnings and gross secondary non-benefit earnings. Income tax and the ACC Levy can be estimated based on each of these separately. The application to gross primary income is shown first. This gross income is a function of the gross primary wage rate (W_P), the primary hours of work (H_P), and the gross abated benefit:

$$(16) Y_{PG} = IF(Civil = sole, (W_P * H_P) + BEN_{GA}, (W_P * H_P) + 0.5BEN_{GA})$$

Likewise, for the second earner (if applicable) the gross taxable income can be calculated as:

$$(17) Y_{SG} = IF(Civil = sole, 0, (W_S * H_S) + 0.5BEN_{GA})$$

New Zealand has a four-step income tax scale and levies income taxes from the first dollar of earnings (with thresholds and rates of T_{T1} , T_{T2} , T_{T3} , T_{R1} , T_{R2} , T_{R3} , and T_{R4}). Further, the ACC scheme is levied (at a rate of ACC_R) on all income up to a maximum threshold (of ACC_T , beyond which additional ACC levies are not charged). Thus the tax on primary earnings (T_P) is:

$$(18) T_P = Max(0, IF(Y_{PG} < T_{T1}, Y_{PG} * T_{R1}, \\ IF(Y_{PG} < T_{T2}, (T_{T1} * T_{R1}) + ((Y_{PG} - T_{T1}) * T_{R2}), \\ IF(Y_{PG} < T_{T3}, (T_{T1} * T_{R1}) + ((T_{T2} - T_{T1}) * T_{R2}) + ((Y_{PG} - T_{T2}) * T_{R3}), \\ (T_{T1} * T_{R1}) + ((T_{T2} - T_{T1}) * T_{R2}) + ((T_{T3} - T_{T2}) * T_{R3}) + ((Y_{PG} - T_{T3}) * T_{R4}))$$

And the ACC levy on primary earnings (ACC_P) is:

$$(19) ACC_P = IF(Y_{PG} > ACC_T, ACC_T * ACC_R, Y_{PG} * ACC_R)$$

These calculations can be repeated for the secondary earners' gross income (Y_{SG}) (if relevant), giving:

$$(20) T_S = Max(0, IF(Y_{SG} < T_{T1}, Y_{SG} * T_{R1}, \\ IF(Y_{SG} < T_{T2}, (T_{T1} * T_{R1}) + ((Y_{SG} - T_{T1}) * T_{R2}), \\ IF(Y_{SG} < T_{T3}, (T_{T1} * T_{R1}) + ((T_{T2} - T_{T1}) * T_{R2}) + ((Y_{SG} - T_{T2}) * T_{R3}), \\ (T_{T1} * T_{R1}) + ((T_{T2} - T_{T1}) * T_{R2}) + ((T_{T3} - T_{T2}) * T_{R3}) + ((Y_{SG} - T_{T3}) * T_{R4}))$$

And:

$$(21) ACC_S = IF(Y_{SG} > ACC_T, ACC_T * ACC_R, Y_{SG} * ACC_R)$$

The tax and ACC liabilities for each spouse can then simply be added together to give a family liability. And as equation (2) noted, $Y_{NH} = Y_{AG} + WFF - T - ACC$. Y_{NH} can thus found by combining (3), (9), (18), (19), (20) and (21).

3 EMTR Profiles

3.1 Modelling approach

Assessing EMTRs requires detailed modelling of both the interaction of a number of (at times complex) tax-benefit programmes and of the income distribution. This can be a difficult exercise and can be subject to controversy. Challenges include:

- how the results for scenario family types can be weighted and aggregated to generate estimates for the population as a whole (which can create a technical constraint on which programmes can be modelled (e.g., results for highly targeted programmes can be sensitive to weighting schedules));
- whether the results presented distinguish between the numbers and ages of children in households, which is an important consideration in the labour supply of parents;
- whether the results presented show incentives relative to hours of work (not earned incomes) to distinguish the effects among families on similar incomes but facing different wage rates;
- whether the results are based on equivalised household income and whether costs like housing are taken into account;
- whether the results account for unemployment, which would mean that not all increases in participation of certain groups would lead to increases in aggregate labour supply (due to displacement effects);
- if decisions on whether to work or not, and hours of work, are based on continuous labour supply models, or discrete hours labour supply models (which recognise that people may choose from only a limited set of possible hours of work) (e.g., the labour supply decision can be “lumpy” (Australian Productivity Commission, 2014);
- how joint labour supply decisions in couples are accounted for in modelling;
- the sensitivity of results to the assumed labour supply elasticities and the degree to which earnings elasticities and participation elasticities are held constant among different population groups; and
- the requirement to assume individuals maximise income and have perfect information, for instance, that they fully understand how changes in gross incomes will be reflected in changes in income in the hand.

Although entitlement and abatement schedules are often expressed in terms of gross incomes (in some cases net incomes) this paper models financial assistance available to families at different hours of work with a fixed gross wage rate. This approach separates low-wage families from higher-wage families who have low hours of work and thus low incomes. This is important as modelling assistance against gross incomes could create a misleading picture of the financial assistance provided to families. While programmes may appear relatively heavily targeted by income when modelled against incomes this may not be the case when levels of financial assistance are modelled against hours of work for families with relatively low wage rates. This is especially relevant when making comparisons across countries with varying wage rates, as in such case relatively low wage countries can appear overly residual.

Further, two individuals with identical gross incomes may face different financial incentives. A high-wage part-time worker could, for example, face lower EMTRs when increasing their hours of work than a low-wage full-time worker even if their gross incomes are the same (as with a higher wage the abatement of transfers occurs over a shorter range of hours of work). Modelling financial incentives by hours of work can illustrate which financial incentives are most likely to affect individuals of interest. For example, given the relatively low median wage of sole-parents, financial incentives to supply labour that apply at very high incomes are less likely to affect this group (as reaching these incomes could require

working for an unlikely number of hours per-week) unless they have an unusually high gross wage rate for this family type.

EMTRs profiles and budget constraints are produced for this paper with a spreadsheet model. This model shows the interaction of key tax-benefit programmes only (e.g., it does not model the interaction of these programmes with the income distribution). The analysis is static and several important tax-benefit programmes (including accommodation assistance, childcare subsidies and child support, student support/loans, parental leave, etc.) are not included. However, limiting coverage to main benefits, income and social security taxes (e.g., the ACC earners' levy), and tax credits allows the results to be more generalisable. The approach taken allows a wide range of scenarios to be easily compared. The only parameters needed are the family's civil status, wage rate (or rates if a dual income couple), number and ages of children, and key policy features. For illustrative purposes in this paper assistance is illustrated for three family types:⁷

- the first family is a sole-parent earning an hourly gross wage rate of \$16.50 (current minimum wage) and with two children aged two and five;
- the second family is a partnered person earning an hourly gross wage rate of \$16.50 and with a non-working spouse and two children aged two and five; and
- the third family is a partnered person earning an hourly gross wage rate of \$25.00 and with a working spouse and two children aged two and five. The working spouse is assumed to earn a fixed income of \$1,000 gross per-week (at a wage rate of \$20.00 per-hour and 40 hours of work per-week).

Families are assumed to have two children as this is a relatively common structure for partnered families and, although sole-parents tend to be in single-child families, the incidence of poverty and significance of poverty traps can be expected to increase with the number of children in the family. Assistance is modelled over a range of hours of work for a family type at a fixed wage rate. These wage rates were chosen as they illustrate the current minimum wage and the median hourly earnings for men. It is assumed that wage rates, hours of work, and family structures do not vary during the year.

3.2 Results

Scenario 1: minimum wage sole parent

The first scenario is a sole parent on minimum wage. The reforms modelled are aspects of the Government's Families Package (see Box 1): a higher rate of Family Tax Credit, an increase in the Minimum Family Tax Credit, an increase in the Working for Families Tax Credit abatement threshold, an increase in the Working for Families abatement rate, and the introduction of the Best Start Programme. Note any interaction between the Best Start Programme and Paid Parental Leave has not been modelled. Further, to simplify the presentation of the results it is assumed the Best Start Programme is fully in operation.⁸ A recent change in the minimum wage is also shown (e.g., in the pre-reform case the minimum wage is \$15.75 and in the post-reform case it is \$16.50).

As this is the first scenario illustrated in this paper the results are shown in three figures. The first figure shows the EMTR profile and budget constraint post reform, the second shows how the reforms have changed net incomes, and the third shows EMTR profiles before and after reform. To minimise duplication in later scenarios the results are only presented in two figures (the change in net incomes and the comparison of EMTR profiles).

Figure 4 shows the sources of income received by the sole parent. Based on 2017-18 benefit rates (the 2018-2019 rates were not available at time of writing) at zero hours of work this person is estimated to receive an unabated main benefit of \$329.57 and Family Tax Credit payments of \$264.29. The result is

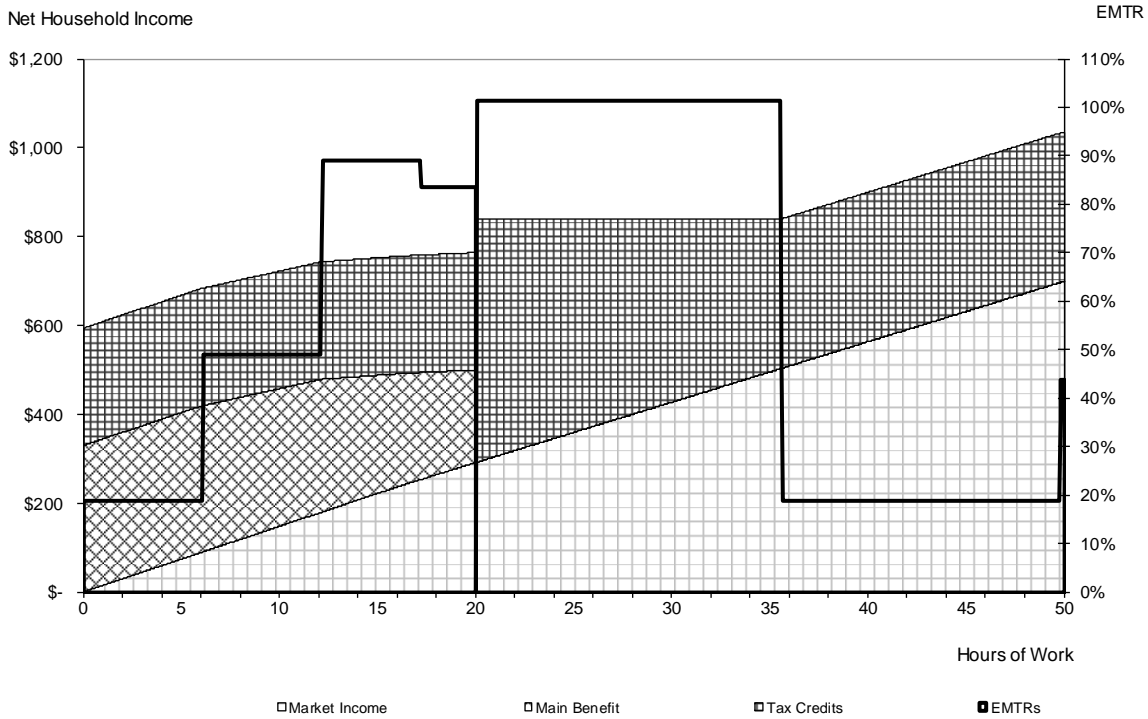
⁷ Appendix A contains modelling for an additional scenario (a single person (without children) on minimum wage).

