

Mok, Penny; Mercante, Joseph

Working Paper

Working for Families changes: The effect on labour supply in New Zealand

New Zealand Treasury Working Paper, No. 14/18

Provided in Cooperation with:

The Treasury, New Zealand Government

Suggested Citation: Mok, Penny; Mercante, Joseph (2014) : Working for Families changes: The effect on labour supply in New Zealand, New Zealand Treasury Working Paper, No. 14/18, ISBN 978-0-478-43600-6, New Zealand Government, The Treasury, Wellington

This Version is available at:

<https://hdl.handle.net/10419/205673>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Working for Families changes: The effect on labour supply in New Zealand

Penny Mok and Joseph Mercante

New Zealand Treasury Working Paper 14/18

November 2014



THE TREASURY

Kaitohutohu Kaupapa Rawa

New Zealand Government

DISCLAIMER

The views, opinions, findings, and conclusions or recommendations expressed in this Working Paper are strictly those of the author(s). They do not necessarily reflect the views of the New Zealand Treasury or the New Zealand Government. The New Zealand Treasury and the New Zealand Government take no responsibility for any errors or omissions in, or for the correctness of, the information contained in these working papers. The paper is presented not as policy, but with a view to inform and stimulate wider debate.

Access to the data used in this paper was provided by Statistics New Zealand in accordance with security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics New Zealand.

**NZ TREASURY WORKING
PAPER 14/18**

Working for Families changes: The effect on labour supply in
New Zealand

MONTH/YEAR

November 2014

AUTHOR/S

Penny Mok
New Zealand Treasury
1 The Terrace
Wellington
New Zealand
Email penny.mok@treasury.govt.nz
Telephone +64 4 917 6274
Fax +64 4 473 0982

Joseph Mercante
Australia Treasury
Langton Crescent
Parkes Act 2600
Australia
Email joseph.mercante@treasury.gov.au
Telephone +61 2 6263 3370
Fax +61 2 6263 4322

ISBN (ONLINE)

978-0-478-43600-6

URL

Treasury website at November 2014:
<http://www.treasury.govt.nz/publications/research-policy/wp/2014/14-18>
Persistent URL: <http://purl.oclc.org/nzt/p-1695>

ACKNOWLEDGEMENTS

We would like to thank John Creedy, Gerald Minnee, Angela Mellish, Chris Ball and referees for their helpful comments and assistance. This paper was undertaken while Joseph Mercante was on secondment to the New Zealand Treasury.

NZ TREASURY

New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND
Email information@treasury.govt.nz
Telephone 64-4-472 2733
Website www.treasury.govt.nz

Abstract

This paper examines the labour supply responses to the Working for Families (WfF) package of welfare reforms, which was fully implemented in 2008. The policy changes were implemented with the aim to encourage benefit recipients to participate in the labour market and to address income adequacy issues for families with children. The results presented in this paper are obtained using the behavioural microsimulation model for New Zealand, TAXMOD-B. We used the Household Economic Survey (HES) in 2008/09 to capture the full effect of the policy. It is estimated that the introduction of the new policy increases labour supply of sole parents by an average of 0.62 hours per week, but decreases labour supply of married men and women by 0.10 and 0.50 hours per week, respectively. The negative effects for married couples with dependents are about 16 and 41 times larger than for married couples without dependents, with the largest difference observed for married women. A good way of validating the results is by comparing our ex-ante simulated effects of a policy change with the ex-post estimated effects of the policy change after it has been introduced. While it is often difficult to find policy changes which could be used to test TAXMOD-B in a similar way, the Ministry of Social Development (MSD) and Inland Revenue department (IR) have estimated labour supply effects after the WfF changes were introduced. The overall labour supply results from the simulation are in the same direction and of similar magnitudes as the ex-post results from the WfF evaluation reports. Our analysis shows that after allowing for labour supply changes, the cost of the policy change increases for couples but decreases for sole parents. These changes in labour supply are reflected in the tax revenue, family payment and benefit income changes for both subgroups. Overall, our results show that the WfF reform reduced the incidence and intensity of poverty as well as income inequality.

JEL CLASSIFICATION

C25
J22

KEYWORDS

Working for Families; labour supply; discrete choice model; microsimulation; New Zealand.

Executive Summary

This paper presents the labour supply responses to the Working for Families (WfF) package of welfare policy changes which was fully implemented in 2008 using the New Zealand Treasury's behavioural microsimulation model, TAXMOD-B. The changes included shifting financial support for children from the welfare system to the tax system, increasing the rates of the Family Tax Credit and Accommodation Supplement (AS), introducing the In-work Tax Credit and changes in the abatement regime of WfF tax credits. The policy was introduced with the aim to encourage beneficiaries with children to participate in the labour market. This paper simulates employment responses from the WfF policy changes using a simulation approach and then compares the results to an ex-post evaluation study by Inland Revenue (IR) and the Ministry of Social Development (MSD) in 2010.

In addition, our paper analyses the impact of the reforms on net government expenditures and on income distribution and poverty. Our analyses focus primarily on responses by married couples and sole parents. Singles are affected by the change in the AS but this change is not well captured in TAXMOD-B and is a relatively small change compared to the family payments in the WfF reform. Thus, there are very small labour supply responses by singles.

With the relatively low participation rate of sole parents observed in the data (slightly above 50%) and the increase in Family Assistance which has an accompanying work test where sole parents must work for at least 20 hours per week, we expect a potentially significant increase of labour supply for sole parents. The large increase in net incomes at the 20-hours level may induce the non-participating sole parents into the labour market.

Our results show that the increase in Family Assistance increases the labour supply of sole parents by an average of 0.62 hours per week and labour force participation by 1.76 percentage points. The "net" increase of 1.72 percentage points of sole parents who are expected to enter the labour market would be around 3,000 individuals. Although the results show some sole parents decreasing their working hours, in net terms there is a 0.11 percentage points increase in sole parents working more hours. This dominant substitution effect is consistent with the findings from the WfF evaluation reports by the MSD and IR; however, our simulated results are more modest.

Labour supply for married men and women are expected to decrease by 0.1 and 0.5 hours per week respectively. This is mainly due to the work test where couples must work at least 30 (combined) hours per week in order to be eligible. Married women are more likely to leave the labour market than enter while both married men and women are more likely to work less hours. The largest reduction in participation and hours of work are expected from married women. The "net" reduction in the number of married women in work of around 1.17 percentage points, equates to around 9,000 married women. These reductions could be explained by the fact that most of the married men are already in full-time employment and the family already working over 30 hours. This is different to the case of sole parents where half of the sole parents are not participating in the labour market. Another reason for the reduction of labour supply of married women is because of a dominant income effect.

The negative labour supply effects for married couples with dependents are about 16 and 41 times larger than for married couples without dependents. The largest negative effect is on married women. The “net” effect on married women with dependents is expected to decrease their employment rate by 1.94 percentage points. This estimate is close to the estimated 2.3 percentage points fall in employment rate of secondary earners reported in the evaluation reports by the MSD and IR. For married men, the results from the simulation and the MSD and IR evaluation both show that WfF reform decreases working hours.

The different labour supply responses of households to the WfF policy reform have an impact on estimates of the changes in government expenditure and revenue. Our analysis shows that after allowing for labour supply changes, the cost of the policy change increases for couples but decreases for sole parents. These changes in labour supply are reflected in the tax revenue, family payment and benefit income changes for both subgroups. For sole parents, the reduction in benefit income is larger than the increase in family payments after accounting for labour supply responses. However, this results in a reduction in government expenditure, which is larger than the decrease in tax revenue.

In terms of income distribution, our results also show that the WfF reform reduced the incidence and intensity of poverty as well as income inequality.

This paper is the third in the suite of papers from the New Zealand Treasury’s behavioural microsimulation modelling project. The observed and imputed wage rates from the first paper, Mercante and Mok (2014a) were used to calculate the net incomes at a range of discrete labour supply levels. The second paper estimates the preference functions for all demographic groups, Mercante and Mok (2014b). These papers explain the parameter estimates that underlie the labour supply model used. Together, the papers offer substantive information about labour supply responses to tax and benefit policy changes in New Zealand.

Table of Contents

Abstract	i
Executive Summary	ii
1 Introduction	1
2 The Policy Changes	3
2.1 Working for Families (WfF)	3
2.2 Expected effects of the changes	5
3 Methodology	7
3.1 Non-behavioural and behavioural microsimulation	7
3.2 Unobserved wages and labour supply	8
3.3 The behavioural simulation	8
4 Simulation results	10
4.1 TAXWELL	10
4.2 TAXMOD-B	11
5 Conclusion	23
6 References	25
Appendices	27
Appendix A	27
Appendix B	34

List of Tables

Table 1 – Simulated responses of labour supply	12
Table 2 – Sole parent’s labour supply transitions (row percentages)	12
Table 3 – Married men’s labour supply transitions (row percentages)	13
Table 4 – Married women’s labour supply transitions (row percentages)	14
Table 5 – Change in the probability of working for the head of the income unit by selected individual and household characteristics (row percentages)	15
Table 6 – Change in weekly working hours for the head of the income unit by selected individual and household characteristics (row percentages)	16
Table 7 – Change in the probability of working for married women by individual and household characteristics (row percentages)	17
Table 8 – Change in weekly working hours for married women by individual and household characteristics (row percentages)	18
Table 9 – The effect of labour supply responses: changes in tax and transfer cost	19
Table 10 – Foster, Greer & Thorbecke poverty measures by income unit type	21
Table A.1 – Changes as part of WfF	27
Table A.2 – Accommodation Supplement maximum entitlement (non-beneficiaries) at 1 April 2004	28
Table A.3 – Accommodation Supplement maximum entitlement (non-beneficiaries) at 1 October 2008	29
Table A.4 – Accommodation Supplement weekly expenses test as part of WfF reform	30
Table A.5 – Simulated responses for married couples with and without dependents	31
Table A.6 – Married men’s labour supply transitions (with dependents)	32
Table A.7 – Married women’s labour supply transitions (with dependents)	33

List of Figures

Figure 1 – Budget constraint pre- and post- WfF reform for a sole parent.....	10
Figure 2 – Budget constraint pre- and post- WfF reform for a married woman.....	11
Figure 3 – TIP curve pre- and post- policy reform.....	21
Figure 4 – Lorenz curve pre- and post- policy reform.....	22

Working for Families Changes: The Effect on Labour Supply in New Zealand

1 Introduction

Over the period October 2004 to April 2007, the New Zealand government implemented substantial changes to in-work incentives and financial assistance for families with dependent children as part of a new package of welfare reforms referred to as 'Working for Families' (WfF). The policy changes were implemented with the aim to encourage beneficiaries with children to participate in the labour market and to address income adequacy issues for families with children.

