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Estimating the effects of minimum wage increases and tax credits on household incomes using a microsimulation model

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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

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The findings and views based on these data and reported in this supplement are those of the Productivity Commission. They should not be attributed to either DSS or the Melbourne Institute, nor to the academics who provided assistance.

Abbreviations

ABS	Australian Bureau of Statistics
ATO	Australian Tax Office
CBO	Congressional Budget Office (US)
EITC	Earned Income Tax Credit
EMTR	Effective Marginal Tax Rate
FTB	Family Tax Benefit
HILDA	Household, Income and Labour Dynamics in Australia (survey)
OECD	Organisation for Economic Cooperation and Development
PC	Productivity Commission
WTC	Working Tax Credit (UK)

1 Introduction

1.1 Background

Regulated minimum wages have long been seen as a means of promoting a more equitable distribution of income, helping to limit the gap between high-income earners and those Australians in low-paid employment. The Productivity Commission's report on Workplace Relations Framework (PC 2015) indicated that, among *working* households, minimum wage increases benefit those in lower equivalised household income quintiles the most. The awards system — with wage growth rates linked to those of the minimum wage — has also helped to compress wage dispersion in Australia.

However, the report also found that minimum wages do not target poverty or equity directly and, moreover, have the potential to cause unemployment and underemployment. It indicated that many people in the lowest equivalised income quintiles do not have jobs, and so do not benefit from minimum wage increases, or work for relatively few hours. On the other hand, many people who receive the minimum wage in fact live in higher income quintile households. This suggests that attempts to improve the outcomes for those households with the lowest incomes through minimum wages may not be particularly efficient or effective. Moreover, some economists have argued that, contrary to popular perceptions, minimum wage increases have the potential to detract from equity, depending on the nature and extent of the disemployment effects. Leigh (2007), for example, has shown that, where disemployment effects are sufficiently large, minimum wage increases have the potential to widen both earnings and income inequality.

Accordingly, the Productivity Commission explored other instruments, including Earned Income Tax Credits (EITCs), that might be used to relieve pressure on minimum wages while safeguarding the living standards of the low-paid and their families. An EITC offers a credit on people's labour income in order to increase their disposable income. Several Australian economists have advocated the use of EITCs to supplement the minimum wage.

The Commission found that*, in principle,* an EITC coupled with restraint in the growth of the minimum wage is attractive, having the potential to reduce disemployment while addressing concerns about the living standards of the low-paid. EITCs should also able to better target the 'assistance' provided to people on low incomes than an equivalent increase in minimum wages.

However, several issues would need to be favourably resolved before it would be possible to recommend a move towards an EITC as part of a wage–tax tradeoff. These include its constitutional standing and various design issues, which would have implications for its costs, incentives and equity effects. The design would also need to be coordinated with

other changes to the tax and welfare systems. The Commission said that it is difficult to reach a firm view on whether an Australian EITC could be feasible or justified, but that modelling of the outcomes of EITCs is an important input into their consideration as a possible complement to the minimum wage.

1.2 About this supplement

The Commission has developed a microsimulation model to help inform analysis of the distributional impacts of minimum wage increases and of the effects of EITCs. This technical supplement describes the model and estimates the outcomes from the current minimum wage system (with and without behavioural responses to wage increases) and various EITC designs.

The minimum wage analysis in this supplement builds on similar work undertaken by Leigh (2007), who estimated the distributional impacts of an increase in the minimum wage in an Australian context, allowing for changes in household income based on changes in wages ('morning after' effects) and changes in employment ('behavioural' effects). The analysis also bears some similarity with microsimulation work by Dockery, Ong and Seymour (2008). However, their main focus was the effects of introducing the Federal Minimum Wage on the incomes of sub-minimum wage workers. When they simulated an increase in the minimum wage, it was only in order to examine the effects on work incentives.

The present microsimulation modelling extends Leigh's approach by:

- adding the tax and transfer system — whereas Leigh (2007) modelled effects only on pre-tax household income, the present analysis considers effects on income net of taxes and transfers, which gives a more precise picture of living standards
- adjusting for household size and composition through equivalisation — which is potentially relevant since the same disposable income may result in higher living standards for smaller households than larger households, all else being equal
- modelling three possible EITC designs for Australia — which together cover a range of features including whether tax credits are calculated for individuals or couples, and whether they are based on income or a combination of wages and hours worked.
- using a more recent (2012) dataset than was available to Leigh, and setting parameters to reflect tax rates and other relevant conditions in 2012. The minimum wage change around which the microsimulations are based — an increase of 2.9 per cent in nominal terms — is also the change that was granted in 2012.

Some features of Leigh's (2007) approach persist in this supplement:

- 'nominal income' is used as the main indicator of living standards, which is only a partial measure. It excludes some of the possible effects of an increase in the minimum wage, such as higher prices for some goods and services, and lower returns on

investments. This indicator also excludes non-financial dimensions of living standards. It nevertheless provides an indication of some of the main policy-relevant impacts of changes in minimum wages and of EITCs

- behavioural relationships are limited to the employment effects of the minimum wage. Other relationships, for instance the effects of EITCs on labour supply, are not modelled.

The analysis also does not model various other matters, including the labour market's adjustment time path to the policy measures, and the possible repercussions of minimum wage increases and EITCs on other segments of the labour market, such as award-based, higher-waged workers.

The next two chapters describe the modelling methodology and results of the minimum wage simulations and EITC simulations, respectively. For readers interested primarily in the overall conclusions of the analysis, they are presented in chapter 4.

2 Minimum wage simulations

Under the *Fair Work Act 2009*, an expert panel of the Fair Work Commission (FWC) adjusts the national minimum wage each year following an annual wage review. The annual adjustments made over the last six years are show in table 2.1.

Table 2.1 **Minimum wage changes**
2010–2015

	Unit	*Jul 2010*	*Jul 2011*	*Jul 2012*	*Jul 2013*	*Jul 2014*	*Jul 2015*
Minimum wage							
Old minimum wage	$ p.h.	14.31	15.00	15.51	15.96	16.37	16.87
New minimum wage	$ p.h.	15.00	15.51	15.96	16.37	16.87	17.29
Percentage increase	%	4.8	3.4	2.9	2.6	3.1	2.5

To illustrate some of the impacts of statutory minimum wages, the Commission has modelled the direct effects on household and government finances flowing from the 2012 adjustment of 2.9 per cent. This adjustment falls towards the middle of the range of adjustments provided over recent years.

The modelling considers only the effect of changes in the wages of 'minimum wage workers' (defined in section 2.1), with the wages of all other workers unaffected. In practice, under current institutional settings, the FWC also increases award wages as part of the annual wage review, often granting identical percentage wage increases. For example, in 2012, the FWC granted the same percentage increase (2.9 per cent) to award wages and minimum wages. This, in turn, would increase the wages of employees paid under enterprise agreements or other mechanisms that are directly linked or indirectly influenced by award rates. Higher flow-on wages further up the scale would benefit those higher-income workers. For this analysis, the Commission has not sought to model these impacts but, rather, has focused on the group earning minimum wages.[1]

The simulations consider the effects of the minimum wage increase not just on people's gross incomes but also on their net incomes — that is, after taking into account the effects of taxation and changes in government benefits. The results applying to all households are

1 As the exercise is based on HILDA data, it captures a larger number of 'minimum wage workers' than would be captured using the ABS Employee Earning and Hours survey, so the exercise can be seen as equivalent to modelling a significant degree of wage flow-through to workers earning above the national minimum wage (PC 2015, p. 322).

disaggregated by equivalised income quintile,[2] and also by whether the household is a working household (containing at least one employed person). The simulations also enable estimation of the direct impacts of the changes on government finances. The basic simulation assumes that the increase in the minimum wage has no impact on employment. The Commission has also simulated the effects where a higher minimum wage leads to disemployment, using a range of assumed employment elasticities.

Importantly, the simulations capture only some of the effects of adjustments to minimum wages on people's living standards and on government finances. In addition to the effects simulated here, minimum wage changes can affects prices for outputs and other inputs, the incentives for existing or prospective workers to undertake education or acquire skills, and the composition of the economy. These induced effects give rise to wider resource allocation effects which may vary geographically and by industry. For these and other reasons, the simulation results should not be interpreted as estimates of the actual changes in wages and household incomes that followed the 2012 Annual Wage Review decision.

The next section details the model and methodology used for the simulations, with the results discussed in the subsequent section. The results of various sensitivity analyses are provided in section 2.2 and in appendix A.

2.1 Model and methodology

Database

The Productivity Commission's microsimulation model is based on wave 12 of the Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA offers a number of advantages for the task at hand. First, it is reasonably large, providing the analysis with an estimation sample of 13 600 individuals. Second, HILDA contains a large range of information about each of the persons and households modelled, including income, employment and socio-demographic characteristics. Detailed comparisons of HILDA with Australian Bureau of Statistics (ABS) disposable income data have found the former to be reasonably accurate (Wilkins 2014). Third, HILDA contains disaggregated data (surveyed and imputed) on taxes and transfers. This is useful for integrating the raw data with the Productivity Commission's Tax and Transfer (PCTT) simulator, a module in the microsimulation model. The sample used for the estimation contains all employees aged 15 and over present in wave 12 of HILDA. When some of the necessary data for individuals were missing, these persons were removed from the sample. This and the fact that observations are unweighted means that the characteristics of the sample may diverge

[2] Equivalence scales assign a value to each household in proportion to its deemed needs. Household income is divided by this value to obtain equivalised household income. The modified OECD equivalence scale assigns a value of 1 to the household head, 0.5 to each additional adult, and 0.3 to each child (OECD n.d.).

to some extent from the broader Australian population. Nonetheless, the number of observations underlying the microsimulation model remains large and diverse.

Gross income under baseline and policy scenarios

The gross income of individuals in the database is calculated by summing reported income from all sources, including labour earnings and income support payments. This represents the baseline scenario for evaluating the effects of the increase in the minimum wage on gross income. Individuals are assumed to be minimum wage workers if their wage is between 0 and 110 per cent of the relevant minimum wage, after adjusting for casual and junior rates of pay. This results in 15.6 per cent minimum wage coverage among employees.[3]

The behavioural component of the model captures the effects of the increase in the minimum wage on employment. Following Leigh (2007), lower and upper bound employment elasticities of 0 and -1, respectively, have been modelled. A midpoint elasticity of 0.5 has also been modelled (appendix A). For the minimum wage adjustment modelled, these employment elasticities translate into job loss probabilities of 0, 2.9 and 1.45 per cent, respectively. In the modelling, the probability of job loss does not depend on individual characteristics, and the employment prospects of workers outside the minimum wage group are assumed to be unaffected.

Once a probability of job loss has been assigned to each employed individual, a random number is generated for each individual and, for each simulation, drawn from a uniform probability distribution with bounds of 0 and 1. If the random number is less than the job loss probability, the hours worked variable is set to 0 for the individual and simulation, reflecting the loss of a job.[4] If the random number is greater than the job loss probability, the individual retains his or her job for the simulation. The randomness of the process means that each simulation potentially generates a different result, due to differences in individual job loss. A large number of simulations were run, which were then averaged across the simulations. The results presented in this technical supplement are the averages.

Once wages and employment have been calculated for the policy scenario, gross income is recalculated. This is then compared with the baseline scenario to estimate the effects of the increase in the minimum wage on gross income.

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3 The effects of using different lower and upper bounds for the minimum wage worker definition are tested in sensitivity analyses (reported in section 2.2 and in appendix A). What a 'minimum wage worker' earns, relative to the official minimum wage, determines what wage increase they will actually receive. In contrast to Leigh (2007), the full minimum wage increase is modelled as being passed on to all minimum wage workers. However, because the main definition of a minimum wage worker used here extends down to labour earnings of $0 per hour, the modelled minimum wage increase is very small, in absolute terms, for some individuals. It is unlikely that sub-minimum wages are automatically raised to comply fully with the new minimum wage, but they might still be expected to rise somewhat in response to flow-on labour demand and supply changes.

4 If a job is not lost, hours worked are unchanged from their baseline value.

Net income under baseline and policy scenarios

The PCTT module is used to convert gross income into net income. PCTT calculates taxes and transfers for each individual based on their gross taxable income and other characteristics affecting eligibility for government payments. The taxes and transfers modelled are:

- personal income tax
- low-income tax offset and other tax offsets
- Medicare levy and surcharge
- Family Tax Benefit parts A and B
- Rent Assistance
- Disability Support Pension
- Newstart Allowance
- Youth Allowance
- Austudy
- Age Pension
- Parenting Payments.