⁸ The Best Start programme can only be received for children born after 1 July 2018. Given the assumed ages of the children in these scenarios the families would in practice be ineligible for this transfer. For illustrative purposes, however, the Best Start programme is assumed to be fully operational in this paper.

an income in the hand of \$593.86 a week. (Note this net income does not include accommodation support and several other transfers, and it is assumed that the Best Start programme is fully in operation.)

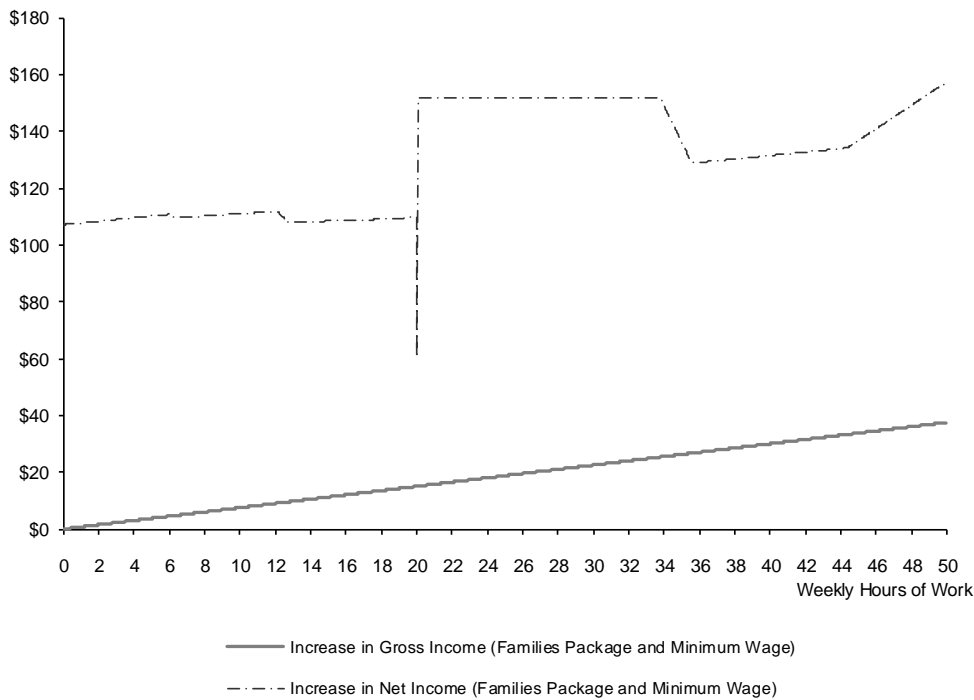
There is an earnings disregard of \$100 per week and so for the first few hours of work this person's gross earnings are reduced by the second rate of income tax (17.5%) and the ACC levy earner (1.4%) only. The person faces the second rate of income tax (and not the lower rate) as the main benefit is included in taxable income. This leads to an EMTR of 18.9%.

Figure 4 EMTR profile and budget constraint following reform (minimum wage sole parent)

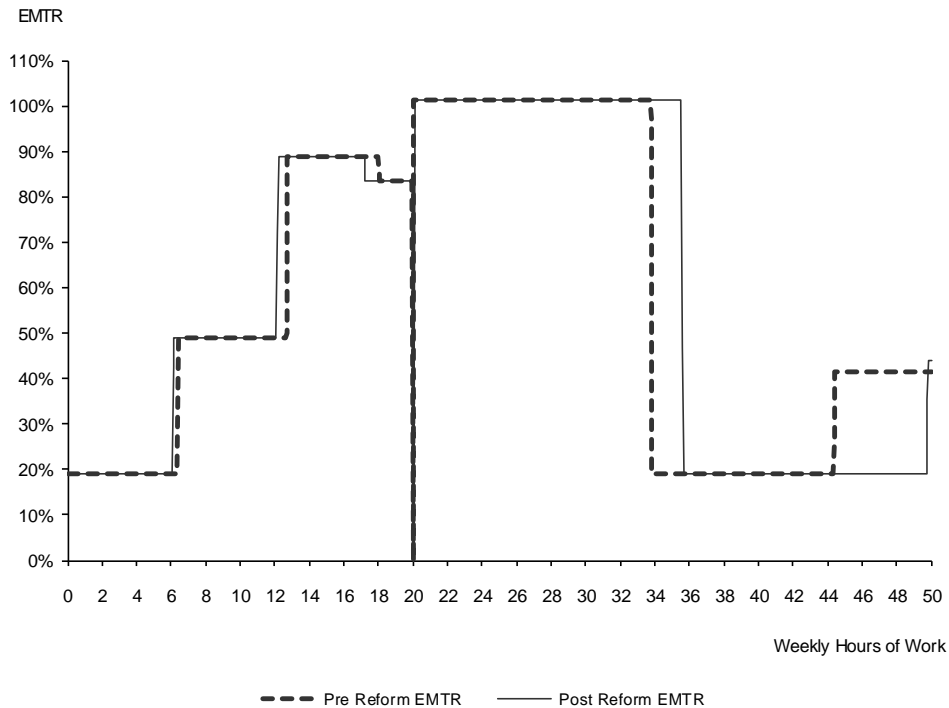


Source: Author's calculations

Figure 5 Effect of reform on net incomes (minimum wage sole parent)



Source: Author's calculations

Figure 6 Comparison of EMTR profiles before and after reform (minimum wage sole parent)

Source: Author's calculations

At just over 6 hours of work the main benefit starts abating at a rate of 30%. As noted above the net main benefit abates against increases in gross income. The result is an increase in the EMTR to 48.9%.

Once gross non-benefit earnings increase to \$200 per week the main benefit starts to abate at a rate of 70%. This takes place at just over 12 hours of work, and leads to an EMTR of 88.9%. At this point the sole parent's net income is around \$726.13. Note that at just over 17 hours of work the value of the abated main benefit has fallen to a level that means that the income tax rate applying to this benefit is now the lower rate (of 10.5%) not the second rate, and so the EMTR falls to 83.4%. At this point the net income is around \$735.53.

At 20 hours of work the sole parent becomes eligible for the work-based components of Working for Families: particularly the Minimum Family Tax Credit and the In-Work Tax Credit. This leads to a boost in net incomes of \$91.64 (from \$743.06 to \$834.69). There is thus a relatively strong incentive to satisfy the statutory hours-based work threshold. The Minimum Family Tax Credit provides a guaranteed minimum family income it abates at a rate of 100% against any increases in earnings until it is fully exhausted. The combination of this abatement and the ACC levy results in an EMTR of 101.4%. Net income thus decreases very slightly against increases in earnings until around 36 hours of work.

Once the sole parent has exited the Minimum Family Tax Credit the EMTR falls to 18.9% and remains at this level until their earned income is sufficient for them to face abatement of their Working for Families Tax Credits and (later) put them into higher income tax brackets. Abatement of the Best Start Programme begins at \$79,000 but with a \$16.50 gross wage it is highly unlikely that the family would face this abatement (note if the youngest child was under 1 then no abatement of this programme takes place). In this scenario the abatement of Working for Families begins at around 50 hours work a week.

The latter two figures show the effect of the modelled reforms. Like Figure 1, Figure 5 compares gross and net incomes before and after policy changes. In relation to net income this figure shows that the sole parent receives an additional \$107.12 (\$60.00 Best Start Payment and \$47.12 of Family Tax Credit entitlement) at zero hours of work, and that with the higher minimum wage net income increases by around \$109.60 by 20 hours a week.

At above 20 hours the sole parent also receives a higher Minimum Family Income Tax Credit (an increase of \$151.91 at this point) until this programme is fully withdrawn at around 36 hours of work.

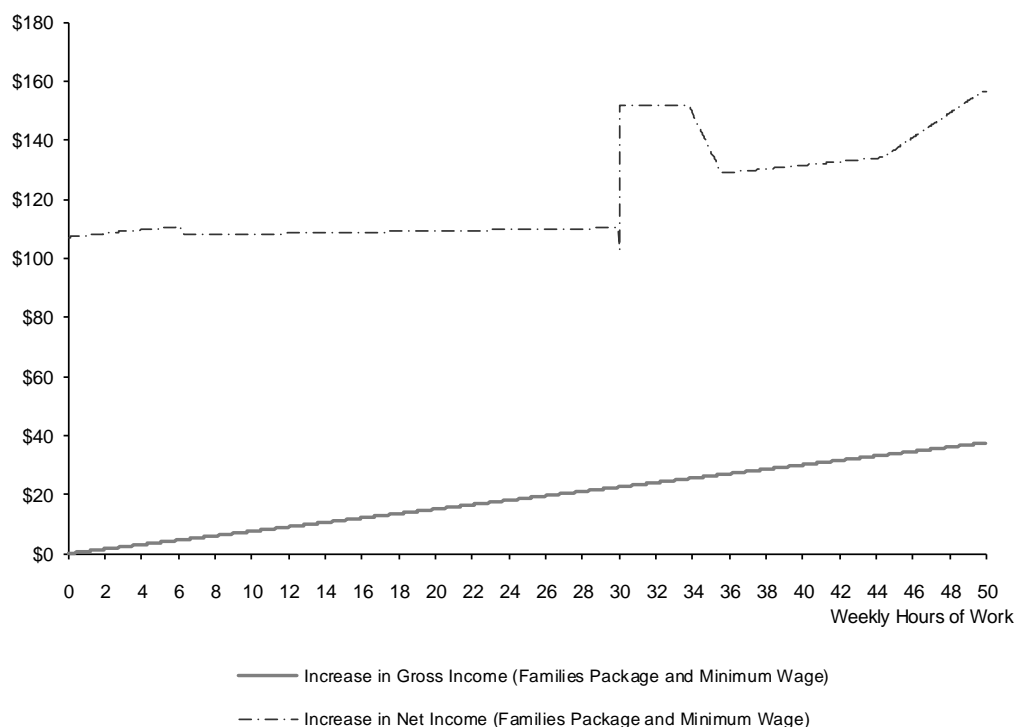
The increase in the abatement threshold for Working for Families means this sole parent largely avoids abatement of these credits, which would have otherwise begun at around 44 hours of work. These changes are reflected in the comparison of the EMTR profiles in Figure 6. These profiles show that the reforms mean the period of high EMTRs due to the Minimum Family Tax Credit is extended and the increase in EMTRs due to Working for Families abatement is postponed.