This paper presents the simulated effects of the WfF changes on labour supply using the New Zealand Treasury's behavioural microsimulation model TAXMOD-B. We use the Household Economic Survey (HES) 2008/09 to capture the full effect of the policy. In particular, we focus on the labour supply responses for sole parents and couple parents.¹ To validate the simulated effects of the policy change obtained through TAXMOD-B, we compare our results to the ex-post evaluation studies by the Ministry of Social Development (MSD) and Inland Revenue (IR) in 2010 (see MSD and IR (2010)). The MSD and IR had estimated labour supply effects after the WfF changes were introduced. In addition, our paper analyses the impact of the reforms on the changes in net government expenditures and on income distribution and poverty.

TAXMOD-B is based on the New Zealand HES, which contains information about the characteristics of individuals and households and their labour supply and earnings. The model is a partial-equilibrium supply-side model where it is assumed that all additional labour supply is met by a sufficient demand for labour. In reality, individuals may not be able to work their desired number of hours and outcomes may be driven to some extent by what jobs are available (Kalb (2010)).²

¹ Throughout this paper the terms married men and women refer to partnered men and women regardless of whether they are married legally or *de facto*.

² It is possible that the WfF policy changes might have an impact on household formation and dissolution, which might affect the labour supply in the long run (see Fitzgerald, Maloney and Pacheco, 2008). However, our study assumes household formation to be constant at one point in time. The dynamics of household formation is outside the scope of this paper.

The model can be used to simulate the behavioural effects of policy changes, provided that these policy changes are of a financial nature. These changes could range from a change in the abatement rate of a benefit payment, a change in the tax rate or a change in eligibility rules which affect the net household income levels. In simulating a policy, the model is calibrated to the observed labour supply to ensure that the simulated labour supply in the pre-reform situation is similar to the observed situation (see Buddelmeyer, Creedy and Kalb (2007)).

This paper sets out to describe the effect that the WfF changes have on labour supply of New Zealand households and on government expenditure and revenue with and without allowing for labour supply responses. TAXMOD-B produces labour supply responses in the form of estimated average changes in the probability of working and expected hours of work over the population. The responses can further be analysed according to a selection of individual and household characteristics. The model also has the capability to analyse the changes on inequality and poverty in New Zealand through a range of distributional measures.

The remainder of the paper is organised as follows. The next section provides a brief overview of the policy changes from 2004 to 2008. Section 3 describes the behavioural microsimulation approach and the data used. Section 4 presents the behavioural simulation results for the different demographic groups and government revenue and expenditure. Section 5 concludes.

2 The Policy Changes

This section briefly explains the policy changes which were fully implemented in 2008.

2.1 Working for Families (WfF)

The New Zealand Government's assistance to families has evolved over time and between 2004 and 2007 substantial changes were introduced to in-work incentives and financial support for families with dependent children.³ The policy changes implemented between 2004 and 2007 aimed to encourage benefit recipients to participate in the labour market and to address income adequacy issues for families with children (Dalgety, Dorsett, Johnston and Spier (2010)).

The main components of the reforms were changes to the WfF tax credits, the Accommodation Supplement (AS) and Childcare Assistance (CCA). The WfF tax credits comprise four main tax credits: the family tax credit (FTC); the in-work tax credit (IWTC); the minimum family tax credit (MFTC); and the parental tax credit (PTC). The WfF changes were implemented by the MSD and IR. The changes included shifting financial support for children from the welfare system to the tax system, increasing the rates of the FTC and AS, introducing the IWTC (which replaced the former Child Tax Credit) and changing the abatement regime of WfF tax credits. A detailed description on the changes in WfF which are analysed in this paper is provided in the Appendix.

The reform was implemented using a staged approach where the various components of the reform were introduced over different time periods. The changes described below and in the Appendix refer to the full implementation of the reform up to 31 March 2009. In this paper only the effects of the WfF tax credit changes and part of the AS changes are simulated whereas the changes to CCA are not simulated.

The FTC which is available to all beneficiaries with children is subject to an income test and is abated for family income above a certain threshold. The tax credit amount is increased by \$25 per week for the first child and \$15 for the second and subsequent children. A further increase of \$10 per child per week was implemented in 2007.

The IWTC experienced the most significant changes; from \$15 per week per child which is conditional on the family receiving no income-tested benefit to \$60 per week and \$15 per week for each extra child past the third. Note that this means \$60 per week for one, two or three children, \$75 per week for four children, \$90 per week for five children and so on. As a consequence, families with one or two children are likely to gain the most in dollar terms from this reform. In addition, the IWTC has an accompanying work test where couples must work at least 30 hours per week (as combined hours) and sole parents for at least 20 hours per week in order to be eligible. As a result, disposable income would increase significantly for families working those hours, providing an incentive to work at least at that level of working-hours.

³ Nolan (2002) provides a detailed description on the evolution of New Zealand's family assistance tax credits changes over time up to 2000.

Other changes implemented as part of WfF includes the increase of the MFTC rates to \$355 per week. The MFTC is paid on a per family basis subject to the same work and income tests as the IWTC and is paid in addition to the other tax credits. Also, income thresholds and abatement rates for the three WfF tax credits were made more generous.⁴ The thresholds were increased and the abatement rates have been standardised to 20%. The changes to thresholds and abatement rates meant that families at higher incomes now qualified for WfF tax credits, and families already receiving FTC would continue to receive payments as their incomes increased.

No changes were made in the PTC, a payment for a newborn baby for the first eight weeks after the baby is born⁵; however, the changes made in the FTC, IWTC and abatement thresholds for FTC ensure that more families will also receive PTC.

The full policy reform package also includes increases in Childcare Assistance and the removal of the child component in the main benefits. The changes in Childcare Assistance would mean more financial assistance is available for families who need to use childcare to enable them to participate in the labour market. This part of the package is not analysed in the simulation presented in this paper. The reason is because Childcare Assistance is not modelled in TAXWELL, a non-behavioural microsimulation model developed by the New Zealand Treasury that is also based on the HES and produces input data for TAXMOD-B. Further explanation on TAXWELL is provided in Section 3.

The removal of the child component in the main benefits would mean that families with children are paid the same rate of benefit regardless of the number of children. So couples with children receive the same amount of benefits as couples without children, and sole parents with more than one child receive the same amount as sole parents with two or more children. Since TAXWELL was developed in 2006 in which the new policy has been adopted, the child component is no longer an option in the current setting for the main benefits. As a consequence, we hold the changes in child component of the main benefits constant in our analysis. Buddelmeyer, Creedy and Kalb (2007) argued that the increase in the Family tax credit rates according to the age and number of children more than compensates for the reduction in benefit incomes. Nonetheless, this impact of the policy could potentially be analysed in the future after a new procedure is developed in TAXWELL.

Another component as part of WfF reform is the AS. AS is a non-taxable supplement for renters (depending on rent paid) and home-owners (depending on mortgage repayments) who face high housing costs. The AS entitlement amount depends on the amount of rent or mortgage paid, region of residency, income and the number of people in the household. Recipients do not have to be receiving a government benefit to qualify for an AS. To qualify for AS, a person's accommodation costs must be more than a certain amount, and their income and assets must be under certain limits. The reform involved changes in the abatements, increasing both the maximum rates of AS payable and the number of AS regions from three to four. Under the abatement changes, beneficiaries receiving AS and earning additional income no longer have their AS abated. However, once they enter the labour market, their AS is abated to reflect their income. In addition, the reform introduced a new 'high rent' region which mainly consists of locations in Auckland and other high rent places.

⁴ The abatement scheme is sequential; the FTC abates first, then IWTC. The PTC begins to abate only after the FTC and the IWTC have both fully abated.

⁵ However, there are some eligibility rules, for example PTC is not available to families receiving income-tested benefits or receiving paid parental leave.

Due to the complexity of this policy change and data availability, this component of the WfF reform cannot be modelled accurately. In order to consider the effect of the increase in the maxima of AS which is based on the number of AS regions, we would need to adjust the number of regions to the situation observed before the reform took place. The adjustment would require the information of sub-regions in the HES dataset which is not available. We matched the areas reported in the dataset to the 'old' regions as best as we could and adjusted the maxima accordingly. Details on the new maximum rates are shown in the Appendix Table A.3.

Currently, AS is 'modelled' in TAXWELL based on the households in the HES who report paying rent or mortgage expenses and either report getting the AS in the HES or receiving the main benefits. AS is not available for those living in Housing New Zealand Corporation (HNZC) rental houses. Tenants living in the HNZC rental houses are already receiving subsidised rent by paying an amount based on a percentage of their own income. The information of this implicit subsidy is not available in the HES data and thus not modelled in TAXWELL. In TAXWELL, AS is classified as non-taxable income. In comparison to the HNZC implicit subsidy which is not considered by the model, the net incomes for those reported receiving AS would be higher than those who live in HNZC rental houses.

In the current TAXWELL setting, the removal of the AS abatement for beneficiaries and the increase in the AS abatement threshold for non-beneficiaries are already in place. The analyses prior to these changes are no longer an option in the current setting. Similar to the complication faced by the removal of the child component for the main benefits as part of the WfF reform mentioned above, we hold these changes in the AS abatement constant in our analysis. In this paper, we only consider changes in the maxima rates of AS and increased regional areas of AS, hence the net effect of the AS changes would be minimal.

2.2 Expected effects of the changes

The WfF policy changes impact the budgets of sole parents and married couple families. These are shown in Figures 1 and 2 and are discussed further in Section 4.1.

