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DISCUSSION PAPER SERIES

IZA DP No. 13288

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# ABSTRACT

## Understanding the Rising Trend in Female Labour Force Participation*

Female labour force participation has increased tremendously since World War II in developed countries. Prior research provides piecemeal evidence identifying some drivers of change but largely fails to present a consistent story. Using a rare combination of data and modelling capacity available in Australia, we develop a new decomposition approach to explain rising female labour force participation since the mid-1990s. The approach allows us to identify, for the first time, the role of tax and transfer policy reforms as well as three other factors that have been shown to matter by earlier studies. These are (i) changes in real wages, (ii) population composition changes, and (iii) changes in labour supply preference parameters. A key result is that –despite the ongoing emphasis of public policy on improved work incentives for women in Australia and elsewhere– changes in financial incentives due to tax and transfer policy reforms have contributed relatively little to achieve these large increases in participation. Instead, the other three factors drive the increased female labour force participation.

**JEL Classification:** H31, J22, J31

**Keywords:** female labour force participation, employment rate, tax-transfer policy, behavioural microsimulation, decomposition

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# 1. Introduction

Female labour force participation has increased tremendously over the long run in developed countries (Costa 2000). This trend is still ongoing in most of these countries (Thévenon 2013) and has been the subject of extensive research. This research is important to bolster our understanding of changing labour market as well as for effective policy design. However, understanding the drivers of these large structural changes remains a challenge, partly because most studies focus on one factor, providing piecemeal and sometimes inconsistent evidence while often leaving a large portion of the observed changes unexplained.

The key contribution of this paper is to provide, for the first time, separate and internally consistent estimates of the role of tax and transfer policy reforms, wage growth, population changes and changes in labour supply preferences. Previous papers have pointed to the potential importance of some of these factors separately but the contribution of tax-transfer reforms remains largely undocumented. Using Australia's rare combination of consistent historic data collecting the same household and individual information over several decades and specialised tax-benefit behavioural microsimulation modelling capacity, we develop a new approach to estimate the respective roles of these four factors in a unified analytical framework.

The key result is that despite employment effects of tax and transfer reforms looming large in the political discourse in Australia,[1] we find that these reforms have done little to drive the rise in female participation rates. Two other important results emerge from this study. First, real wage growth plays an important role, confirming results from earlier studies. Second, changes in the structure of the population, which includes age, education and family composition among other observable characteristics, play a more important role than suggested by earlier studies.

There have been numerous studies on women's labour force participation. The extensive US literature has emphasised the role of rising wages and reductions in the gender wage gap as key drivers for the increase in labour force participation (Jones et al. 2015; Cardia and Gomme 2013; Eckstein and Lifshitz 2011; Attanasio et al. 2008; Olivetti 2006; Pencavel 1998; Juhn and Murphy 1997; Gustafsson and Jacobsson 1985). Although the literature has generally found little evidence for changes in observable demographic characteristics explaining much of the labour force participation increase, one notable exception is Eckstein and Lifshitz (2011) who identify a large role for rising education levels above and beyond the effects on wages. Numerous other explanations have been considered in the literature, including technological improvements in the household (Jones et al. 2015; Eckstein and Lifshitz 2011), cohort (or time) effects (Goldin 1990), possibly related to shifts in preferences; fertility (Erosa et al. 2005); culture and social norms (Costa 2000; Fernández et al. 2004; Fernández 2013), which again may relate to shifts in preferences; improvements in medical technology (Albanesi and Olivetti 2016; Goldin and Katz 2002); reductions in the cost of children (Attanasio et al. 2008; Eckstein and Lifshitz 2011); and labour demand shifts towards occupations favoured by women (Blau and Kahn 2017, p.809; Goldin 1990).[2]

[1] This focus of the policy discourse extends beyond Australia. A prominent example is the 2017 US tax reform that linked employment and tax cuts in its title ("Tax Cuts and Jobs Act of 2017").

[2] Bick et al. (2018) provide cross-country evidence on the wage-hours relationship. They note that "in the majority of countries hours are decreasing with the individual wage, while only in the richest countries [such as the US] is this relationship reversed." (p. 191) They find that the positive relationship between wages and hours in high-income countries is strongest for women.

Nevertheless, a large portion of the observed changes typically remains unexplained (Blau 1998, p.161) and most studies have focused on one or sometimes two factors, thereby limiting these studies' capacity to gauge the relative importance of different factors. In addition, the role of tax-transfer policy reforms, which have often been presented by governments as improving work incentives, has been understudied, leading Blundell et al. (2013) to call for "a detailed analysis of effective incentives in the tax and benefit system, how they have changed over time, and how individuals and families have responded".[3]

We consider actual labour supply changes over more than two decades and assess the contributions of four specific drivers, namely changes in financial incentives arising from all tax and transfer policy reforms implemented during this period, real wage growth, population composition changes, and changes in labour supply preference parameters. Our starting point is to quantify the effect of tax-transfer policy reforms by extending the decomposition approach introduced by Bargain (2012b) from its original focus on income to the distribution of hours worked. We then augment this decomposition with an approach inspired by Oaxaca-Blinder wage decompositions to identify the effect of changes in wages and in population composition. All other drivers of change are captured in a fourth component represented by changes in labour supply preference parameters. We focus on changes in labour supply decisions separate from decisions related to education or retirement (which are outside the scope of this paper) by restricting our analysis to prime working-age individuals aged between 25 and 55.

The new approach we develop to decompose changes in the distribution of hours worked is data-demanding. This constraint explains our choice of Australia as case study as consistent data on labour supply and income have been collected in Australia for several decades, but we note that Australia is also of broader interest as similar trends are observed across most OECD countries.[4] The decomposition is based on Australian survey data spanning 23 years from 1994 to 2016 combined with a behavioural microsimulation model which embeds the details of all tax and transfer policy reforms implemented during this period. In answering the call by Blundell et al. (2013) we are thus able to account for the complexity and non-linearities in the tax and transfer system, a feature that has been shown to be important in explaining the labour supply behaviour of couples (Bick and Fuchs-Schündeln 2018).

The paper is structured as follows. Section 2 describes the data used in the analyses and discusses the sample selection. Some background with regard to the Australian circumstances is provided in Section 3. The methodology for the different components of our analysis (microsimulation, labour supply modelling and decomposition) is outlined in Section 4. Results are then presented and discussed in Section 5, after which Section 6 concludes.

[3] Although Burniaux et al. (2004) and OECD (2004) simulated the impact of some specific policy changes for some OECD countries, evidence on a broader range of tax and transfer policy reforms is still lacking.

[4] Furthermore, wage elasticities' estimates for Australia presented in Section 4.1.2 are well within the range of prior estimates for developed countries, further supporting the claim of broader relevance.

# 2. Data

## 2.1 The Survey of Income and Housing (Costs)

The analysis is based on several years of the Australian Survey of Income and Housing (SIH), which was previously known as the Survey of Income and Housing Costs. This nationally representative survey is designed by the Australian Bureau of Statistics to collect detailed information on the income sources, labour market status, hours worked and socioeconomic characteristics of households and household members. In particular, the SIHC provides rich information on the various components of labour and capital income that we use to generate measures of market income.

We use the SIH to compute the values of taxes and benefits by using the Melbourne Institute Tax and Transfer Simulator (MITTS) to determine entitlements, as described briefly in Section 4, rather than the actual receipts reported in the SIH. MITTS generates all major social security transfers, family payments, rebates and income taxes to compute disposable income. Labour supply responses to a change in the tax-transfer regime are estimated using the behavioural component of MITTS, which is based on a structural model of labour supply (briefly described in Section 4.1).

## 2.2 Sample Selection

To ensure that we have some wage variation in our data and sufficient observations in each of our demographic groups to estimate the structural labour supply models, we pool four cross-sectional surveys from the mid to late 1990s (1994/95, 1995/96, 1996/97, and 1997/98) and three cross-sectional surveys from 2011 to 2016 (2011/12, 2013/14 and 2015/16). We exclude full-time students, self-employed workers, people receiving a disability support payment, people who report being permanently unable to look for work and anyone aged over 65 from this sample.

The decomposition attributes the labour supply changes between the first year (1994/95) and the last year (2015/16) of our datasets to a range of factors. To allow a focus on labour supply decisions separate from any decisions related to education or retirement, we restrict the sample on which we run our simulations to individuals who are aged between 25 and 55. Appendix A presents weighted summary statistics for the non-labour market characteristics of the individuals in our sample, with labour market outcomes presented and discussed in section 3.1.

Comparing the average age of individuals in our 1994/95 sample with that of the 2015/16 sample, we observe that the prime working-age population has slightly aged on average, and that there are slightly fewer children. The most striking difference between the two samples is however the large increase in the proportion of people who complete post-school qualifications. This increase is particularly large for partnered women and single parents (who are mostly women). Similar patterns are observed for the pooled mid to late 1990s data versus the pooled data from the 2010s used in the labour supply estimations.

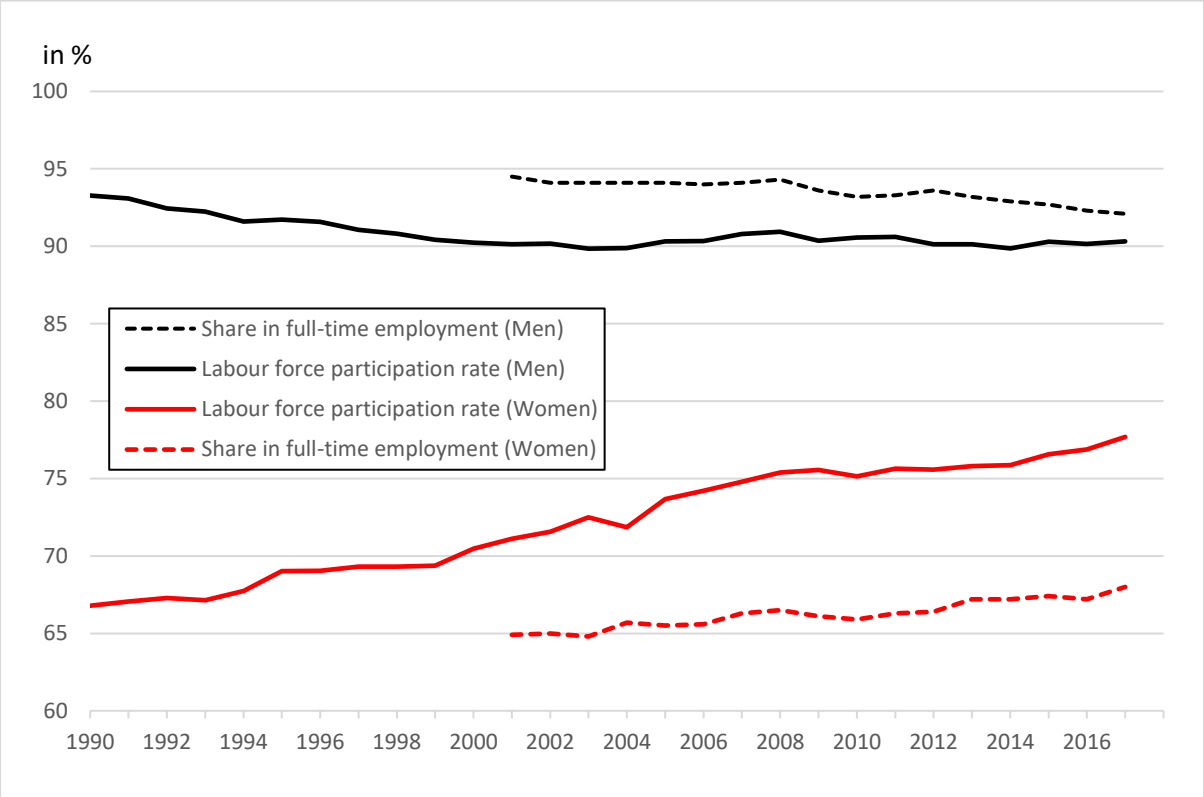
# 3. The Australian Context

## 3.1 Labour Market Outcomes in 1994/95 and 2015/16

Similar to many other countries around the world, female labour force participation has increased substantially over the past few decades in Australia. This increased labour force participation has also translated into increased employment rates for women, but the proportion working full-time has decreased, indicating that the growth in employment is to a large extent in part-time work. Figure 1

shows that female labour force participation increased by over 9 percentage points from 67.7% in 1994 to 76.9% in 2016.

**Figure 1 Labour force participation and proportion in full-time work (among those in employment) of persons aged 25-54 years (Australia, 1990-2017)**




*Source*: Data extracted on 14 August 2019 00:30 UTC (GMT) from OECD.Stat.

The proportion of employed women in full-time work also increased from 64.9% in 2001 to 67.2% in 2016, with this proportion slowly increasing over the last decade. In the same period, the labour force participation of men slightly decreased by 1.4 percentage points from 91.6% to 90.2%, a trend that has only recently been turned around with the participation rate remaining around 90% over the past few years. Unlike women, employed men are slightly less likely (by just over 2 percentage points) to be working full-time now than they were 15 years ago.

Table 1 and Table 2 present summary statistics for the data we use in the analysis in this paper, separately for single and partnered individuals. These data exclude full-time students, and people who are retired, self employed or receive a disability support payment.

The tables clearly show that the employment rate increased for all groups except for single men. A large increase in female labour force participation, employment and hours worked can be observed, especially for single parents (who are largely women) and partnered women. Single parents increased their employment rate by 17.4 percentage points, and average working hours by over 7 hours per week. Partnered women's employment rate increased by more than 12 percentage points on average, and hours worked by over 5 hours per week. The increase for single women is much more modest and is mostly driven by a decrease in unemployment (with labour force participation not changing).