While this list captures the main Australian tax and transfer policies, some minor policies, such as the Service Pension and Clean Energy Advance, are omitted. Australian Government rebates and subsidies to households linked to childcare expenses have also been omitted.

The PCTT module is calibrated based on policy settings in 2012-13. This financial year corresponds to the timing of the relevant increase in the minimum wage, which took effect in July 2012. Estimates of net taxes from PCTT were compared with equivalent estimates of net taxes from HILDA for validation. Overall, the differences were small for the purposes of this analysis (box 2.1).

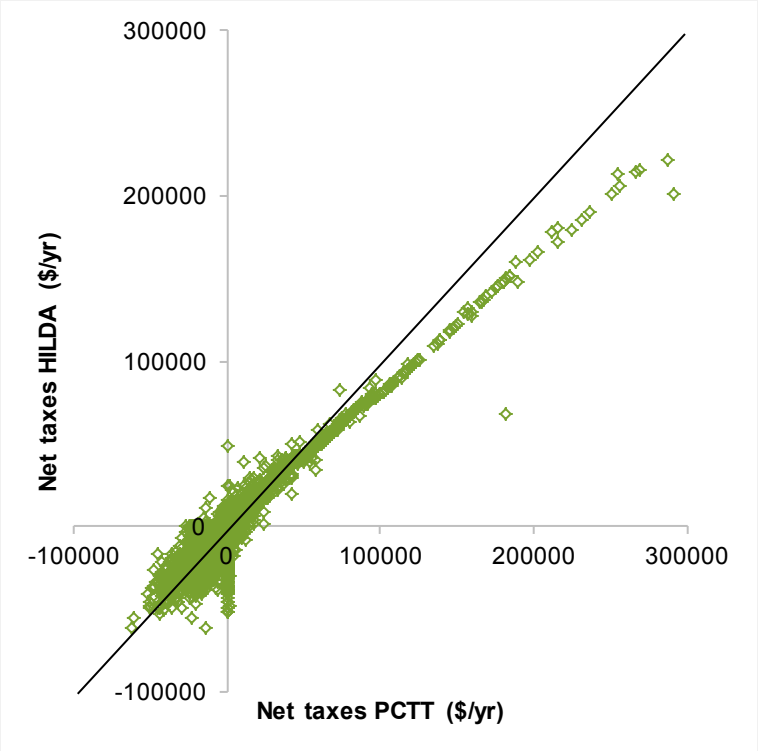
In order to link PCTT to the broader microsimulation model, the individual characteristics required by PCTT (such as eligibility for various income support payments) are drawn from HILDA data. In the small number of cases where HILDA data are not available, a plausible assumed value is used or the observation is dropped altogether. PCTT is then run twice — once with gross income from the baseline scenario and again with gross income from the policy scenario. Minimum wage workers who lose their jobs in some simulations, and were not already receiving an income support payment, are assumed to become eligible for the Newstart Allowance, subject to income tests. Those who are already receiving an income support payment are assumed to remain eligible for that income support payment. The differences in the resulting estimates of net income under the baseline and policy scenarios give the estimated effects of the increase in the minimum wage on net income.

Box 2.1 Validation of PCTT against HILDA

One way to evaluate the accuracy of PCTT is to compare its estimates of net taxes with HILDA estimates across all individuals in the HILDA sample for 2012. This comparison shows that annual net taxes are on average $935 per year higher in PCTT than in HILDA. The difference is less than $6000 per year for approximately two thirds of individuals in the sample. This suggests that, while PCTT and HILDA do sometimes generate substantially different estimates of annual net taxes, the results are typically quite similar, as illustrated in figure 2.1. Net taxes tend to be higher at all levels of net taxes in PCTT than in HILDA, although the effect is more pronounced for higher net taxes in PCTT. Observed differences between the two sets of estimates are due to a number of factors, including:

1. The more comprehensive scope of HILDA tax and transfer data. Some types of government benefit that are included in HILDA are excluded from PCTT. Similarly some taxes (such as taxes on private pensions) and tax offsets (such as dividend imputation credits) are not modelled in PCTT.
2. The calculation of all government benefits in PCTT based on rules set out by the Department of Human Services. Although some government benefits in HILDA are calculated in this way, others are derived from survey responses. Respondents might underestimate or overestimate the value of the benefits they receive.

Figure 2.1 Comparison of net taxes in PCTT and HILDA for individuals in HILDA sample, 2012



Data source: Productivity Commission estimates based on HILDA wave 12.

2.2 Modelling estimates

Basic scenario

Under the basic scenario reported in the draft report, all minimum wage workers are granted an increase in wages of 2.9 per cent — the nominal minimum wage increase awarded in July 2012 — and remain in employment: that is, this scenario uses the lower bound employment elasticity of zero.

Impacts across all households

The 2012 increase in the minimum wage of 2.9 per cent is estimated to increase average household gross income directly by around $112 per year (table 2.2).[5] Most households (around 85 per cent) do not contain minimum wage workers and are unaffected. The remaining households gain through higher wages for the minimum wage workers within the household. The average increase in gross income for these households is around $767 per year. Under this scenario, there are no adverse changes in employment and no households experience a reduction in gross income.

There are substantial distributional differences across equivalised household net income quintiles. The average gains of $43 per year reaped by households in the lowest quintile are the smallest in absolute terms, with this quintile receiving around 7 per cent of the total increase in gross income (table 2.3). The largest average gains are for households in the middle quintile, with an increase of around $174 per year (amounting to 30 per cent of the total gains).

The relatively small benefits accruing to households in the lowest quintile are due to it being less likely to contain minimum wage workers — around 8 per cent for the lowest quintile compared to 20 per cent for the middle quintile. This is partly because the proportion of working households in the lowest quintile is lower. To a lesser extent, smaller benefits to the lowest quintile also arise because of having minimum wage workers who work fewer hours on average than those in the middle quintile. This reduces the average gains since a given increase in wages translates to less additional income.

Household net incomes change in the same direction as household gross incomes, although the magnitudes of these changes are moderated by the tax-transfer system (table 2.4). Specifically, the 2012 increase in the minimum wage of 2.9 per cent is estimated to increase average household net income by around $82 per year (compared with $112 per year in gross income). This is because higher wages tend to result in lower income support payments and higher taxes. There is a very small proportion of cases where the increase in

[5] As noted above, this captures the direct benefits accruing to employees from higher wages without considering the costs.

net taxes outweighs the increase in wage income, so that net income falls for some households with minimum wage workers (this accounts for the losers in table 2.4).[6]

The net gains are again smallest for households in the lowest quintile ($39 per year) and largest for households in the middle quintile ($122 per year). Overall, the tax and transfer system has little effect on the distribution of gains across and within quintiles, with the third quintile again emerging as the main beneficiary (table 2.3).

Table 2.2 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	509	8.39	0	91.61	43	100
2	735	17.87	0	82.13	131	100
3	847	20.49	0	79.51	174	100
4	846	18.05	0	81.95	153	100
5	805	9.68	0	90.32	78	100
Total	767	14.65	0	85.35	112	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table 2.3 **Share of increase in total gross and net income by equivalised household income quintile**

2.9 per cent increase in the minimum wage, no job loss

Quintile	*Gross income*		*Net income*	
	$m	%	$m	%
1	71	7.4	64	9.1
2	219	22.7	151	21.4
3	289	30.0	204	28.9
4	254	26.4	190	26.9
5	130	13.5	97	13.7
Total	963	100.0	705	100.0

Source: Productivity Commission estimates based on HILDA wave 12.

6 This is a rare occurrence, created by discontinuities in the tax system. For example, a worker with an income just below the threshold for the Medicare Levy could conceivably face an EMTR in excess of 100 per cent.

Table 2.4 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	459	8.39	–	0.00	0	91.61	39	100
2	511	17.77	-61	0.11	0	82.13	91	100
3	596	20.49	–	0.00	0	79.51	122	100
4	630	18.05	–	0.00	0	81.95	114	100
5	597	9.68	–	0.00	0	90.32	58	100
Total	563	14.63	-61	0.02	0	85.35	82	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

The size of income gains brought about by the minimum wage increase can also be assessed in relation to initial income levels. For context, average annual net household income varies from around $20 000 for the lowest quintile to $140 000 for the highest quintile. The effects in percentage change terms are shown in the 'All households' columns of table 2.5. As could be expected, the proportional boost to gross income is highest for households in the bottom quintile. Because of the loss of some transfer payments, the boost to net income is only second-highest for that quintile.

Table 2.5 **Percentage change in household gross and net income by equivalised household income quintile**

2.9 per cent increase in the minimum wage, no job loss

Quintile[a]	*Gross income (%)*		*Net income (%)*	
	All households	*Working households*	*All households*	*Working households*
1	0.78	0.79	0.18	0.45
2	0.47	0.31	0.21	0.22
3	0.24	0.19	0.18	0.16
4	0.14	0.11	0.13	0.10
5	0.04	0.04	0.04	0.04
Total	0.15	0.22	0.12	0.18

a The quintiles for 'Working households' are based on a different (narrower) group of households, compared with the quintiles for 'All households'.

Source: Productivity Commission estimates based on HILDA wave 12.

Impacts across working households

The results above pertain to all households, not just households containing workers. If non-working households are excluded, the distribution of absolute gains from the minimum wage increase favours households in the lowest quintile of working households, both in gross and net terms (tables 2.6 and 2.7).[7] Although minimum wage workers in such households work fewer hours on average than those further up the income scale, they form a larger share of all workers in this quintile. Overall, the minimum wage increase leads to a higher proportional increase in both the gross and net incomes of households in the lower quintiles of working households, with progressively smaller percentage gains for households in higher quintiles (as shown in the 'Working households' columns of table 2.5).

Table 2.6 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	648	37.52	0	62.48	243	100
2	841	24.79	0	75.21	208	100
3	841	21.67	0	78.33	182	100
4	816	16.84	0	83.16	138	100
5	808	9.22	0	90.78	75	100
Total	767	22.15	0	77.85	170	100

Source: Productivity Commission estimates based on HILDA wave 12.

Direct fiscal impact

The direct fiscal impact of the increase in the minimum wage can be estimated by subtracting the total average net income figure in table 2.4 from the total average gross income figure in table 2.2 and multiplying by the number of households in 2012 (estimated at 8.6 million based on ABS (2010)). The result is an estimated fiscal saving to the government of about $258 million per year.[8] Because the data underlying the simulation are unweighted, this figure should be regarded as indicative only.

[7] Since non-working households tend to be poorer on average in terms of equivalised net income, redefining the quintiles in terms of working households pushes some of these households into the lower income quintiles. Households in the lowest working household quintile should not necessarily be considered poor, but have lower incomes relative to a group of households, namely working households, that has higher-than-average incomes.

[8] Fiscal impacts are limited to the effects on government expenditure and revenue of changes in household incomes due to the minimum wage increase. They exclude other minimum wage-related changes in government receipts and outlays, such as payroll taxes and paid parental leave payments. They also exclude any increase in government outlays as a result of employing minimum wage workers.

Table 2.7 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	492	37.36	-61	0.17	0	62.48	184	100
2	585	24.79	–	0.00	0	75.21	145	100
3	616	21.67	–	0.00	0	78.33	133	100
4	614	16.84	–	0.00	0	83.16	103	100
5	591	9.22	–	0.00	0	90.78	55	100
Total	563	22.12	-61	0.03	0	77.85	125	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Upper bound disemployment scenario

Under this scenario, all minimum wage workers are again granted an increase in nominal wages of 2.9 per cent but, to reflect disemployment effects, some are modelled as losing their jobs. 'Disemployment' covers situations in which existing workers face reduced hours or unemployment, and/or fewer jobs or jobs of shorter duration are created as the economy grows over time. Disemployment may take some time to manifest following a minimum wage change (or, in some cases, might precede an expected change). Even where disemployment occurs, actual (observed) employment and unemployment levels may not change, due to other, offsetting changes in the economy. In the simulations, however, disemployment effects are modelled as a reduction in employment, and as occurring at the same time as the minimum wage change. Following Leigh (2007), the scenario uses an upper bound employment elasticity of -1. (A sensitivity analysis using an employment elasticity of -0.5 is reported in table 2.13 and appendix A.)

Impacts across all households

Under this alternative scenario, the overall change in average household gross income is effectively zero, with the gains to households with minimum wage workers who retain their jobs being offset by losses to households with minimum wage workers who lose their jobs (table 2.8). Although fewer households lose than gain (0.5 per cent versus 14.2 per cent overall), the average magnitude of the change is much larger for households who lose ($23 700 per year versus $800 per year). This pattern is evident across all income quintiles. Once again, the low representation of minimum wage earners in the first quintile ensures that there are proportionally fewer beneficiaries and losers in that quintile.