It is expected that families with children are the ones most affected by the reforms. Families without dependent children might benefit through the changes in the AS, but these changes were relatively minor in comparison to the main WfF reforms. In addition, we only consider the changes in the maximum rates and the geographic areas involved in the AS.

Families with one child are likely to benefit the most from the in-work tax credit changes. In the reform, they will receive an increase of \$45 per week in IWTC as long as they fulfil the hours test. Families with two children will receive a \$30 increase (from \$30 to \$60) and families with three or more children will receive a \$15 increase (from \$45 to \$60) in IWTC from the previous levels.

The change in abatement rates may also have an impact on work incentives. The reduction in abatement rates and the increase of the no-abatement threshold both increase the family incomes and effective wages. The higher effective wage has both income and substitution effects. Depending on which effect is dominant, the labour supply could either increase or decrease. Given that the IWTC is available to families that fulfil the required working hours, the increased net incomes should make entering into workforce more attractive and encourage increased work hours to meet these thresholds.

With the relatively low participation rate of sole parents observed in the data (slightly above 50%) and the new hours test, we expect a potentially significant increase of labour supply for sole parents compared to the couples families. This is because couple families have higher employment rates and significant proportions already satisfy the (combined) working-hour test. Comparing the participation rate of sole parents across time, it is observed to be lower (below 50%) in the HES 2006/07 and 2007/08 datasets. The higher participation rate of sole parents observed in HES 2008/09 would include the behavioural impact of the WfF reform. We expect that a large increase in net incomes at the 20-hours level may induce the non-participating sole parents into the labour market. See Figure 1 for the effects of the WfF reform for a typical sole parent.

As for couple families, the 30 hours requirement is unlikely to have a huge positive impact on couple families' labour supply as most of the married men are already working and they are working for at least 40 hours (see Appendix Table A.5).⁶ For some couple families, the increased income from WfF tax credits may induce them to reduce their combined hours, while still remaining above the threshold. The income threshold where IWTC begins to abate is based on the combined earnings of the couple, and may result in higher effective marginal tax rates (EMTRs) for some partners. Thus, WfF reform could induce a reduction in labour supply of one or both partners. Figure 2 illustrate the effects of the WfF reform for a married woman in a couple household.

MSD and IR (2010) found there to be gains of 9 percentage points in employment (from 48% in 2004 to 58% in 2007) for sole parents. They estimated that around two-thirds of this increase was the effect of WfF. The reports which covered the implementation of the scheme until 31 March 2007 also found that the increase in the employment of secondary earners in couple families with dependents between 2004 and 2007 would have been larger if WfF had not been implemented. In addition, the largest impact of WfF on secondary earners' employment was the reduction in the number of secondary earners working part-time (defined as less than 30 hours a week).⁷

⁶ In the HES 2008/09 sample, around 90% of married men in couple families with dependent children are in the labour force.

⁷ The WfF evaluation reports found that primary earners in couples are predominantly male, tend to have higher qualifications and are slightly older than secondary earners (MSD and IR (2010)).

3 Methodology

This section describes the components of TAXWELL, TAXMOD-B and how the behavioural simulation is conducted.

3.1 Non-behavioural and behavioural microsimulation

TAXWELL is a non-behavioural microsimulation model developed by the New Zealand Treasury. It utilises large cross-sectional datasets from the HES. The HES is produced by Statistics New Zealand (SNZ) and is conducted every year. Every 3 years HES collects detailed information on household expenditures and incomes and a range of demographic variables. Every other year, HES only collects income and demographic information. Households are interviewed throughout the year and the quarter of interview is recorded.

TAXWELL contains the information on the social security and tax system and produces analyses at individual, family and household level on the effects of tax and benefit changes on individuals' consumption without accounting for labour supply changes. The model uses most of the income data from HES which includes income from current jobs and other income sources such as interest and dividends. It calculates benefit expenditure using the reported benefit receipts in HES and re-assigns the amounts into 24 fortnightly periods.⁸

The behavioural labour supply model, TAXMOD-B utilises the output from TAXWELL. The data contains the net incomes at a range of discrete labour supply levels before and after a policy reform, and individual and household characteristics. TAXMOD-B contains the labour supply parameters on which the behavioural responses are based and a variety of tabulation and graphic facilities. The model assumes that there is 100% take-up of welfare benefits. This assumption is required to enable the calculation of labour supply responses. However, this assumption may not necessarily hold as for example, stigma associated with benefit receipt may dissuade some people from claiming benefits. Incomplete take-up is more likely for types of benefits which have low benefit values – people may simply not claim because the amounts are too small and the effort required is too great. One example is the AS. For people who are currently receiving government benefits, the assignment of AS would be calculated by the MSD. For people who are not beneficiaries but are within the AS income bands, they may not take-up the benefit if the amount is small or they may be unaware that they are eligible for AS. In contrast, welfare program participation has been modelled jointly with labour supply by Keane and Moffitt (1998) for the US and by Kalb (2000) for Australia.

In this paper we have assumed that all persons (except sole parents) for whom labour supply is modelled, are eligible for Unemployment Benefits (UB). Sole parents are eligible for Domestic Purpose Benefit (DPB). The income-test rules⁹ are then applied to calculate actual benefit levels.

⁸ Note that a fortnight contains 15.225 days in TAXWELL.

⁹ Note that this paper presents the policy prior to welfare reform in July 2013.

3.2 Unobserved wages and labour supply

Estimating labour supply responses requires knowledge of the budget constraint for each individual (or couple) which relates net income to hours worked. Constructing the budget constraint requires knowledge of the hourly wage rates of individuals. For workers these are observed, however they are unobserved for non-workers. For non-workers we require the offered wage if they were to enter employment. Therefore wages are imputed using wage equations that correct for potential sample selection bias. We use wage equations that are separately estimated for partnered men, partnered women, single men, single women and sole parents using the pooled HES data from 2006/07 to 2010/11. Further details of the wage imputation method are in Mercante and Mok (2014a).

To analyse household labour supply, we adopt a neo-classical utility maximisation approach which assumes that individual chooses a combination of leisure and income that gives them the greatest utility. In estimating changes in labour supply with TAXMOD-B, we use a discrete choice labour supply model. Discrete choice models have several advantages over continuous hours models (see Van Soest (1995) and Blundell, Duncan, McCrae and Meghir (2000)). We estimate separate labour supply equations for single men, single women and sole parents. For couples we estimate a joint labour supply equation. The estimation of the parameters of the labour supply equations used data from the HES from 2006/07 to 2010/11 and is described in detail in Mercante and Mok (2014b).

The labour supply equations represent the utility derived by individuals and couples at a given working-hour choice and disposable income at the chosen level of working-hours. There are 11 possible working-hour choices for singles and sole parents and 66 combined working-hour choices for couples.¹⁰ The observed heterogeneity of the population is accounted for by variables that represent differences in characteristics between individuals, including age, the number and ages of children and educational qualifications. The model equations calculate the utilities at all the discrete working-hour choices and enable the model to determine the optimum working-hours for the individual or couple.

3.3 The behavioural simulation

In this section, we provide a brief overview of the behavioural simulations in TAXMOD-B. Further detail of the way the simulation works is in Buddelmeyer, Creedy and Kalb (2007).

The behavioural simulations for each individual or couple begin by converting the observed working hours to the closest discrete working-hours level. Then, given the parameter estimates of the labour supply equation utilities at all the discrete working-hours are calculated. This is the deterministic utility.

Then a set of random draws is taken from the conditional distribution of the error term for each discrete hours level. The utility-maximising hours level is determined by adding this random amount to the deterministic utility for each discrete working-hours level. From this we determine the optimal working-hours, which is the working-hours that gives the highest utility. We produce 100 sets of draws and only accept draws if the optimal hours level matches the observed working-hours before the reform. This process is called 'calibration'. The accepted draws are then used to determine the optimal hours level after the reform. For each sets of draw, the optimal working-hours level is calculated resulting

¹⁰ Single men and women, sole parents and married women have choices of 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 hours of work. Married men have choices of 0, 10, 20, 30, 40 and 50 hours of work which when combined with married women, couples have a total of 66 working-hour choices.

in a probability distribution over the set of discrete hours for each individual under the policy reform. In some cases, the required number of successful random draws producing observed hours as the optimal hours cannot be generated from the model within the designated number of drawings. Under such circumstances, the individual's labour supply will be held fixed at their observed hours. Note that the calibration approach ensures that the results before the reform are comparable from TAXWELL and TAXMOD-B.

In this paper, we use the HES 2008/09 dataset to capture the WfF changes up to 31 March 2009. We use this data set to make a "base" simulation run of TAXMOD-B. We then simulate the pre-reform system in 2004 as the counterfactual (in the absence of the policy reform), as if it were to apply in 2009. We compare the results to the "base" simulation run and the differences between the two simulations represent the impacts of the WfF changes. For certain groups we keep labour supply constant. These are the retirees (838 cases), self-employed (483 cases), full-time students, disabled and others (together 624 cases). After excluding these groups, we have around 2385 (from the total of 4330) families in the HES sample for whom the effects of the policy reform on labour supply are simulated. This represents about 68% of the working age population which are allowed to change labour supply in the simulation.

4 Simulation results

This section presents the results from the policy changes described in Section 2. We start our analysis with an illustration of the impact of the reform on disposable incomes without accounting for behavioural changes. These are merely illustrative examples and are aimed to provide an intuitive explanation for the results generated by the labour supply model described in Section 4.2. We also analyse the effect these responses have on government expenditure and revenue and compare the behavioural and non-behavioural results.

4.1 TAXWELL

Figures 1 and 2 illustrate the effects of the WfF reform for a typical sole parent and a married woman in a couple household, each with one dependent child aged one and earning a wage of \$15 per hour.

The sole parent is working at 20 hours per week, earning around \$16,000 a year, living in the South Island, paying annual rent of \$11,000. The married woman in a couple household is currently working at 30 hours per week with an annual income of \$23,000, living in Wellington, paying annual rent of \$15,000. The household head (the husband) is assumed not to be working. As shown in the figures, the disposable incomes have increased in the low-income bracket for both households after the reform.