**Table 1 Labour Market Summary Statistics for Couples with 25-55-Year-Old Men**

| | 1994/95 | | 2015/16 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| Hours of work (men) | 38.281 | 14.363 | 39.761 | 12.462 |
| Hours of work (women) | 19.356 | 17.838 | 24.706 | 17.484 |
| Labour force status men: not in LF | 0.037 | 0.190 | 0.036 | 0.185 |
| unemployed | 0.063 | 0.242 | 0.030 | 0.170 |
| employed | 0.900 | 0.300 | 0.934 | 0.248 |
| Labour force status women: not in LF | 0.337 | 0.473 | 0.222 | 0.415 |
| unemployed | 0.042 | 0.201 | 0.032 | 0.176 |
| employed | 0.621 | 0.485 | 0.747 | 0.435 |
| Nominal wage in $ (men)[a] | 18.860 | 9.237 | 37.620 | 16.597 |
| Nominal wage in $ (women)[b] | 14.304 | 7.455 | 29.617 | 13.153 |
| Weighted No. of obs. /No. of obs. | 2,195,245 | 2,231 | 2,574,200 | 4,221 |

*Notes*: The summary statistics for couples when selecting on the woman being 25-55 years old are very similar.
a) the 1994/95 male wage is $30.46 in 2016 dollars.
b) the 1994/95 female wage is $23.10 in 2016 dollars.

*Sources:* Authors' calculations based on the weighted Survey of Income and Housing, excluding full-time students, and people who are retired, self employed or receive a disability support payment.

**Table 2 Labour Market Summary Statistics for 25-55-Year-Old Single Persons**

| | 1994/95 | | 2015/16 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| **Men** | | | | |
| Hours worked | 35.330 | 15.875 | 33.052 | 17.288 |
| Labour force status: not in LF | 0.032 | 0.176 | 0.090 | 0.286 |
| unemployed | 0.113 | 0.316 | 0.094 | 0.291 |
| employed | 0.855 | 0.352 | 0.816 | 0.387 |
| Nominal wage in $[a] | 16.986 | 7.645 | 30.460 | 13.103 |
| Weighted No. of obs. /No. of obs. | 820,656 | 744 | 1,050,100 | 1,530 |
| **Women** | | | | |
| Hours worked | 30.908 | 16.658 | 32.830 | 15.725 |
| Labour force status: not in LF | 0.100 | 0.301 | 0.096 | 0.295 |
| unemployed | 0.093 | 0.290 | 0.047 | 0.212 |
| employed | 0.807 | 0.395 | 0.856 | 0.351 |
| Nominal wage in $[b] | 15.818 | 5.923 | 30.489 | 11.943 |
| Weighted No. of obs. /No. of obs. | 531,464 | 534 | 797,290 | 1,261 |
| **Single Parents** | | | | |
| Hours worked | 15.862 | 18.262 | 23.231 | 18.767 |
| Labour force status: not in LF | 0.387 | 0.487 | 0.243 | 0.429 |
| unemployed | 0.100 | 0.300 | 0.070 | 0.256 |
| employed | 0.513 | 0.500 | 0.687 | 0.464 |
| Nominal wage in $[c] | 12.148 | 4.648 | 29.780 | 12.640 |
| Weighted No. of obs. /No. of obs. | 316,635 | 368 | 418,440 | 893 |

*Notes*: a) the 1994/95 wage for single men is $27.43 in 2016 dollars.
b) the 1994/95 wage for single women is $25.55 in 2016 dollars.
c) the 1994/95 wage for single parents is $19.62 in 2016 dollars.

*Sources:* As for Table 1.

The tables also show that the modest decline in labour force participation and employment reported for men in Figure 1 only affects single men of prime working-age, and not partnered men. These results indicate that partnered women and single parents may be the most interesting group for a decomposition.

## 3.2 The Tax and Transfer System in 1994/95 and 2015/16

Australia has been traditionally described as a liberal welfare regime where strong emphasis is placed on the provision of welfare through market mechanisms. Underpinned by the principle of self-reliance by which every citizen with capacity to work should do so, the Australian welfare system is aimed to help only those who are most in need, limiting the tax burden and the overall spending to ensure work disincentives are minimised. Thus, Australia is one of the OECD countries with the lowest levels of tax and social expenditures, as well as the country with the most targeted system (Whiteford 2013).

Over the last three decades, similar to other developed countries, Australia's social security system has seen major reforms with the clearly stated aim to reduce welfare dependency and promote self-reliance through paid work (e.g., Costello 2006). Australian fiscal policy has been subject to a continuous process of reforms, which can be traced back to the significant reforms of the 1980s and 1990s that led to the broadening of the tax base. These reforms have been mostly driven by the principle of efficiency more than those of equity and simplicity (Tran-Nam et al. 2016).

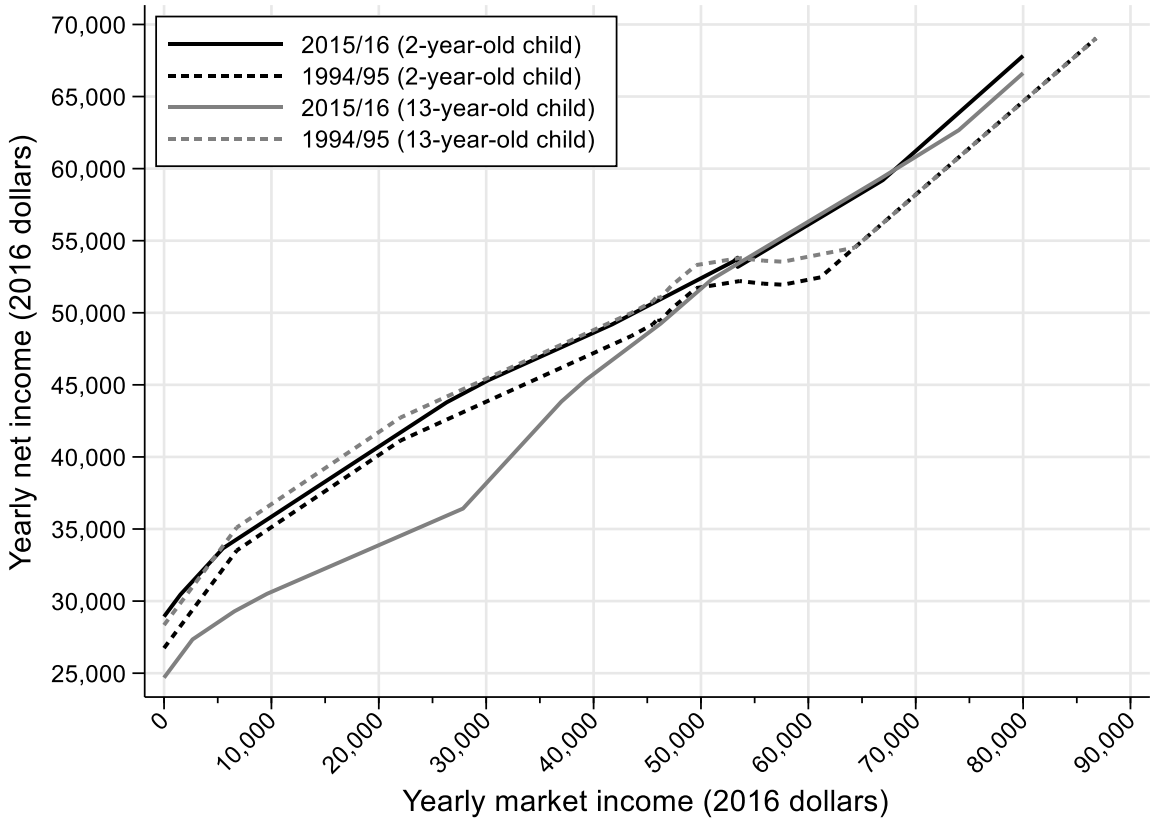
As a result, the tax and transfer system in 2016 is substantially different from that in 1994. This section summarises some of the most substantial changes that occurred during this period. Appendix B provides details of the main income tax parameters, allowances, pensions and family payments affecting working-age individuals and households. To allow for easier comparison, we provide all rates and thresholds for payments in 1994/95 both in March 1995 and January 2016 dollars, using the Australian Bureau of Statistics (ABS) consumer price index (CPI) for uprating.[5]

Figures 2 to 4 present budget constraints generated for four hypothetical secondary earners and for two single parents, all of whom tend to be women. The partners' income, for partnered women, is set at 40 hours per week at $40 per hour (leading to an annual gross income of just over $80,000) and kept constant while varying the women's hours. Alternatively, it is assumed that the partner is unemployed and has zero gross income. The single parent is assumed to have either a 2 or a 13-year-old child while the couple family with children is assumed to have two children aged under 5 years. There is no non-labour income.

The figures present net household income against the annual gross income of the women in 1994/95 and 2015/16. These budget constraints are constructed for single parents, and partnered women (secondary earners) with and without dependent children, using the tax and transfer systems of 1994/95 and 2015/16 respectively. For comparability between years, the income tax thresholds, the benefit withdrawal thresholds, and allowances and pensions of 1994/95 are all inflated to the 2015/16 level using the wage index (Australian Bureau of Statistics, cat. no. 6302.0, table 3, series ID A2734023X). Using a wage index instead of the CPI means that tax thresholds, allowances and pensions have all kept pace with wages.

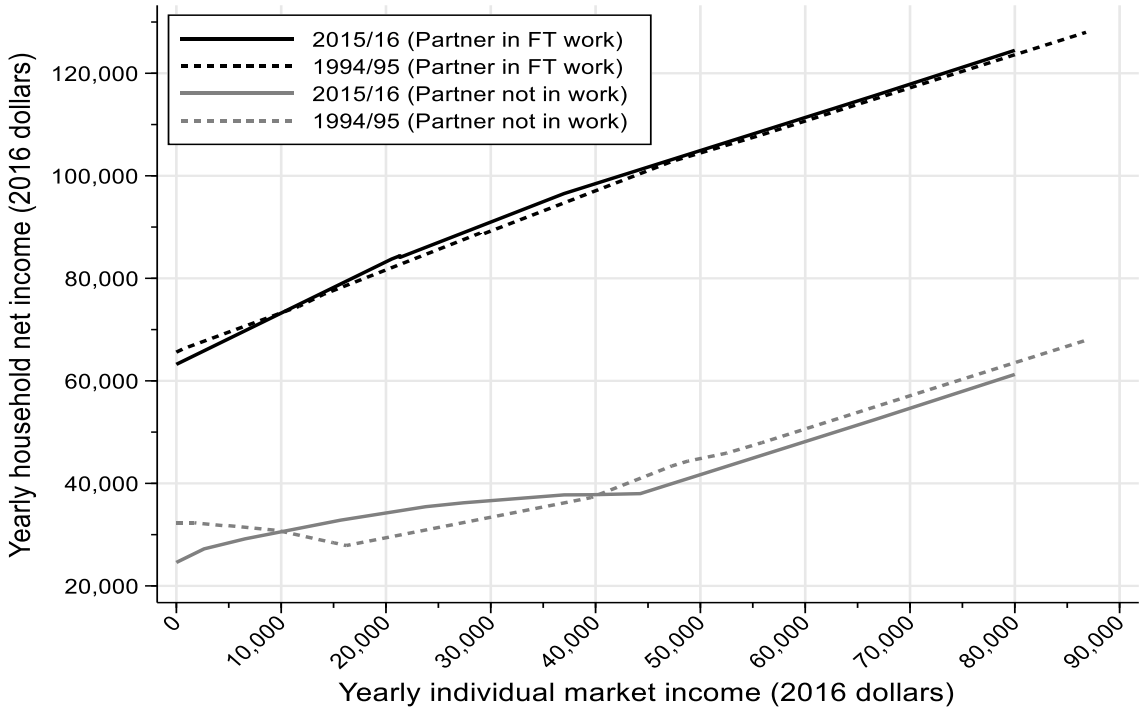
[5] ABS, cat. no. 6401.0, Table 1, series ID A2325846C.

**Figure 2 Budget Constraints for a Working-Age Single Parent**



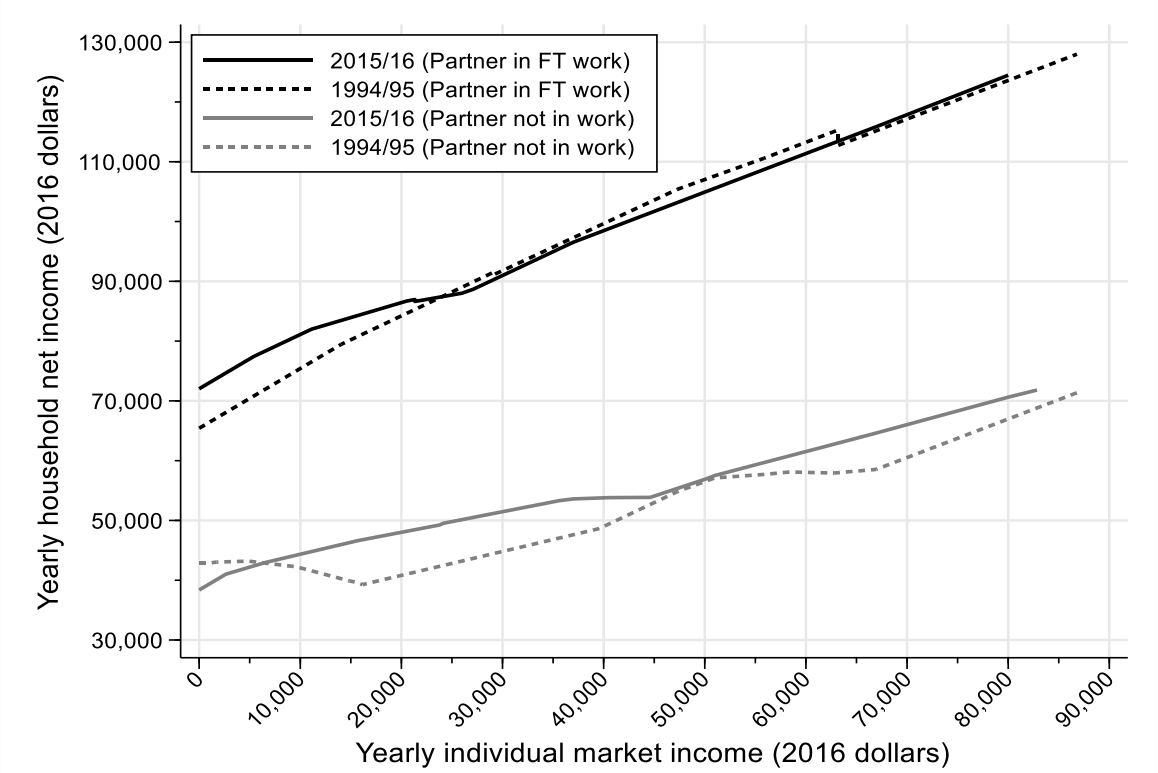

*Notes:* The single parent is 35 years of age.
*Sources:* Authors' calculations based on the Melbourne Institute Tax and Transfer Simulator.