Table 2.8 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -1)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	509	8.14	-16 903	0.26	0	91.61	-2	100
2	732	17.31	-23 039	0.56	0	82.13	-3	100
3	845	19.81	-25 021	0.69	0	79.51	-5	100
4	844	17.47	-26 133	0.58	0	81.95	-4	100
5	803	9.36	-24 708	0.32	0	90.32	-4	100
Total	765	14.18	-23 692	0.47	0	85.35	-4	100

Source: Productivity Commission estimates based on HILDA wave 12.

There is a small increase in average household net income of around $15 per household per year, despite average household gross income being largely unchanged (table 2.9). This is because the tax and transfer system tends to compensate losses at a higher rate than it moderates gains. Nevertheless, the broad relativities across and within quintiles observed in terms of gross incomes — for example, the proportion of beneficiaries within each quintile — are replicated in terms of net incomes.

Table 2.9 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -1)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	503	8.21	-11 624	0.19	0	91.61	20	100
2	526	17.26	-11 845	0.62	0	82.13	17	100
3	620	19.89	-16 905	0.60	0	79.51	22	100
4	652	17.53	-20 453	0.51	0	81.95	10	100
5	613	9.40	-17 868	0.28	0	90.32	8	100
Total	586	14.22	-15 721	0.43	0	85.35	15	100

Source: Productivity Commission estimates based on HILDA wave 12.

Impacts across working households

As with the ‘no jobs loss’ case, the microsimulation results can be presented as they apply to working households only. For these households also, a 2.9 per cent rate of job loss leads to virtually no change in gross incomes by quintile (table 2.10). However, once taxes and

transfers are taken into account, working households in the bottom quintile benefit most from the minimum wage increase (table 2.11). Compared to the 'no jobs loss' scenario, the quantum of net benefits accruing to that quintile is reduced by approximately two thirds ($56 dollars annually on average, instead of $184).

Table 2.10 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -1)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	647	36.34	-20 782	1.18	0	62.48	-10	100
2	838	23.96	-25 198	0.83	0	75.21	-8	100
3	839	20.98	-25 502	0.69	0	78.33	1	100
4	815	16.30	-25 567	0.55	0	83.16	-7	100
5	807	8.92	-24 623	0.30	0	90.78	-3	100
Total	765	21.44	-23 750	0.71	0	77.85	-6	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table 2.11 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -1)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	518	36.37	-11 454	1.15	0	62.48	56	100
2	604	24.04	-16 199	0.74	0	75.21	25	100
3	640	21.08	-19 486	0.59	0	78.33	20	100
4	635	16.37	-19 972	0.48	0	83.16	9	100
5	606	8.95	-17 068	0.27	0	90.78	8	100
Total	586	21.50	-15 662	0.65	0	77.85	24	100

Source: Productivity Commission estimates based on HILDA wave 12.

The average loss of net income recorded by those working households where one or more minimum wage worker loses their job (table 2.11) has some similarities with the results of the simulations undertaken by Dockery, Ong and Seymour (2008). Using 2006 HILDA data, these authors estimated that the net annual disposable income of income units containing displaced minimum wage workers would fall by between 10 and 14 thousand dollars (depending on whether these workers received the Newstart Allowance or moved out of the labour force).

Direct fiscal impact

The direct fiscal impact was again estimated using the procedure outlined above. Under the revised employment elasticity, the estimated impact on government finances associated with the increase in the minimum wage is a net fiscal expenditure of around $163 million per year. This result illustrates that the sign and magnitude of the fiscal impacts are sensitive to the employment elasticity assumptions. In general, the more negative the elasticity, the more negative the fiscal impacts of increasing the minimum wage. Intuitively, this is because the government receives less in taxes and pays out more in income support when disemployment occurs.

Some implications and sensitivity analyses

The modelling results show that, unsurprisingly, in the absence of negative employment effects, minimum wage increases lift the gross and net incomes of minimum wage households, and lead to some compression in incomes across working households. However, simulation results also illustrate that the impact on the living standards of all people at the lower end of the household income distribution is likely to be relatively limited in absolute terms, primarily because these households are less likely to contain minimum wage workers (or indeed any workers). This conclusion is not sensitive to varying key assumptions used to identify minimum wage workers, including changing the upper and lower bounds of the minimum wage band and the top-coding of hours worked (table 2.12 and appendix sections A.1 to A.6).

In conducting these sensitivity analyses, each parameter was varied in turn while all other assumptions were held constant. The wider the band for identifying minimum wage workers, the greater the proportion of workers who receive an increase in wages, and the greater the increase in net income. Conversely, when the band is narrowed by setting the lower bound at 80 per cent of the minimum wage, or the upper bound at 105 per cent, the increase in net income is smaller. While households in the lowest quintile receive greater benefits from an increase in the minimum wage with wider bands, their share of the total increase in net income falls. For example, when the upper bound is set at 130 per cent, they receive only 22 per cent of the increase in income that accrues to the third quintile. That figure rises to 26 per cent under the 120 per cent cut-off. The top-coding of hours affects only a small proportion of workers and has little effect on the results.

Table 2.12 **Change in household net income by equivalised household income quintile under different coverage assumptions[a,b]**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

Quintile	*Basic scenario*[c]	*105% upper bound*	*120% upper bound*	*130% upper bound*	*80% lower bound*	*Top-coding at 50 hours*	*Top-coding at 70 hours*
	$	$	$	$	$	$	$
1	39	32	50	61	28	38	39
2	91	72	136	188	77	85	93
3	122	96	190	278	101	113	125
4	114	92	179	262	90	107	119
5	58	46	91	133	45	50	62
Total	82	66	126	178	67	77	85

[a] Refer to appendix B for more details on sensitivity analyses. [b] In each of the alternative scenarios above, only one parameter at a time is changed. [c] The basic scenario corresponds to a 110 per cent upper bound, 0 per cent lower bound and top coding at 60 hours.

Source: Productivity Commission estimates based on HILDA wave 12.

The analyses so far reveal that the quantum and distribution of the increases in net income depend crucially on the employment effects of the minimum wage. Even if there were sizeable disemployment effects, most households with minimum wage workers would still benefit financially from an increase in the minimum wage. However, a small proportion would lose significant earnings, only partially replaced by reduced taxes and increased transfers.

Sensitivity analysis was undertaken based on the midpoint of the two elasticity scenarios examined so far (table 2.13 and appendix section A.7). Under this new scenario, a 2.9 per cent increase in the minimum wage would result in a 1.45 per cent probability of job loss. The results indicate that the effects on net income are approximately linear over the range of scenarios analysed. This suggests that results elsewhere in this chapter could be scaled to reflect different elasticity values.

It should be re-emphasised that minimum wage regulation can also have broader and more indirect effects on the living standards of people on low incomes (and, indeed, on the broader community) than the 'morning after' and limited behavioural effects modelled here. For example, binding minimum wages can result in an increase in the price of goods and services used by this group. In addition, the effects of unemployment or underemployment on the people affected can be far larger than the loss of income alone.

Table 2.13 **Change in household net income by equivalised household income quintile under different employment elasticities[a]**

Average gain, 2.9 per cent increase in the minimum wage

Quintile	*Basic scenario[b] (0 elasticity)*	*Disemployment (midpoint) scenario (-0.5 elasticity)*	*Disemployment (upper bound) scenario (-1 elasticity)*
	$	$	$
1	39	30	20
2	91	55	17
3	122	70	22
4	114	60	10
5	58	35	8
Total	82	49	15

a Refer to appendix A for more details on sensitivity analyses. **b** The basic scenario assumes zero job loss.

Source: Productivity Commission estimates based on HILDA wave 12.

3 EITC simulations

Earned income tax credits (EITCs) are a type of in-work, government-funded payment in use in many countries. The United States and the United Kingdom pioneered the first EITC schemes in the 1970s, which subsequently evolved into the US Earned Income Tax Credit scheme and the UK Working Tax Credit (WTC) scheme, respectively. Over the past two decades, a number of other OECD countries have adopted similar schemes (OECD 2011). There is large variation in the design of EITC schemes across OECD countries with respect to eligibility rules, groups targeted, maximum credit levels, withdrawal rates and payment methods. In part, these variations reflect the different objectives countries pursue through EITCs. For a detailed discussion of different approaches to designing EITC schemes in OECD countries and the pros and cons of various design features, see OECD (2005, 2011).

In Australia, concerns that minimum wages do not directly target poverty and equity and may cause disemployment have led several Australian economists to advocate EITCs or other policies that could 'relieve the burden on the minimum wage as an instrument to achieve improved living standards for those on low incomes' (PC 2015, p. 375).

In its report on Workplace Relations Framework, the Productivity Commission canvassed some in-principle strengths and weaknesses of EITCs for supplementing minimum wages (PC 2015). In principle, the 'promise' of a wage–tax tradeoff involving a reduced rate of growth of the minimum wage coupled with a 'top up' from an EITC is fourfold.

- Reducing the growth of the minimum wage would reduce the cost of employing labour and could lead to greater employment. This could benefit people who would otherwise remain unemployed or underemployed, as well as overall economic activity.
- The EITC would compensate people in work who would otherwise receive lower wages due to there being a lower growth in the minimum wage. In principle, these workers could be left in the same (or better) financial position as before the reduction in the growth of the minimum wage. Alternatively, the benefits provided through the EITC could be targeted to those in low-income households only, or to other subsets of the low-paid, thereby reducing the upfront fiscal costs entailed and/or potentially better targeting payments to the most needy.
- The risk that lower growth in the minimum wage would cause some people to leave the labour force (because the minimum wage would be less than their reservation wage) could also be nullified by a tax credit tied to working that returned them to the equivalent financial position.
- While the EITC would have fiscal costs, the expansion in employment and economic activity brought about by the slower growth in the minimum wage could mitigate those costs. This would reflect reductions in the total quantum of unemployment benefits and

related welfare expenditures, and increases in the broader tax collections associated with economic expansion.

However, the report noted that a range of design choices affect the fiscal costs, effects on work incentives, and nature and degree of redistribution associated with different EITC designs, and thus the overall merits or demerits of particular EITCs.

One important area in which designs can differ is in how they link payments to work. The two main approaches adopted in OECD countries are to base credits on receipt of labour income or to require a specific number of hours to be worked per week. For example:

- Eligibility requirements for the US EITC include that an applicant must earn income from employment or self-employment (within certain limits). The EITC equals a fixed percentage of earnings (known as the phase-in rate) from the first dollar of earnings until the credit reaches its maximum.
- Eligibility requirements for the UK WTC include that an applicant must work a minimum of number of hours per week, typically 16. Once applicants meet the minimum hours condition, they are eligible for the maximum WTC payment, given their personal circumstances — there is no phasing-in of credits.[9]

Another area of design difference is in the targeting of payments. The two main criteria for targeting EITCs are family status and income level. Countries that focus their EITCs on child poverty or low-income families tend to base eligibility for credits on the presence of children. In New Zealand, for example, eligibility for EITCs is dependent on the presence of children, with the maximum level of the credit increasing with the number of children in the family. While eligibility for the US EITC does not depend on the presence of children, the maximum level of credit increases substantially with the presence of children (OECD 2011). Other countries, which address child/family issues using other mechanisms, tend to give their EITCs a greater focus on work incentives (OECD 2011). For example, the UK WTC is largely independent of family status, with a separate Child Tax Credit addressing child poverty concerns.

The modelling in this chapter considers three main EITC plans that together cover a range of design features, including whether EITCs are calculated for individuals or couples, and whether they are calculated based on income or a combination of wages and hours worked. The first two EITC plans are based on that proposed by a group of Australian economists known as the 'Five Economists', while the third is one put forward by US economists Thomas MaCurdy and Frank McIntyre. The Commission has also briefly considered the effects of a hypothetical 'direct compensation' scheme.

As with the minimum wage simulations in the previous chapter, the simulations in this chapter do not attempt to cover all facets or considerations that are relevant to determining the merits of particular EITCs. For example, one of the key omitted effects are the direct

9 In the UK, the Working Tax Credit is being progressively replaced by the Universal Credit, which does not have a minimum hours worked limit.

effects of EITCs on labour supply. Another is how the fiscal costs of an EITC might be financed. The need to raise additional taxes to finance an EITC will create deadweight losses (the 'marginal excess burden' of taxation). These indirect losses arise because taxes change people's incentives to invest, supply labour or make other economic decisions. The magnitude of these losses depends on the choice of tax instrument, but can be high. In addition, the practical aspects of providing EITCs can sometimes involve administrative costs for government and (at least as has occurred in the United States) substantial overpayments to households. Accordingly, an EITC with a design intended to achieve a particular distributional goal may not do so because of various unmodelled impacts. These qualifications need to be borne in mind when interpreting the results of the modelling.