Figure 1 – Budget constraint pre- and post- WfF reform for a sole parent

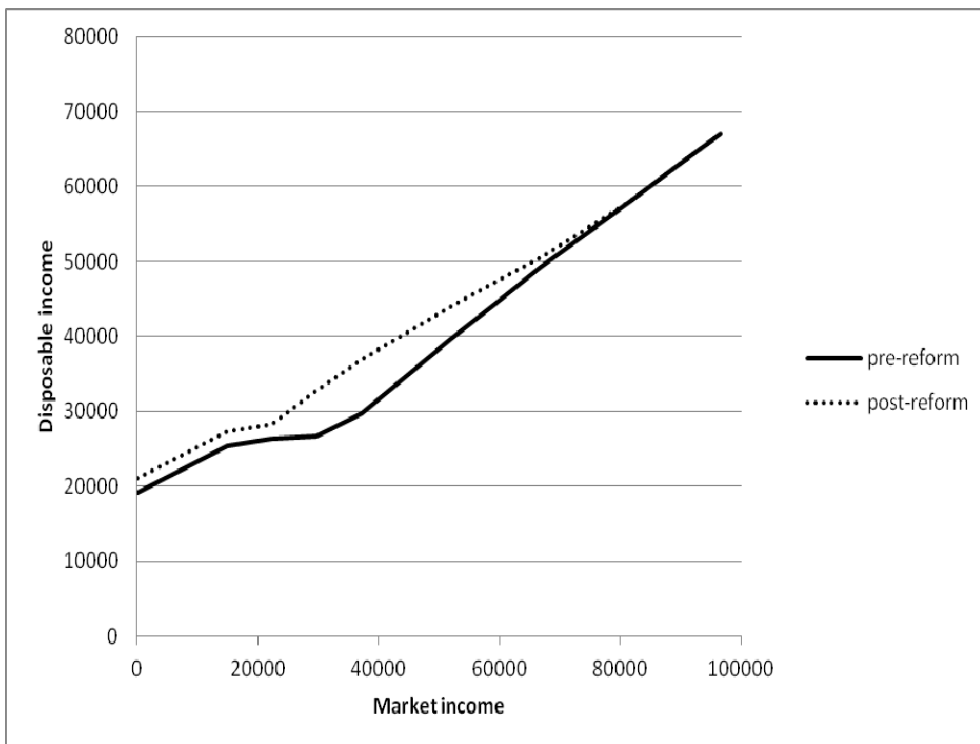
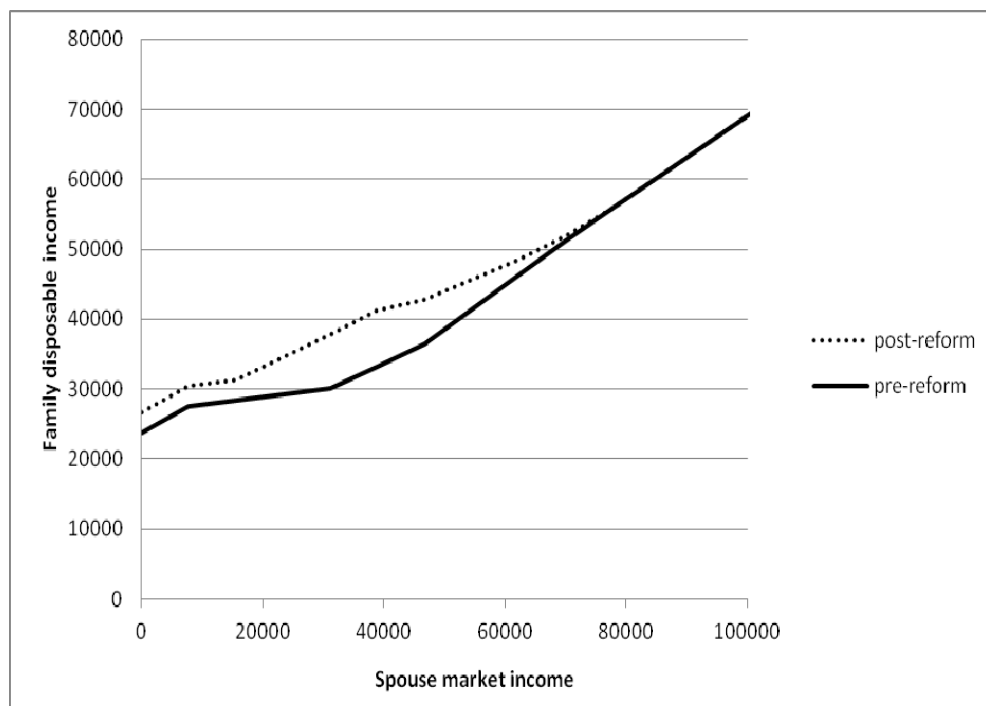


Figure 2 – Budget constraint pre- and post- WfF reform for a married woman



4.2 TAXMOD-B

4.2.1 Labour supply responses

In this section we focus on the effect of the policies on the labour supply of different demographic groups, in terms of changes in participation rates, average working hours, working hour distributions and transitions between labour market states and working hours. Table 1 presents the summary labour supply responses for all groups. Singles are only affected by the change in the AS but the change is not well captured in TAXMOD-B and is a relatively small change compared to the family payments in the WfF reform. Thus, there are very small responses in singles' labour supply. In the next sub-sections, we focus our discussion on the responses for sole parents and married couples.

Sole parents

Sole parents show the largest responses from the WfF reform with large increases in the intensive (sole parents working-hours increase by 2.29 percentage points) and extensive (entering the labour force increase by 1.76 percentage points) margins. In order to validate the results, it is useful to compare with results from other studies. The simulated estimates are consistent with the findings from the WfF evaluation reports by the MSD and IR though our simulated labour supply responses are more modest.¹¹ Interestingly, a similar conclusion was found when comparing the effect of the Australian New Tax System in 2000 estimated by behavioural microsimulation with the effect calculated using a difference-in-difference evaluation approach (see Cai, Kalb, Tseng and Vu (2005)).

¹¹ Table 1 shows that the employment rate of salaried workers for sole parents was estimated to increase by 1.72 percentage points (from 48.85% to 50.57%). This estimate is much smaller than the estimate of 6 percentage points increase in employment from the evaluation report by MSD and IR. The estimates of additional sole parents in employment due to WfF using both methods are quite similar (around 3,000 new workers estimated from our simulation while around 8,000 new workers estimated through an evaluation approach).

They found that the simulation results are lower than the effect of the policy change estimated through an evaluation approach.

Table 1 – Simulated responses of labour supply

Behavioural Response	Married Men	Married Women	Single Men	Single Women	Sole Parents
all workers (% pre reform)	79.96	63.51	65.26	49.93	53.35
salaried workers (% pre reform)	61.41	53.73	59.05	47.25	48.85
salaried workers (% post reform)	61.43	52.56	59.03	47.20	50.57
non-work to work (ppt)	0.32	0.17	0.00	0.00	1.76
Work to non-work (ppt)	0.31	1.34	0.03	0.05	0.04
workers working more (ppt)	0.22	0.11	0.00	0.00	2.29
workers working less (ppt)	0.98	0.57	0.00	0.10	2.18
average hours change (hrs)	-0.10	-0.50	-0.01	-0.03	0.62
Average base hours	25.4	17.3	22.1	15.6	16.2
Average conditional hrs change	-0.17	-0.23	0.00	-0.04	0.10
Average base conditional hours	41.4	32.2	37.4	33.1	33.2

Table 2 – Sole parent's labour supply transitions (row percentages)

Labour supply in hours per week	Post-reform											% of population	
	Pre-reform	0	5	10	15	20	25	30	35	40	45		50
0		96.6	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.2	0.3	0.7	51.1
5		-	99.8	-	-	-	-	-	-	-	-	0.2	0.4
10		-	-	95	-	0.2	0.5	0.5	1.1	1.0	1.1	0.8	3.3
15		-	-	-	84.5	-	-	0.4	0.1	2.4	4.2	8.4	1.7
20		-	-	-	0.2	91.6	0.5	1.7	2.1	1.7	1.4	0.8	4.5
25		-	0.1	-	-	0.2	74.3	0.8	2.3	7.9	8.4	5.9	3.7
30		-	0.1	-	-	0.1	0.2	94	1.9	1.6	1.4	0.6	7.7
35		-	-	-	-	0.5	1.5	0.6	95.4	0.7	0.7	0.6	4.1
40		0.2	-	0.0	0.2	1.1	1.5	1.3	1.1	94.1	0.2	0.2	15.5
45		0.0	-	-	-	0.3	1.5	1.7	4.4	3.6	88.3	-	3.7
50		0.2	-	0.1	0.1	0.6	1.4	3.4	4.2	5.0	3.0	82.1	4.4
% of population		49.4	0.5	3.3	1.7	4.5	3.4	7.9	4.9	15.6	4.2	4.5	100

The policy change leads to very few sole parents wanting to leave the labour force. The net increase of 1.72 percentage points of sole parents who are simulated to enter the labour market would gross up to around 3,000 individuals. With more sole parents wanting to increase than decrease their weekly working hours, this leads to an increase of 0.62 hours in the average weekly working hours. On average, sole parents work around 16 hours a week, while sole parents who are currently working work on average 33 hours.¹² The increase in work incentives for sole parents is largely due to the changes in abatement rates and IWTC which require sole parents to work for at least 20 hours per

¹² We've calculated separately the confidence intervals (CI) for sole parents and married couple with dependents and the CI for sole parents is slightly wider than the married couples with dependents. The average hours change for sole parents range from 0.35 at 5th percentile to 1.25 hours at 95th percentile. Married men and women with dependents range from -0.22 to -0.10 and -0.91 to -0.75 hours, respectively at 5th and 95th percentiles.

week and not be receiving income-tested benefits to qualify for the IWTC. This incentive is reflected in the transition matrix of labour supply before and after the reform as shown in Table 2. The diagonal of each hour represents the people whose labour supply remained unchanged. Relatively few sole parents have reduced their labour supply below 20 hours while the majority of the increases in labour supply are up to 20 hours or more.