**Figure 3 Budget Constraints for a Working-Age Partnered Woman without Dependent Children**




*Notes:* The partner in full-time work works 40 hours per week at a wage rate of $40/hour. Both partners are 35 years of age.
*Sources:* As for Figure 2.

**Figure 4 Budget Constraints for a Working-Age Partnered Woman with Children**




*Notes:* The partner in full-time work works 40 hours per week at a wage rate of $40/hour. Both partners are 35 years of age. Couple with two children: one aged 2 years and the other 4 years.
*Sources:* As for Figure 2.

The three figures show that the least has changed for partnered women without children with a full-time working partner, although the incentive to participate may have slightly improved for women earning up to $20,000. For women earning over $45,000 little seems to have changed in terms of incentives. Women who are partnered to an unemployed partner experienced a reduction in average effective tax rates (AETRs) between $10,000 and $40,000, but an increase in AETRs at all other incomes. This is likely to have had mixed work incentives, although at low incomes the incentives seem to have improved.

For women with children who are partnered to unemployed men the tax and transfer system seems to have reduced AETRs for all market incomes above $5,000. The conclusion is more mixed for marginal effective tax rates (METRs), which are indicated by the slope of the curves. For this group of women, the METR under the 2015/16 tax-transfer system is sometimes higher and sometimes lower than under the 1994/95 system. Incentives to work for women earning up to $15,000, and women earning between $50,000 and $65,000 should have improved given the much lower METRs in 2015/16 at these income levels, although the income effect could dampen the positive substitution effects. For mothers partnered to full-time working men on a medium-level salary, the AETRs is lower in 2015/16 for incomes under $25,000 and over $63,000 but slightly higher at other income levels, again with potentially mixed effects on incentives.

For single parents with a young child, AETRs have decreased at all incomes. The high METRs between $50,000 and $60,000 apparent in 1994/95 have disappeared. Income and substitution effects are likely to work in opposite directions. The picture is markedly different for single parents with older children, who experienced large increases in AETRs at all incomes under $55,000, as well as an increase

in METRs between $5,000 and $28,000. By contrast, a reduction in AETRs is apparent above $55,000. Thus, there was a clear shift in incentives away from participation at low income towards participation at high income.

The changes observed in the budget constraints in Figures 2 to 4 relate to the various tax-transfer policy reforms implemented since the mid-1990s (see Appendix B for a detailed discussion of these reforms). Recent research shows that despite the claimed emphasis on reducing disincentives to work, the reforms to the tax-benefit system did not lead to a reduction in the marginal effective tax rates (METRs) faced by families. Harding et al. (2009) and Dockery et al. (2008) find a substantial shift in the distribution of effective marginal tax rates since the 1990s with the proportion of working-age people facing METRs above 50% growing from 4.8% in 1996 to more than 7% in 2006. This is likely due to the large income and employment growth recorded over the period since people moving from welfare to work tend to face high METRs. Although the proportion of working-age people facing METRs above 50% may have grown, Herault and Azpitarte (2015) show that successive reductions in benefit taper rates and income tax rates have ensured that the highest METRs decreased between 1999 and 2008. This is also reflected in Figures 2 to 4 by the disappearance of flat and downward sloping sections in the budget constraints.

The combined effect on labour supply of the tax and transfer changes occurring over the 1994-2016 period is not clear a priori, and is likely to differ by demographic group. It is an empirical question which we seek to answer in this paper. We are interested in determining to what extent these tax and transfer changes can explain the observed changes in labour supply and how they amplified or worked against the concomitant changes in preferences and in wages.

# 4. Methodology

## 4.1 Behavioural Microsimulation

Microsimulation models were first applied in an economic context by Orcutt (1957), and are now commonly used for analysing government policy. In these models, each micro-unit (also referred to as agent) from a population is individually represented. This facilitates analysis of heterogeneity and diversity within the simulated population. As such, microsimulation models are particularly useful for policy analyses where the effects depend upon individual-specific circumstances, or where the distributional implications are a focus of interest.

In a static microsimulation model, it is assumed that behaviour remains invariant to changes to the policy environment. In a behavioural microsimulation model like the Melbourne Institute Tax and Transfer Simulator (MITTS), a structural model of labour supply is incorporated to generate behavioural responses to tax reforms (see Appendix C for a brief description of MITTS). As the theoretical model of labour supply decisions that is implemented in MITTS is what makes the model an appropriate basis for predicting labour supply responses to policy counterfactuals, we provide some further detail of the model used in the next subsections.

### 4.1.1 The Labour Supply Model

The behavioural component in MITTS is based on the assumption that individuals and couples maximise utility, which is represented as a function of household income, and of leisure and home

production time.[6] Individuals are assumed to balance income, and hours of leisure and home production, where more of one implies less of the other. The model allows for different preferences for income and leisure/home production time, depending on the individual's characteristics. Couple families are assumed to maximise a joint utility function, and to determine their hours of work jointly. The estimated preference parameters drive the behavioural responses to policy changes in MITTS.[7]

We use a structural model of labour supply to estimate preference parameters and elasticities with respect to income and wages. We treat labour supply as a discrete choice problem rather than a continuous choice (e.g. see van Soest 1995). The exact same specification is used for estimating the labour supply models underlying the labour responses in the 1994/95-1997/98 period and the 2011/12-2015/16 period. For all groups, except partnered men, we allow for 11 labour supply points from which the individual can choose: these include 0, 5, 10, …, 45, 50 hours per week. Partnered men can choose from six labour supply points only, to avoid having few observations at the lower hours levels since partnered men are unlikely to work part-time hours. The points included are 0, 10, 20, 30, 40 and 50 hours per week. Observed hours are rounded to the nearest discrete point in the choice set.

We use a quadratic utility specification (e.g. see Keane and Moffitt 1998) which is quite flexible, without imposing too many restrictions a priori, as individual leisure and consumption can be either substitutes or complements.[8] Furthermore, unlike other utility functions, the quadratic utility function can take working hours rather than leisure as its arguments and therefore does not require choosing an arbitrary value for the total endowment of time. It also allows us to check post-estimation whether utility is quasi-concave at the observed labour supply point and thus consistent with economic theory, rather than requiring us to impose this a priori (Varian 1992, pp.96–97).[9]

We assume that each household/individual *i* can choose between *j* alternatives from a limited set of *m* combinations (=66 for couples) of income and working hours, ($y_{ij}$ , $h_{1ij}$ , $h_{2ij}$ ); *j*=1, 2, ..., *m*, where $y_{ij}$ is the household's net income associated with male working hours $h_{1ij}$ and female working hours $h_{2ij}$ . We specify the utility function as follows:

$$
\begin{aligned}
&U_{ij} = V_{ij} + \varepsilon_{ij} \quad \text{with} \\
&V_{ij} = \beta_1 y_{ij} + \beta_2 y_{ij}^2 + \beta_3 h_{1ij} + \beta_4 h_{1ij}^2 + \beta_5 h_{1ij} y_{ij} + [\beta_6 h_{2ij} + \beta_7 h_{2ij}^2 + \beta_8 h_{2ij} y_{ij} + \beta_9 h_{1ij} h_{2ij}]
\end{aligned}
\qquad [1]
$$

We assume that the random error $\varepsilon_{ij}$ follows a type I Extreme Value distribution and estimate the parameters as a multinomial logit model by maximum likelihood. Furthermore, we allow the vector of linear preference parameters $\beta_1$, $\beta_3$ and $\beta_6$ to differ by some individual characteristics: i.e., the

[6] Total time available is assumed to be divided between leisure and home production time on the one hand, and hours in employment on the other hand. Leisure and home production time are usually combined given the data that are available.

[7] Creedy et al. (2002) outline the initial set-up of MITTS. Creedy and Kalb (2006) discuss the methodology of behavioural microsimulation modelling more generally, including a number of examples using MITTS, whereas Buddelmeyer et al. (2007) report on a range of microsimulation applications in tax-transfer policy design.

[8] Van Soest et al. (2002) show that utility functions including fifth-order polynomials yield almost identical wage elasticities compared with models using second-order polynomials.

[9] All four demographic groups pass the quasi-concavity test in all or the vast majority of cases (i.e., for at least 96% of the observations). Couples pass the test in 100% of the cases in 1994/98 and in 2011/16; the same for single men in both periods, and single women and single parents in 1994/98. Single women and single parents in 2011/16 pass this test in 96% and 99% of all cases, respectively.

number of children, age of the youngest child, and the individual's age and education. For single adult households, equation [1] is estimated without the terms in between square brackets. In this case $h_{1ij}$ denotes hours worked by the single adult (male or female), and there are *m*=11 hours points to choose from.

Given the assumption of an Extreme Value type I error distribution and assuming that individuals choose the alternative that leads to the highest utility, the probability that individual *i* chooses alternative *j* (from the *m* alternatives) is:

$$\Pr\left(U_{ij} > U_{ik}, k \neq j\right) = \frac{\exp(V_{ij})}{\sum_{k=1}^{m} \exp(V_{ik})} \qquad [2]$$

To estimate these probabilities, we need to determine the utility level and thus the household net income associated with each choice *j*. To generate household net income, we first compute gross hourly wages either directly from observed information or by using wage regressions with a Heckman correction to account for selection bias (see Appendix Tables D.1 to D.5 for the full set of estimated wage coefficients). Using gross hourly wages, we calculate gross labour income associated with each choice of working hours. We then add non-labour income and the spouse's gross income to generate gross household income. Finally, we apply the Australian tax and transfer system to compute the amount of net household income associated with each level of working hours. These computations are all carried out in MITTS, our microsimulation model, which accounts for all individual income tax payments and income tax rebates, as well as income support and family payments (see Appendix C).

### 4.1.2 The estimated parameters

The estimated coefficients are reported in Appendix D: Table D.6 for couple families, Table D.7 for single men and single women, and Table D.8 for single parents. The tables clearly and unsurprisingly show the larger impact of having children (and especially preschool children) on women's preferences for labour supply compared to men's preferences, although there is some weak indication in Table D.6 (close to the 10% significance level) that this may be changing with negative coefficients estimated for male preferences for hours worked in 2011/2016 when young children are present in the household. Most single parents are women and we find strong impacts from having young children for this group, with single fathers being more likely to have stronger preferences for higher hours worked (as well as more income in the 2011/2016 period). The attained education level also appears more important for women than for men, with men having less variation in participation and hours worked by education level than women. That is, most men appear to prefer to work full time regardless of education or the presence of children. Amongst all groups (men and women), the preference for hours worked first increases with age, before declining after a certain age (which occurs in most cases in the late thirties or early forties).

Due to the non-linearity of the models, the coefficients are difficult to interpret and compare across groups and years, so we also report average wage elasticities in each year and for each demographic group, restricting our sample to those aged 25-55 years (see Table 3). Elasticities with respect to gross wage are representative of labour supply responsiveness although they are also affected by the tax and transfer system (which determines the translation from gross to net wage). However, the wage elasticities do not change much when computed for the same population but with an earlier or later tax and transfer system. Crucially, wage elasticities are relative measures that also depend on the individual's current labour supply. An individual already working 50 hours per week would typically

have a lower elasticity than the same individual working 10 hours per week. Partnered women with children under 15 have larger wage elasticities than partnered women without children under 15, whereas for men the presence of children under 15 does not make much difference. Table 3 shows that both participation and hours worked elasticities changed the most for women (and women with children in particular) from 1994/95 to 2015/16; in all cases the elasticities substantially decreased, which is consistent with increased labour supply. These large decreases are similar to what Heim (2007) and Blau and Kahn (2007) find for married women in the US between 1980 and 2000. They suggest that this may be due to changed preferences, as they find that changed demographics do not explain much. Furthermore, these estimated wage elasticities for Australia are well within the range of prior estimates for other developed countries (Bargain et al. 2014), suggesting that our results are likely to be relevant more broadly.

**Table 3 Participation and hours worked elasticities in 1994/95 and 2015/16 by demographic group**

| | Partnered Men | | Partnered Women | | Single Men | Single Women | Single Parents |
|---|---|---|---|---|---|---|---|
| | All | With children | All | With Children | | | |
| *Participation rate* | | | | | | | |
| 1994/1995 | 0.145 | 0.140 | 0.375 | 0.476 | 0.155 | 0.208 | 0.843 |
| 2015/2016 | 0.071 | 0.069 | 0.152 | 0.199 | 0.069 | 0.089 | 0.198 |
| *Hours worked* | | | | | | | |
| 1994/1995 | 0.160 | 0.161 | 0.448 | 0.569 | 0.166 | 0.171 | 1.084 |
| 2015/2016 | 0.110 | 0.110 | 0.226 | 0.295 | 0.111 | 0.096 | 0.233 |

*Notes*: Elasticities obtained from simulating the effect of a 10% increase in gross wage rates for the prime working-age population (aged 25-55). The estimation sample excludes full-time students, self-employed workers and people receiving a disability support payment.