3.1 Scaled Five Economists Plan

Background

In October 1998, a group of five prominent Australian economists — Peter Dawkins, John Freebairn, Ross Garnaut, Michael Keating and Chris Richardson — suggested that, over a period of around four years, minimum (and award) wage increases be replaced with earned income tax credits for low-wage earners in low-income families. The group argued that the proposed approach would have a number of advantages, including better targeting of assistance and increased employment, particularly among low-skilled workers (Dawkins 2002).[10]

Michael Keating and Simon Lambert outlined a specific EITC mechanism in 1998, which Simon Lambert subsequently modified in 2000, following changes to Australia's tax system. Peter Dawkins (2002) has noted that the EITC models outlined by Keating and Lambert (1998) and Lambert (2000) offer the best representation of the Five Economists plan. The design of the proposed EITC scheme borrowed from overseas experiences (especially the United Kingdom and the United States) (Duncan 2002).

While the Five Economists' plan has not been adopted, several of its authors recently suggested that the idea of tax credits was worth revisiting in the context of rising unemployment and greater means-testing of income support benefits (Potter 2014).

Methodology

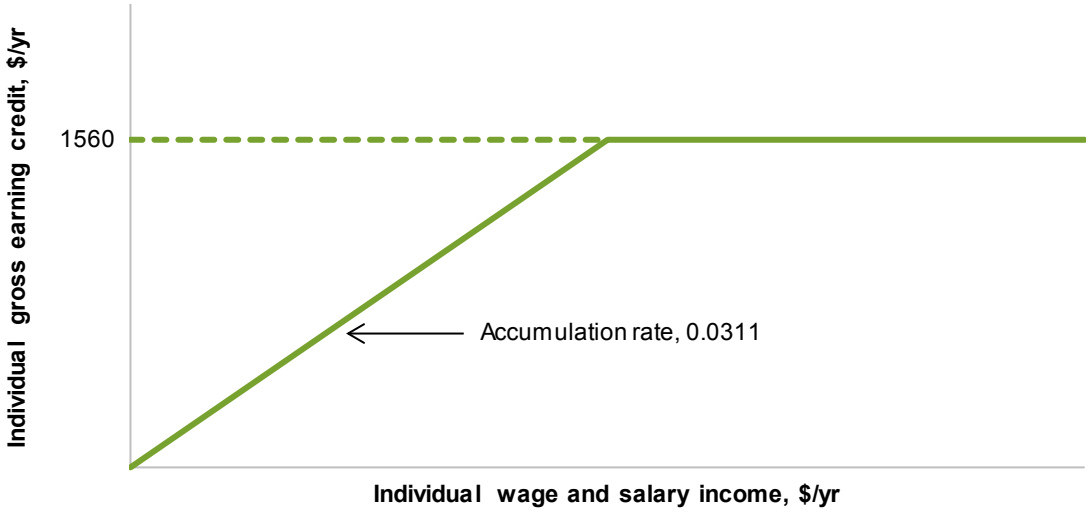
The effects over one year of implementing a modified version of the Five Economists Plan were estimated using the microsimulation model outlined in chapter 2. The model was set up in a series of steps. First, the Five Economists Plan was partially updated for 2012-13.

[10] The potential use of EITCs to compensate minimum wage earners for forgoing an increase in the minimum wage has also been suggested overseas (MaCurdy and McIntyre 2004; US CBO 2007).

In particular, Family Tax Benefit (FTB) part A household taxable income thresholds that applied in 2012-13 were implemented.

Second, payments were calculated according to the approach devised by Lambert (2000), but using the revised FTB thresholds. Initially, gross earning credits are calculated for all individuals, irrespective of whether they are single or a member of a family. Individual gross earning credits are phased in at 3.11 cents per dollar of individual wage and salary income, and are capped at $1560 per year (figure 3.1). EITC payments are assumed to be calculated after all other transfer payments have been finalised. As a result, tax credits do not affect someone's eligibility for, say, Parenting Payment.

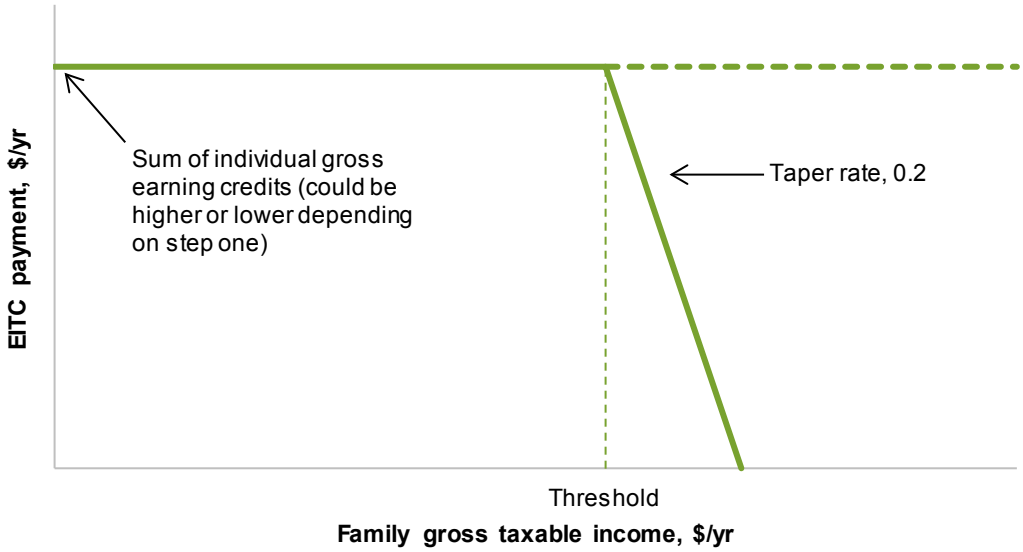
Figure 3.1 **Step one: calculate individual gross earning credit**
Unscaled Five Economists Plan



Following this calculation, individual gross earning credits are summed over all individuals in the family to give family gross earning credits. (The term 'family' is used for consistency with Lambert (2000) and covers all types of taxpaying unit, including singles without children.) A threshold is defined for each family, equal to the level of family income at which the FTB part A payment reaches the base payment. The thresholds in the microsimulation model start at $48 836 per year for families without FTB-eligible children and are higher for those with FTB-eligible children. The highest threshold for families observed in the HILDA sample is $177 412 per year. Families are paid their family gross earning credits until family gross taxable income reaches the threshold, at which point payments taper by 20 cents in the dollar until they reach zero (figure 3.2). The relationship between the FTB part A schedule and the Five Economists Plan illustrated for a hypothetical cameo in figure 3.3.

Figure 3.2 **Step two: calculate payment to couple**

Unscaled Five Economists Plan



Third, the payments accruing to all families were multiplied by a factor of 0.15 (over all household income levels, not just the maximum payment) to scale them down. The scaling factor was chosen so that the average increase in household net income across the bottom two quintiles was the same as under the minimum wage analysis with no job loss (table 2.4). This allows a like-for-like comparison of the effects of the minimum wage increase and of EITC payments on low-income households. This revised objective — the compensation of low-income households *only* for not receiving a minimum wage increase — is much narrower than that of the original Five Economists Plan, resulting in smaller total government outlays.[11]

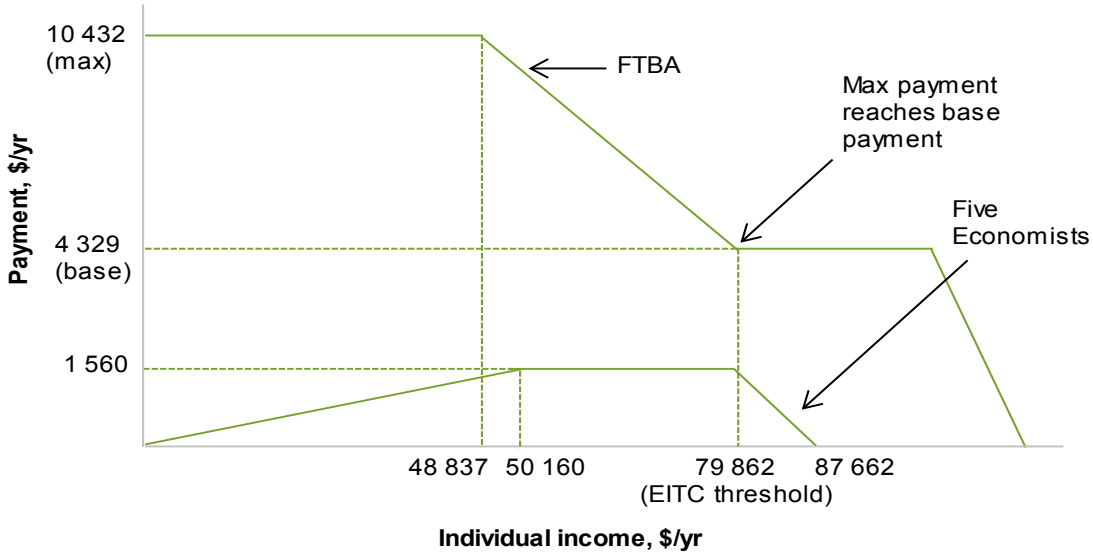
To simulate the effects of the scaled Five Economists plan, the PCTT module is run with and without EITCs. The baseline for the analysis is the gross income of individuals in the HILDA database, which is identical to the baseline used for the minimum wage simulations.

EITCs have the potential to affect work incentives, by allowing some workers to retain proportionally more of their additional labour earnings. Indeed, encouraging participation and work has been a key objective of tax credits around the world. Although the direction of such effects is theoretically ambiguous, EITCs are generally considered to have enhanced employment and earnings of disadvantaged groups in many countries (Neumark and Wascher 2011; Leigh 2005).

[11] Smaller outlays are due to reducing the amount payable to any EITC recipient for a given level of labour income, not from considering the effects of the Five Economists Plan over a single year only.

Figure 3.3 **Link between FTB part A and unscaled Five Economists Plan**

Lone parent with 2 FTB eligible children under 13, all income from wages and salaries over one year



As mentioned, in the present modelling, it is assumed that individuals do not adjust the number of hours they work (or whether they work) in response to EITCs. Nevertheless, the effects of EITCs on Effective Marginal Tax Rates (EMTRs) are explored. To calculate EMTRs, annual gross income is increased by $100 per year for all individuals. The change in individual net taxes is then calculated. This gives an estimate of EMTRs in percentage terms. EMTRs are calculated with and without EITCs. The potential effects on EMTRs of higher taxes or reduced government spending in other areas are not considered.

For the Five Economists Plan, EMTRs were calculated by raising individual income and observing the response in net taxes.[12]

[12] Estimates of EMTRs under the Five Economists Plan are only an approximation. For individuals who have a spouse for taxation purposes, the true EMTR captures the change in net taxes for the couple in response to an increase in the income of the individual, holding the income of their spouse constant. The change in net taxes includes changes in taxes and transfers that are determined for the individual without considering the income of the spouse, as well as those, such as Family Tax Benefit, which are determined for the couple as a whole. By increasing the income of both members of the couple, the approach taken in this technical supplement results in double the change in household income, and hence approximately double the reduction in benefits to the couple. To adjust for this, the change in net taxes is considered at the individual level only and benefits accruing to the couple are divided evenly between the members. This means that only half of the reduction in benefits to the couple is considered (for each individual). For entitlements such as Family Tax Benefit, these errors offset each other, and the procedure for estimating EMTRs is correct. For other government transfers, this procedure is only an approximation.

Results

Net household income

The household net income effects from the introduction of the Scaled Five Economists Plan are broadly similar to the minimum wage simulations with a minimum wage employment elasticity of 0 (compare tables 2.2 and 3.1), although the transfer to the highest two quintiles is reduced under this EITC plan. From a distributional perspective, this is reflected in a reduction in the share of the total increase in household net income received by the highest two quintiles from 41 per cent to 21 per cent (compare tables 2.3 and 3.2).

The largest average gains accrue to households in the middle quintile, with considerably smaller gains going to the lowest quintile. This is because, under the assumption of no labour supply response to EITCs, households in the middle quintile are much more likely to earn wage income, which is necessary to qualify for EITCs. Even if they do receive EITCs, households in the lowest quintile tend to be in the accumulation phase (where payments increase in line with labour income), so that payments are below the maximum. By contrast, those in the middle quintile are likely to be located higher in the accumulation phase or receive the maximum payment. Households in the highest quintile are least likely to receive EITCs, since their high income tends to disqualify them. However, some members of households in this quintile remain eligible, due to their personal characteristics (for example, children living at home or parents with many children).