Married couples

The labour supply response for married couples is shown in Table 1. The average working hours for married couples fell since the WfF policy changes were introduced, with the largest reduction of 0.5 hours observed for married women. Married women are more likely to leave the labour market than enter while both married men and women are more likely to work less hours. The net reduction in the number of married women in work is around 1.17 percentage points, equating to around 9,000 married women. These reductions are due to many reasons.

First, the impact of labour supply for married couples is mainly due to the changes in family payments, which are work-tested. Comparing the participation rate between married men with dependents and sole parents, most of the married men are already in full-time employment while half of the sole parents are not participating in the labour market. Thus, the requirement for a couple household to work for at least 30 hours per week would not have major positive impact in terms of labour supply as most families have combined working hours above 30 hours per week. This is shown in the last row of Table 1 where the average hours for working married men and women both had exceeded 30 hours. Similar results are found for married men and women with dependents (see Table A.5 in the Appendix). Instead, the overall reduction in labour supply for married men reflects the dominance of the income effect of the policy change. With higher overall income at 30 hours, married men would tend to reduce their labour supply. Table 3 shows a large proportion of married men have reduced their labour supply to 30 or 40 hours. Secondly, the reduction in labour supply for married women could also be explained by an often dominant income effect (see Blundell *et al.* (2000)). Table 4 shows a larger proportion of women exiting the labour market and decreased hours of work.

Table 3 – Married men’s labour supply transitions (row percentages)

Labour supply in hours per week		Post-reform						% of population
		0	10	20	30	40	50	
Pre-reform	0	99.2	-	0.0	0.1	0.5	0.3	38.6
	10	-	100	-	-	-	-	1.6
	20	-	-	99	0.1	0.9	0.1	1.9
	30	0.2	-	-	98.8	0.6	0.4	2.5
	40	0.4	-	0.0	0.7	98.3	0.5	36.1
	50	0.7	-	0.1	1.1	2.5	95.6	19.4
% of population		38.6	1.6	1.9	3.0	36.2	18.8	100

Table 4 – Married women’s labour supply transitions (row percentages)

Labour supply in hours per week	Post-reform											% of population
	0	5	10	15	20	25	30	35	40	45	50	
Pre-reform												
0	99.6	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	46.3
5	1	98.7	0.0	-	0.0	0.0	-	-	0.0	-	0.1	1.6
10	2.1	0.1	97.5	0.0	0.0	0.2	0.1	0.1	0.1	-	-	3.2
15	1.3	0.0	0.0	98.3	0.1	0.1	0.0	0.1	0.0	0.1	-	2.7
20	2.4	0.1	0.1	0.2	96.7	0.1	0.1	0.1	0.1	0.1	0.0	5.4
25	2.5	0.1	0.0	0.2	0.1	97.0	0.1	0.0	0.0	0.0	0.0	4.2
30	2.3	0.2	0.2	0.5	0.3	0.3	95.7	0.3	0.1	0.1	0.0	5.8
35	3.5	0.1	0.2	0.4	0.2	0.3	0.2	95.0	0.0	0.1	0.0	6.7
40	2.3	0.1	0.1	0.2	0.2	0.2	0.2	0.2	96.2	0.1	0.0	16.2
45	3.2	0.1	0.1	0.3	0.1	0.2	0.2	0.1	0.1	95.5	0.0	3.8
50	2.8	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.2	95.2	4.1
% of population	47.4	1.6	3.2	2.8	5.4	4.3	5.6	6.5	15.7	3.7	3.9	100

The labour supply for married women could be viewed as labour supply of secondary earners.¹³ We further analyse the labour supply for married couples with dependents and the results are comparably consistent with the findings from the WfF evaluation reports by the MSD and IR (see MSD and IR, 2010). The simulated output tables are in the Appendix. The negative effects for married couples with dependents are about 16 and 41 times larger than for married couples without dependents, with the largest difference observed for married women (shown in Table A.5 in the Appendix). The average weekly working hours for married couples with dependents fell, with the reduction of 0.82 and 0.16 hours for married women and men respectively. Table A.5 also shows that the net effect on married women with dependents was estimated to be a decrease of 1.94 percentage points in the employment rate (from 54.17% to 52.23%). This estimate is close to the estimates of 2.3 percentage points fall in employment rate of secondary earners reported in the MSD and IR evaluation report. As shown in Table A.5, married women with dependents are more likely to leave the labour market and work less hours. On the other hand, married men with dependents have large decreases in the intensive margin (decreased working-hours) by 1.63 percentage points.

Disaggregated results

Tables 5 to 8 present the expected changes in the probability of working at selected individual and household characteristics, for the household head and spouse (the latter being married woman). The household heads in Tables 5 and 6 include the single-adult households and sole parents. In TAXMOD-B, we assigned the male as the household head for all married couples and female headed households reflect single households and sole parents. Table 5 shows that no change is expected for a large proportion of the population by income unit type, gender of the household head, number of children and age of the youngest child. As expected, families without dependents and single-adult households are not affected much by the policy changes. This is also true for married

¹³ This definition is used in the evaluation report by the MSD and IR. See footnote 7 for further information on the definition.

women (see Table 7). Consistent with the results above, Table 5 shows that sole parents experience the highest average increase in the probability of working.

Table 5 – Change in the probability of working for the head of the income unit by selected individual and household characteristics (row percentages)

	Decrease in ppt				Increase in ppt			Average
	>50	10-50	2-10	none	2-10	10-50	>50	
<i>Income unit type</i>								
couple	-	-	1	99	0	-	-	-0.03
couple & dependents	-	0	11	84	2	2	-	0.04
single	-	0	1	99	-	-	-	-0.04
single & dependents	-	-	1	72	22	5	-	1.71
<i>Gender of head</i>								
female	-	0	1	88	9	2	-	0.65
male	-	0	6	91	1	1	-	0.05
<i>Number of children</i>								
None	-	0	1	99	0	-	-	-0.03
One dependents	-	0	10	83	6	1	-	0.05
Two dependents	-	-	9	83	5	2	-	0.2
Three dependents	-	-	11	79	5	5	-	0.42
Four dependents	-	-	-	85	11	3	-	0.98
Five dependents	-	-	6	68	10	16	-	2.02
Six dependents	-	-	-	-	-	100	-	26.15
<i>Age of youngest child</i>								
No dependents	-	0	1	99	0	-	-	-0.03
<1 year	-	-	8	78	11	4	-	0.75
1 year	-	-	8	81	6	5	-	0.69
2 years	-	-	14	77	5	3	-	0.22
3 years	-	-	6	90	2	2	-	0.09
4 years	-	-	9	78	10	3	-	0.25
5 years	-	-	1	90	6	3	-	0.54
6to9 yrs	-	-	7	82	7	3	-	0.63
10to12yr	-	-	10	81	4	5	-	0.44
13to15yr	-	1	13	80	4	1	-	-0.31
16to18yr	-	-	11	85	4	0	-	-0.09
Total	-	0.09	4.83	90.48	3.09	1.51	-	0.17
Count ('000) ¹	-	4	203	3811	130	64	-	-

Note: ¹ The weighted counts are rounded to the nearest 1000.

Table 6 – Change in weekly working hours for the head of the income unit by selected individual and household characteristics (row percentages)

	Decrease in hours				Increase in hours			Average
	>10	5-10	1-5	none	1-5	5-10	>10	
<i>Income unit type</i>								
couple	-	-	1	99	-	-	-	-0.01
couple & dependents	-	0	12	83	3	2	0	-0.16
single	-	0	1	99	-	-	-	-0.02
single & dependents	0	1	6	68	20	4	1	0.62
<i>Gender of head</i>								
female	0	1	3	86	9	1	0	0.21
male	-	0	6	91	2	1	0	-0.07
<i>Number of children</i>								
None	-	0	1	99	-	-	-	-0.02
One dependents	0	0	11	80	6	2	0	-0.02
Two dependents	-	1	12	81	5	2	0	-0.09
Three dependents	-	1	13	77	6	3	-	-0.17
Four dependents	-	-	1	87	10	-	2	0.39
Five dependents	-	6	-	59	35	-	-	0.37
Six dependents	-	-	-	-	-	41	59	11.01
<i>Age of youngest child</i>								
No deps	-	0	1	99	-	-	-	-0.02
<1 year	-	-	10	81	7	2	-	0.07
1 year	-	1	10	80	5	5	-	0.16
2 years	-	-	12	80	7	1	1	-0.07
3 years	-	-	8	90	0	2	-	-0.13
4 years	0	2	7	79	11	-	-	-0.17
5 years	-	-	1	90	6	3	-	0.1
6to9 yrs	-	1	10	77	10	1	1	0
10to12yr	-	0	9	84	4	2	0	0.04
13to15yr	-	1	21	71	6	1	1	-0.18
16to18yr	-	1	12	78	6	3	0	0.01
Total	0.01	0.34	5.65	89.59	3.18	0.98	0.25	-0.01
Count ('000) ¹	s	14	238	3774	134	41	10	-

Note: ¹ The weighted counts are rounded to the nearest 1000

Due to the WfF reform, we expect families with one child to benefit the most from the IWTC. Thus, we would expect a large increase in the probability of working for this family type. There is a modest increase in the probability of working for families with one dependent but the largest increase is observed in the families with five or more dependents. Table 5 shows that the expected effects are mostly positive for married men and sole parents (independent of the number of children) and the increase is largest for families with five and six dependents. It is worth noting that the number of families with five or more children in our sample is very small (less than 1%).

Table 6 shows the expected changes in average working hours by the same characteristics shown in Table 5. Consistent with results shown above and from Table A.5 in the Appendix, married men with dependents have the highest average decrease in the working hours while sole parents experience the highest average increase in the working hours.