*Sources:* Authors' calculations based on the weighted Survey of Income and Housing.

Goodness of fit measures generally show a good fit, except for the 40 hours point which is underpredicted (see Appendix E). Partnered women and single parents suffer less from this underprediction of 40 hours than the other demographic groups. These findings further justify the focus of the decomposition on those groups where large changes have occurred, and where we have accurate predicted changes: partnered women and single parents.

## 4.2 Decomposition Approach

This section describes the approach used to decompose changes in labour force participation into four components. Let *M* denote the index of interest. The aim is to decompose changes in the index between two periods, $\Delta = M_1 - M_0$. *M* can be any relative inequality or redistributive measure (as in, e.g., Bargain 2012a; Herault and Azpitarte 2016; Creedy and Herault 2015). The latter type of measure generally involves the comparison of distributions of market income, income taxes, and benefit payments. Market income is determined by the wage rate (*w*), hours worked and non-labour market income.

This paper extends previous decompositions by acknowledging that M can also be any indicator pertaining to the distribution of hours worked, which includes all information on employment status

at both the extensive and intensive margins. For instance, *M* can be the proportion of full time or part time workers in the whole population or for any specific demographic subgroup.

Let $\tau_t = (T_t, B_t)$ be the vector with all relevant information on taxes, $T_t$, and benefits, $B_t$, at time $t$. This information includes all rates, thresholds and eligibility rules embedded in the tax-transfer system.

In the analysis in this paper, the parameters of tax-transfer structure $\tau_0$ are adjusted in nominal terms to period 1 values using an uprating factor. The removal of the uprating factor simplifies the notation. The choice of an appropriate uprating factor is important, and two candidates are typically considered, either a consumer price index (CPI) or a wage index. Following earlier Australian studies by Herault and Azpitarte (2015, 2016) and Creedy and Herault (2015), we use a wage index based on average earnings for full-time workers provided by the Australian Bureau of Statistics (ABS, cat. no. 6302.0, table 3, series ID A2734023X). The index increased by 130.2% between the first quarters of 1995 and 2016.[10] Hence, any failure of the tax thresholds or transfer parameters to maintain pace with wage growth (thus increasing the average effective tax rate) is interpreted as an explicit policy choice. Specifically, in the case of Australia, the slower growth of allowance rates for the unemployed relative to wage growth is considered to be a policy decision. In contrast, the growth of the age and disability pensions in line with wage growth is considered to be the result of maintaining the status quo. For the uprating of incomes, the default is to use the same wage index, although as explained below we depart from this choice in two instances in the decomposition.[11]

Let $P_t$ denote the set of socioeconomic and demographic characteristics of the population in period *t*, including non-labour market income. Let $\beta_t$ denote the preference parameters derived by estimating a structural labour supply model. In practice such models are typically estimated over more than one year of data. With no loss of generality, we assume that the estimation is conducted on data from only one period, *t*. These parameters, combined with the tax-transfer structure $\tau$ and population characteristics *P*, determine the distribution of hours worked and we can write the value of any index *M* at time *t* as follows:

$$M_t = M(P_t, \mathrm{w_t}, \beta_t, \tau_t)$$

The observed changes in *M* between periods 0 and 1 can then be decomposed as follows:

$$\Delta = M_1 - M_0$$

$$= M(P_1, \mathrm{w}_1, \beta_1, \tau_1) - M(P_0, \mathrm{w}_0, \beta_0, \tau_0)$$

$$= M(P_1, \mathrm{w}_1, \beta_1, \tau_1) - M(P_1, \mathrm{w}_1, \beta_1, \tau_0) \quad \text{(T)}$$

$$+ M(P_1, \mathrm{w}_1, \beta_1, \tau_0) - M(P_1, \mathrm{w}_1, \beta_0, \tau_0) \quad \text{(PR)}$$

$$+ M(P_1, \mathrm{w}_1, \beta_0, \tau_0) - M(P_1, \mathrm{w}_0, \beta_0, \tau_0) \quad \text{(W)}$$

$$+ M(P_1, \mathrm{w}_1, \beta_0, \tau_0) - M(P_0, \mathrm{w}_0, \beta_0, \tau_0) \quad \text{(P)}$$

[10] This indicator closely tracks GDP per capita, which increased by 150.4% over the same period (World Development Indicators, the World Bank, http://databank.worldbank.org/source/world-development-indicators).

[11] Note that any change in inequality resulting from an equal proportional change in incomes and all tax and benefit thresholds is negligible (see Creedy and Herault 2015, p.161).

where T is the effect of a change in the tax-transfer structure with respect to components which have an impact on net income, thus changing the financial incentives pertaining to labour supply. $M(P_1, \mathrm{w}_1, \beta_1, \tau_0)$ is calculated using the labour supply arising after a change from tax-transfer structure of period 1 to that of period 0. PR is the variation attributed to changes in preference parameters. The computation of PR and T requires the use of a behavioural microsimulation model. This model is used to estimate labour supply responses to changes in tax-transfer policies at both the extensive and intensive margins (T), following the approach introduced by Bargain (2012b).

One innovation of this paper is that we also assess the effect of changes in preferences by estimating labour supply changes that result from swapping the preference parameters of periods 0 and 1 (term PR). Thus $M(P_1, \mathrm{w}_1, \beta_0, \tau_0)$ is calculated using the labour supply arising from preference parameters from period 0 ($\beta_0$) combined with data of period 1 ($P_1$) and tax-transfer structure from period 0 ($\tau_0$). A complication is that the preference parameters of period 0 only apply to (disposable) incomes expressed in period 0 prices. Thus, period 1 disposable incomes must be deflated and expressed in period 0 dollars to compute $M(P_1, \mathrm{w}_1, \beta_0, \tau_0)$. Here we use the consumer price index (ABS, cat. no. 6401.0, table 1, series ID A2325846C) to ensure that incomes are kept constant in real terms.[12] Thus, the term PR is net of any real income (or wage) growth effect.

Starting from the counterfactual distribution $M(P_1, \mathrm{w}_1, \beta_0, \tau_0)$, we then change the hourly wage rates to what they would have been in period 0 to obtain $M(P_1, \mathrm{w}_0, \beta_0, \tau_0)$. Determining the contribution of wage growth is a key component of the decomposition as the literature has emphasised the role played by changes in wages in the long-term increase in female labour force participation. It is not desirable to simply apply a wage growth index, as typically obtained from statistical agencies, even if it is gender specific. Indeed, we are interested in changes in conditional wages and not in changes due to compositional effects, which are all subsumed in a wage index. We are interested in what the wages of the population in period 1 would have been in period 0. We therefore follow the approach recently introduced by Jessen (2019) and inspired by Blinder-Oaxaca decompositions to account for changes in wage rates. We make use of the wage equations embedded in the microsimulation model (see Section 4.2.1 and Appendix D: Tables D.1 to D.5). To obtain $M(P_1, \mathrm{w}_0, \beta_0, \tau_0)$, we estimate counterfactual wages by predicting wages using the wage coefficient estimates from period 0 on data from period 1. Following Bourguignon et al. (2008), each individual's residual from the wage equation from period 1 is retained and adjusted for any change in the standard deviations of the residuals between the two periods.

This approach ensures that the wage effect W captures changes in the wage distribution that are due to changes in the observed returns to individual characteristics, rather than those due to changes in population composition. Non-labour (market) incomes are kept constant in real terms by deflating them to period 0 prices using the ABS price index. Hence, W captures the effect of changes in wages, accounting for real wage growth as well as changes in the (conditional) wage distribution. That means that W includes the effect of changes in relative wage rates across different population subgroups, such as between men and women.

The Workplace Gender Equality Agency (WGEA) (2019) publishes gender pay gap statistics on a regular basis. They report little change between 1998 and 2018, with the gender pay gap actually increasing up to 2014 (18.5% at its peak), after which it started declining to 14.1% in 2018. Similarly, OECD (2017) reports gender pay gaps for a range of countries between 2005 and 2015. There is no evidence that

[12] The index increased by 69.6% between the first quarters of 1995 and 2016.

women's wages are closer to men's wages in 2015 than they were in 2005 (or in 1998). However, wages may have changed differently for particular female populations leaving the wage gap intact.

Finally, P captures the effect of changes in the population's composition in terms of observable characteristics such as, for instance, ageing or an increase in educational attainment.

Notably, each of these four components T, PR, W and P can be computed in alternative ways. For example, the effect T of a switch in the tax-transfer structure can be computed using the population from period 0 rather than the population from period 1. Similarly, the term P can be computed using the tax-transfer structure of period 1 rather than the tax-transfer structure of period 0.

In principle, there are 24 different decomposition paths (factorial 4). These 24 decompositions account for all possible interactions between the various components of the decomposition, thus eliminating the need to introduce a separate interaction term. As there is a priori no reason to prefer any specific decomposition path, one could argue on the grounds of symmetry that an appropriate measure of each component is obtained by simply averaging the values from all possible decomposition paths. Following Shapley (1953) and Shorrocks (2013), we measure the effect of each component by their arithmetic mean values over all possible decomposition paths (that is, applying the same weight to each).

Tax microsimulation models are partial equilibrium supply side models. Some caution is needed when interpreting the behavioural effects. Such models can simulate the effect of a change in the tax-transfer structure on each individual's desired labour supply, but they do not allow for demand-side factors or for potential general equilibrium effects on wage rates. In addition, tax-transfer policy changes may affect other behaviours, such as fertility, household formation, migration and educational choice. These behaviours are not modelled explicitly, but to the extent that these policies result in a change in the population's composition, their effects are captured in the population component of the decomposition in the present approach (the term P above). The overall net effect of government policies –other than the modelled tax-transfer policies– affecting labour supply decisions directly or indirectly is captured in the preferences component PR, which also captures demand-side factors (other than those captured by changing coefficients in the wage equation). Such policies include, for instance, public transport policies, childcare policies (which have seen substantial changes that are likely to be important), immigration policies or non-financial tax and transfer policies (such as additional welfare conditionality). The term PR also captures changes in social norms or any change in policy or in the society's structure that would affect the observed or perceived cost of working. To ensure that the decomposition is net of any change in modelling error, we use fitted rather than observed hours worked for $M_1$ and $M_0$. The model's goodness of fit is thus important (see section 4.1.2 and Appendix E).

Although the scope of the drivers of change captured by the first three components of the decomposition (T, W and P) is relatively well defined, the fourth term PR captures a wide range of factors. This means that the interpretation of the PR term is much less clear cut than the interpretation of the other decomposition components. Thus, the discussion of the results in the next section focuses on the first three components.

# 5. Results

We first present the decomposition results before turning to a discussion of their policy implications.

## 5.1 Decomposition results by demographic group

Results from the decomposition approach described in section 4.2 are presented in Table 4.[13] We discuss the results by outcome. The Tax, Wage and Preferences components together explain a substantial portion of the changes in labour supply between 1994/95 and 2015/16 for single parents and partnered women, as do demographic changes, such as the large increase in educational attainment, which are captured in the Population component.

**Table 4 Decomposition results for partnered women and single parents of working age (25-55 years old) – absolute (ppt or hrs/wk) and relative (%) contributions**

| | Employment rate | | Average weekly hours | | Full-time work | | Part-time work | |
|---|---|---|---|---|---|---|---|---|
| | (ppt) | (%) | (hrs/wk) | (%) | (ppt) | (%) | (ppt) | (%) |
| **Single parents** | | | | | | | | |
| T = Tax-transfer policy changes | 0.1 | 0.5 | 1.1 | 14.7 | 3.7 | 21.4 | -3.6 | -128.7 |
| W = Wage changes | 4.3 | 21.4 | 1.6 | 22.1 | 3.9 | 22.7 | 0.4 | 13.6 |
| P = Population composition changes | 11.0 | 55.0 | 3.6 | 49.4 | 7.1 | 41.5 | 3.8 | 138.4 |
| PR = Preference parameter changes | 4.6 | 23.2 | 1.0 | 13.9 | 2.5 | 14.5 | 2.1 | 76.7 |
| Total 1994-2015 change | 20.0 | 100 | 7.3 | 100 | 17.2 | 100 | 2.8 | 100 |
| **Partnered women without children** | | | | | | | | |
| T = Tax-transfer policy changes | 1.7 | 14.9 | 0.5 | 10.0 | 0.9 | 7.6 | 0.8 | -114.7 |
| W = Wage changes | 1.9 | 16.5 | 0.7 | 14.9 | 1.4 | 11.7 | 0.5 | -69.2 |
| P = Population composition changes | 4.5 | 40.2 | 2.9 | 58.9 | 8.2 | 68.2 | -3.6 | 535.1 |
| PR = Preference parameter changes | 3.2 | 28.4 | 0.8 | 16.2 | 1.5 | 12.5 | 1.7 | -251.1 |
| Total 1994-2015 change | 11.3 | 100 | 5.0 | 100 | 12.0 | 100 | -0.7 | 100 |
| **Partnered women with children** | | | | | | | | |
| T = Tax-transfer policy changes | 0.5 | 3.8 | 0.0 | -0.7 | -0.4 | -4.0 | 1.0 | 30.6 |
| W = Wage changes | 1.5 | 10.6 | 0.7 | 14.1 | 2.1 | 18.8 | -0.6 | -18.0 |
| P = Population composition changes | 7.5 | 53.1 | 2.9 | 58.4 | 6.2 | 56.6 | 1.3 | 40.8 |
| PR = Preference parameter changes | 4.6 | 32.6 | 1.4 | 28.2 | 3.1 | 28.6 | 1.5 | 46.6 |
| Total 1994-2015 change | 14.1 | 100 | 5.0 | 100 | 11.0 | 100 | 3.2 | 100 |

*Notes*: The estimation sample excludes full-time students, self-employed workers and people receiving a disability support payment. W refers to changes in the estimated real wages at the individual level. PR refers to changes in the estimated labour supply preference parameters.