Scenario 2: single income (minimum wage) partnered family

The second scenario is the case of a partnered parent on minimum wage. The family is assumed to have one income earner and two young children (as above). As with the earlier scenario, the reforms modelled are aspects of the Government's Families Package: a higher rate of Family Tax Credit, an increase in the Minimum Family Tax Credit, an increase in the Working for Families Tax Credit abatement threshold, and an increase in the Working for Families abatement rate. The Best Start Programme is included but any interaction of this programme with Paid Parental Leave is not considered. And, again, to simplify the presentation of the results it is assumed the Best Start Programme is fully in operation. The figures below show the change in net incomes and the comparison of EMTR profiles.

Figure 7 compares gross and net incomes before and after policy changes. This shows that, as with the sole parent family, this family receives an additional \$107.12 of entitlement at zero hours of work (assuming the Best Start programme is fully in operation). With the higher minimum wage, the increase in net income grows slightly (to \$110.23) at 30 hours of work. At this point the family also receives a higher Minimum Family Income Tax Credit (so a total increase of \$151.91) until this programme is fully withdrawn at around 36 hours of work. The increase in the abatement threshold for Working for Families means this family avoids abatement of these credits, which would have otherwise begun at around 44 hours of work.

Figure 7 Effect of reform on net incomes (single income (minimum wage) partnered family)

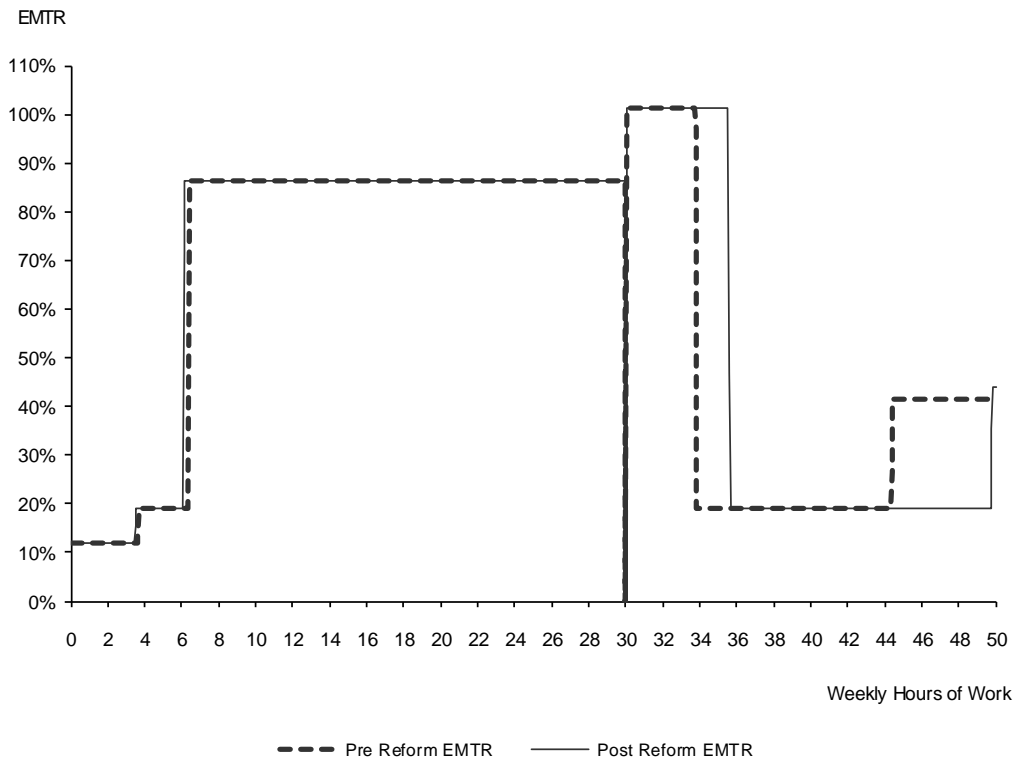


Source: Author's calculations

These changes are reflected in the comparison of the EMTR profiles in Figure 8. These profiles show that the reforms mean the period of high EMTRs due to the Minimum Family Tax Credit are extended, but the increase in EMTRs due to Working for Families abatement is postponed. Note that as this family is assumed to have the same number of children (with the same ages) and the same wage rate (and one earner) as scenario one the EMTR profiles for the two scenarios are broadly similar. The main

differences are the higher EMTRs at very low hours of work for the couple due to the lower benefit earnings disregard and the later take-up of the Minimum Family Tax Credit due to the higher hours-based eligibility threshold.

Figure 8 Comparison of EMTR profiles before and after reform (single income (minimum wage) partnered family)



Source: Author's calculations

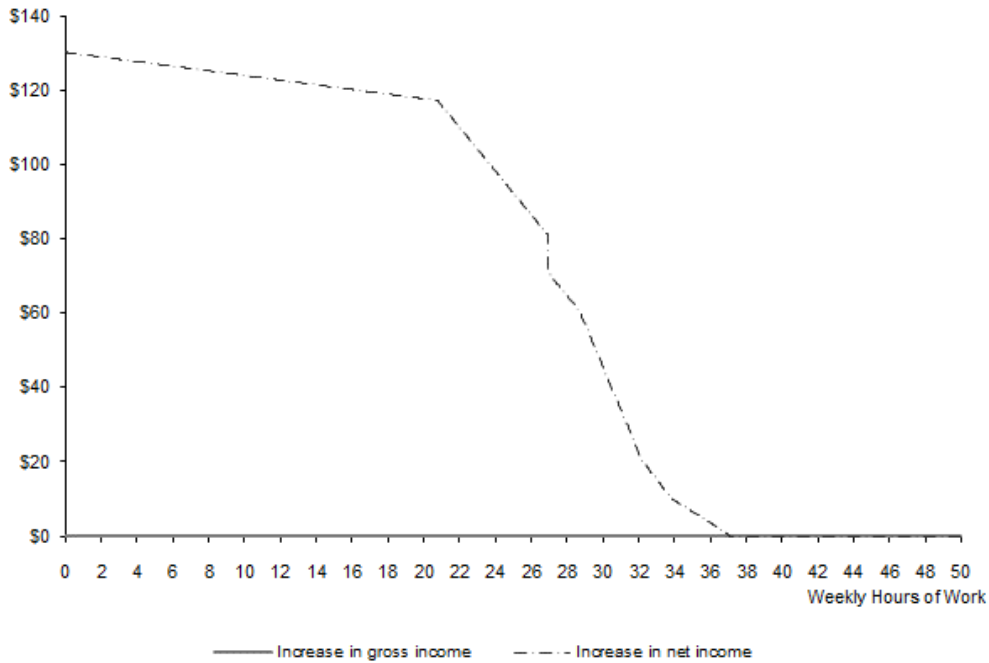
Scenario 3: median earner with working spouse family

The third scenario is the case of a partnered parent earning around median hourly earnings (\$25 per hour) and a working spouse (assumed to work 40 hours at \$25 per hour). As with the other scenarios the family has two young children. Again, the reforms modelled are aspects of the Government's Families Package: a higher rate of Family Tax Credit, an increase in the Minimum Family Tax Credit, an increase in the Working for Families Tax Credit abatement threshold, an increase in the Working for Families abatement rate, and the introduction of the Best Start Programme. Note any interaction between the Best Start Programme and Paid Parental Leave has not been modelled. It is assumed the Best Start Programme is fully in operation. The figures below show the change in net incomes and the comparison of EMTR profiles.

Figure 9 compares net incomes before and after policy changes. This shows that this family receives around \$130.12 a week extra assistance. This reflects the \$60.00 Best Start Payment, additional \$47.12 of Family Tax Credit entitlement, and lower abatement of these tax credits due to the increase in the abatement threshold. Looking at the EMTR profiles, the increase in the Working for Families abatement rate (to 25% from 22.5%) leads to a slight increase in EMTRs for up to around 20 hours of work.

At 20 hours of work the abatement of the Best Start Programme begins, leading to a more significant increase in EMTRs (from 43.9% to 64.9%). EMTRs remain at this level until the Best Start Payment is fully abated (at around 32 hours of work). As the generosity of the Working for Families Tax Credits has increased the abatement of these programmes takes place over a longer range of hours of work. Thus, while these credits were fully exhausted in the pre-reform case at around 29 hours of work, in the post reform case this abatement continues until around 37 hours of work.