In proportional terms, households in the bottom quintile receive only half the boost to their net income that is received by the second and third quintiles (table 3.3). Unlike with the increase in the minimum wage, no households lose as a result of the introduction of the Scaled Five Economists Plan.[13]

Direct fiscal cost

The estimated fiscal cost of this plan is $654 million per year. This figure is obtained by multiplying the average increase in net income from EITCs by the number of Australian households in 2012. EITCs do not interact with other taxes and transfers.

[13] Even when the employment elasticity is set at zero, some households lose net income from an increase in the minimum wage, due to the operation of the tax/transfer system (table 2.3).

Table 3.1 **Change in household net income by household income quintile**

Scaled Five Economists Plan

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	144	19.57	0	80.43	28	100
2	213	52.23	0	47.77	111	100
3	257	64.98	0	35.02	167	100
4	204	27.88	0	72.12	57	100
5	178	13.97	0	86.03	25	100
Total	216	35.44	0	64.56	76	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.2 **Percentage share of increase in total household net income by household income quintile**

Scaled Five Economists Plan

Quintile	*Net income*	
	$m	%
1	48	7.3
2	188	28.7
3	281	43.0
4	95	14.6
5	42	6.4
Total	654	100.0

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.3 **Percentage change in household net income by household income quintile**

Scaled Five Economists Plan

Quintile	*Net income (%)*
1	0.13
2	0.26
3	0.25
4	0.06
5	0.02
Total	0.11

Source: Productivity Commission estimates based on HILDA wave 12.

Effective marginal tax rates

In addition to redistributing income, EITCs can also have an impact on work incentives. Effective marginal tax rates (EMTRs) are one indicator commonly used to measure work incentives, and represent the proportion of an additional dollar of labour income lost to increased taxes and reduced benefits. Overall, the Scaled Five Economists Plan reduces EMTRs (averaged over all individuals) slightly from 25.5 per cent to 25.3 per cent (table 3.4). EMTRs fall most for the lowest quintile (0.5 percentage points), where a relatively large number of households operate in the accumulation phase. By contrast, EMTRs increase for the middle quintile, where some households operate in the taper phase (where increases in income reduce EITCs). The EMTRs change little for households in the highest quintile, who are least likely to qualify for EITCs.

Table 3.4 **Percentage of additional income lost to higher taxes and reduced transfers by household income quintile, all individuals[a]**

Scaled Five Economists Plan

Quintile	*EMTR without EITCs (%)*	*EMTR with EITCs (%)*	*Difference (ppt)*
1	6.6	6.1	-0.5
2	26.5	26.1	-0.4
3	31.6	31.7	0.1
4	29.6	29.7	0.1
5	33.2	33.2	0.0
Total	25.5	25.3	-0.2

a EMTRs were calculated for individuals currently working and those not in employment.

Source: Productivity Commission estimates based on HILDA wave 12.

The results confirm the long-established conclusion that the introduction of the Five Economists Plan would reduce EMTRs facing low-income households and increase them for middle-income households (Apps 2002). The overall effects on labour force participation are ambiguous and depend on factors such as the number of individuals in low and middle-income working households, and their work and leisure preferences. Nonetheless, one of the acknowledged objectives of EITCs is to improve the incentives to join the labour force or increase hours worked for individuals in the lowest quintiles. From that perspective, and notwithstanding the fact that this group can face multiple barriers to work, the reduction in EMTRs for that group is more likely than not to produce the sought-after result.

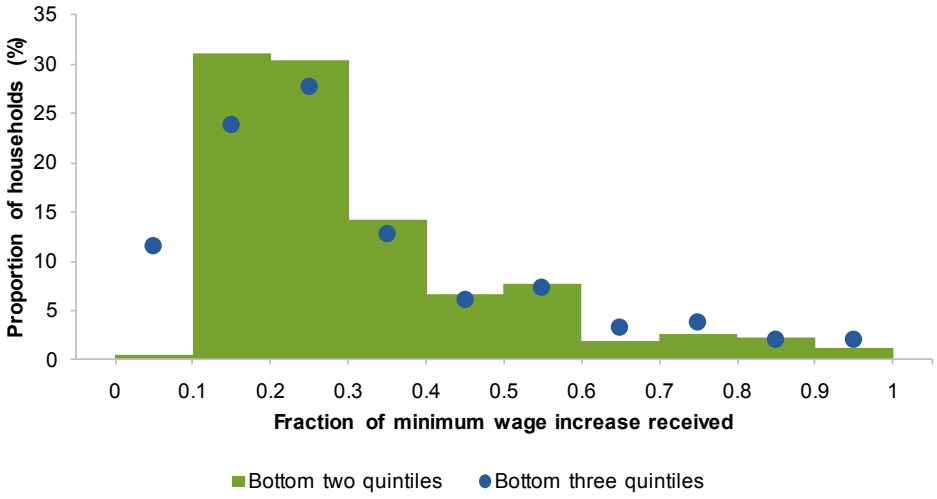
Extent of compensation

Under the Scaled Five Economists Plan, only 11 per cent of households with minimum wage workers in the lowest two quintiles are fully compensated for forgoing an increase in

the minimum wage (12 per cent for the lowest three quintiles).[14] This includes households who have been overcompensated, sometimes substantially. The remainder receive zero or partial compensation, with a high proportion of those households receiving between 10 and 30 per cent compensation (figure 3.4). Unsurprisingly, meeting an average compensation target does not result in full compensation of every minimum wage worker in the bottom two or three quintiles. Because they are based on different eligibility rules, the Five Economists EITC follows a different targeting approach to the minimum wage. To give one example, a person working only a few hours at a relatively high wage would receive EITCs but not a wage increase.

Figure 3.4 **Compensation among low-income households with minimum wage workers[a,b]**

Scaled Five Economists Plan



a In the graph above, the horizontal axis measures the fraction of compensation received, ranging from 0 to under 1. Therefore, only households whose minimum wage workers are not fully compensated are in scope of this graph. **b** 'Low-income' defined as a household with an equivalised net income in the bottom two or three quintiles.

Source: Productivity Commission estimates based on HILDA wave 12.

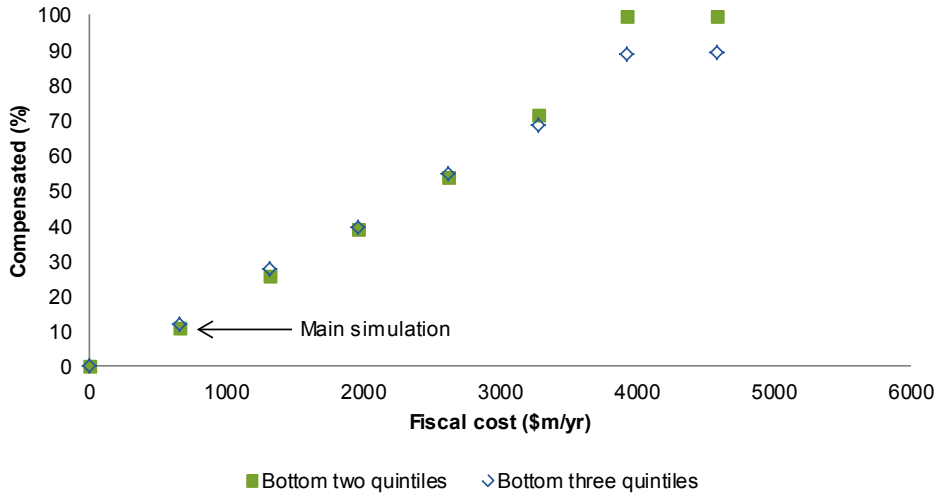
By scaling payments up under the Five Economists Plan, it is possible to increase the proportion of households with minimum wage workers in the lowest two quintiles who are fully compensated. For example, EITCs could be doubled or tripled for all households. However, fully compensating the vast majority of households in those quintiles would be fiscally very expensive (estimated at around $4 billion per year to compensate 90 per cent of the group) (figure 3.5). Moreover, there is a very small proportion of households in the second quintile who cannot be compensated under the Five Economists Plan, no matter

[14] These results are those denoted by the arrow in figure 3.5. The compensation accruing to the third quintile is a by-product of compensating the second quintile. That is, when targeting compensation to the second quintile on average, the third quintile also ends up being eligible and compensated on average.

how much the EITCs are scaled up. This is because their household income is too high to qualify for payments.[15] A similar pattern is evident when the bottom three quintiles are considered, although the proportion of households who cannot be compensated under the Scaled Five Economists Plan is higher.

Figure 3.5 **Total fiscal cost of compensating households with minimum wage workers in the bottom two and three quintiles[a,b]**

Scaled Five Economists Plan



[a] Households are considered to be compensated if they receive 100 per cent compensation or greater. [b] The two top two green squares illustrate that nearly all households with minimum wage earners in the bottom three quintiles are fully compensated for this level of fiscal expenditure.

Source: Productivity Commission estimates based on HILDA wave 12.

3.2 Individual Scaled Five Economists Plan

The Scaled Five Economists Plan is a hybrid scheme that determines payments to couples based on both individual and combined income. Eligibility for most government transfers to households is based on joint household income. However, it may be desirable to base EITC payments on individual income to, among other things, improve the work incentives of second earners or if there were concerns that subsidies based on scaled (monetary) household incomes unfairly discriminate against singles or dual-income couples (Apps 2002). To explore the differences, an individual variant of the Scaled Five Economists Plan is assessed below. Under the Individual Scaled Five Economists Plan, each member of a couple is treated as an individual. All other parameters are unchanged from the hybrid scheme.

[15] This is a fairly rare occurrence, arising from the personal characteristics of some households, such as marital status and number of children.

Results

Net household income

Calculating tax credits on an individual basis has the effect of increasing payments to the highest three quintiles, mainly due to expanded eligibility (table 3.5). There is very little change for the lowest two quintiles as additional payments under the Individual Scaled Five Economists Plan only accrue to households who: (i) earn more than the relevant couples income threshold; and (ii) have two income earners. Most of these households are in the highest three quintiles. The bottom 40 per cent of (equivalised) households receive just 21 per cent of payments under the Individual Scaled Five Economists Plan (table 3.6). In proportional terms, households in the middle quintile see their net income boosted by around a third of one per cent (table 3.7).

Direct fiscal cost

The overall fiscal cost of the Individual Scaled Five Economists Plan is estimated to be $1127 million per year. This is substantially more than the cost of the hybrid scheme.

Table 3.5 **Change in household net income by household income quintile**

Individual Scaled Five Economists Plan

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	145	19.57	0	80.43	28	100
2	217	52.82	0	47.18	114	100
3	300	79.81	0	20.19	240	100
4	311	66.46	0	33.54	207	100
5	226	43.14	0	56.86	98	100
Total	259	50.73	0	49.27	131	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.6 **Percentage share of increase in total household net income by household income quintile**

Individual Scaled Five Economists Plan

Quintile	*Net income*	
	$m	%
1	46	4.1
2	188	16.7
3	393	34.9
4	339	30.1
5	160	14.2
Total	1 127	100.0

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.7 **Percentage change in household net income by household income quintile**

Individual Scaled Five Economists Plan

Quintile	*Net income (%)*
1	0.13
2	0.27
3	0.35
4	0.23
5	0.07
Total	0.19

Source: Productivity Commission estimates based on HILDA wave 12.

Effective marginal tax rates

As expected, the Individual Scaled Five Economists Plan tends to result in slightly lower EMTRs on average than the hybrid scheme, especially for the middle income quintile (table 3.8). Under the hybrid scheme, primary and secondary earners were exposed to substantially higher EMTRs when their combined income was around the threshold, as any additional income accruing to either member of the couple resulted in EITCs being reduced (Apps 2002). Under the Individual Scaled Five Economists Plan, individual income replaces combined income, and many secondary earners face substantially lower EMTRs (results for this group are not shown).

Table 3.8 **Change in individual EMTRs by household income quintile, all individuals[a]**

Individual Scaled Five Economists Plan

Quintile	*EMTR without EITCs (%)*	*EMTR with EITCs (%)*	*Difference (ppt)*
1	6.6	6.1	-0.5
2	26.5	26.0	-0.5
3	31.6	31.3	-0.3
4	29.6	29.7	0.1
5	33.2	33.2	0.0
Total	25.5	25.2	-0.2

a EMTRs were calculated for individuals currently working and those not in employment.

Source: Productivity Commission estimates based on HILDA wave 12.