*Sources:* Authors' calculations based on the weighted Survey of Income and Housing.

Starting with the decomposition of the large employment rate changes between 1994/95 and 2015/16, changes in the tax and transfer system explain 14.9% of the change for partnered women without children, but only 3.8% for partnered women with children and 0.5% for single parents. Other factors appear much more important, especially for the latter two groups. Changes in real wage levels are a key factor for single parents as they explain over one fifth of the employment rate increase. And

[13] Appendix F presents the results for all 24 decomposition paths for the three groups of interest.

wages explain 16.5% of the increase in the employment rate for partnered women without children and 10.6% for partnered women with children.

For single parents, and partnered women with and without children, changes in observable population characteristics such as the increased proportion of women with high education levels (see Tables A.1 to A.3) explain 55.0%, 53.1% and 40%, respectively, of the employment rate increase. This result stands in contrast to most of the US literature, which has typically found little contribution from demographic changes, though Eckstein and Lifshitz (2011) found that increased educational attainment played a large role. The Australian context may differ given the high level of population growth over this period, partly driven by immigration policies aimed at attracting skilled migrants. Finally, nearly one third of the increased employment rate for partnered women and nearly a quarter for single parents is explained by the changes in labour supply preference parameters.

The gain in employment was mostly in full-time employment: for partnered women without children the full-time employment rate increased by 12 percentage points, for partnered women with children by 11 percentage points, and for single parents by 17.2 percentage points. Tax-transfer reforms were instrumental in this increase for single parents (explaining 21.4%), but not for partnered women without children for whom it only explains 7.6% of the change while for partnered women with children tax-transfer reforms worked in the opposite direction.

Interestingly, the results reveal that tax-transfer reforms had two offsetting effects on the employment rate of single parents and partnered women with children. The reforms encouraged full-time employment while actively discouraging part-time employment for single parents and the reverse for partnered women with children, leading to a negligible net effect on the overall employment rate for both groups.

Average hours worked increased substantially for single parents (+7.3 hours/week) and for partnered women (+5.0 hours/week). Tax-transfer policy reforms actually appear to decrease hours worked slightly for partnered women with children (-0.7% contribution), while they explain part of the increase for single parents (14.7%) and partnered women without children (10%). The impact of tax-transfer reforms on hours worked for single parents was mostly through the impact on part-time employment. Population, preference and wage changes (in that order of importance) played key roles for partnered women, while for single parents, wage changes were more important than changes in preferences for increased hours of work.

## 5.2 Discussion of Policy Implications

The observed increases in labour force participation and hours worked for partnered women and single parents (who are overwhelmingly women) are large. Increasing female labour force participation and hours worked has featured prominently as one of the goals of the Australian Government but the policies implemented since the mid-1990s have often had counteracting effects. Although some tax-transfer policy reforms aimed to improve incentives to work, overall, they have contributed relatively little to the large increases in female employment. Most of the increase has come from changes in population composition; from changed labour supply preference parameters, possibly due to changed norms and values and labour demand shifts; and from real wage growth.

Arguably, some of these changed norms and values could have been caused by Government policies. For example, the eligibility for parenting payments is now restricted to parents of children aged 6 or younger (or 8 or younger for single parents), while 20 years ago, parents were not required to look for

employment until their child turned 16. As a result, more parents are subject to activity testing which sends a strong message of "society" expecting primary carers of school-age children to be in the labour force. Or reversely, the time could have been right for the policy change due to changed norms in society. It is likely that both effects are relevant; i.e. the policy change may have reinforced already changing norms and vice versa changing norms may have driven policy change. However, the changing preferences are likely to be part of a global and continuing trend, which may to some extent be related to shift in labour demand towards the services sector in many developed countries' economies.

Our results indicate that Australian tax and transfer policies could potentially reinforce these existing trends better than they have done so far by ensuring policy reforms work in the same direction (providing financial incentives for women to participate in the labour force) rather than counteract each other as has sometimes been the case. For example, for single parents the tax and transfer reforms had a negative impact on part-time employment rates, which often happens to be a desirable option as it can more easily be combined with looking after children than full-time employment. Discouraging part-time employment by making this financially less attractive may lead to these women not working at all as full-time employment may not be compatible with childcare. Instead, the focus has largely been on improving incentives to work full-time, essentially through tax cuts. Indeed, Figure 2 showed that average effective tax rates increased for single parents with children over 8 at low income levels –corresponding to part-time employment– while they decreased at higher income levels. By contrast, tax-transfer reforms slightly discouraged working full-time versus part-time for partnered women with children, leading to a small change in overall employment rate (see Table 4).

The results for partnered women with and without children are quite different. The changes in tax and transfers over our period of analysis do less to explain labour supply increases for women with children than for women without children. In fact, these policy changes had a negative effect on average hours for partnered women with children. The interpretation is that the tax-transfer policy changes related to families with children that occurred between 1994/95 and 2015/16 did not provide the right incentives, but were counteracting existing trends.

As wage elasticities for partnered and single women with children are larger than the wage elasticities for childless partnered women, one would expect tax-transfer policies that improve labour supply incentives to be particularly effective for this group. Not putting such policies in place is a missed opportunity to encourage female labour force participation. Although restricting benefit eligibility is rather punitive, there are opportunities in the tax and transfer system to use "carrots" (such as more advantageous withdrawal rates, or other rewards for participation) as well as the current "sticks" when aiming to achieve higher female labour force participation.

# 6. Conclusion

Similar to many other developed countries, Australia has seen large increases in labour force participation for women since the 1990s. In Australia and beyond, the key question, as to what the main drivers of this trend are, largely remains an open question. We develop and apply a novel decomposition approach to quantify the role of four key factors: (i) changes in real wages, which includes wage growth and reductions in the gender wage gap, the role of which has been identified as important by previous studies in other countries; (ii) changes in tax-transfer policies; (iii) changes in preference parameters, with both (ii) and (iii) having been suggested as likely key factors although there is little evidence on the extent of their respective effects; and (iv) population composition changes.

The increasing trend in female participation is consistent with the stated goals of the Australian government, particularly in relation to counteracting the impact of population ageing on the size of the labour force. However, we find that the changed financial incentives due to tax-transfer policy reforms have done relatively little to achieve these large increases. Most of the increase in labour force participation have arisen from the three other factors we considered. The most prominent factor was simply the changes in the composition of the population, such as the increase in education attainment. Changes in labour supply preference parameters also played a key role, though we speculate that they are largely part of a global and continuing trend across many countries rather than a consequence of government policies. In addition, increases in real wages explain a substantial part of the increased participation, especially for single parents, a group that has experienced tremendous wage growth since the mid-1990s.

The results point to a lack of consistency in the financial incentives provided through tax-transfer policies. With more focus and consistency in tax-transfer reforms, the Government could provide better support for the development of female labour force participation through policies that provide further participation incentives instead of putting hurdles in the way. This could be achieved by providing incentives through more advantageous withdrawal rates encouraging part-time employment rather than through punitive measures such as lowering single parents' payment rates (which are likely to harm future opportunities for the children of single parents). This would take the necessity of achieving work-family balance of this population into account.

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# Appendix A: Additional Summary Statistics Tables

**Table A.1 Non-Labour Market Summary Statistics for Couples with 25-55-Year-Old Men**

| | 1994/95 | | 2015/16 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| Age (men) | 40.466 | 8.228 | 41.000 | 8.295 |
| Age (women) | 37.999 | 8.520 | 39.072 | 8.665 |
| Number of children | 1.331 | 1.209 | 1.287 | 1.125 |
| Age of youngest child: 0-2 | 0.195 | 0.396 | 0.215 | 0.410 |
| 3-4 | 0.083 | 0.276 | 0.095 | 0.293 |
| 5-9 | 0.156 | 0.363 | 0.144 | 0.351 |
| No children in household | 0.339 | 0.474 | 0.330 | 0.470 |
| New South Wales | 0.340 | 0.474 | 0.320 | 0.467 |
| Capital City | 0.646 | 0.478 | 0.680 | 0.467 |
| No qualifications (men) | 0.434 | 0.496 | 0.221 | 0.415 |
| Vocational education (men) | 0.289 | 0.453 | 0.317 | 0.465 |
| Diploma (men) | 0.106 | 0.308 | 0.115 | 0.319 |
| Degree (men) | 0.171 | 0.376 | 0.347 | 0.476 |
| No qualifications (women) | 0.598 | 0.490 | 0.233 | 0.423 |
| Vocational education (women) | 0.179 | 0.383 | 0.211 | 0.408 |
| Diploma (women) | 0.098 | 0.298 | 0.140 | 0.347 |
| Degree (women) | 0.125 | 0.331 | 0.416 | 0.493 |
| Weighted No. obs. /No. obs. | 2,195,245 | 2,231 | 2,574,200 | 4,221 |

*Sources:* Authors' calculations based on the weighted Survey of Income and Housing.

**Table A.2 Non-Labour Market Summary Statistics for Couples with 25-55-Year-Old Women**

| | 1994/95 | | 2015/16 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| Age (men) | 41.872 | 8.950 | 42.698 | 9.272 |
| Age (women) | 39.352 | 8.249 | 40.344 | 8.529 |
| Number of children | 1.302 | 1.214 | 1.244 | 1.125 |
| Age of youngest child: 0-2 | 0.177 | 0.382 | 0.196 | 0.397 |
| 3-4 | 0.081 | 0.273 | 0.089 | 0.285 |
| 5-9 | 0.155 | 0.362 | 0.139 | 0.346 |
| No children in household | 0.355 | 0.479 | 0.348 | 0.476 |
| New South Wales | 0.345 | 0.475 | 0.324 | 0.468 |
| Capital City | 0.642 | 0.479 | 0.684 | 0.465 |
| No qualifications (men) | 0.431 | 0.495 | 0.228 | 0.419 |
| Vocational education (men) | 0.287 | 0.452 | 0.315 | 0.464 |
| Diploma (men) | 0.107 | 0.309 | 0.119 | 0.324 |
| Degree (men) | 0.174 | 0.380 | 0.338 | 0.473 |
| No qualifications (women) | 0.598 | 0.490 | 0.245 | 0.430 |
| Vocational education (women) | 0.181 | 0.385 | 0.207 | 0.405 |
| Diploma (women) | 0.096 | 0.295 | 0.138 | 0.345 |
| Degree (women) | 0.125 | 0.331 | 0.409 | 0.492 |
| Weighted No. obs. /No. obs. | 2,228,009 | 2,264 | 2,719,300 | 4,473 |

*Sources:* As for Table A.1.

**Table A.3 Non-Labour Market Summary Statistics for 25-55-Year-Old Single Persons**

| | 1994/95 | | 2015/16 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| **Men** | | | | |
| Age | 35.527 | 8.105 | 36.188 | 8.818 |
| New South Wales | 0.350 | 0.477 | 0.340 | 0.474 |
| Capital City | 0.705 | 0.456 | 0.708 | 0.455 |
| No qualifications | 0.456 | 0.498 | 0.297 | 0.457 |
| Vocational education | 0.262 | 0.440 | 0.280 | 0.449 |
| Diploma | 0.097 | 0.295 | 0.120 | 0.325 |
| Degree | 0.186 | 0.389 | 0.303 | 0.460 |
| Weighted No. obs. /No. obs. | 820,656 | 744 | 1,050,100 | 1,530 |
| **Women** | | | | |
| Age | 38.068 | 9.584 | 38.122 | 9.979 |
| New South Wales | 0.356 | 0.479 | 0.352 | 0.478 |
| Capital City | 0.759 | 0.428 | 0.711 | 0.453 |
| No qualifications | 0.491 | 0.500 | 0.227 | 0.419 |
| Vocational education | 0.196 | 0.397 | 0.197 | 0.398 |
| Diploma | 0.096 | 0.295 | 0.119 | 0.323 |
| Degree | 0.217 | 0.412 | 0.457 | 0.498 |
| Weighted No. obs. /No. obs. | 531,464 | 534 | 797,290 | 1,261 |
| **Single Parents** | | | | |
| Female | 0.854 | 0.353 | 0.839 | 0.367 |
| Age | 38.380 | 7.240 | 41.414 | 7.859 |
| Number of children | 1.785 | 0.872 | 1.719 | 0.917 |
| Age of youngest child: 0-2 | 0.155 | 0.362 | 0.112 | 0.316 |
| 3-4 | 0.118 | 0.323 | 0.110 | 0.313 |
| 5-9 | 0.272 | 0.445 | 0.298 | 0.457 |
| New South Wales | 0.341 | 0.474 | 0.295 | 0.456 |
| Capital City | 0.646 | 0.478 | 0.626 | 0.484 |
| No qualifications | 0.664 | 0.472 | 0.306 | 0.461 |
| Vocational education | 0.195 | 0.397 | 0.319 | 0.466 |
| Diploma | 0.082 | 0.275 | 0.137 | 0.344 |
| Degree | 0.058 | 0.234 | 0.238 | 0.426 |
| Weighted No. obs. /No. obs. | 316,635 | 368 | 418,440 | 893 |

*Sources:* As for Table A.1.

# Appendix B: Discussion of Main Features and Changes in the Australian Tax and Transfer System (1994/95 – 2015/16)

For all comparisons in this appendix, when 1994/95 information is translated into Quarter 1 2016 dollars, the Consumer Price Index (with a value of 1.63444) is used.