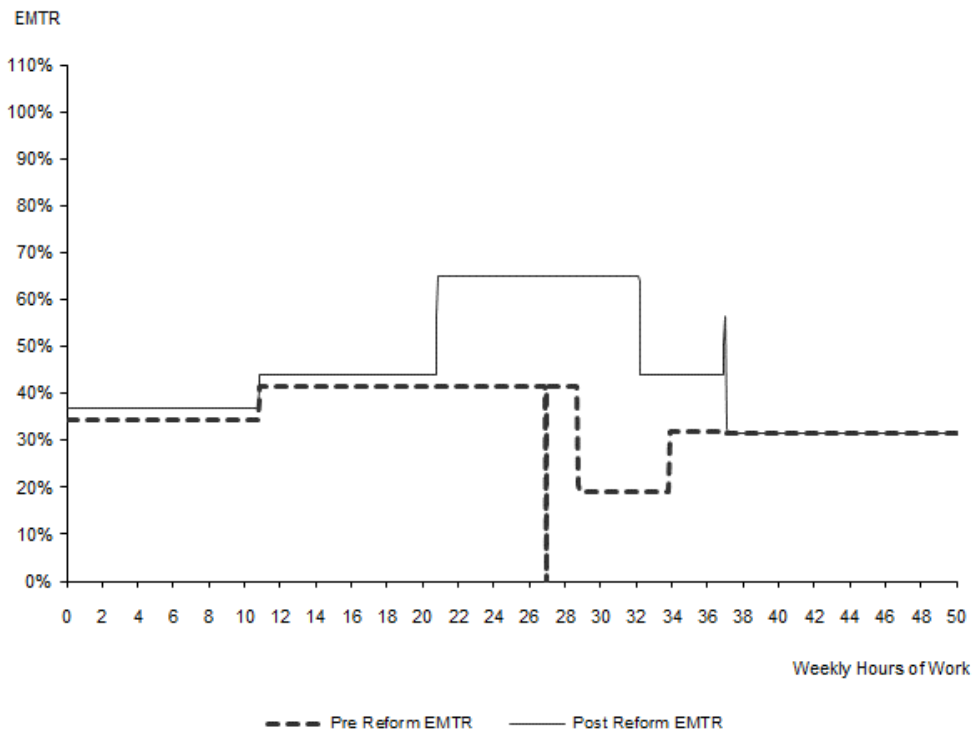
Figure 9 Effect of reform on net incomes (median earner with working spouse)



Source: Author's calculations

Note: It is assumed there is no change in gross income (this is thus zero and restricted to the x-axis)

Figure 10 Comparison of EMTR profiles before and after reform (median earner with working spouse)



Source: Author's calculations

The changes to Working for Families mean that this programme now interacts with the \$48,000 personal income tax threshold. At this income for this scenario family the Working for Families tax

credits are almost already fully exhausted (providing less than \$1) and so a higher EMTR is faced over only a very small range of earnings. This explains the spike in the EMTR post-reform profile at around 37 hours of work. Note that in the pre-reform profile there does not appear to be much of an increase in EMTRs when the higher personal income tax rate comes into effect as this occurs at around the same income at which the Independent Earner Tax Credit is fully abated.

3.3 Discussion

Although EMTRs are limited as a measure of the effect of the tax-benefit system (e.g., as they generally only measure change over the next dollar of income) the scenarios above still illustrated several points. For instance:

- putting differences in wage rates between family types to the side, beneficiaries without children working for *small* numbers of hours face higher EMTRs than beneficiary parents. This reflects the higher earnings disregards (income that can be earned before abatement begins) facing beneficiary parents;
- however, as these disregards have changed little over the last decade and a half (Nolan, P., 2003; Nolan, M., 2018b) their real value (and thus the difference between family types) has fallen;
- nonetheless, for all beneficiaries, once full abatement of the main benefit begins there are few incentives to work until income is sufficient to exit the benefit; and
- the disincentives for parents take place over a wider range of hours of work, reflecting the lower abatement at lower hours of work (for sole parents), higher levels of assistance, and abatement of the Working for Families Tax Credits.

This discussion highlights that not only can there be trade-offs between different objectives of the tax-benefit system but there are trade-offs within objectives too. Efforts to improve the incentives to work at one point, e.g., by increasing earnings disregards, can worsen the incentives elsewhere. An analogy can be drawn with a balloon. It is possible to squeeze a balloon downwards but – unless the overall volume of air in the balloon reduces – this will lead to it expanding out sideways. As the author noted in oral evidence to the House of Commons Work and Pensions Committee during the introduction of the Universal Credit in the United Kingdom:

effectively what you can do is you can squeeze the balloon downwards or sideways and you move the abatement around. That's all you can really do with the benefits system, because the more you put in, in terms of the more you spend on the benefits system, you always have to abate it somewhere else (House of Commons Work and Pensions Committee, 2011, response to Q26).

Lowering EMTRs at one point of the income distribution would imply that this abatement now takes place at another part of the income distribution. The only way to avoid this is to provide less assistance overall (which may conflict with other objectives). To give a practical example, an increase in an earnings' disregard may improve the financial returns from a very small number of hours of work, but is likely to come at an economic cost of worsening incentives for larger hours of work or work at higher wage rates (e.g., facing second earners in households) (House of Commons Work and Pensions Committee, 2011, response to Q28).

These trade-offs mean that when evaluating EMTRs it is difficult to avoid becoming an archetypal “two-handed economist.” As former US President Harry Truman once said: “give me a one-handed Economist. All my economists say ‘on one hand’, then ‘but on the other’.” The answer to this problem is to consider the specific location of “notches” (areas of high EMTRs) and how these interact with wage rates and the distribution of hours of work. As Binder and Rosen (1985) emphasised while linear taxes may impose relatively small excess burdens on everyone a notch imposes a relatively large excess burden on a smaller number of people. The aggregate excess burden thus depends on the distribution of individual tastes and endowments. They then went on to argue that:

Unlike linear incentives, notch schemes do not distort the behaviour of every person. Rather, if properly designed, they induce individuals to self select so that those who are most willing to change their behaviour are the ones who receive the subsidy (or avoid the tax) (Binder & Rosen, 1985, p. 745).

But designing notches (e.g., with tax credits) in this way requires locating them in the correct position in the distribution of hours of work, which is likely to be difficult to implement given the degree of population heterogeneity and the difficulty in accurately establishing the distribution of individual tastes and endowments.

This paper does not include primary analysis of the distribution of hours of work by wage rate and family type. There has, however, been valuable work undertaken in this area in New Zealand at the Treasury and Victoria University of Wellington (see, for example, Mercante & Mok, 2014a and 2014b). As they found (Mercante & Mok, 2014a, p. 11):

employment rates [tend] to be highest for partnered men, and lowest for partnered women and single parents (who are mostly women). Average working hours of workers are also highest for partnered men and lowest for partnered women and single parents. This is primarily due to the higher prevalence of part-time working hours for the latter two groups as indicated in the working hour distributions [...]. Partnered men work predominantly full-time at 40 hours or more.

Single men tend to have lower employment rates than partnered men, and of those who work, single men are more likely to work full-time than partnered women or single parents.

The practical significance of understanding these different distributions of hours of work can be illustrated with a finding in Creedy, Mercante & Mok (forthcoming). They show that the requirement for couples to work at least 30 hours to qualify for in-work assistance is unlikely to have had much of an effect on labour supply, given the fact that most married men are already working for at least 40 hours.

The key messages emerging from these distributions of hours of work appear broadly consistent with international work. For example, Blundell (2012, pp. 47-48) noted that over the last three decades in the UK, France, and the USA:

- hours of work are often found to respond less than employment decisions;
- for men, variations in the extensive margin occur mainly at the beginning and end of their working lives (schooling-work and early retirement margins);
- hours differences, conditional on employment, also matter for men and they matter across the working life;
- for women, both employment itself and hours vary across working lives;
- the extensive margin is also relatively important for women in the early and later periods of working life; and
- hours of work for women show more variation over the life-cycle, especially around child-bearing ages. As they noted, for “women with younger children it is not usually just an employment decision that is important, it is also whether to work part-time or full-time” (p. 48).

This work thus highlights the effect of the tax-benefit system on the intensive margin for men and both the extensive and intensive margin for women.

These results can also be seen in the context of the distribution of high hours of work in New Zealand. New Zealand has relatively high working hours by international standards. The 2011 Census showed that around 1 in 5 people work for 50 hours or more a week. Earlier research (Fursman, 2008 and 2009) showed that the type of households that long hours workers lived in were similar to those of the total workforce, and while workers with high incomes were most likely to work long hours, the majority of long hour workers were in lower income brackets. About 12.3% of people earning less than \$30,000 worked 50 hours or more compared to about 54.5% of people earning greater than \$100,000. However,

people with incomes under \$30,000 were a significantly larger group than those with incomes over \$100,000.

A key question is the degree to which families find that they need to work longer hours because their wage rates are low. This can reflect the presence of poverty traps, as with lower wage rates more hours of work are needed to leap over areas of high EMTRs. Yet there does not appear to be a simple relationship between low wages and long hours. Recent work by the New Zealand Work Research Institute (Cochrane et al., undated) on low pay showed that workers with relatively low wage rates tended to have a weak attachment to the labour market and relatively short employment spells. It is also useful to recognise that the assessment of EMTRs often does not include factors like take-up rates, institutional features of welfare benefits, like work tests and stand-down periods, and characteristics of the labour market (such as labour market segmentation). These institutional features can act as important constraints on reform. Nonetheless, this interaction between the tax-benefit system, long hours, and low pay could be a potentially fruitful area for future work.

4 Family and Working Tax Credits

4.1 Modelling approach

This paper includes modelling of family and working tax credits in five countries: New Zealand, Australia, Canada, the United Kingdom and the United States. The programmes modelled are:

- New Zealand: the Working for Families Tax Credits, which are made up of the Minimum Family Tax Credit, the Family Tax Credit, and the In-Work Tax Credit. Also modelled are the personal income tax scale, the ACC earners' levy and main welfare benefits (for the purposes of work testing). The Parental Tax Credit (and Best Start Programme) and Independent Earner Tax Credit are not included in this Section;
- Australia: the Family Tax Benefit Part A and Family Tax Benefit Part B;
- Canada: the Canada Child Tax Benefit, comprising the Basic Benefit and the National Child Benefit Supplement, and, as an example of provincial-level assistance, the British Columbia Family Bonus. As programmes abate against net income federal and provincial income taxes are also modelled;
- United Kingdom: the Child Tax Credit, Working Tax Credit, and Child Benefit (including Child Benefit means-testing). Note that these programmes are being replaced by the Universal Credit. The Universal Credit is not modelled in this note as it is not possible to separate the level of this payment that is effectively a main welfare benefit and the level that is replacing these tax credits; and
- United States: the federal Earned Income Tax Credit, Child Tax Credit, and, as an example of state-level assistance, the Wisconsin Earned Income Credit.

Further detail on these programmes can be found in an annex to this paper and for a summary of the history of these programmes in the early 2000s see Nolan, P. (2005) and Nolan, P. (2006). Note that the purpose of this comparison is to illustrate the key approaches taken in the design of tax credits. This requires relatively detailed modelling of how these programmes vary with family characteristics and wage rates. This is not a comparison of the overall levels of assistance in different countries. For an international comparison of overall levels of assistance for scenario families at particular parts of the income distribution see Fletcher (2015).

Over several decades there has been a shift towards tax credits playing a more prominent role in New Zealand's tax-benefit system. In other words, the balance has shifted away from first-tier to second tier programmes. As one example, more is now spent on the Working for Families Tax Credits (\$2,319 million in 2017 (Treasury, 2017, Table 6.2)) than Jobseeker Support and Emergency Benefit (\$1,697 million), Supported living payment (\$1,533 million), and Sole Parent Support (\$1,159 million). This shift in balance has reflected the use of tier-two programmes to account for variations in need due to factors like the numbers and ages of children and which, in turn, allowed for the simplification of main benefits.