Table 7 – Change in the probability of working for married women by individual and household characteristics (row percentages)

	Decrease in ppt				Increase in ppt			Average
	>50	10-50	2-10	none	2-10	10-50	>50	
<i>Income unit type</i>								
couple	-	-	1	99	-	-	-	-0.04
couple & dependents	-	8	19	69	4	1	-	-1.93
<i>Number of children</i>								
None	-	-	1	99	-	-	-	-0.04
One dependents	-	5	21	70	4	0	-	-1.65
Two dependents	-	8	19	70	3	0	-	-2.23
Three dependents	-	14	16	64	5	1	-	-2.75
Four dependents	-	1	15	73	9	1	-	-0.34
Five dependents	-	15	14	71	-	-	-	-4.08
Six dependents	-	-	-	-	-	100	-	17.55
<i>Age of youngest child</i>								
No dependents	-	-	1	99	-	-	-	-0.04
<1 year	-	16	9	68	7	-	-	-3.62
1 year	-	7	19	66	5	2	-	-1.47
2 years	-	10	16	69	3	2	-	-2.1
3 years	-	7	18	72	4	-	-	-1.71
4 years	-	12	14	68	7	-	-	-2.8
5 years	-	4	13	83	-	-	-	-1.51
6to9 yrs	-	9	18	69	3	1	-	-1.65
10to12yr	-	6	22	71	1	-	-	-1.87
13to15yr	-	5	22	63	10	-	-	-1.48
16to18yr	-	-	34	63	3	-	-	-1.44
Total	-	4.64	11.49	80.92	2.53	0.43	-	-1.17
Count ('000) ¹	-	130	322	2268	71	12	-	-

Note: ¹ The weighted counts are rounded to the nearest 1000

The results in Tables 7 and 8 show similar patterns to those in Tables 5 and 6. Married women with dependents are mainly affected by the policy changes, as they have the highest average decrease in their probability of working. The negative change in the probability of working is larger for women than the positive change for men in income units with dependent children, reflecting the dominant income effect for married women. The overall effect is negative for married women by the number of dependents and age of the youngest dependents, with the effect being more prominent for women with more dependents and with younger dependents (<1 year old). The change in working hours in Table 8 presents similar patterns.

Table 8 – Change in weekly working hours for married women by individual and household characteristics (row percentages)

	Decrease in hours				Increase in hours			Average
	>10	5-10	1-5	none	1-5	5-10	>10	
<i>Income unit type</i>								
couple	-	-	1	99	-	-	-	-0.02
couple & dependents	1	4	15	77	2	0	-	-0.82
<i>Number of children</i>								
None	-	-	1	99	-	-	-	-0.02
One dependents	1	3	18	77	2	-	-	-0.73
Two dependents	2	4	15	77	1	-	-	-0.91
Three dependents	1	9	15	74	1	-	-	-1.19
Four dependents	-	-	5	91	3	-	-	-0.06
Five dependents	9	14	-	78	-	-	-	-1.71
Six dependents	-	-	-	-	41	59	-	4.38
<i>Age of youngest child</i>								
No dependents	-	-	1	99	-	-	-	-0.02
<1 year	6	6	7	78	4	-	-	-1.33
1 year	2	3	14	78	3	-	-	-0.65
2 years	2	5	15	77	2	-	-	-0.87
3 years	-	5	10	85	-	-	-	-0.65
4 years	6	1	17	76	-	-	-	-1.2
5 years	-	4	17	79	-	-	-	-0.6
6to9 yrs	1	4	17	77	1	1	-	-0.71
10to12yr	-	5	15	79	-	-	-	-0.87
13to15yr	-	7	18	74	1	-	-	-0.85
16to18yr	-	1	22	74	3	-	-	-0.55
Total	0.84	2.61	9.31	86.19	0.91	0.15	-	-0.5
Count ('000) ¹	24	73	261	2416	25	4	-	-

Note: ¹ The weighted counts are rounded to the nearest 1000

4.2.2 Government expenditure and revenue

From the simulated responses shown in the tables above, we see that the labour supply for couples and sole parents have changed the most in response to the WfF policy reform. Thus, this would have some impact on the estimates of government expenditure and revenue. Note that the calculations from TAXWELL would be slightly different to the calculations produced from the non-behavioural part of TAXMOD-B. Appendix B provides a detailed explanation of the differences. Nonetheless, the results are reasonably similar in both models and the calibration approach used in TAXMOD-B ensures that the results before the reform are comparable in both models. As mentioned earlier, due to the lack of information on the take-up rate after a policy reform, TAXMOD-B assumes a 100% take-up rate. This would likely cause overestimation of expenditure on the different payments for pre- and post-reform. However, as most policy changes would not expand eligibility to a large extent, the estimated percentage changes are informative on their own (see Buddelmeyer, Creedy and Kalb (2007)).

Table 9 – The effect of labour supply responses: changes in tax and transfer cost

	Change after reform	
	With labour supply change	Without labour supply change
	Relative change (%)	Relative change (%)
Couple		
Market/private income	-0.7	0
<i>Government Expenditure</i>		
Benefit income	3.8	2.8
Rebate	0	0
Family payment	361.1	339.9
NZ Superannuation	0	0
Total Expenditure	25.2	23.5
<i>Government Revenue</i>		
Income Tax paid	-0.7	0
Total Revenue	-0.7	0
Net Expenditure	-11.7	-10.0
Sole parents		
Market/private income	1	0
<i>Government Expenditure</i>		
Benefit income	-0.4	1.8
Rebate	0	0
Family payment	138.4	133.4
NZ Superannuation	0	0
Total Expenditure	27.8	28.5
<i>Government Revenue</i>		
Income Tax paid	-0.9	0
Total Revenue	-0.9	0
Net Expenditure	47.9	48.5

Table 9 shows the estimated government revenue and expenditure in percentage changes with and without labour supply responses for couples and sole parents. The net expenditure in pre-reform was negative for couples but positive for sole parents. This means that government revenue (in terms of tax collected) is higher than its expenditure (in terms of transfers) for couples. The opposite is true for sole parents. After allowing for labour supply changes, the net government expenditure of the policy change increases for couples but decreases for sole parents. This is due to the decrease in labour supply for couples but an increase for sole parents. These changes in labour supply are reflected in the tax revenue, family payments and benefit income changes for both subgroups.

For sole parents, the decrease in the cost after allowing for labour supply changes is modest (about 0.6 percentage points). This is caused by the increase in family payments and reduction in both tax revenues and benefit incomes. The fall in tax revenues could be due to the reason that sole parents who increased their labour supply or entered the

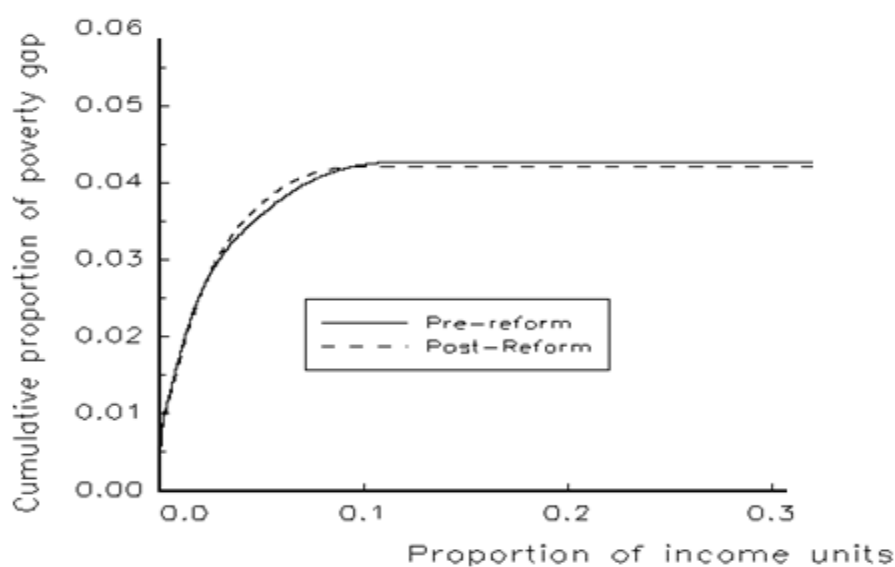
labour market are likely to earn low wages.¹⁴ On the contrary, those on higher incomes are likely to reduce their labour supply while remaining eligible for the increased family payment. Although the aggregate labour supply is positive, the reduction in taxes paid by the latter group (who earn high income) is more than offset by the increase in taxes paid by the former. The increased labour supply has caused a reduction in benefit income (around \$40m) which is larger than the increase in family payments (around \$24m). Consequently, this results in a reduction in government expenditure, which is larger than the reduction in tax revenues.

4.2.3 Income distribution and poverty analyses

TAXMOD-B provides the additional capability to analyse the impact of the WfF reform on poverty and inequality. Figure 3 shows a TIP curve which is a useful diagram to examine poverty and income distribution for a given poverty level. It reflects three characteristics of poverty ('Three "I"s of Poverty') - its incidence, intensity and inequality. The TIP curve is obtained by plotting the total poverty gap per capita against the corresponding proportion of people. For the incidence, the diagram shows around 10% of all income units fall below the poverty line after the reform compared to 12% before the reform. This suggests the fall in poverty headcount of about 2 percentage points. This is summarised by the length of the TIP curve's non-horizontal section (see Jenkins and Lambert (1997)). The poverty line is set at 50% of the median equivalised income unit income, which is \$239.55 before the reform and \$248.69 after the reform. The income is equivalised using the Whiteford equivalence scales (see Whiteford (1985)). The result is identical to the P_0 measures shown in Table 10. Detailed derivation of the Foster, Greer and Thorbecke poverty measures is available in Foster, Greer and Thorbecke (1984) and Creedy (1998). It suggests that sole parents benefited the most from the policy reform followed by couples with dependent children. Note that the poverty line and poverty estimates in this paper may differ from other published results. This is due to a number of reasons: the net income derivation and the assumption of 100% take-up of benefits (see Appendix B); choices of the poverty line and the equivalence scales.

¹⁴ Table 2 shows that most sole parents working 40 hours or more before the WfF reform are expected to reduce their labour supply while most sole parents working less than 30 hours are expected to increase their labour supply. Sole parents who are currently working 40 hours or more are more likely to be skilled and experienced workers thus earn higher incomes than those who are not working or working low hours. It is reasonable to conclude that an increase from 20 to 30 hours would result in a lower average increase in tax revenue than an increase from 30 to 40 hours, based on the current progressive tax rates. This result is consistent with Buddelmeyer, Creedy and Kalb (2007).