Table B.1 shows that income tax decreased for all income levels with the tax-free income threshold more than doubling in real terms, and similarly, the top income tax rate starting at more than double the income (in real terms) in 2015/16 compared to 1994/95.[14] Figures 2 to 4 all show higher net incomes for the higher market incomes in 2015/16 than in 1994/95; the increased tax-free income threshold is not evident, due to the existence of an equivalent tax offset at low incomes prior to the increase in this tax threshold. The tax cuts increased the price of leisure and home production time by increasing the net wage received which should increase labour supply (the substitution effect), while the higher net income received at the same hours of work should decrease labour supply (the income effect). Depending on the size of the substitution and income effects, we therefore expect labour supply to increase for some groups and decrease for others as a result of this change.

**Table B.1: Marginal taxation rates**

| **1994/1995** | | **2015/2016** | |
|---|---|---|---|
| **Taxable income range in $ per week [in 2016 dollars per week]** | **Marginal tax rate** | **Taxable income range in $ per week** | **Marginal tax rate** |
| 0 – 103.56 [0 – 169.27] | Nil | 0 – 349.04 | nil |
| 103.57 – 396.99 [169.27 – 648.85] | 0.20 | 349.04 – 709.59 | 0.19 |
| 397.00 – 728.77 [648.85 – 1191.13] | 0.34 | 709.59 – 1534.25 | 0.325 |
| 728.78 – 958.90 [1191.13 – 1567.27] | 0.43 | 1534.25 – 3452.05 | 0.37 |
| More than 958.90 [1567.27] | 0.47 | More than 3452.05 | 0.47 |

Major changes have also occurred for allowances (paid in cases of unemployment) and pensions (paid in cases of disability or single parenthood) between March 1995 and January 2016 (see Tables B.2 and B.3). In 1995, allowance and pension payment rates are the same, and the key difference lies in the withdrawal-free range (higher for pensions than for allowances) and in the withdrawal rate, which is more generous for pensions (50% over a withdrawal-free threshold) than for allowances (50% at first, and then dollar for dollar). By 2016, allowance payment rates had become much less generous compared to the pension rate, with pension rates having increased with the wage index for many years while the allowance rate only increased with the CPI. However, the withdrawal rate of allowance payments became much more generous, providing recipients with improved incentives to work, although it is not as generous as for pension recipients. These changes are reflected in the slight increases/decreases in the slopes of the budget constraints at different market income levels in Figures 2 to 4, and in the disappearance of the slightly downward sloping budget constraint at low income levels for partnered women with unemployed partners. The impact on labour supply is again ambiguous and may differ by demographic group: it depends on the income effect resulting from the

[14] Herault and Azpitarte (2015, 2016a) show how these tax cuts contributed to the reduction in the redistributive capacity of the tax-transfer system and the increase in net income inequality.

higher pension rates and the reduced withdrawal rates of pensions and allowances (decreasing expected labour supply by increasing net income at a given level of labour supply), and it also depends on the substitution effect resulting from the reduced withdrawal rate (increasing expected labour supply by increasing the return per hour of work).

**Table B.2: Weekly allowance rates**

| **March 1995 [in 2016 dollars]** | | **January 2016** | |
|---|---|---|---|
| Maximum rate single | $150.75 [$246.39] | Maximum rate single | $261.70 |
| Maximum rate single parent/ single 60 years or older | $163.05 [$266.50] | Maximum rate single parent/ single 60 years or older | $283.15 |
| Maximum rate couple (per person) | $136.00 [$222.28] | Maximum rate couple (per person) | $236.30 |
| Free area for income below | $30.00 [$49.04] | Free area for income below | $51.00 |
| | | Taper rate of 0.4 for single principal carers for income over | $51.00 |
| Taper rate of *0.5* for income below | $70.00 [$114.41] | Taper rate of *0.5* for all others for income below | $126.00 |
| Taper rate of *1.0* for income over | $70.00 [$114.41] | Taper rate of *0.6* for all others with income over | $126.00 |

Note: The payment that a single person is eligible for is calculated as follows:
maximum rate – taper rate1*(min[other income, second income threshold] – free area) – taper rate2*max[0, (other income – second threshold)].
For a couple household, a partner's income starts reducing an individual's payment at the highest taper rate when the partner's own allowance payment has been completely withdrawn.

Another large change occurred for primary carers of children (see Table B.3). In 1995, the primary carer of a child aged 15 or under was eligible for a parenting payment which was more generous than the alternative unemployment-related payment for working-age individuals. In 2016, the age of the child at which eligibility for parenting payments cuts out was reduced to 6 years for partnered primary carers and 8 years for single parents. This had financial consequences as parents were transferred from the parenting payment to the less generous Newstart allowance (Figure 2 shows this clearly for the single parent with the older child on low market income). In addition, these primary carers were now expected to look for work and had to meet the activity test for eligibility. This may have made benefit receipt less attractive and paid employment more attractive, shifting individuals' preferences between market work and home production/leisure. Given that most primary carers are women, this is likely to have affected women more than men.

**Table B.3: Weekly Pension rates and Parenting Payment Single rate (for single parents with children under age 15 [1995] or under age 9 [2016])**

| **March 1995 [in 2016 dollars]** | | **January 2016** | |
|---|---|---|---|
| Maximum rate single | $163.05 [$266.50] | Maximum rate single | $394.20 |
| | | Maximum rate single parent with child under 8 years | $365.60 |
| Maximum rate couple (per person) | $136.00 [$222.28] | Maximum rate couple (per person) | $297.15 |
| Free area for income below (singles) | $45.00 [$73.55] +$12.00 [$19.62]*nr of children | Free area for income below (singles) | $81.00+$12.30* nr of children |
| Free area for income below (couples) | $78.00 [$127.49] +$12.00[$19.62]*nr of children | Free area for income below (couples) | $144.00 |
| Taper rate of *0.5* for income over | Free area | Taper rate of *0.4* for women on parenting allowance single (with children under 9 years) with income over | Free area |
| | | Taper rate of *0.5* for income over (for all others) | Free area |

A third group of payments that is important for individuals and households of working age, are the family-related benefits (presented in Table B.4). By 2016, family payments had become more generous in real terms, and the withdrawal of payments more gradual. As a result, a larger group of households is subject to withdrawal of payments as more income is earned, mostly affecting secondary earners. Although the income thresholds at which the minimum rate payments are reduced are lower in real terms in 2016, due to the lower withdrawal rate, the payments are paid to a larger group of households than in 1995. Family payments for primary carers with low annual income have increased in real terms, especially for preschool children, and are withdrawn slightly more gradually in 2016 than in 1995, starting at a higher annual income of the secondary earner. In 1995, payments were supplemented by tax rebates for single parents and families with a dependent spouse. The payments in 2016 are however more targeted at households on low- to medium-level incomes, with eligibility cutting out at household incomes over $100,000. Again, with secondary earners and dependent spouse being more likely to be women than men, these changes are expected to affect women to a larger extent than men. Again, these changes are reflected in Figures 2 and 4 by slightly different slopes of the budget constraints, and by a higher net income for the same market income in 2015/16 compared to 1994/95 for single parents and partnered women with dependent children respectively. Income and substitution effects may work in opposite directions resulting again in increased labour supply for some groups and a decrease for others.

**Table B.4: Family Assistance**

| **March 1995 [in 2016 dollars]** | | **January 2016** | |
|---|---|---|---|
| **For all families with children** | | | |
| *Family Payment* | | *Family Tax Benefit part A* | |
| Basic rate per week ≤ 3 children | $10.85 [$17.73] | Minimum rate per week | $42.89 |
| Large family supplement per week for fourth and each subsequent child | $3.60 [$5.88] | Large family supplement per week for fourth and each subsequent child | $6.25 |
| Additional Family Payment rate per week for 0-12 year old child | $33.60 [$54.92] | Maximum basic rate per week for 0-12 year old child | $104.10 |
| Additional Family Payment rate per week for 13-15 year old child | $47.05 [$76.90] | Maximum basic rate per week for 13-15 year old child | $131.26 |
| Additional Family Payment rate per week for 16-17 year old child | $17.00 [$27.79] | Maximum basic rate per week for 16-17 year old child | $131.26 |
| Additional Family Payment rate per week for 18-24 year old child | $17.00 [$27.79] | Maximum basic rate per week for 18-19 year old child | $131.26 |
| Basic Family Payment rate payable for annual income below | $61,020+$3,051 [$99,734+$4,987]* (number of children – 1) | Minimum rate payable for annual income below | $94,316+$0* (number of children – 1) |
| Maximum rate payable for annual income below | $21,700+$624 {$35,467+$1,020]* (number of children – 1) | Maximum rate payable for annual income below | $51,027 |
| Taper rate for Basic Family Payment | “Sudden death” | Taper rate for minimum rate | 0.3 |
| Taper rate for Additional Family Payment | 0.5 | Taper rate for more-than-minimum rate | 0.2 |

**Table B.4: continued**

| | | | |
|---|---|---|---|
| ***For single-income families with children*** | | | |
| *Home Child Care Allowance* | | ***Family Tax Benefit part B*** | |
| Maximum rate per week if youngest is <16 years old | $30.50 [$49.85] | Maximum rate per week if youngest child 5-18 years old | $60.37 |
| | | Maximum rate per week if youngest child 0-4 years old | $83.46 |
| Maximum rate payable to second earners with annual income of less than | $282.00 [$460.91] | Maximum rate payable to all single parents or second earners with annual income of less than | $5,402.00 |
| | | Maximum household income for eligibility is | $100,000 |
| Taper rate | 0.25 | Taper rate | 0.2 |
| *Guardian Allowance* | | | |
| Maximum rate per week per family | $15.05 [$24.60] | | |
| Payable to single parents who | get more-than-minimum Family Allowance | | |
| *Dependent Spouse Rebate (with children)* | | | |
| Maximum rate per year | $1,211 [$1,979] | | |
| Maximum rate payable for spouse with children under 16 years and annual income below | $282 [$460.91] | | |
| Taper rate | 0.25 | | |
| ***For single-income families with children*** | | | |
| *Sole Parent Rebate* | | | |
| Maximum rate | $1,137 [$1,858] | | |

# Appendix C: The Melbourne Institute Tax and Transfer Simulator (MITTS)

This appendix provides a brief description of the MITTS model, a behavioural microsimulation model of direct tax and transfers in Australia. Since the first version was completed in 2000 and described by Creedy et al. (2002), this model has undergone a range of substantial developments.[15]

Static microsimulation models are designed to generate output relevant for a single point in time. Variants of this approach, which have been used to consider the effects of tax and transfer policy, commonly start with a reference data set (the SIH in our case) that describes relevant circumstances for each benefit unit sampled to reflect a population cross-section. The information contained in the reference data set is combined with assumptions concerning agent behaviour, and the rules and regulations of an assumed transfer system to generate various measures of interest, including income gross and net of transfer payments, net tax take, rates of employment, and so on.

Static microsimulation models consequently provide a potentially powerful tool for exploring how policy change is likely to affect a population at a given point in time. By treating each micro-unit of a reference database as a separate case study, microsimulation can be used to build up a macro-level picture of the effects of a change to transfer policy. The micro-detail permits a very broad set of analyses to be conducted, from the consideration of population averages and budgetary impact of policy alternatives, through to distributional effects. However, this type of microsimulation models does not allow consideration of the effects of policy through time.

MITTS consists of two components. MITTS-A is the arithmetic tax and benefit computation component and uses the wage rate of each individual to generate budget constraints that are crucial to the analysis of behavioural responses to tax changes. For those individuals in the data set who are not working, an imputed wage is estimated. MITTS-B can examine the effects of any specified tax reform, allowing individuals to adjust their labour supply. Behaviour is based on quadratic preference functions in which the parameters are allowed to vary according to individual and household characteristics. Individuals are constrained to select from a discrete set of levels of hours worked. For singles, 11 discrete points are distinguished. For couples, a joint set of discrete labour supply points are used. The female distribution of hours worked covers a wider range of part-time and full-time hours than the male distribution, which is mostly divided into non-participation and full-time work. Therefore, women's labour supply is divided into 11 discrete points, whereas men's labour supply is represented by only 6 points. The joint labour supply of couples is estimated simultaneously, in contrast to a commonly used approach in which female labour supply is estimated with the spouse's labour supply taken as exogenous. Thus, for couples, 66 joint labour supply combinations are considered.

Simulations are probabilistic, as utility at each level of hours worked is the sum of a deterministic component (depending on hours worked and net income) and a random component. Hence, MITTS generates a probability distribution over the discrete levels of hours worked. Self-employed

[15] A detailed discussion of behavioural microsimulation modelling approaches can be found in Creedy and Kalb (2005, 2006). For a list of refereed publications and books relating to the MITTS model, see: https://melbourneinstitute.unimelb.edu.au/research-programs/labour-economics-and-social-policy/previous-projects/behavioural-microsimulation/publications

individuals, individuals with a Disability Support Pension, full-time students and those over 65 have their labour supply fixed at observed hours. Simulations begin by recording for each individual the discrete level of hours worked that is closest to the observed number of hours worked. The deterministic component of utility is obtained using the parameter estimates of the quadratic preference function. To generate the random component, a draw is taken from the distribution of the error term for each level of hours worked (an Extreme Value Type I distribution). The utility-maximising level of hours worked is found by adding the two components of utility for each level of hours worked and choosing the level with the highest utility. Calibrated simulations are generated by taking draws from the error terms conditional on the observed labour supply; that is, only error terms that place the individual at the actual observed labour supply are used, assuming that this hours point represents the optimal pre-reform labour supply. As a result, post-reform labour supply is simulated conditional on the observed pre-reform labour supply. A user-specified number of draws is produced. Simulations can also be run without calibration by using unconditional error terms, generating an hours distribution pre- and post-reform.