However, among the five liberal welfare states studied in this paper this shift in the balance has not been all one way. The United Kingdom is an interesting example (Nolan, 2011). In this jurisdiction there was a significant expansion of tax credits under Labour-led governments (1997-2010) on grounds such as improving incentives to work for second earners. However, following the election of a Conservative-Liberal Democrat (and then Conservative) government in 2010 focus shifted towards reform of welfare benefits under the Universal Credit programme. This programme aimed to simplify tier one and tier two benefits and reflected a greater focus on reducing the number of workless households. The intention is to absorb the current system of family and work tax credits into the Universal Credit.

All figures are in New Zealand dollars adjusted using OECD purchasing power parity rates for 2016. Purchasing power parity rates illustrate the differences in the costs of a comparable basket of goods and services in different countries. Converting assistance into New Zealand dollars based on purchasing power parity rates illustrates the purchasing power that a family would have if the different

programmes were in operation in New Zealand. Purchasing power parity rates are used, rather than modelling assistance provided to a family at a particular point in the income distribution (such as a proportion of average production worker income), as modelling assistance at a point in the income distribution reflects both the distribution of wage rates and of hours of work. Further, PPPs are preferred to exchange rates as, as Stephens (2003) noted, “(PPPs) take account of differences in the price of a comparable basket of goods and services in each country rather than depending on the competitiveness of tradeables plus capital flows that dominate exchange rate determination.”

Table 2 Purchasing Power Parities for GDP (2016)

	National currency per US\$	National currency per NZ\$
AU\$	1.49	0.99
CAN\$	1.25	1.17
UKP	0.70	2.09
US\$	1.00	1.47
NZ\$	1.47	1.00

Source: OECD.Stat

These five countries have been modelled as they have all been classified as liberal or residual welfare states on the basis of their degree of welfare effort, reliance upon targeting, entitlement rules, and emphasis on work for poverty relief (Esping-Andersen, 1990). They have a common language and similar cultures, histories, economic structures, and political institutions, and have made prominent use of family and work tax credits. But there are also some important differences between them too. For instance, New Zealand and Australia place heavy reliance on non-contributory social assistance programmes provided without time limits for eligibility for assistance. Canada, the United Kingdom, and the United States use a mixture of contributory social insurance and non-contributory social assistance programmes, with the United States placing the greatest emphasis on time limits for eligibility for assistance. They also differ in the emphasis they place on spending on family cash benefits and use of active labour market policies in their welfare systems.

4.2 Results

Scenario 1: minimum wage sole parent

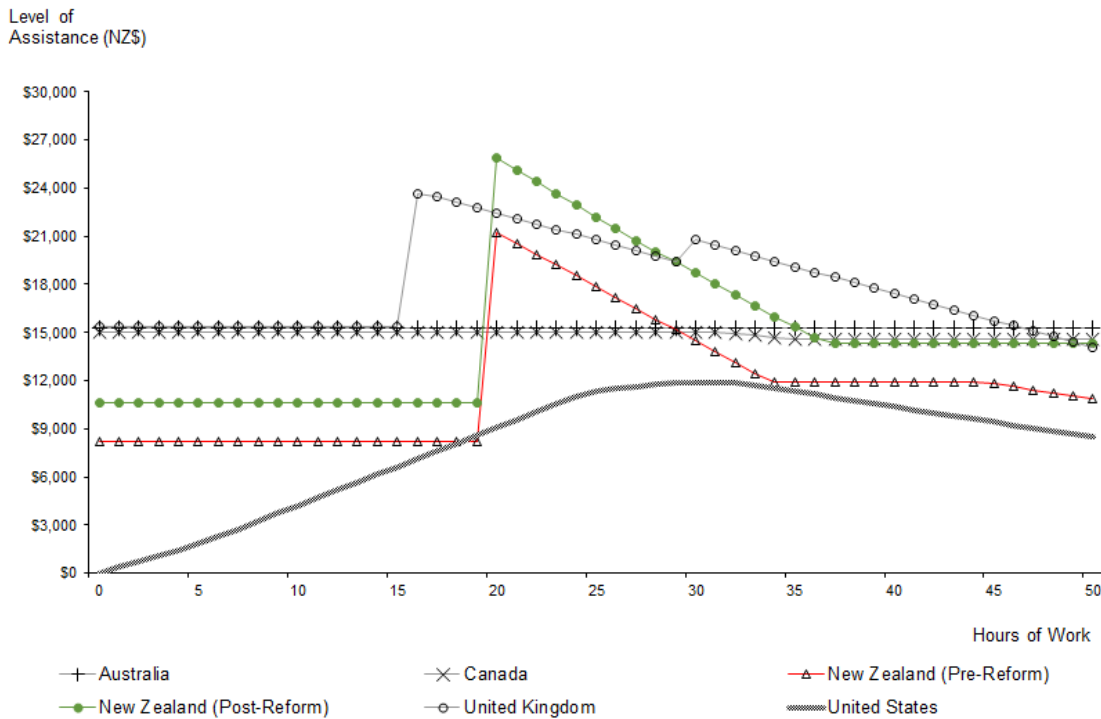
The first scenario is the case of a sole parent on minimum wage (Figure 11). This illustrates the family and working tax credits provided to a sole-parent with two children and earning minimum wage for up to 50 hours of work per-week. The figure also shows pre-reform and post-reform results for New Zealand. In this case the reforms modelled are aspects of the Government’s Families Package: a higher rate of Family Tax Credit, an increase in the Minimum Family Tax Credit, an increase in the Working for Families Tax Credit abatement threshold, and an increase in the Working for Families abatement rate. The Independent Earner Tax Credit and Best Start Programme are not included.

Variations in targeting regimes mean that the effects of changes in hours of work on assistance differ in the five countries. These differences indicate the degree to which the different countries target assistance on the basis of family structure as opposed to paid employment. In Australia there is no change in the level of assistance provided to this sole-parent at this wage rate if their hours of work vary between zero and 50 hours per week. Family tax credits in Canada are also largely targeted by family structure and not paid employment. At this wage rate the sole-parent receives similar levels of assistance from not working, working part-time, or working full-time.

The United States places greater emphasis upon targeting assistance by paid employment. Under the federal Earned Income Tax Credit and state-level programme (the Wisconsin Earned Income Credit) the assistance provided to the sole-parent increases with earnings from work until their income reaches a threshold. At low hours of work the levels of assistance are low. This phase-in of assistance boosts financial incentives to increase hours of work in this range. At a little over 5 hours a week this family

qualifies for the Child Tax Credit, which provides assistance to families with earned income above a threshold, and which only begins to abate at high-income levels. Above this threshold the level of assistance remains stationary until the sole-parent's earned income reaches the threshold for abatement of the Earned Income Tax Credit (creating disincentives to increase hours of work).

Figure 11 Comparison of tax credits (sole parent)



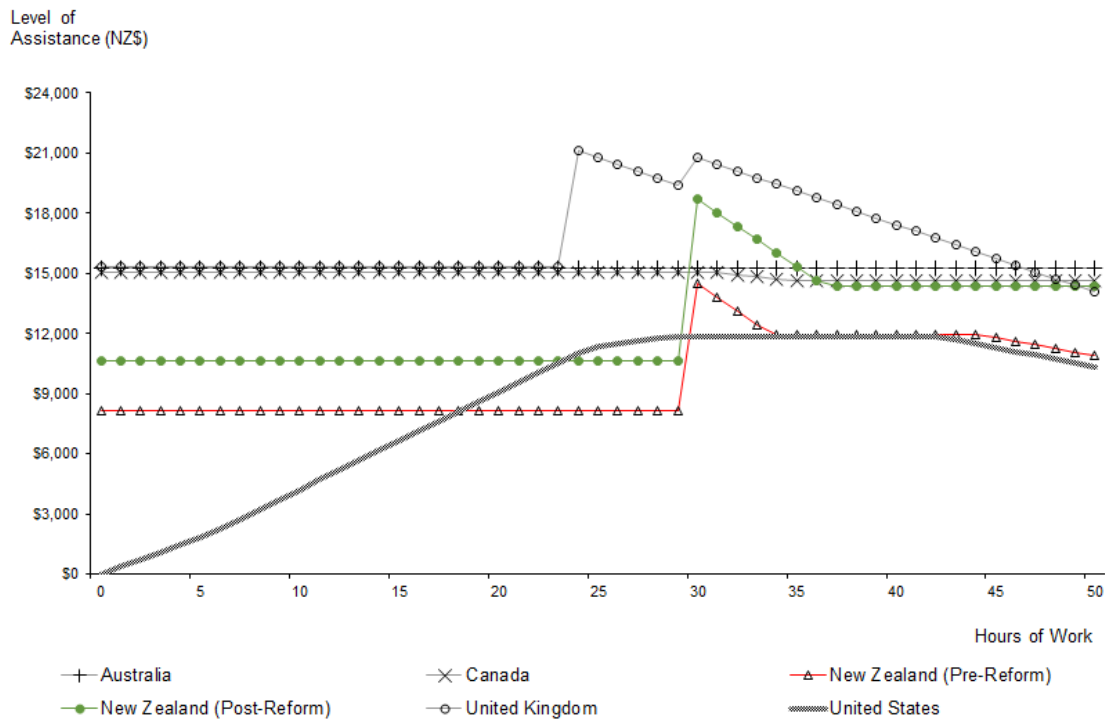
Source: Author's calculations

Both the United Kingdom and New Zealand use hours-based thresholds to target in-work assistance (along with rules excluding recipients of main welfare benefits). In New Zealand employment tax credits are only available to families with dependent children and who satisfy hours-based eligibility criteria (20 hours per week for sole-parents and 30 hours per week for partnered families). In the United Kingdom since 2003 the Working Tax Credit has been paid to people in work both with and without children. Eligibility requires satisfying an hours-based eligibility threshold (at least one income earner in the family working 16 hours per week) and a full-time premium is paid when total family hours of work exceed 30 hours per week. This use of hours-based thresholds in New Zealand and the United Kingdom is likely to lead to notches in budget constraints.

Scenario 2: single income (minimum wage) partnered family

The second scenario illustrated is the case of a partnered parent on minimum wage. The family is assumed to have one income earner and two young children. As with the earlier scenario, the reforms modelled are aspects of the Government's Families Package: a higher rate of Family Tax Credit, an increase in the Minimum Family Tax Credit, an increase in the Working for Families Tax Credit abatement threshold, and an increase in the Working for Families abatement rate. The Independent Earner Tax Credit and Best Start Programme are not included. Note that as this family is assumed to have the same number of children (with the same ages) and the same rate (and one earner) as scenario one the profiles for the two scenarios are similar. The main differences between the two scenarios occur in New Zealand and the United Kingdom, due to the use of hours-based eligibility thresholds for in-work assistance that differ between single and partnered families.