Extent of compensation

As EITCs are either the same or higher under the Individual Scaled Five Economists Plan than under the hybrid scheme, the percentage of households with minimum wage workers who are fully compensated is also marginally higher (figure 3.6). Still only around 11 per cent of households with minimum wage workers in the lowest two quintiles are fully compensated. The figure increases to 15 per cent for the lowest three quintiles.[16] However, the vast majority are still not fully compensated. Furthermore, the fiscal cost of achieving a given level of compensation is higher under the Individual Scaled Five Economists Plan (figure 3.7).

3.3 MaCurdy and McIntyre Plan

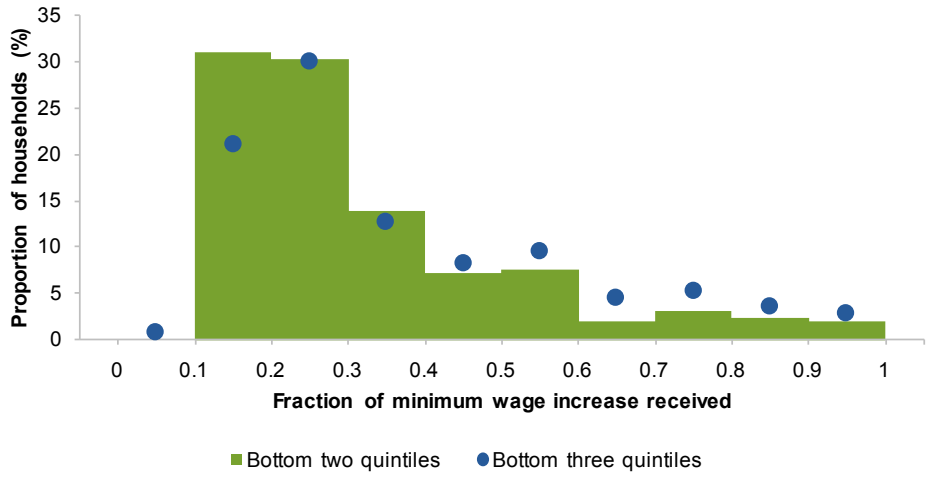
Background

US economists Thomas MaCurdy and Frank McIntyre outlined two EITC plans, which they argue would be superior — in terms of targeting, work incentives and cost — to the existing EITC system that operates in the US and also to minimum wage increases (MaCurdy and McIntyre 2004). Their first scheme — a wage-based tax credit — articulates with the existing US EITC system and would not be directly applicable in an Australian context. This technical supplement focuses on their second plan — a wage-subsidy tax credit — which amounts to a government payment making up the difference between a worker's wage and a higher, notional minimum wage.

16 Results denoted by arrow in figure 3.7.

Figure 3.6 **Compensation among low-income households with minimum wage workers[a,b]**

Individual Scaled Five Economists Plan

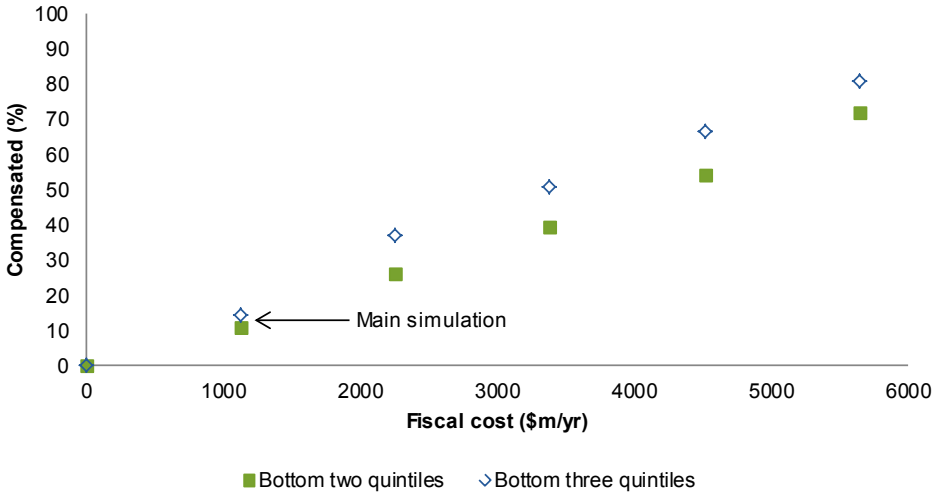


[a] In the graph above, the horizontal axis measures the fraction of compensation received, ranging from 0 to under 1. Therefore, only households whose minimum wage workers are not fully compensated are in scope of this graph. [b] 'Low-income' defined as a household with an equivalised net income in the bottom two or three quintiles.

Source: Productivity Commission estimates based on HILDA wave 12.

Figure 3.7 **Total fiscal cost of compensating households with minimum wage workers in the bottom two or three quintiles[a]**

Individual Scaled Five Economists Plan



[a] Households are considered to be compensated if they receive 100 per cent compensation or greater.

Source: Productivity Commission estimates based on HILDA wave 12.

A notable feature of the wage-subsidy plan is that payments are made only to workers earning below a threshold wage, and that the subsidy paid per hour worked does not start tapering until the household reaches the equivalent of full-time hours. Thus, the plan avoids the potential pitfall of other EITC schemes that reward people on high earnings working few hours a week (PC 2015).

To the Commission's knowledge, neither of the MaCurdy and McIntyre plans has been adopted by a country or jurisdiction worldwide. Nonetheless, the OECD has stated that:

> … the policy implications of the two [MaCurdy and McIntyre] proposals are interesting. Such modifications appear not only to have the potential of enhancing work incentives of participants, but are also likely to improve the targeting of benefits to families with children supported by low-wage workers. In addition, the wage-subsidy EITC would dominate increasing the minimum wage as an effective antipoverty policy. (2005, p. 155)

Some of the perceived weaknesses identified with the US EITC scheme are also apparent with the Five Economists Plan. Because of this, and to inform longer-term consideration of the benefits and costs of EITCs, the Commission has simulated the effects of the MaCurdy and McIntyre wage-subsidy plan in the Australian context. The methodology used for that purpose is detailed in the next section, with results presented in the subsequent section.

Methodology

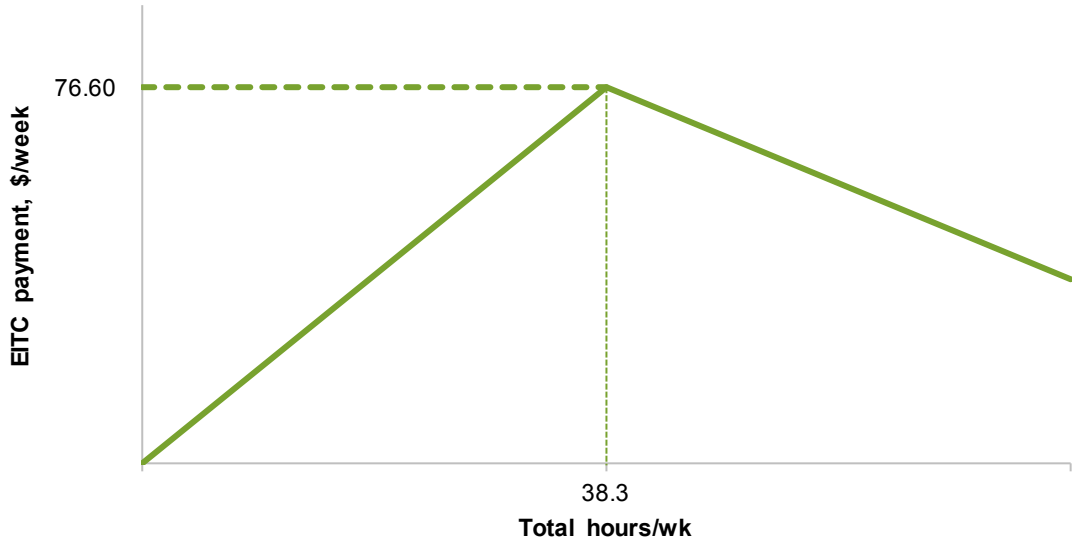
Under the original MaCurdy and McIntyre plan, eligibility for payments is restricted to people with children. Moreover, families with multiple income earners are treated identically to families with a single income earner, with the overall family wage equal to the hours-weighted average of family members' wages and overall family hours worked equal to the sum of family members' hours. A target wage is determined, which could be the wage after the notional minimum wage increase the EITC is intended to replace. Below 38.3 hours worked per week (full-time), the payment is calculated to make up any shortfall between current wage income and wage income under the target wage. The payment tapers above 38.3 hours worked per week at a constant rate until it reaches zero.

To illustrate the operation of the MaCurdy and McIntyre Plan, assume a hypothetical couple where family member A works 10 hours per week at $19.00 per hour and family member B works 20 hours per week at $17.50 per hour. The family is considered to work 30 hours per week at $18.00 per hour. If the target wage was $20 per hour, the payment would be $60 per week [30 x (20 – 18)]. The full payment schedule for this hypothetical couple is illustrated in figure 3.8.

In adapting the MaCurdy and McIntyre Plan to Australia, eligibility for payments is extended to individuals and couples without children. To mimic the simulation of the minimum wage increase, individuals and couples who are identified as minimum wage households receive a maximum payment equivalent to a 2.9 per cent increase in the minimum wage (this is reduced for individuals and couples who exceed the hours threshold).

Figure 3.8 **MaCurdy and McIntyre plan for hypothetical couple**

Family wage $18.00/hour, target wage $20/hour



Results

Net household income

Compared to the Scaled Five Economists Plan, fewer households receive EITCs (9 per cent versus 35 per cent) under the MaCurdy and McIntyre Plan, since eligibility is restricted to individuals and couples deemed to be minimum wage workers (table 3.9). However, the average gains to households who do receive EITCs are higher ($518 per year versus $216 per year). This is because, in many cases, the MaCurdy and McIntyre Plan compensates for the full loss in income to individuals and couples forgoing the increase in the minimum wage.

The benefits under the MaCurdy and McIntyre Plan are more evenly spread across the household income distribution, with households in the middle income quintile receiving a smaller share and all other quintiles receiving a larger share than under the Five Economists Plan (table 3.10). The bottom two quintiles together receive 44 per cent of total payments, substantially more than the 36 per cent under the Scaled Five Economists Plan. This translates into proportional increases in these quintiles' average net household income of around 0.15 per cent, the highest for all quintiles (table 3.11).

Table 3.9 **Change in household net income by household income quintile**

MaCurdy and McIntyre Plan

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	434	7.24	0	92.76	31	100
2	557	12.35	0	87.65	69	100
3	526	10.25	0	89.75	54	100
4	551	8.71	0	91.29	48	100
5	490	4.72	0	95.28	23	100
Total	518	8.68	0	91.32	45	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.10 **Percentage share of increase in total household net income by household income quintile**

MaCurdy and McIntyre Plan

Quintile	*Net income*	
	$m	%
1	54	13.9
2	118	30.5
3	92	23.9
4	82	21.3
5	40	10.3
Total	387	100.0

Source: Productivity Commission estimates based on HILDA wave 12.

Table 3.11 **Percentage change in household net income by household income quintile**

MaCurdy and McIntyre Plan

Quintile	*Net income (%)*
1	0.14
2	0.16
3	0.08
4	0.05
5	0.02
Total	0.06

Source: Productivity Commission estimates based on HILDA wave 12.

Direct fiscal cost

The fiscal cost of the MaCurdy and McIntyre Plan is estimated to be $387 million per year, which again compares favourably with the Scaled Five Economists Plan. (This figure is derived by multiplying the average payment by the total number of households.)

Effective marginal tax rates

To calculate EMTRs for the MaCurdy and McIntyre plan, hours were increased for working individuals, holding wages constant. The results are only calculated for working individuals.

The MaCurdy and McIntyre Plan would reduce average EMTRs for workers in the lowest two income quintiles (table 3.12). The reduction in EMTR is especially large for workers in the bottom quintile. These workers (and their partners) are relatively likely to be in the accumulation phase, where an increase in hours worked results in higher payments. By contrast, the MaCurdy and McIntyre Plan would increase average EMTRs for workers in the third quintile. Many of these workers are working full-time, individually or as part of a couple, and operate in the taper phase. As a result, any further increase in hours would reduce EITC payments.

Table 3.12 **Change in individual EMTRs by household income quintile, working individuals**

MaCurdy and McIntyre Plan

Quintile	*EMTR without EITCs (%)*	*EMTR with EITCs (%)*	*Difference (ppt)*
1	8.6	7.6	-1.0
2	31.7	31.4	-0.3
3	36.3	36.4	0.2
4	32.2	32.2	0.0
5	34.7	34.7	0.0
Total	32.7	32.7	0.0

Source: Productivity Commission estimates based on HILDA wave 12.