For the post-reform analysis, the new net incomes cause the deterministic component of utility to change at each level of hours worked, such that using the same set of draws from the calibration stage yields a new set of optimal hours worked. This method generates a probability distribution over the set of discrete hours for each individual under the new tax and transfer structure. Rather than using the arithmetic mean hours for each individual over the discrete hours available for work, as in Bargain (2012), we use the 'pseudo-distribution' method proposed by Creedy et al. (2006) for dealing with the complete distribution.

Table C.1 provides a list of all the taxes, rebates and benefits calculated by MITTS, and a list of those that are excluded.

**Table C.1 Taxes and benefits in MITTS**

| Taxes and Rebates | Allowances | Pensions |
|---|---|---|
| - Income tax | - Newstart Allowance | - Age Pension |
| - Medicare Levy | - Youth Allowance | - Disability Support Pension |
| - Medicare Surcharge | - Mature Age | - Wife Pension |
| - Pensioner Rebate | Allowance | - Carer Payment |
| - Low-Income Earner Rebate | - Sickness Allowance | - Widow Pension |
| - Dependent Spouse Rebate | - Widow Allowance | - DVA Service Pension |
| - Sole Parent Rebate | - Partner Allowance | - DVA Disability Pension |
| - Senior Australians Tax Offset | | - DVA War Widows Pension |
| - Mature-Age Workers Tax Offset | | |

| Family Payments | Other Benefits | Not Included |
|---|---|---|
| - Parenting Payment | - Austudy/Abstudy | - Child Care Rebate |
| - Family Tax Benefit Part A | - Special Benefit | - Child Care Benefit |
| - Family Tax Benefit Part B | - Rent Assistance | - Private Health Insurance |
| - Family Tax Assistance | | Offset |
| - Family Tax Payment | | - Superannuation Concessions |
| - Maternity Allowance/Baby | | - Capital Gains Discount |
| Bonus | | - Tax deductions |

# Appendix D: Wage and Labour Supply Models

**Table D.1 Wage equation parameters for couple women**

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Age/10 | 1.087 | 8.699 | 0.266 | 0.035 | 0.100 | 0.010 | 0.033 | 0.003 |
| Age squared/100 | -0.157 | -10.371 | -0.032 | 0.005 | -0.001 | 0.000 | 0.000 | 0.000 |
| Employed (1-year lag) | 2.257 | 65.688 | 0.364 | 0.049 | 2.108 | 0.027 | 0.229 | 0.041 |
| *Post-school education (ref. is none)* | | | | | | | | |
| University degree | | | | | 0.351 | 0.034 | 0.019 | 0.032 |
| Post-graduate degree | 0.504 | 5.349 | 0.160 | 0.056 | | | | |
| Under-graduate degree | 0.322 | 5.419 | 0.108 | 0.050 | | | | |
| Advanced diploma | 0.175 | 3.204 | 0.100 | 0.017 | 0.252 | 0.043 | 0.089 | 0.012 |
| Vocational education | 0.156 | 3.732 | 0.030 | 0.011 | 0.166 | 0.036 | 0.012 | 0.009 |
| University degree X age | | | 0.020 | 0.012 | | | 0.004 | 0.001 |
| *State (ref. is NSW)* | | | | | | | | |
| Victoria | -0.069 | -1.513 | -0.036 | 0.013 | -0.053 | 0.044 | -0.047 | 0.012 |
| Queensland | -0.124 | -2.532 | -0.061 | 0.013 | -0.051 | 0.046 | -0.039 | 0.013 |
| South Australia | -0.144 | -2.643 | -0.049 | 0.014 | 0.101 | 0.048 | -0.026 | 0.012 |
| Western Australia | -0.190 | -3.560 | -0.066 | 0.014 | -0.050 | 0.046 | 0.007 | 0.013 |
| Tasmania | -0.085 | -1.284 | -0.042 | 0.017 | -0.010 | 0.054 | -0.022 | 0.014 |
| ACT & NT | 0.201 | 2.776 | 0.075 | 0.018 | 0.285 | 0.058 | 0.136 | 0.015 |
| Live in capital city | 0.044 | 1.268 | 0.054 | 0.009 | 0.019 | 0.029 | 0.061 | 0.008 |
| No. of children | -0.032 | -1.504 | | | -0.029 | 0.020 | | |
| *Age of youngest child* | | | | | | | | |
| 0-2 yrs old | -0.960 | -14.971 | | | -0.775 | 0.056 | | |
| 3-4 yrs old | -0.535 | -7.146 | | | -0.452 | 0.071 | | |
| 5-9 yrs old | -0.329 | -5.113 | | | -0.273 | 0.061 | | |
| 10-14 yrs old | -0.135 | -2.226 | | | -0.124 | 0.061 | | |
| *Tenure type (ref. is owner outright)* | | | | | | | | |
| Mortgage | 0.081 | 2.195 | | | 0.251 | 0.037 | | |
| Renter | -0.070 | -1.434 | | | -0.034 | 0.044 | | |
| Other | -0.111 | -1.076 | | | 0.011 | 0.104 | | |
| Non-labour income (in $1,000) | -0.066 | -2.439 | | | -0.002 | 0.001 | | |
| *Occupation (ref. is Labourer)* | | | | | | | | |
| Managers & professionals | | | 0.264 | 0.016 | | | 0.256 | 0.013 |
| Service workers & clerks | | | 0.117 | 0.012 | | | 0.104 | 0.010 |
| *Industry (ref. is Agriculture)* | | | | | | | | |
| Mining | | | 0.271 | 0.083 | | | 0.425 | 0.062 |
| Manufacturing | | | 0.118 | 0.039 | | | 0.087 | 0.050 |
| Electricity & water | | | 0.264 | 0.053 | | | 0.258 | 0.065 |
| Construction | | | 0.270 | 0.062 | | | 0.119 | 0.055 |
| Retail | | | 0.068 | 0.039 | | | -0.030 | 0.048 |
| Transport | | | 0.187 | 0.050 | | | 0.125 | 0.053 |
| Communications | | | 0.193 | 0.050 | | | 0.161 | 0.054 |
| Finance | | | 0.146 | 0.039 | | | 0.158 | 0.050 |

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Health & education | | | 0.097 | 0.038 | | | 0.107 | 0.048 |
| Employed partner | 0.637 | 13.722 | | | 0.446 | 0.039 | | |
| Post-graduate degree (partner) | -0.146 | -2.042 | | | | | | |
| Under-graduate degree (partner) | 0.019 | 0.351 | | | | | | |
| Younger partner | -0.029 | -0.646 | | | -0.021 | 0.028 | | |
| Older partner | 0.026 | 0.158 | | | | | | |
| Inverse Mills ratio | | | 0.184 | 0.030 | | | 0.144 | 0.035 |
| Constant | -3.111 | -12.214 | 1.437 | 0.102 | -2.813 | 0.213 | 2.083 | 0.094 |
| Sample size | 13,354 | | 7,434 | | 17,647 | | 12,109 | |
| Log-likelihood | -4,243 | | | | -5,612 | | -24,400 | |

*Notes:* Estimates based on pooled cross-sectional surveys from the mid to late 1990s (1994/95, 1995/96, 1996/97, and 1997/98) and from 2011 to 2016 (2011/12, 2013/14 and 2015/16). The covariates used in the two periods have been aligned to facilitate the estimation of counterfactual wages. Some differences are maintained in the education variables to obtain the best fit possible in both periods, while ensuring full compatibility with both the 1994/95 and 2015/16 Survey of Income and Housing.

*Sources:* Authors' estimates based on the Survey of Income and Housing.

**Table D.2 Wage equation parameters for couple men**

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Age/10 | 1.141 | 7.748 | 0.210 | 0.036 | 0.110 | 0.012 | 0.032 | 0.003 |
| Age squared/100 | -0.155 | -9.181 | -0.023 | 0.004 | -0.001 | 0.000 | 0.000 | 0.000 |
| Employed (1-year lag) | 1.845 | 40.796 | 0.173 | 0.051 | 1.511 | 0.036 | 0.068 | 0.036 |
| *Post-school education (ref. is none)* | | | | | | | | |
| University degree | | | | | 0.083 | 0.043 | 0.006 | 0.038 |
| Post-graduate degree | 0.650 | 5.876 | 0.102 | 0.058 | | | | |
| Under-graduate degree | 0.351 | 4.553 | 0.044 | 0.054 | | | | |
| Advanced diploma | 0.209 | 3.335 | 0.129 | 0.014 | 0.226 | 0.058 | 0.110 | 0.014 |
| Vocational education | 0.110 | 2.463 | 0.060 | 0.010 | 0.107 | 0.040 | 0.042 | 0.010 |
| University degree X age | | | 0.042 | 0.013 | | | 0.005 | 0.001 |
| *State (ref. is NSW)* | | | | | | | | |
| Victoria | 0.035 | 0.608 | -0.054 | 0.012 | -0.050 | 0.054 | -0.052 | 0.013 |
| Queensland | 0.071 | 1.187 | -0.034 | 0.013 | -0.024 | 0.056 | -0.012 | 0.013 |
| South Australia | -0.089 | -1.282 | -0.070 | 0.014 | -0.014 | 0.058 | -0.061 | 0.014 |
| Western Australia | 0.107 | 1.569 | -0.032 | 0.014 | -0.031 | 0.056 | 0.066 | 0.014 |
| Tasmania | 0.007 | 0.080 | -0.022 | 0.016 | -0.211 | 0.062 | -0.058 | 0.014 |
| ACT & NT | 0.159 | 1.728 | 0.069 | 0.018 | 0.166 | 0.071 | 0.127 | 0.016 |
| Live in capital city | 0.066 | 1.579 | 0.050 | 0.009 | 0.050 | 0.035 | 0.044 | 0.009 |
| No. of children | -0.025 | -1.000 | | | 0.003 | 0.025 | | |
| *Age of youngest child* | | | | | | | | |
| 0-2 yrs old | -0.105 | -1.287 | | | -0.011 | 0.072 | | |
| 3-4 yrs old | -0.056 | -0.549 | | | -0.025 | 0.089 | | |
| 5-9 yrs old | -0.028 | -0.319 | | | 0.052 | 0.077 | | |
| 10-14 yrs old | -0.042 | -0.533 | | | -0.076 | 0.072 | | |
| *Tenure type (ref. is owner outright)* | | | | | | | | |
| Mortgage | 0.296 | 5.982 | | | 0.410 | 0.042 | | |
| Renter | -0.226 | -4.076 | | | -0.025 | 0.050 | | |
| Other | 0.032 | 0.265 | | | 0.446 | 0.142 | | |
| Non-labour income (in $1,000) | -0.292 | -5.182 | | | 0.001 | 0.001 | | |
| *Occupation (ref. is Labourer)* | | | | | | | | |
| Managers & professionals | | | 0.125 | 0.012 | | | 0.140 | 0.011 |
| Service workers & clerks | | | 0.061 | 0.011 | | | 0.034 | 0.011 |
| *Industry (ref. is Agriculture)* | | | | | | | | |
| Mining | | | 0.612 | 0.041 | | | 0.731 | 0.033 |
| Manufacturing | | | 0.276 | 0.030 | | | 0.374 | 0.030 |
| Electricity & water | | | 0.413 | 0.038 | | | 0.585 | 0.035 |
| Construction | | | 0.228 | 0.032 | | | 0.371 | 0.031 |
| Retail | | | 0.127 | 0.031 | | | 0.195 | 0.031 |
| Transport | | | 0.265 | 0.033 | | | 0.349 | 0.032 |
| Communications | | | 0.354 | 0.035 | | | 0.417 | 0.039 |
| Finance | | | 0.264 | 0.032 | | | 0.401 | 0.035 |
| Health & education | | | 0.238 | 0.030 | | | 0.356 | 0.030 |
| Employed partner | 0.633 | 13.444 | | | 0.392 | 0.035 | | |

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Post-graduate degree (partner) | 0.065 | 0.532 | | | | | | |
| Under-graduate degree (partner) | -0.080 | -1.053 | | | | | | |
| Older partner | 0.015 | 0.258 | | | | | | |
| Younger partner | -0.280 | -2.174 | | | | | | |
| Inverse Mills ratio | | | 0.017 | 0.049 | | | -0.034 | 0.052 |
| Constant | -2.599 | -8.259 | 1.744 | 0.111 | -2.195 | 0.255 | 2.178 | 0.095 |
| Sample size | 11,240 | | 9,510 | | 15,974 | | 13,790 | |
| Log-likelihood | -2,686 | | | | -3,737 | | -24,400 | |

*Notes*: As for Table D.1.

*Sources:* As for Table D.1.