Figure 12 Comparison of tax credits (single income (minimum wage) partnered family)



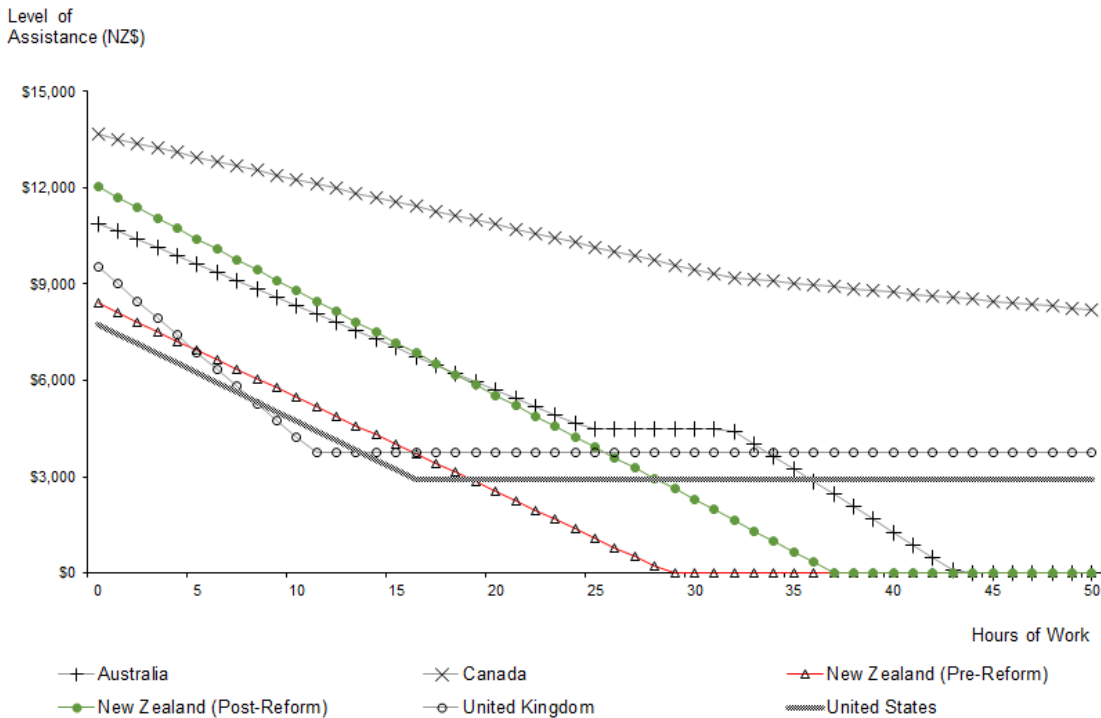
Source: Author's calculations

Scenario 3: median earner with working spouse family

The third scenario illustrated is the case of a partnered parent with median hourly earnings and a working spouse (working 20 hours a week at the New Zealand minimum wage). As with the other scenarios the family has two young children. The reforms modelled are also aspects of the Government’s Families Package.

The figure shows that at higher hours of work the programme in New Zealand have less spill-over of spending to the non-poor. Spill-over can be associated with fiscal churn (where families face higher taxes to fund the transfers they receive). Nonetheless, some commentators argue that greater targeting efficiency can be associated with complexity but in practice this relationship is not so simple. Indeed, the fiscal cost associated with poorly targeted programmes can drive increases in complexity in other parts of the tax-benefit system (to find fiscal savings). Complexity reflects the number of objectives programmes aim to address and is heavily influenced by administrative approaches (e.g., what income period is used for assessment, disregards for fluctuations in circumstances, etc.).⁹

⁹ It is also sometimes argued that expanding the receipt of transfers can increase the political support for transfers but, looking at UK data on social attitudes, Nolan, P. (2012) argued that expanding welfare to groups not in need had “damaged the integrity of the welfare system. Analysis of the British Social Attitudes Survey showed that, as spending on welfare increased, there was a fall in the number of people who believed that benefits are too low and cause hardship. Yet the reality is that benefits like the unemployment benefit have become less generous (as a percentage of average earnings) over time. This difference between perception and reality is not surprising, as extending welfare to wealthy families for political reasons reinforces an impression that the system spends money poorly.”

Figure 13 Comparison of tax credits (median earner with working spouse)

Source: Author's calculations

4.3 Discussion

Family and working tax credits have at times been suggested as key instruments for addressing the problems associated with high EMTRs (poverty traps). One advantage of tax credits (see Table 3) is that they can provide tax relief on a more targeted (less fiscally costly) basis than changes to personal income tax scales. The personal tax scale is a broad instrument and so even small changes in thresholds and rates can lead to a very large fiscal cost.^{10,11} Further, as they can be delivered through personal income tax systems they are seen to more strongly reinforce work effort than welfare benefits and their use is often part of a reform strategy emphasising active labour market policies. Yet, increasing the generosity of tax credits (even if targeted by work effort) would at some point require abatement to increase. Unless their generosity is reduced tax credits can at best shift but not eliminate financial disincentives to work. This contrasts with personal income tax reductions, which (assuming that taxes elsewhere do not need to rise to offset the loss of revenue) would unequivocally improve substitution effects.¹²

The design of tax credits can be seen on two levels. The first is how coverage is restricted to the population of interest based on criteria such as civil status, family size, age of family members, citizenship, etc. Once the population(s) of interest has been targeted then assistance can be designed to achieve desired policy objectives for this group(s), such as those relating to income adequacy, work

¹⁰ In New Zealand in 2017 the taxation of individuals accounted for 45% (\$33.910 billion of \$74.973 billion) of government tax revenue from around 3.6 million taxpayers. Based on the December 2017 Half Year Economic and Fiscal Update (p. 111), individual direct tax (\$33.910 billion) was made up of source deductions of \$28.641 billion, other persons tax of \$6,382 billion, refunds to taxpayers of \$1,638 billion, and fringe benefit tax of \$0.525 billion. Total Crown taxation was \$74.973 billion. The number of taxpayers is based on individual customers and includes 0.1 million taxpayers with zero taxable incomes.

¹¹ Changes to the personal income tax scale can be made via increases in the thresholds at which particular tax rates apply, changes in the rates themselves, or some combination of both. The fiscal effect of threshold and rate changes differ though, with the potential static level of relief provided by changes in tax thresholds automatically being capped while the potential static cost of reductions in the top personal tax rate being uncapped (as there is no limit to the amount of income over which a lower rate applies). The dynamic fiscal effect, however, is likely to be different again (partly depending on the elasticity of the taxable incomes) and any assessment would require a detailed analysis of the income and substitution effects created by changes

¹² It is also important to note that personal income tax reductions (and, of course, tax credits) may also create income effects (e.g., allowing an individual to achieve a desired level of income at lower hours of work) that could weaken incentives to work.

incentives, protecting the (real or relative) purchasing power of transfers (indexation), etc. This takes place within the constraint of fiscal objectives.

Table 3 Relative strengths and weaknesses of interventions

<p>Minimum Wage</p> <ul style="list-style-type: none"> • Supports concepts of fairness of reward and socially acceptable incomes • Reduces demand for low-wage labour • Low (static) fiscal cost to Government, but increases costs faced by businesses • Effectiveness at lifting incomes reduced by poverty traps 	<p>Personal Income Tax Schedule</p> <ul style="list-style-type: none"> • Simple • Broadly received • Fiscally costly (rate changes costlier than threshold changes, <i>ceteris paribus</i>) and low poverty reduction effectiveness • Reduction (although often small) in poverty traps
<p>Family and Work Tax Credits</p> <ul style="list-style-type: none"> • Some complexity in their design • Able to target assistance on basic criteria (e.g., joint taxable income, numbers and ages of children) • Cost effective way of providing moderate levels of assistance to many households • Seen to reward work effort, although they create poverty traps 	<p>Welfare Benefits</p> <ul style="list-style-type: none"> • Complex design • Able to narrowly target assistance • Cost effective way of providing a lot of assistance to relatively few households • Able to respond to fluctuations in need or family circumstances • Create poverty traps

Source: Nolan, P. (2007)

The scenarios above illustrated how differently the five countries have answered these design questions:

- one of the key dimensions is the age of children, as reflected in variation in age-related scales. The UK and US have no age-related variation for eligible children, Canada has an add-on for children under 6, Australian assistance both increases (Part A) and decreases with age (Part B), and until recently New Zealand increased assistance with age;¹³
- there is also wide variation in the recognition of the numbers of children. Australia does not vary the per-child rate for larger/smaller families, the UK has no variation in tax credits (but more Child Benefit for oldest children in families), Canada has no variation in unabated entitlement but abatement increases with family size, in the United States subsidy rates/thresholds (levels of assistance) and abatement increase with family size, and in New Zealand there is more assistance for the first child;
- there are different approaches to how marital status is treated. In New Zealand and the UK the hours-based thresholds differ between married and single families, and joint filing in the US the thresholds for abatement of tax credits differ between married and unmarried families; and
- finally, the countries illustrate different approaches to encouraging work. The programmes generally fall into three groups – no explicit work focus (vary little with earnings), assistance increases with earnings, and thresholds based on hours of work. Hours-based thresholds produce significant “notches” in budget constraints.

Treatment of family types is thus complex but, as an illustration, further scenarios are shown in the table below. These are not necessarily representative and so should be treated with care. They use a sole parent with one child as the benchmark, and calculate the assistance to other family types as a proportion of this. Again, it is useful to emphasise that the purpose of this comparison is to illustrate the

¹³ Separate Family Support (the precursor to the Family Tax Credit) rates for younger (0-15) and older (16-18) children were first introduced in 1989-90. The rate for older children was more generous. In contrast, between 1976 and 1983 there were a number of tax rebates which provided greater assistance to families with younger children (see Nolan, P., 2002 and 2005).

key approaches taken in the design of tax credits, this is not a comparison of the overall levels of assistance in different countries. For an international comparison of overall levels of assistance for scenario families at particular parts of the income distribution see Fletcher (2015).