Figure 3 – TIP curve pre- and post- policy reform



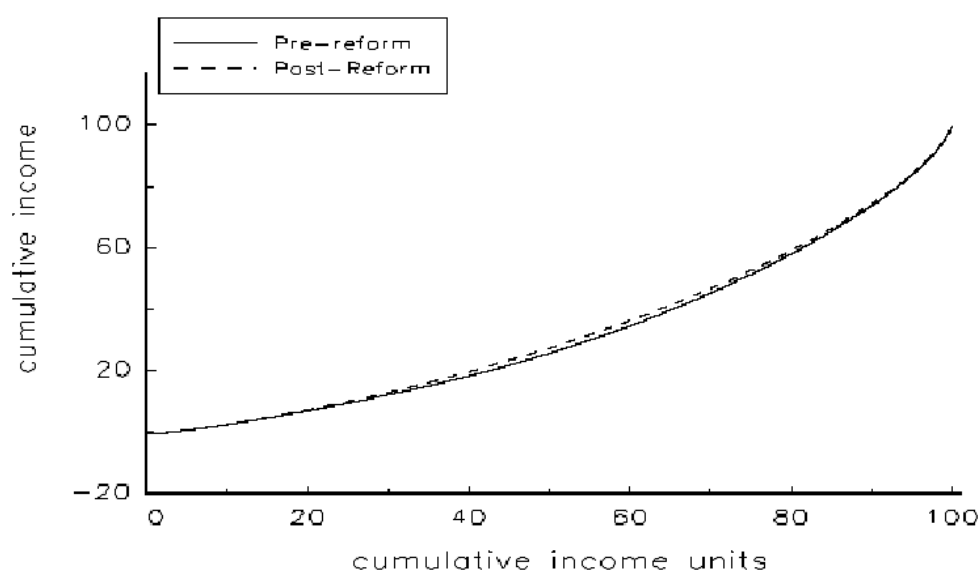
The intensity of poverty in the TIP curve is summarised by the height of the TIP curve and its measured through the poverty gap, which provides the information regarding how far off households are from the poverty line. It captures the mean aggregate income shortfall relative to the poverty line across the whole population. Overall, the poverty gap has decreased slightly, as observed by the slightly lower level of TIP curve (dotted line). This is represented by the P_1 measures in Table 10 where the overall poverty gap decreased marginally after the reform.

Table 10 – Foster, Greer & Thorbecke poverty measures by income unit type

Group	Proportion in poverty		
	Pre-reform	Post-reform	Difference
<i>P₀ (Poverty headcount)</i>			
Couple	0.0368	0.0471	0.0103
Couple and dependents	0.0905	0.0511	-0.0393
Single	0.2346	0.2516	0.0171
Singles and dependents	0.1722	0.072	-0.1002
All	0.118	0.099	-0.019
<i>P₁ (Poverty gap)</i>			
Couple	0.0336	0.0338	0.0002
Couple and dependents	0.0194	0.0181	-0.0013
Single	0.103	0.1082	0.0052
Singles and dependents	0.0188	0.0052	-0.0137
All	0.0427	0.042	-0.0007
<i>P₂ (Squared poverty gap)</i>			
Couple	0.2758	0.2583	-0.0176
Couple and dependents	0.0124	0.0131	0.0007
Single	0.0957	0.0964	0.0007
Singles and dependents	0.0031	0.0013	-0.0019
All	0.1015	0.0971	-0.0045

Lastly, the inequality is reflected by the degree of concavity of the non-horizontal section of the TIP curve. The TIP curve shows that there is quite a large difference between the 'poorest' poor and the 'richest' poor however this difference has decreased moderately after the reform as the dotted line lies slightly closer to the horizontal axis. The post-reform TIP curve intersects the pre-reform TIP curve once from above, suggesting more explicit value judgement is needed. We further analyse the poverty measure to include the inequality of those in poverty, P_2 . Table 10 shows an overall lower value of P_2 , the inequality measure after the reform. This is consistent with the results shown in the Lorenz curve (see Figure 4) where the dotted line representing the post-reform income distribution has moved upwards, suggesting a slight improvement in income inequality.¹⁵

Figure 4 – Lorenz curve pre- and post- policy reform



¹⁵ Our estimated Gini coefficient also shows an overall fall of 0.02 after the reform.

5 Conclusion

This paper examines the labour supply responses to the Working for Families welfare reforms which were fully implemented in 2008. The changes included shifting financial support for children from the welfare system to the tax system, increasing the rates of the FTC and AS, introducing the IWTC (which replaced the child tax credit) and changes in the abatement regime of WfF tax credits. The policy changes were implemented with the aim to encourage benefit recipients to participate in the labour market and to address income adequacy issues for families with children. The results presented in this paper are obtained using New Zealand Treasury's behavioural microsimulation model TAXMOD-B. The model is able to estimate the effects of the reform on average hours worked and employment rates, government expenditure and revenue and implied effect on poverty and inequality in New Zealand.

Our analyses focus primarily on responses on married couples and sole parents. Singles are affected by the change in the AS but this change is not well captured in TAXMOD-B and it is a relatively small change compared to the family payments in the WfF reform. Thus, there are very small labour supply responses by singles.

We expect the WfF reform to have a positive effect on sole parents' labour supply but a negative effect on married couples' labour supply. The increase in Family Assistance which has an accompanying work test where sole parents must work for at least 20 hours per week is estimated to increase labour supply of sole parents by an average of 0.62 hours per week and increase labour force participation by 1.76 percentage points. The net increase of 1.72 percentage points of sole parents who are estimated to enter the labour market would be around 3,000 individuals. About 2.29 percentage points of sole parents are willing to work more and 2.18 percentage points estimated to work less, giving a net 0.11 percentage points of sole parents working more hours. These results are consistent with the findings from the WfF evaluation reports by the MSD and IR; however, our estimations are more modest.

Labour supply for married men and women are estimated to decrease by 0.1 and 0.5 hours per week respectively. This is mainly due to the work test where couples must work at least 30 (combined) hours per week in order to be eligible. Married women are more likely to leave the labour market than enter while both married men and women are more likely to work less hours. The largest reduction in participation and hours of work are expected from married women. The net reduction in the number of married women in work of around 1.17 percentage points, equates to around 9,000 married women. These reductions could be explained by the fact that most of the married men are already in full-time employment and the couple already working over 30 hours. This is different to the case of sole parents where half of the sole parents are not participating in the labour market. Another reason for the reduction of labour supply of married women is because of the often dominant income effect.

The negative effects for married couples with dependents are about 16 and 41 times larger than for married couples without dependents, with the largest difference being the married women. The net effect on married women with dependents is estimated to decrease the employment rate by 1.94 percentage points. This estimate is close to the estimates of 2.3 percentage points fall in employment rate of secondary earners reported in the evaluation reports by the MSD and IR. The results from the simulation approach and evaluation approach also show that WfF reform decreases the hours worked for married men.

The different labour supply responses of households to the WfF policy reform have an impact on estimates of the changes in government expenditure and revenue. Our analysis shows that after allowing for labour supply changes, the cost of the policy change increases for couples but decreases for sole parents. These changes in labour supply are reflected in the tax revenue, family payment and benefit income changes for both subgroups. For sole parents, the reduction in benefit income is larger than the increase in family payments after accounting for labour supply responses. However, this results in a reduction in government expenditure, which is larger than the decrease in tax revenue. In terms of income distribution, our results show that the WfF reform reduced the incidence and intensity of poverty as well as income inequality.

The analyses in TAXMOD-B are based on the assumption that all additional labour supply is met by a sufficient demand for labour. Arguably, individuals may not be able to work their desired number of hours and outcomes may be driven to some extent by what jobs are available. It would be useful to incorporate certain measurement of labour demand from different data sources to improve the estimation without losing the advantage of providing the detailed subgroup analyses of labour supply.

Childcare assistance is another important component of the WfF reform for families with dependents which is not currently modelled in TAXWELL. We would expect that this additional payment for families with school age dependents would have increased the net incomes for low-wage families and thus increased the probability of labour force participation and labour supply. It would be useful to incorporate some measurement of childcare assistance to improve the simulation results.

6 References

- Aziz, Omar, Christopher Ball, John Creedy and Jesse Eedrah (2013) "The distributional impact of population ageing." Wellington, New Zealand Treasury Working Paper 13/13, July.
- Blundell, Richard, Alan Duncan, Julian McCrae and Costas Meghir (2000) "The labour market impact of the Working Families' Tax Credit." *Fiscal Studies* 21(1): 75-104.
- Buddelmeyer, Hielke, John Creedy and Guyonne Kalb (2007) "Policy reforms in New Zealand" in *Tax policy design and behavioural microsimulation modelling* (Cheltenham: Edward Elgar): 207-231.
- Cai, Lixin, Guyonne Kalb, Yi-Ping Tseng and Hong Ha Vu (2005) "The effect of financial incentives on labour supply: Evidence for sole parents from microsimulation and quasi-experimental evaluation." Melbourne Institute Working Paper No. 10/2005, July.
- Creedy, John (1998) "Measuring poverty: An introduction." *The Australian Economic Review* 31(1): 82-89.
- Dalgaty, Jacinta, Richard Dorsett, Steven Johnston and Philip Spier (2010) "Employment incentives for sole parents: Labour market effects of changes to financial incentives and support." Wellington, Ministry of Social Development and Inland Revenue, Technical report, January.
- Fitzgerald, John, Tim Maloney and Gail Pacheco (2008) "The impact of recent changes in family assistance on partnering and women's employment in New Zealand." *New Zealand Economic Papers* 42(1): 17-57.
- Foster, James, Joel Greer and Erik Thorbecke (1984) "A class of decomposable poverty measures." *Econometrica* 52(3): 761-766.
- Jenkins, Stephen P. and Peter J. Lambert (1997) "Three 'I's of poverty curves, with an analysis of UK poverty trends." *Oxford Economic Papers* 49(3): 317-327.
- Kalb, Guyonne (2000) Labour supply and welfare participation in Australian two-adult households: Accounting for involuntary unemployment and the 'cost' of part-time work. Centre of Policy Studies and the Impact Project. Preliminary Working Paper No. BP-35 October 2000. Monash University.
- Kalb, Guyonne (2010) "Modelling labour supply responses in Australia and New Zealand" in Claus, Iris, Norman Gemmell, Michelle Harding and David White (eds). *Tax reform in open economies: International and country perspectives* (Cheltenham: Edward Elgar): 166-193.
- Mercante, Joseph and Penny Mok (2014a) "Estimation of wage equations for New Zealand." Wellington, New Zealand Treasury Working Paper 14/09, April.
- Mercante, Joseph and Penny Mok (2014b) "Estimation of labour supply in New Zealand." Wellington, New Zealand Treasury Working Paper 14/08, April.