That said, these EMTR results are not directly comparable with those presented earlier for the Scaled Five Economists Plan (table 3.4), as those earlier results are not limited to working individuals. To enable a like-for-like comparison, the estimated impacts of the Scaled Five Economists Plan on EMTRs for working individuals only are presented in table 3.13.

Table 3.13 **Change in individual EMTRs by household income quintile, working individuals**

Scaled Five Economists Plan

Quintile	*EMTR without EITCs (%)*	*EMTR with EITCs (%)*	*Difference (ppt)*
1	8.6	8.1	-0.5
2	31.7	31.4	-0.3
3	36.3	36.5	0.2
4	32.2	32.4	0.2
5	34.7	34.7	0.0
Total	32.7	32.7	0.0

Source: Productivity Commission estimates based on HILDA wave 12.

The comparison reveals that the MaCurdy and McIntyre Plan performs better than the Scaled Five Economists Plan in terms of the EMTRs facing households in those income quintiles typically targeted by EITCs (the bottom two). However, both schemes deliver no significant change in overall average EMTRs.[17] This may seem surprising, given the large EMTR reduction for the first quintile under the MaCurdy and McIntyre Plan. However, relatively few workers benefit from this reduction.

Extent of compensation

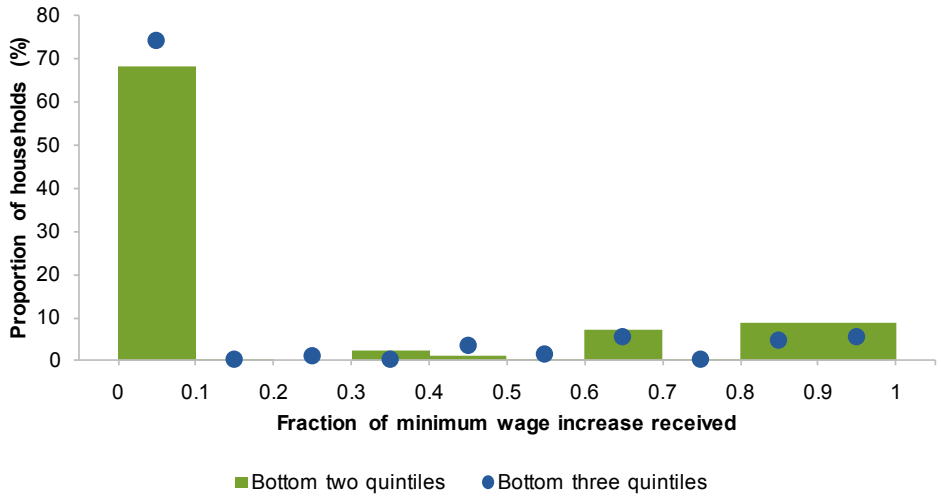
The MaCurdy and McIntyre Plan fully compensates around 68 per cent of household with minimum wage workers in the lowest two quintiles (and around 53 per cent for the lowest three quintiles).[18] Households with minimum wage workers who do not receive full compensation may be exceeding the full-time hours threshold, in which case their payment is reduced, or be ineligible because their average combined wage is beyond the relevant band used to identify minimum wage workers. The latter is a peculiarity of the MaCurdy and McIntyre Plan, which explains that most households with minimum wage workers in the lowest two or three quintiles who do not receive full compensation receive no compensation at all (figure 3.9). As figure 3.10 illustrates, the scope to increase the proportion of compensated households under this plan is very limited.

17 The MaCurdy and McIntyre Plan has a slightly lower average, which disappears after rounding.

18 Denoted by the arrow in figure 3.10.

Figure 3.9 **Compensation among low-income households with minimum wage workers[a,b]**

MaCurdy and McIntyre Plan

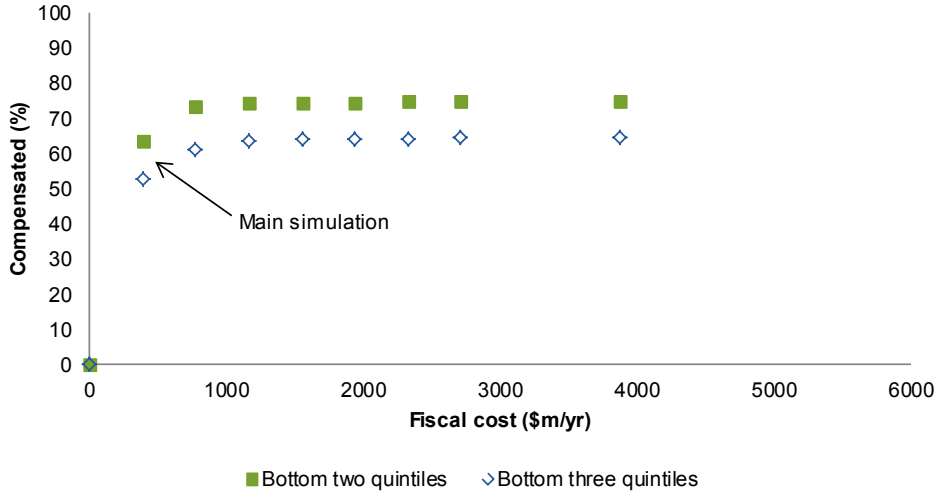


[a] In the graph above, the horizontal axis measures the fraction of compensation received, ranging from 0 to under 1. Therefore, only households whose minimum wage workers are not fully compensated are in scope of this graph. [b] 'Low-income' defined as a household with an equivalised net income in the bottom two or three quintiles.

Source: Productivity Commission estimates based on HILDA wave 12.

Figure 3.10 **Total fiscal cost of compensating households with minimum wage workers in the bottom two or three quintiles[a]**

MaCurdy and McIntyre Plan



[a] Households are considered to be compensated if they receive 100 per cent compensation or greater.

Source: Productivity Commission estimates based on HILDA wave 12.

3.4 Direct Compensation

As is apparent, none of the EITC plans considered above is capable of compensating all minimum wage earners fully for the loss of net income resulting from forgoing the increase in the minimum wage. Were it technically feasible, a more effective instrument for full and direct compensation would be for the Australian Tax Office (ATO) to identify minimum wage workers in low-income households and provide them with an EITC to *exactly* offset a freeze in (or reduction in the rate of growth of) the minimum wage. This credit would be paid under the assumption that increasing the minimum wage would have no negative employment effects. This hypothetical scheme can be regarded as a variant on the MaCurdy and McIntyre Plan, but without an hours taper and with eligibility strictly restricted to low-income households.

If low-income households were defined as those in the lowest two equivalised net income quintiles, the effects of direct compensation would, by definition, be equivalent to those in table 2.3 for those quintiles, with the highest three quintiles attracting no payment. The estimated fiscal cost of exactly compensating all households with minimum wage workers in the two lowest quintiles is $224 million per year. The absence of benefit tapering under Direct Compensation may create high EMTRs for some individuals, as their household moves from the second to the third income quintile. Overall, however, the effect of Direct Compensation on average EMTRs is indeterminate.

There would be some practical and financial obstacles to the implementation of this approach to compensation. In particular, it would require information on individual hourly wages that is not currently collected by the ATO. Self-reporting of wages, without robust verification procedures, would create incentives for individuals and/or businesses to misrepresent earnings. Implementing systems to remedy this would result in set-up and administration costs for the ATO and employers. The Commission notes that the proposed introduction of a 'single-touch payroll' tax reporting facility by the ATO might mitigate those costs.

4 Discussion

Similar to Leigh (2007), the simulation modelling in this supplement shows that the net financial benefits of higher minimum wages extend across the entire household income distribution, with only around 31 per cent of payments accruing to households in the bottom 40 per cent. Generally speaking, households in the middle (equivalised) quintile are the main beneficiaries of a minimum wage increase. When only households containing employed persons are considered, the balance shifts more in favour of the bottom two quintiles. However, there are relatively few working households in those quintiles.

When the model assumes that disemployment results from minimum wage increases, there is a stark separation of winners and losers amongst households with minimum wage workers. The vast majority of these keep their jobs and receive a small increase in wage income, but a small proportion incur substantial losses. The tax and transfer system moderates both the gains and losses associated with increasing the minimum wage. However, that system does not alter the overall story substantially, in terms of distributional impact.

The modelling results, therefore, reinforce that minimum wages do not target poverty or equity directly, with the potential to reduce the living standards of some households.

This raises the question of whether other instruments, such as EITCs, might be used to relieve pressure on minimum wages while safeguarding the living standards of the low-paid and their families. Variants of EITCs are in use in many countries, and have been specifically proposed for Australia by the Five Economists as compensation for a temporary freeze in the minimum wage (and award wages).

The analysis reveals that even subtle changes in the design of EITC plans can have large effects on their performance. For example, treating couples as though they were two individuals increases fiscal costs dramatically. Budgetary expenditure can be reduced under some plans, but at the cost of higher effective marginal tax rates for some groups. No single plan performs best across all indicators, highlighting the need for tradeoffs (table 4.1). While it would be possible to restrict the generosity of each plan to meet a pre-determined budgetary envelope, this would simply exacerbate differences across plans in other dimensions.

Table 4.1 **Summary of indicators by policy instrument[a]**

Policy instrument	*Share of payments received by households in the bottom 40 per cent of income distribution*	*Fiscal cost*	*Average change in EMTRs facing bottom quintile households (all households / working households)*	*Households with minimum wage workers fully compensated in the bottom 40 per cent of income distribution*
	%	$m/year	ppt	%
Minimum wage	31	-258 (no job loss) to 163 (upper bound disemployment)	nm / nm	100 (no job loss)
Scaled Five Economists	36	654	-0.5 / -0.5	11
Individual Scaled Five Economists	21	1 127	-0.5 / nm	11
MaCurdy and McIntyre	44	387	nm / -1.0	68
Direct Compensation	100	224	nm / nm	100

a EITC instruments are all assessed by comparison with a 2.9 per cent increase in the minimum wage. **nm** Not modelled.

Source: Productivity Commission estimates based on HILDA wave 12.

In terms of targeting payments to the bottom 40 per cent of households, Direct Compensation is the best-performing instrument of those examined, followed by the MaCurdy and McIntyre Plan, the Scaled Five Economists Plan (which performs similarly to the minimum wage increase), and the Individual Scaled Five Economists Plan. The rankings are identical in terms of fiscal costs, except that the minimum wage has much lower fiscal costs than the other instruments. This is because payments of around $963 million per year from higher wages are made by employers rather than the government. The fiscal costs (or savings) associated with the minimum wage increase are due to changes in taxes and transfers induced by changes in wages and employment, rather than direct payments.

The parallel rankings of plans according to targeting and fiscal cost criteria are not coincidental. Under Direct Compensation and the MaCurdy and McIntyre Plan, the fiscal costs are reduced by limiting or emphasising payments to the bottom 40 per cent of households. However, this strict targeting tends to increase EMTRs substantially for households on the cusp of losing eligibility.

In relation to fully compensating individual minimum wage workers in the bottom 40 per cent of households, Direct Compensation and the MaCurdy and McIntyre Plan outperform the Scaled Five Economists Plan and the Individual Scaled Five Economists Plan. The MaCurdy and McIntyre Plan is also the most effective in respect to lowering the EMTRs faced by low-income households containing at least one worker.

To the Commission's knowledge, the Five Economists Plan is the only EITC plan to have been formally proposed and modelled for Australia, in the context of minimum wages (Keating and Lambert 1998; Lambert 2000; Dixon and Rimmer 2001). The analysis in this technical supplement has shown that it is not necessarily the best instrument available, even when adjusted to focus primarily on compensating low-income households.

The selection of an EITC scheme should be guided by policy objectives. For example, Direct Compensation is clearly superior when the only relevant indicator is the percentage of payments accruing to households in the bottom 40 per cent of the income distribution. On the other hand, the Five Economists Plans (Scaled and Individual) are superior if the only relevant indicator is average EMTRs faced by all households. This illustrates the importance of being clear about policy objectives, including how competing objectives are weighted.

While informative and supportive of further analysis, the estimates in this technical supplement should be interpreted with caution. There is a potential gap between the indicators used and high-level objectives such as efficiency and equity. There is also a gap between the indicators presented and more complex outcomes such as economy-wide equilibrium wages, incomes and employment. For instance, a reduction in EMTRs via EITCs may lead to an increase in labour supply by some groups. Such a result was modelled for Australia by Buddelmeyer, Freebairn and Kalb (2006). They estimated that their EITC option would be especially effective in lifting labour force participation and hours worked by single parents. However, other authors have shown, at least in the United States context, that an increase in labour supply by EITC recipients had led to other groups having lower wages and employment prospects (Neumark and Wascher 2007; Leigh 2010).