Table 4 Hypothetical illustration of treatment of different family types

	Base case: sole parent, 20 hours work, \$16.50 per hour, one 5- year-old child	Sole parent, 20 hours work, \$16.50 per hour, one 16- year-old child	Sole parent, 20 hours work, \$16.50 per hour, three 5- year-old children	Married, single income, 20 hours work, \$16.50 per hour, one 5- year-old child	Married, 20 hours work each, \$16.50 per hour, one 5-year-old child
NZ (Pre)	100%	103%	137%	27%	48%
NZ (Post)	100%	100%	145%	28%	46%
AU	100%	116%	227%	100%	63%
CA	100%	84%	329%	100%	100%
UK	100%	100%	158%	53%	67%

Source: Author's calculations

The assistance provided by tax credits varies widely by the number and ages of children in the family. These implicit equivalence scales tend to reflect assumptions regarding the degree to which the costs of raising children vary with their ages. There is no one single view on how these costs should be recognised. This is perhaps not surprising given the range of ways in which “the costs of children” can be defined (Bradbury, 2003). Are they just the direct expenditures made by families? Or should broader costs, such as the opportunity cost of parents’ foregone time in the labour market, be taken into account? And, as well as costs, should weight also be given to the benefits that children provide parents and society more widely (in both financial and non-financial terms)?¹⁴ Yet given the importance of these scales there has been surprisingly little attention given to the assumptions that underpin them.

Tax credits can also be designed to recognise variations in work effort. But again there is no one single view on the best way to do this (or, indeed, if this is an appropriate objective). Decisions need to be made regarding how assistance varies with changes in income, the use of hours based thresholds, and the eligibility status of recipients of main benefits. Further, in a significant number of cases families’ incomes or work status will vary throughout the year. Indeed, compared to the demographic criteria discussed above work-related criteria are likely to be relatively responsive to the design of programmes themselves.¹⁵

In New Zealand the decision to target work effort has been the subject of debate. The Child Poverty Action Group (CPAG) has argued that the Working for Families Tax Credits should not be targeted on these grounds. Yet maintaining a margin between the income from welfare and income from work can be seen as important in signalling work as a route out of poverty. The CPAG has argued that the EMTRs created by the abatement of assistance weakens the effectiveness of this strategy. But if this is of concern then the logical reform would address the disincentives facing the working poor not provide

¹⁴ This issue of the potential benefits of children can be a useful illustration of the difference between “welfarists” and “non-welfarist” models (e.g., the distinction between conditional and unconditional equivalence scales (Bradbury, 2003, in Nolan, P., 2005, p. 47). This can also be seen in the distinction between early optimal tax theory and later work incorporating a poverty minimisation objective. As Bradbury (1999, in Nolan, P., 2005, p. 29) showed, a “poverty minimisation objective differs from the welfarist objective in two ways. First, as poverty is a function of income no value is assigned to the consumption of leisure by the poor. (In some cases a negative value can be assigned to this leisure.) Second, a poverty minimisation objective involves a tighter focus on individuals at the bottom of the income distribution. Consequently this poverty minimisation objective can be seen as being relatively consistent with values often expressed in policy discourse.”

¹⁵ This does not mean that demographic criteria are completely unresponsive to tax-benefit programmes. There may, for example, be marriage penalties. As Nolan, P. (2008, p. 8) noted, “Marriage penalties occur when two parents (or spouses) have a higher total income (net of income transfers and living costs) when separated than when a partnered unit. The presence of marriage penalties means that some people are discouraged from entering into or remaining in a relationship in the nature of marriage by the family income assistance system.”

additional assistance to people out of work. To cite the working poor as a reason for extending in-work assistance to non-working households is a *non-sequitur*.

Indeed, providing assistance targeted to the working poor is consistent with a view that families in work require additional assistance given the particular costs that face working families and which do not face families out of work (such as transport and childcare costs). It could be argued that it is, alternatively, possible to both provide support to people out of work and the working poor but, given fiscal constraints, reducing the degree of targeting of particular programmes would increase expenditure (including to people not in poverty) and so require some combination of reductions in spending on other tax-benefit programmes, reductions in spending elsewhere, and/or an increase in tax burdens. And there are trade-offs in the design of financial incentives within an EMTR schedule.

Overall this discussion shows how, both internationally and within New Zealand, there are many and varied ideas on how tax-benefit systems could be improved. Advocates sometimes get frustrated that governments do not adopt these ideas. Some attribute this to “a lack of political courage” (or, more charitably, “imagination”), “ideology” (e.g., aversion (or otherwise) to poverty or inequality, support for concepts of “just deserts”), or “short-term focus on fiscal constraints.” But many of these criticisms miss the point. There are practical barriers to reform. For instance, as John Kay (2017) noted in relation to the idea of a universal basic income:

The complexity of current arrangements is not the result of bureaucratic perversity. It is the result of attempts to solve the genuinely difficult problem of meeting the variety of needs of low-income households while minimising disincentives to work for households at all income levels – while ensuring that the system established for that purpose is likely to sustain the support of those required to pay for it.

As in other areas of policy, it is simply not the case that there are simple solutions to apparently difficult issues which policymakers have hitherto been too stupid or corrupt to implement.

Thus, even if there is a shared view on “what the desired outcomes of the tax-benefit reform should be” (objectives for revenue, poverty reduction, etc.) there would still be questions regarding what is the best way of going about achieving these objectives. Practical questions (see, for example, Alstott (1994) and Inland Revenue Department (2017)) include:

- What are the roles of different policy instruments (minimum wages, changes in personal income tax thresholds and rates, family and working tax credits, and main welfare benefits)?
- What are some of the key design questions for these instruments? For instance: How accurately should income be measured? Do we need to know who recipients share income or resources with? How important are fluctuations in circumstances? What role should compliance-based thresholds play?
- How does the system fit together as a whole and what are workable metrics for assessing performance?

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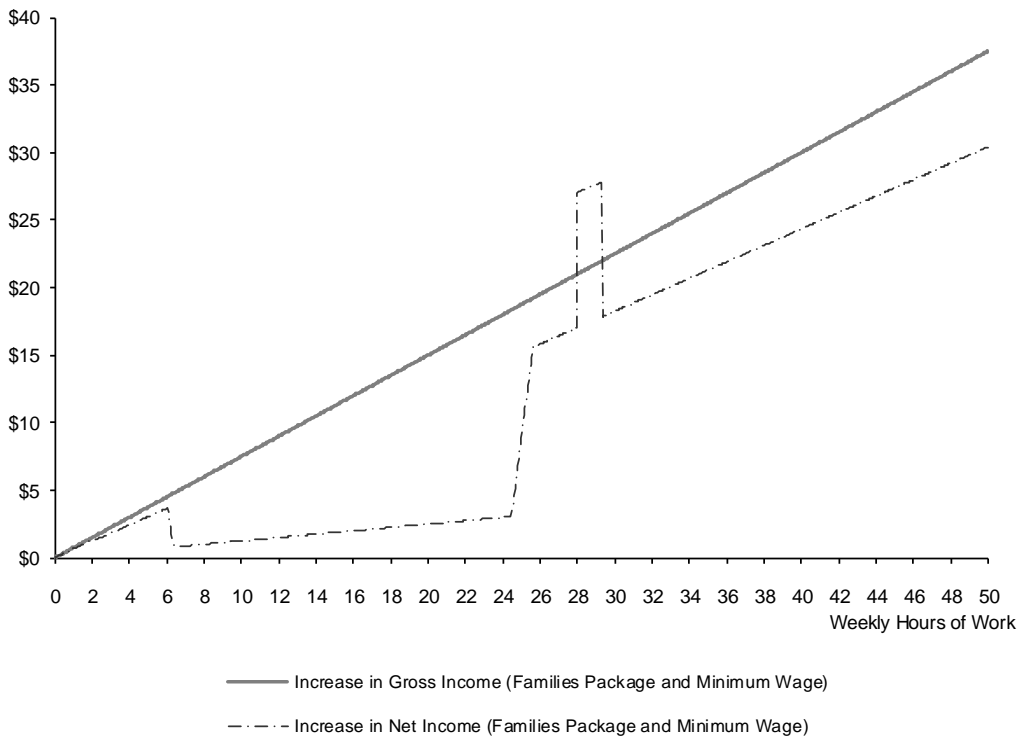
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Appendix A EMTR profile of single person without children

Scenario of a single person without children

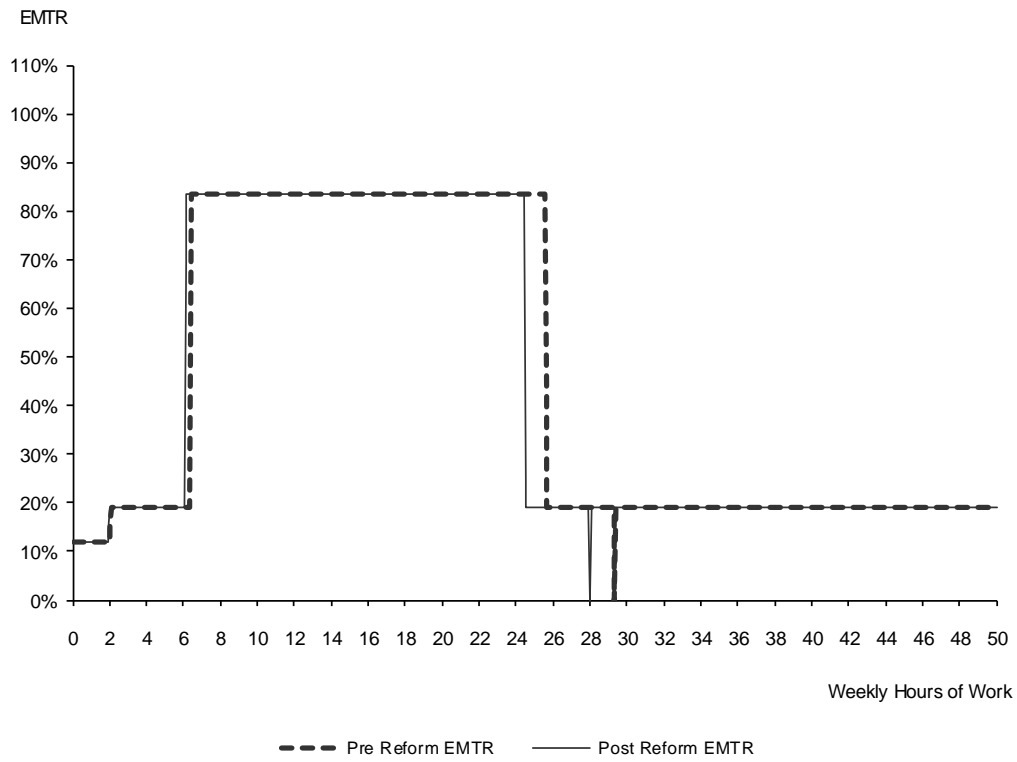
This appendix illustrates an alternative scenario of a single person without children. As with the earlier scenarios, the reforms modelled are aspects of the Government’s Families Package and the increase in the minimum wage. Figure 14 compares gross and net incomes before and after policy changes. These changes are reflected in the comparison of the EMTR profiles in Figure 15. Up to around 24 hours of work much of the increase in gross earnings is lost in taxation and benefit abatement. However, above this point the main benefit is fully abated and so there is a significant drop in the EMTRs faced. Further, the higher wage rate means this person become eligible for the Independent Earner Tax Credit slightly earlier (at around 28 hours of work).