- Ministry of Social Development and Inland Revenue (2010). "Employment incentives for couple parents: Labour market effects of changes to financial incentives and support." Wellington, Ministry of Social Development and Inland Revenue, Changing Families' Financial Support and Incentives for Working: Annex Report 2. August.
- Nolan, Patrick (2002) "New Zealand's family assistance tax credits: Evolution and operation." Wellington, New Zealand Treasury Working Paper 02/16, September.
- Van Soest, Arthur (1995) "Structural models of family labor supply: A discrete choice approach." *The Journal of Human Resources* 30(1): 63-88.
- Whiteford, Peter (1985) "A family's needs: Equivalence scales, poverty and social security." Canberra, Department of Social Security Research Paper 27.

Appendices

Appendix A

Table A.1 – Changes as part of WfF

WfF components	Pre-reform (2004)	Post-reform (2009)
Family tax credit rates (\$ weekly)		
<i>Age of the child/children</i>		
<i>For the eldest child</i>		
Aged 0-15	47.00	82.00
Aged 16-18	60.00	95.00
<i>For each additional child</i>		
Aged 0-12	32.00	57.00
Aged 13-15	40.00	65.00
Aged 16-18	60.00	85.00
In-Work tax credit rates (\$ week) formerly known as Child tax credit (1)		
Up to three children	15.00	60.00
For each additional child	-	15.00
Minimum family tax credit rates (\$ week) (1)		
Rates	290.00	355.00
WfF tax credit abatement thresholds and rates (\$ annual) (2)		
Abatement rates over thresholds	18% over \$20,356 and 30% above \$27,481	20% above \$35,914

Note: (1) The MFTC is work-tested; couples must work at least 30 hours per week (as combined hours) and sole parents for at least 20 hours per week.

(2) This applies to FTC, IWTC and PTC.

Table A.2 – Accommodation Supplement maximum entitlement (non-beneficiaries) at 1 April 2004

Category	Income threshold	Maximum Entitlement	Cut-out point	
			Per week	Per year
Area 1				
Single 16-17 years	214.22	100	614.22	31,939.44
Single 18+ years	263.77	100	663.77	34,516.04
Married couple no dependents	436.93	115	896.93	46,640.36
Married couple with dependents	436.93	150	1,036.93	53,920.36
Sole parent 1 child	345.23	115	805.23	41,871.96
Sole parent 2+ children	370.44	150	970.44	50,462.88
Area 2				
Single 16-17 years	214.22	65	474.22	24,659.44
Single 18+ years	263.77	65	523.77	27,236.04
Married couple no dependents	436.93	75	736.93	38,320.36
Married couple with dependents	436.93	100	836.93	43,520.36
Sole parent 1 child	345.23	75	645.23	33,551.96
Sole parent 2+ children	370.44	100	770.44	40,062.88
Rest of New Zealand				
Single 16-17 years	214.22	45	394.22	20,499.44
Single 18+ years	263.77	45	443.77	23,076.04
Married couple no dependents	436.93	55	656.93	34,160.36
Married couple with dependents	436.93	75	736.93	38,320.36
Sole parent 1 child	345.23	55	565.23	29,391.96
Sole parent 2+ children	370.44	75	670.44	34,862.88

Table A.3 – Accommodation Supplement maximum entitlement (non-beneficiaries) at 1 October 2008

Category	Income threshold	Maximum Entitlement	Cut-out point
Area 1			Per week
Single 16+years	344	145	924
Married couple no dependents	519	160	1,159
Married couple with dependents	519	225	1,419
Sole parent ,1 child	457	160	1,097
Sole parent , 2+ children	457	225	1,357
Area 2			
Single 16+years	344	100	744
Married couple no dependents	519	125	1,019
Married couple with dependents	519	165	1,179
Sole parent ,1 child	457	125	957
Sole parent , 2+ children	457	165	1,117
Area 3			
Single 16+years	344	65	604
Married couple no dependents	519	75	819
Married couple with dependents	519	120	999
Sole parent ,1 child	457	75	757
Sole parent , 2+ children	457	120	937
Area 4			
Single 16+years	344	45	524
Married couple no dependents	519	55	739
Married couple with dependents	519	75	819
Sole parent ,1 child	457	55	677
Sole parent , 2+ children	457	75	757

Note: Beneficiaries do not have their AS abated. Non-beneficiaries have their AS reduced by 25 cents for each dollar of gross income above the relevant income threshold shown above.

Table A.4 – Accommodation Supplement weekly expenses test as part of WfF reform

Category	Pre-reform (2004)		Post-reform (2009)	
	Rent ¹	Mortgage	Rent ¹	Mortgage
Single 16+years	51	62	46	55
Married couple no dependents	85	103	77	92
Married couple with dependents	97	117	98	118
Sole parent , 1 child	79	95	88	105
Sole parent , 2+ children	84	101	88	105

Note: ¹ This also applies to 62% of boarding costs.

Table A.5 – Simulated responses for married couples with and without dependents

Behavioural Response	With dependents		Without dependents	
	Married Men	Married Women	Married Men	Married Women
all workers (% pre reform)	87.56	65.18	68.71	61.02
salaried workers (% pre reform)	67.36	54.17	52.6	53.09
salaried workers (% post reform)	67.4	52.23	52.57	53.05
non-work to work (ppt)	0.53	0.28	0	0
Work to non-work (ppt)	0.49	2.21	0.03	0.04
workers working more (ppt)	0.37	0.19	0	0
workers working less (ppt)	1.63	0.94	0.01	0.02
average hours change (hrs)	-0.16	-0.82	-0.01	-0.02
Average base hours	28.4	16.5	21.0	18.5
Average conditional hrs change	-0.26	-0.45	-0.01	-0.01
Average base conditional hours	42.1	30.4	39.9	34.8

Table A.6 – Married men’s labour supply transitions (with dependents)

Labour supply in hours per week							
	Post-reform						
Pre-reform	0	10	20	30	40	50	% of population
0	98.4	-	0	0.2	0.9	0.5	32.6
10	-	100	-	-	-	-	1
20	-	-	96.9	0.2	2.7	0.2	1
30	0.3	-	-	98.3	0.8	0.6	3
40	0.6	-	0	1	97.5	0.8	39.8
50	1	-	0.1	1.6	3.6	93.6	22.5
% of population	32.6	1	1.1	3.8	40	21.5	100

Table A.7 – Married women’s labour supply transitions (with dependents)

Labour supply in hours per week												% of population
Pre-reform	Post-reform											
	0	5	10	15	20	25	30	35	40	45	50	
0	99.4	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	45.8
5	1.6	98.1	0.1	-	0.1	0.1	-	-	0	-	0.1	1.7
10	2.6	0.1	96.8	0	0.1	0.2	0.1	0.1	0.1	-	-	4.2
15	2	0.1	0.1	97.5	0.1	0.1	0.1	0.1	0	0.1	-	3.1
20	3.4	0.1	0.2	0.3	95.3	0.2	0.1	0.1	0.1	0.1	0	6.4
25	3.8	0.1	0	0.3	0.1	95.4	0.1	0	0	0	0	4.7
30	3.2	0.2	0.3	0.8	0.5	0.4	93.8	0.4	0.2	0.1	0.1	6.7
35	5.3	0.1	0.3	0.6	0.4	0.4	0.4	92.5	0	0.1	0	7.4
40	4.5	0.3	0.2	0.4	0.4	0.5	0.4	0.4	92.7	0.2	0.1	13.9
45	6.7	0.2	0.1	0.7	0.3	0.3	0.5	0.2	0.2	90.7	0.1	3
50	6.1	0.4	0.4	0.6	0.7	0.6	0.7	0.4	0.1	0.4	89.5	3
% of population	47.8	1.8	4.2	3.3	6.3	4.7	6.5	7	13	2.8	2.7	100

Appendix B

This section provides explanation on the differences in disposable incomes produced in the non-behavioural and behavioural microsimulation models.

There are some differences in the calculations of expenditure and disposable incomes produced by TAXWELL and a non-behavioural run of TAXMOD-B. This is due to several reasons. First, TAXWELL uses the HES reported hours of work and number of weeks worked during the year whereas TAXMOD-B rounds the current hours of work to the closest multiple of five or ten discrete hours (the latter is used for married men). Secondly, TAXWELL calculates benefit expenditure using HES reported benefit receipts whereas TAXMOD-B calculates benefit expenditure for everyone who is eligible and assumes that everyone who is eligible for benefits takes them up. The latter is required to enable the calculation of labour supply responses. Thirdly, TAXWELL produces the government costs and revenues using sample weights which are benchmarked to a number of demographic variables. This is aimed to bring the estimated population number of beneficiaries into line with actual numbers. A detailed explanation on the methodology is found in Aziz, Ball, Creedy and Eedrah (2013). In TAXMOD-B we generate the government costs and revenues based on the sample weights supplied with the HES aimed to represent the number of households in the country. Finally, TAXWELL allocates income into 24 fortnightly periods while TAXMOD-B utilises the information on current income and assumes constant behaviour throughout the year. The approach used in TAXMOD-B may over-report (or under-report) the incomes received when a person moves away from (or moves into) employment in the earlier part of the year. As a result, this would have an effect on the calculation of government expenditures and revenues.

The calibration approach used in TAXMOD-B ensures that the results before the reform are comparable in both models. The assumption of 100% take-up rate in TAXMOD-B is likely to cause overestimation of expenditure on the different payments for pre- and post-reform. In the HES 2008/09 sample and using the same weights, the calculations are reasonably similar in both models. The tax revenue estimates have the smallest difference while the largest difference is from the benefit transfers where TAXMOD-B estimate is around 35% higher than the estimates produced by TAXWELL.