Flow-on effects in labour markets are also expected as a result of minimum wage increases. As discussed, institutional settings in Australia mean that a range of award and non-award wages rise each time the minimum wage is increased. Taking such effects into account by way of microsimulation would be a complex task and was not directly attempted here.

Some other relevant costs and benefits have been excluded from the analysis in this technical supplement. For example, implementing Direct Compensation or the MaCurdy and McIntyre Plan would require information on an employee's hourly wage. Setting up payroll and tax administration systems to collect this information would be costly.

The modelling results in this supplement are thus only a partial guide for understanding the merits of different instruments for maintaining or improving the living standards of the low-paid and their families. Expanding the number of indicators modelled and bringing the analysis together within a benefit–cost framework are areas that could warrant further research.

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A Minimum wage sensitivity analyses

This appendix presents a set of additional simulations, designed to test the sensitivity of the minimum wage results in chapter 2 of this supplement to changes in some of the key parameters. The first sensitivity test concerns the parameters used to identify minimum wage workers within the database. They are:

- Upper bound of the minimum wage — in the main simulations (chapter 2), this bound is set at 110 per cent of the relevant minimum wage for 2012-13 ($15.96 per hour). In this appendix, the bound is lowered to 105 per cent, and raised to 120 and 130 per cent.
- Lower bound of the minimum wage — in the main simulations (chapter 2), this bound is set at zero per cent of the 2012-13 minimum wage. In this appendix, the lower bound is raised to 80 per cent of the minimum wage.
- Cut-off for hours worked — the hourly wage of employees is obtained by dividing labour income through by hours worked. In the main simulations, hours are top-coded at 60 hours per week, to allow for possible reporting errors. In this appendix, top-coding at 50 and 70 hours is trialled.

The sensitivity tests described above are all performed in the context of the 'no job loss' scenario (elasticity = 0).

A final sensitivity test regards the value of the elasticity of minimum wage employment with respect to the minimum wage. A value of -0.5 is tested below, midway between the 0 and -1 values used in the body of this supplement.

A.1 Upper bound 105 per cent

Table A.1 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	486	7.24	0	92.76	35	100
2	685	15.41	0	84.59	105	100
3	790	17.18	0	82.82	136	100
4	830	14.81	0	85.19	123	100
5	752	8.15	0	91.85	61	100
Total	724	12.37	0	87.63	90	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.2 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	444	7.24	–	0.00	0	92.76	32	100
2	469	15.30	-61	0.11	0	84.59	72	100
3	556	17.18	–	0.00	0	82.82	96	100
4	621	14.81	–	0.00	0	85.19	92	100
5	560	8.15	–	0.00	0	91.85	46	100
Total	532	12.34	-61	0.02	0	87.63	66	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.3 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	611	32.64	0	67.36	200	100
2	800	20.63	0	79.37	165	100
3	779	17.88	0	82.12	139	100
4	797	13.83	0	86.17	110	100
5	764	7.86	0	92.14	60	100
Total	724	18.70	0	81.30	135	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.4 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	461	32.48	-61	0.17	0	67.36	150	100
2	556	20.63	–	0.00	0	79.37	115	100
3	577	17.88	–	0.00	0	82.12	103	100
4	600	13.83	–	0.00	0	86.17	83	100
5	559	7.86	–	0.00	0	92.14	44	100
Total	532	18.67	-61	0.03	0	81.30	99	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.2 Upper bound 120 per cent

Table A.5 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	556	10.02	0	89.98	56	100
2	823	24.37	0	75.63	201	100
3	933	29.29	0	70.71	273	100
4	993	24.77	0	75.23	246	100
5	924	13.54	0	86.46	125	100
Total	873	19.99	0	80.01	174	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.6 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	501	10.02	–	0.00	0	89.98	50	100
2	563	24.21	-48	0.16	0	75.63	136	100
3	650	29.29	–	0.00	0	70.71	190	100
4	724	24.77	–	0.00	0	75.23	179	100
5	680	13.48	-1 659	0.06	0	86.46	91	100
Total	630	19.94	-451	0.05	0	80.01	126	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.7 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	724	48.51	0	51.49	351	100
2	926	35.48	0	64.52	329	100
3	970	29.84	0	70.16	289	100
4	965	23.49	0	76.51	227	100
5	918	12.89	0	87.11	118	100
Total	873	30.22	0	69.78	264	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.8 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	538	48.26	-48	0.25	0	51.49	260	100
2	639	35.48	–	0.00	0	64.52	227	100
3	695	29.84	–	0.00	0	70.16	207	100
4	715	23.40	-1 659	0.09	0	76.51	166	100
5	669	12.89	–	0.00	0	87.11	86	100
Total	630	30.15	-451	0.07	0	69.78	190	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.3 Upper bound 130 per cent

Table A.9 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	582	11.61	0	88.39	68	100
2	919	30.65	0	69.35	282	100
3	1 054	38.22	0	61.78	403	100
4	1 125	32.11	0	67.89	361	100
5	1 032	17.89	0	82.11	185	100
Total	983	25.49	0	74.51	250	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.10 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	523	11.61	–	0.00	0	88.39	61	100
2	617	30.49	-48	0.16	0	69.35	188	100
3	728	38.22	–	0.00	0	61.78	278	100
4	815	32.11	–	0.00	0	67.89	262	100
5	751	17.83	-1 659	0.06	0	82.11	133	100
Total	701	25.45	-451	0.05	0	74.51	178	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.11 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	795	58.84	0	41.16	468	100
2	1 049	47.28	0	52.72	496	100
3	1 076	37.83	0	62.17	407	100
4	1 114	30.76	0	69.24	343	100
5	1 032	16.99	0	83.01	175	100
Total	983	38.55	0	61.45	379	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.12 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	579	58.60	-48	0.25	0	41.16	339	100
2	715	47.28	–	0.00	0	52.72	338	100
3	770	37.83	–	0.00	0	62.17	291	100
4	813	30.67	-1 659	0.09	0	69.24	248	100
5	749	16.99	–	0.00	0	83.01	127	100
Total	701	38.48	-451	0.07	0	61.45	269	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.4 Lower bound 80 per cent

Table A.13 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	588	5.28	0	94.72	31	100
2	798	14.01	0	85.99	112	100
3	885	16.27	0	83.73	144	100
4	888	13.75	0	86.25	122	100
5	848	7.17	0	92.83	61	100
Total	825	11.07	0	88.93	91	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.14 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	532	5.28	–	0.00	0	94.72	28	100
2	553	14.01	–	0.00	0	85.99	77	100
3	622	16.27	–	0.00	0	83.73	101	100
4	654	13.75	–	0.00	0	86.25	90	100
5	628	7.17	–	0.00	0	92.83	45	100
Total	601	11.07	–	0.00	0	88.93	67	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.15 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	728	27.11	0	72.89	197	100
2	871	20.12	0	79.88	175	100
3	902	16.08	0	83.92	145	100
4	851	13.21	0	86.79	112	100
5	852	6.66	0	93.34	57	100
Total	825	16.74	0	83.26	138	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.16 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	547	27.11	–	0.00	0	72.89	148	100
2	604	20.12	–	0.00	0	79.88	121	100
3	656	16.08	–	0.00	0	83.92	106	100
4	640	13.21	–	0.00	0	86.79	85	100
5	618	6.66	–	0.00	0	93.34	41	100
Total	601	16.74	–	0.00	0	83.26	101	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.5 Top-coding 50 hours

Table A.17 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	506	8.35	0	91.65	42	100
2	709	17.34	0	82.66	123	100
3	806	19.71	0	80.29	159	100
4	815	17.42	0	82.58	142	100
5	732	8.95	0	91.05	66	100
Total	732	14.13	0	85.87	104	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.18 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	455	8.35	–	0.00	0	91.65	38	100
2	494	17.23	-61	0.11	0	82.66	85	100
3	572	19.71	–	0.00	0	80.29	113	100
4	612	17.42	–	0.00	0	82.58	107	100
5	563	8.95	–	0.00	0	91.05	50	100
Total	544	14.11	-61	0.02	0	85.87	77	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.19 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	627	36.61	0	63.39	230	100
2	812	24.36	0	75.64	198	100
3	800	20.64	0	79.36	165	100
4	768	16.05	0	83.95	123	100
5	744	8.45	0	91.55	63	100
Total	732	21.37	0	78.63	157	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.20 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	478	36.45	-61	0.17	0	63.39	174	100
2	568	24.36	–	0.00	0	75.64	138	100
3	593	20.64	–	0.00	0	79.36	122	100
4	586	16.05	–	0.00	0	83.95	94	100
5	567	8.45	–	0.00	0	91.55	48	100
Total	544	21.33	-61	0.03	0	78.63	116	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.6 Top-coding 70 hours

Table A.21 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	509	8.39	0	91.61	43	100
2	752	18.09	0	81.91	136	100
3	861	20.55	0	79.45	177	100
4	872	18.42	0	81.58	161	100
5	847	9.99	0	90.01	85	100
Total	787	14.83	0	85.17	117	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.22 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	459	8.39	–	0.00	0	91.61	39	100
2	519	17.98	-61	0.11	0	81.91	93	100
3	606	20.55	–	0.00	0	79.45	125	100
4	645	18.42	–	0.00	0	81.58	119	100
5	621	9.99	–	0.00	0	90.01	62	100
Total	575	14.81	-61	0.02	0	85.17	85	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.23 **Change in household gross income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	662	37.85	0	62.15	251	100
2	857	24.87	0	75.13	213	100
3	861	21.93	0	78.07	189	100
4	840	17.11	0	82.89	144	100
5	853	9.65	0	90.35	82	100
Total	787	22.43	0	77.57	177	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.24 **Change in household net income by working household equivalised income quintile**

Average gain, 2.9 per cent increase in the minimum wage, no job loss

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	498	37.69	-61	0.17	0	62.15	188	100
2	596	24.87	–	0.00	0	75.13	148	100
3	627	21.93	–	0.00	0	78.07	138	100
4	629	17.11	–	0.00	0	82.89	108	100
5	616	9.65	–	0.00	0	90.35	59	100
Total	575	22.39	-61	0.03	0	77.57	129	100

– Negligible.

Source: Productivity Commission estimates based on HILDA wave 12.

A.7 Midpoint disemployment (elasticity -0.5)

Table A.25 **Change in household gross income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -0.5)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	509	8.27	-16 735	0.12	0	91.61	21	100
2	734	17.60	-22 915	0.28	0	82.13	66	100
3	846	20.14	-25 136	0.35	0	79.51	82	100
4	845	17.74	-25 933	0.30	0	81.95	72	100
5	804	9.53	-23 821	0.15	0	90.32	40	100
Total	766	14.41	-23 583	0.24	0	85.35	55	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.26 **Change in household net income by equivalised household income quintile**

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -0.5)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	482	8.31	-11 536	0.09	0	91.61	30	100
2	518	17.51	-9 785	0.36	0	82.13	55	100
3	608	20.19	-17 108	0.31	0	79.51	70	100
4	641	17.78	-20 168	0.27	0	81.95	60	100
5	605	9.55	-17 071	0.13	0	90.32	35	100
Total	575	14.42	-14 805	0.23	0	85.35	49	100

Source: Productivity Commission estimates based on HILDA wave 12.

Working households

Table A.27 Change in household gross income by working household equivalised income quintile

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -0.5)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	648	36.94	-20 874	0.58	0	62.48	119	100
2	839	24.38	-24 749	0.41	0	75.21	103	100
3	840	21.32	-25 980	0.35	0	78.33	89	100
4	816	16.57	-24 536	0.28	0	83.16	68	100
5	807	9.08	-25 927	0.14	0	90.78	37	100
Total	766	21.80	-23 738	0.35	0	77.85	83	100

Source: Productivity Commission estimates based on HILDA wave 12.

Table A.28 Change in household net income by working household equivalised income quintile

Average gain, 2.9 per cent increase in the minimum wage, disemployment (elasticity -0.5)

	Beneficiaries		*Losers*		*Unaffected*		*All households*	
Quintile	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*	*$/yr*	*%*
1	504	36.87	-10 176	0.65	0	62.48	120	100
2	596	24.42	-16 160	0.37	0	75.21	87	100
3	627	21.37	-19 706	0.30	0	78.33	75	100
4	626	16.61	-19 541	0.24	0	83.16	58	100
5	597	9.10	-17 908	0.13	0	90.78	32	100
Total	575	21.81	-14 996	0.34	0	77.85	74	100

Source: Productivity Commission estimates based on HILDA wave 12.