Figure 14 Effect of reform on net incomes (single income (minimum wage) single person)



Source: Author’s calculations

Figure 15 Comparison of EMTR profiles before and after reform (single income (minimum wage) single person)



Source: Author's calculations

Appendix B Family and Work Tax Credits

Table 5 New Zealand Family and Employment Tax Credits (1 April 2018)

Programme	Features	Design
Family Tax Credit	<p>Assistance to families with dependent children</p> <p>No work test. Abates against joint net specified income</p> <p>Refundable tax rebate</p> <p>Paid to primary caregiver and can be spilt in cases of joint custody (based on the period for which they are primary caregivers)</p>	<p>Unabated payment per-child: eldest child: \$5,878 additional child: \$4,745</p> <p>Gross abatement threshold: \$42,700</p> <p>Abatement above threshold: 25%</p>
In-Work Tax Credit	<p>Assistance to working families with dependent children</p> <p>Abates against joint net specified income</p> <p>Refundable tax rebate</p> <p>Paid to primary caregiver and can be spilt in cases of joint custody (both caregivers can be eligible for the full amount)</p>	<p>Unabated payment per-family: \$3,744</p> <p>Add-on for 4th and additional children: \$780</p> <p>Abatement: added to Family Tax Credit (total amount abates as one)</p> <p>Work test: 30 hours of work per-week for a couple and 20 hours for a sole-parent. Recipients of welfare benefits excluded</p>
Minimum Family Tax Credit	<p>Ensures a minimum net income for working families with dependent children</p> <p>Abates against joint net specified income</p> <p>Refundable tax rebate</p> <p>Paid to primary caregiver and can be spilt in cases of joint custody (based on the period for which they are primary caregivers)</p>	<p>Guaranteed minimum net family income \$26,156</p> <p>Work test: As above</p> <p>Abates dollar-for-dollar against increases in net specified family income</p>
Personal Income Tax Scale	Based on annual individual taxable income	Thresholds of \$14,000, \$48,000, and \$70,000, with associated rates of 10.5%, 17.5%, 30%, and 33%
Main Benefits	Based on family income and subject to stand down (based on average weekly income (before tax) in the 26 or 52 weeks immediately before client's entitlement date and number of dependent children)	Can be summarised into four benefit types: single no children (e.g., 25+ rate), single with children, partnered no children, partnered with children

Note:

- Several tax credits are from the international comparison in Section 4 (although are included in the modelling in Section 3). These are: Best Start Programme (replacing the Parental Tax Credit), which provides assistance to working families with a newly born dependent child; Independent Earner Tax Credit (IETC): which is provided to individuals who earn between \$24,000 and \$48,000 (after expenses and losses) a year. This latter credit pays \$10 per week and abates at a rate of 13% on incomes above \$44,000.

Table 6 Australian Family Tax Credits (1 July 2017 (NZ\$))

Programme	Features	Design
Family Tax Benefit Part A	Assistance to families with dependent children	Unabated annual payment per-child: under 13: \$5,415 (AU\$5,504.20)
	Base level of assistance abates only at high incomes	13 to 19: \$6,864 (AU\$6,938.65)
	Abatement threshold for base rate increases with number of children	Unabated annual year-end supplement: \$729 (AU\$737.30) per-family
	Additional annual supplement paid at year-end	Gross abatement threshold one: \$51,136 (AU\$52,706)
	No work test	Gross abatement threshold two: \$93,297 (AU\$94,316)
	Abates against joint income	Abatement rate between thresholds one and two: 20%
	Refundable tax rebate Paid to nominated caregiver	Abatement rate above threshold two: 30%
Family Tax Benefit Part B	Assistance to families largely dependent on a single income	Unabated payment per-family: youngest child under five: \$4,345 (AU\$4,412.65)
	Sole-parents with incomes below \$98,919 (AU\$100,000) are not subject to income test. Fully withdrawn above this point	youngest child over five: \$3,156 (AU\$3,190.10)
	In couples with a primary income below a threshold abates against lowest income earner's income only	Gross secondary abatement threshold: \$5,488 (AU\$5,548) Abatement rate: 20%
	Refundable tax rebate	Gross primary abatement threshold \$98,919 (AU\$100,000). Fully withdrawn above this point
	Paid to nominated caregiver	

Note:

1. Unless stated otherwise annual figures in NZ\$ (based on OECD 2016 purchasing power parity rates (constant prices)) and rounded to nearest dollar

Table 7 Canadian Family and Employment Tax Credits (2016 Base Year for 2017-2018 Payments (NZ\$))

Programme	Features	Design	
Canada Child Benefit	Assistance to families with dependent children	Basic benefit per child: \$6,170 (C\$5,400)	
	No work test	Add-on for Child Under 6: \$1,142 (C\$1,000)	
	Abates against joint income (previous year)	Net abatement threshold one: \$34,275 (C\$30,000)	
	Refundable tax rebate		
	Paid to nominated caregiver		Abatement rate one for one child family: 7%
			Abatement rate one for two child family: 13.5%
			Abatement rate one for 3 child family: 19.0%
			Abatement rate one for 4+ child family: 23.0%
			Net abatement threshold two: \$74,263 (C\$65,000)
			Abatement rate two for one child family: 3.2%
			Abatement rate two for two child family: 5.7%
			Abatement rate two for 3 child family: 8.0%
			Abatement rate two for 4+ child family: 9.5%
BC Family Bonus		Assistance to families with dependent children	Base rate \$1,522 (C\$1,332)
	No work test	Base abatement threshold \$23,421 (C\$20,500)	
	Abates against joint income (previous year)	Abatement rate one child family 9 percent	
	Refundable tax rebate	Abatement rate 2+ child family 18 percent	
	Paid to nominated caregiver		Additional abatement threshold \$34,275 (\$30,000)
			Abatement rate first child 12.2 percent
			Abatement rate second child 23 percent
			Abatement rate additional children 33.3 percent

Note:

1. Unless stated otherwise annual figures in NZ\$ (based on OECD 2016 purchasing power parity rates (constant prices)) and rounded to nearest dollar

Table 8 United Kingdom Family and Employment Tax Credits (1 July 2016 (NZ\$))

Programme	Features	Design
Working Tax Credit	Eligibility threshold 16 hours of work by one worker	Unabated Basic Element \$4,098 (£1,960)
	Full-time premium paid for 30+ joint hours of work	Unabated Couple and Sole-Parent Element \$4,203 (£2,010)
	Paid to person working 16 hours or more per week (couples with two eligible workers may elect who receives the payment)	Unabated Full-Time Premium \$1,694 (£810)
Child Tax Credit	Assistance to families with dependent children	Unabated Child Element (children below 16) \$5,812 (£2,780)
	No work test	Gross Abatement Threshold (Incl. WTC) \$13,423 (£6,420)
	Abates against joint income	Gross Abatement Threshold (CTC only) \$33,673 (£16,105)
	Refundable tax rebate	Abatement rate 41 percent
Child Benefit	Paid to primary caregiver	Eldest qualifying child \$2,251 (£1,076)
		Additional children \$1,490 (£712.40)
		Means test threshold \$104,541 (£50,000)
		Abatement rate 10 percent

Note:

1. Unless stated otherwise annual figures in NZ\$ (based on OECD 2016 purchasing power parity rates (constant prices)) and rounded to nearest dollar

Table 9 United States Family and Employment Tax Credits (1 July 2016 (NZ\$))

Programme	Features	Design	
Earned Income Tax Credit	Assistance to low-income working families	Subsidy Rate: 0 Children: 7.65%	
	Abates against joint income	1 Child: 34%	
	Refundable tax rebate	2 Children: 40%	
	Paid to primary caregiver (if appropriate)	2+ Children: 45%	
	Where caregiving responsibilities shared equally in separated families paid to taxpayer with highest adjusted gross income (tie-breaker rule)		Earnings Phase Threshold: 0 Children: \$9,585 (US\$6,610)
			1 Child: \$14,385 (US\$9,920)
			2 Children: \$20,199 (US\$13,930)
			2+ Children: \$20,199 (US\$13,930)
			Married Cap Phase Threshold: 0 Children: \$20,040 (US\$13,820)
			1 Child: \$34,424 (US\$23,740)
		2 Children: \$34,424 (US\$23,740)	
		2+ Children: \$34,424 (US\$23,740)	
		Other Cap Phase Threshold: 0 Children: \$11,992 (US\$8,270)	
	1 Child: \$26,377 (US\$18,190)		
	2 Children: \$26,377 (US\$18,190)		
	2+ Children: \$26,377 (US\$18,190)		
	Abatement Rate: 0 Children: 7.65%		
	1 Child: 15.98%		
	2 Children: 21.06%		
	2+ Children: 21.06%		
Child Tax Credit	Assistance to families with dependent children and income over a threshold	Entitlement Threshold: \$4,350 (US\$3,000)	
	Partly refundable	Credit above threshold: 15%	
	Paid to primary caregiver (if appropriate)	Credit per-child (under 17): \$1,450 (US\$1,000)	
	Where caregiving responsibilities shared equally in separated families paid to taxpayer with highest adjusted gross income (tie-breaker rule)		Abatement Threshold (single): \$108,754 (US\$75,000)
			Abatement Threshold (married, single file): \$159,506 (US\$110,000)
	Abatement Rate: 5%		

Wisconsin Earned Income Credit	Assistance to low-income working families	Subsidy rate:
	Abates against joint income	0 Children: 0%
	Refundable tax rebate	1 Child: 4%
	Paid to primary caregiver (if appropriate)	2 Children: 11%
	Where caregiving responsibilities shared equally in separated families paid to taxpayer with highest adjusted gross income (tie-breaker rule)	3+ Children: 34%

Note:

- Note: Unless stated otherwise annual figures in NZ\$ (based on OECD 2016 purchasing power parity rates) and rounded to nearest dollar