**Table D.3 Wage equation parameters for single women**

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Age/10 | 0.835 | 6.541 | 0.507 | 0.039 | 0.062 | 0.012 | 0.039 | 0.003 |
| Age squared/100 | -0.141 | -8.614 | -0.056 | 0.006 | -0.001 | 0.000 | 0.000 | 0.000 |
| Employed (1-year lag) | 1.704 | 28.794 | -0.072 | 0.076 | 1.863 | 0.052 | -0.014 | 0.107 |
| *Post-school education (ref. is none)* | | | | | | | | |
| University degree | | | | | 0.332 | 0.064 | 0.035 | 0.038 |
| Post-graduate degree | 0.505 | 2.925 | 0.106 | 0.054 | | | | |
| Under-graduate degree | 0.395 | 4.019 | 0.064 | 0.045 | | | | |
| Advanced diploma | 0.202 | 2.064 | 0.071 | 0.019 | 0.292 | 0.081 | 0.097 | 0.020 |
| Vocational education | 0.016 | 0.234 | 0.068 | 0.014 | 0.091 | 0.062 | 0.002 | 0.014 |
| University degree X age | | | 0.023 | 0.013 | 0.000 | 0.000 | 0.004 | 0.001 |
| *State (ref. is NSW)* | | | | | | | | |
| Victoria | -0.006 | -0.078 | -0.016 | 0.015 | -0.164 | 0.076 | -0.006 | 0.019 |
| Queensland | -0.147 | -1.788 | -0.041 | 0.016 | -0.020 | 0.082 | 0.001 | 0.018 |
| South Australia | -0.285 | -3.278 | 0.013 | 0.019 | -0.007 | 0.083 | 0.019 | 0.018 |
| Western Australia | -0.026 | -0.283 | -0.049 | 0.017 | 0.061 | 0.087 | 0.021 | 0.020 |
| Tasmania | -0.059 | -0.520 | -0.014 | 0.024 | -0.185 | 0.094 | 0.020 | 0.022 |
| ACT & NT | 0.027 | 0.211 | 0.086 | 0.025 | 0.275 | 0.105 | 0.104 | 0.023 |
| Live in capital city | 0.160 | 2.709 | 0.026 | 0.013 | -0.013 | 0.053 | 0.027 | 0.012 |
| *Tenure type (ref. is owner outright)* | | | | | | | | |
| Mortgage | 0.513 | 4.606 | | | 0.280 | 0.063 | | |
| Renter | -0.219 | -2.645 | | | -0.019 | 0.062 | | |
| Other | -0.449 | -4.611 | | | -0.250 | 0.143 | | |
| Non-labour income (in $1,000) | -1.505 | -3.621 | | | -0.057 | 0.009 | | |
| *Occupation (ref. is Labourer)* | | | | | | | | |
| Managers & professionals | | | 0.182 | 0.019 | | | 0.219 | 0.019 |
| Service workers & clerks | | | 0.084 | 0.016 | | | 0.093 | 0.016 |
| *Industry (ref. is Agriculture)* | | | | | | | | |
| Mining | | | 0.485 | 0.314 | | | 0.319 | 0.086 |
| Manufacturing | | | 0.032 | 0.063 | | | 0.130 | 0.065 |
| Electricity & water | | | 0.213 | 0.089 | | | 0.402 | 0.079 |
| Construction | | | 0.063 | 0.078 | | | 0.161 | 0.072 |
| Retail | | | 0.012 | 0.063 | | | 0.045 | 0.062 |
| Transport | | | 0.198 | 0.069 | | | 0.276 | 0.068 |
| Communications | | | 0.172 | 0.078 | | | 0.125 | 0.074 |
| Finance | | | 0.079 | 0.063 | | | 0.181 | 0.065 |
| Health & education | | | 0.056 | 0.062 | | | 0.180 | 0.062 |
| Inverse Mills ratio | | | -0.254 | 0.078 | | | -0.120 | 0.116 |
| Constant | -1.317 | -5.711 | 1.506 | 0.150 | -1.448 | 0.210 | 2.118 | 0.169 |
| Sample size | 4,628 | | 3,398 | | 5,412 | | 4,264 | |
| Log-likelihood | -1,500 | | | | -1,737 | | -7,814 | |

*Notes*: As for Table D.1.

*Sources:* As for Table D.1.

**Table D.4 Wage equation parameters for single men**

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Age/10 | 0.217 | 2.032 | 0.606 | 0.036 | 0.048 | 0.009 | 0.033 | 0.004 |
| Age squared/100 | -0.047 | -3.311 | -0.067 | 0.005 | -0.001 | 0.000 | 0.000 | 0.000 |
| Employed (1-year lag) | 1.477 | 28.984 | -0.189 | 0.091 | 1.494 | 0.044 | -0.272 | 0.091 |
| *Post-school education (ref. is none)* | | | | | | | | |
| University degree | | | | | 0.275 | 0.060 | 0.043 | 0.045 |
| Post-graduate degree | 0.613 | 3.495 | 0.074 | 0.076 | | | | |
| Under-graduate degree | 0.579 | 6.662 | 0.049 | 0.059 | | | | |
| Advanced diploma | 0.356 | 4.120 | 0.023 | 0.025 | 0.223 | 0.082 | 0.068 | 0.026 |
| Vocational education | 0.107 | 2.019 | 0.083 | 0.013 | 0.063 | 0.046 | 0.096 | 0.014 |
| University degree X age | | | 0.007 | 0.018 | | | 0.004 | 0.001 |
| *State (ref. is NSW)* | | | | | | | | |
| Victoria | -0.154 | -2.352 | 0.021 | 0.016 | -0.110 | 0.066 | -0.005 | 0.020 |
| Queensland | -0.179 | -2.617 | 0.016 | 0.017 | -0.007 | 0.069 | 0.019 | 0.020 |
| South Australia | -0.239 | -3.196 | -0.008 | 0.021 | -0.107 | 0.070 | -0.017 | 0.021 |
| Western Australia | -0.124 | -1.635 | 0.021 | 0.018 | -0.010 | 0.069 | 0.073 | 0.021 |
| Tasmania | -0.218 | -2.304 | 0.000 | 0.026 | -0.121 | 0.079 | -0.029 | 0.024 |
| ACT & NT | -0.001 | -0.013 | 0.030 | 0.023 | 0.266 | 0.087 | 0.108 | 0.025 |
| Live in capital city | 0.096 | 1.984 | 0.012 | 0.013 | 0.058 | 0.043 | 0.029 | 0.013 |
| *Tenure type (ref. is owner outright)* | | | | | | | | |
| Mortgage | 0.370 | 3.574 | | | 0.329 | 0.053 | | |
| Renter | -0.053 | -0.633 | | | 0.173 | 0.051 | | |
| Other | -0.149 | -1.619 | | | 0.122 | 0.123 | | |
| Non-labour income (in $1,000) | -1.082 | -3.597 | | | 0.004 | 0.004 | | |
| *Occupation (ref. is Labourer)* | | | | | | | | |
| Managers & professionals | | | 0.156 | 0.018 | | | 0.115 | 0.018 |
| Service workers & clerks | | | 0.080 | 0.013 | | | 0.003 | 0.015 |
| *Industry (ref. is Agriculture)* | | | | | | | | |
| Mining | | | 0.578 | 0.064 | | | 0.554 | 0.052 |
| Manufacturing | | | 0.225 | 0.039 | | | 0.232 | 0.040 |
| Electricity & water | | | 0.420 | 0.056 | | | 0.408 | 0.052 |
| Construction | | | 0.241 | 0.042 | | | 0.239 | 0.041 |
| Retail | | | 0.119 | 0.039 | | | 0.100 | 0.040 |
| Transport | | | 0.306 | 0.046 | | | 0.220 | 0.044 |
| Communications | | | 0.325 | 0.046 | | | 0.231 | 0.051 |
| Finance | | | 0.241 | 0.042 | | | 0.215 | 0.049 |
| Health & education | | | 0.197 | 0.040 | | | 0.199 | 0.039 |
| Inverse Mills ratio | | | -0.427 | 0.110 | | | -0.463 | 0.117 |
| Constant | -0.461 | -2.295 | 1.392 | 0.150 | -1.308 | 0.170 | 2.579 | 0.163 |
| Sample size | 5,682 | | 4,458 | | 6,488 | | 4,999 | |
| Log-likelihood | -2,219 | | | | -2,590 | | -9,113 | |

*Notes*: As for Table D.1.

*Sources:* As for Table D.1.

**Table D.5 Wage equation parameters for single parents**

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | Selection | | Wages | | Selection | | Wages | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Female | -0.223 | -1.746 | -0.113 | 0.041 | -0.107 | 0.107 | -0.085 | 0.029 |
| Age/10 | 0.330 | 1.026 | -0.160 | 0.151 | 0.066 | 0.028 | 0.047 | 0.011 |
| Age squared/100 | -0.053 | -1.352 | 0.018 | 0.019 | -0.001 | 0.000 | 0.000 | 0.000 |
| Employed (1-year lag) | 1.838 | 22.707 | -0.062 | 0.118 | 2.011 | 0.074 | 0.132 | 0.107 |
| *Post-school education (ref. is none)* | | | | | | | | |
| University degree | | | | | 0.393 | 0.111 | -0.102 | 0.130 |
| Post-graduate degree | 0.455 | 1.918 | 0.275 | 0.063 | | | | |
| Under-graduate degree | 0.232 | 1.490 | 0.207 | 0.050 | | | | |
| Advanced diploma | 0.276 | 1.922 | 0.082 | 0.046 | 0.228 | 0.116 | 0.069 | 0.031 |
| Vocational education | 0.200 | 2.005 | -0.033 | 0.031 | 0.082 | 0.082 | -0.007 | 0.023 |
| University degree X age | | | | | | | 0.008 | 0.003 |
| *State (ref. is NSW)* | | | | | | | | |
| Victoria | 0.234 | 1.973 | -0.070 | 0.039 | -0.339 | 0.114 | -0.070 | 0.034 |
| Queensland | 0.171 | 1.376 | -0.058 | 0.040 | -0.293 | 0.116 | -0.011 | 0.032 |
| South Australia | -0.005 | -0.037 | -0.053 | 0.047 | -0.023 | 0.125 | -0.001 | 0.033 |
| Western Australia | 0.201 | 1.592 | -0.052 | 0.042 | -0.061 | 0.123 | 0.023 | 0.035 |
| Tasmania | 0.401 | 2.563 | 0.017 | 0.056 | -0.087 | 0.135 | -0.019 | 0.034 |
| ACT & NT | 0.576 | 3.269 | 0.092 | 0.050 | 0.093 | 0.156 | 0.108 | 0.039 |
| Live in capital city | 0.111 | 1.318 | 0.062 | 0.029 | 0.019 | 0.074 | 0.031 | 0.020 |
| No. of children | -0.088 | -1.775 | | | -0.086 | 0.042 | | |
| *Age of youngest child* | | | | | | | | |
| 0-2 yrs old | -1.001 | -5.160 | | | -0.720 | 0.154 | | |
| 3-4 yrs old | -0.543 | -3.086 | | | -0.566 | 0.154 | | |
| 5-9 yrs old | -0.365 | -2.486 | | | -0.186 | 0.127 | | |
| 10-14 yrs old | -0.204 | -1.598 | | | -0.019 | 0.113 | | |
| *Tenure type (ref. is owner outright)* | | | | | | | | |
| Mortgage | 0.198 | 1.560 | | | 0.253 | 0.135 | | |
| Renter | -0.100 | -0.823 | | | -0.180 | 0.125 | | |
| Other | -0.210 | -1.021 | | | 0.343 | 0.317 | | |
| Non-labour income (in $1,000) | 0.852 | 1.876 | | | 0.002 | 0.005 | | |
| Child support (in $1,000) | -1.312 | -1.910 | | | 0.348 | 0.346 | | |
| *Occupation (ref. is Labourer)* | | | | | | | | |
| Managers & professionals | | | 0.254 | 0.044 | | | 0.124 | 0.033 |
| Service workers & clerks | | | 0.105 | 0.035 | | | 0.041 | 0.026 |
| *Industry (ref. is Agriculture)* | | | | | | | | |
| Mining | | | 0.983 | 0.284 | | | 0.830 | 0.149 |
| Manufacturing | | | 0.054 | 0.114 | | | 0.268 | 0.107 |
| Electricity & water | | | 0.460 | 0.198 | | | 0.578 | 0.164 |
| Construction | | | 0.043 | 0.182 | | | 0.298 | 0.124 |
| Retail | | | 0.062 | 0.112 | | | 0.179 | 0.105 |
| Transport | | | 0.221 | 0.122 | | | 0.268 | 0.115 |
| Communications | | | 0.233 | 0.122 | | | 0.360 | 0.124 |
| Finance | | | 0.116 | 0.115 | | | 0.370 | 0.111 |

| | 1994/98 | | | | 2011/16 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Selection** | | **Wages** | | **Selection** | | **Wages** | |
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| Health & education | | | 0.097 | 0.110 | | | 0.288 | 0.103 |
| Inverse Mills ratio | | | -0.063 | 0.085 | | | 0.027 | 0.088 |
| Constant | -1.110 | -1.630 | 2.898 | 0.385 | -1.395 | 0.580 | 1.776 | 0.336 |
| Sample size | 1,787 | | 830 | | 2,376 | | 1,458 | |
| Log-likelihood | -719 | | | | -815 | | -2,811 | |

*Notes*: As for Table D.1.

*Sources:* As for Table D.1.

**Table D.6 Labour supply parameters for couple families**

| | 1994/98 | | 2011/16 | |
|---|---|---|---|---|
| | Coef. | SE | Coef. | SE |
| *Quadratic terms* | | | | |
| Income squared/100,000 | -0.015 | 0.004 | 0.002 | 0.000 |
| Hrs squared/100 (men) | -0.636 | 0.010 | -0.508 | 0.008 |
| Hrs squared/100 (women) | -0.201 | 0.009 | -0.226 | 0.007 |
| *Cross products* | | | | |
| Inc. x hrs. (men) /10,000 | -0.386 | 0.028 | -0.028 | 0.007 |
| Inc. x hrs. (women) /10,000 | -0.153 | 0.017 | -0.036 | 0.006 |
| Hrs (men) x hrs (women)/100 | -0.050 | 0.006 | -0.027 | 0.005 |
| *Linear term in income /100* | | | | |
| Income - Constant | 0.635 | 0.019 | 0.193 | 0.006 |
| Income - Number of children | -0.008 | 0.002 | -0.004 | 0.001 |
| *Linear term in men's hours worked* | | | | |
| constant | 0.350 | 0.013 | 0.291 | 0.012 |
| Children 0-2 years old | 0.003 | 0.003 | -0.004 | 0.002 |
| Children 3-4 years old | 0.001 | 0.003 | -0.005 | 0.003 |
| Children 5-9 years old | 0.000 | 0.003 | -0.001 | 0.002 |
| Number of children | 0.001 | 0.001 | 0.000 | 0.001 |
| Age/10 | 0.068 | 0.005 | 0.074 | 0.004 |
| Age squared/100 | -0.009 | 0.001 | -0.010 | 0.001 |
| Vocational education | 0.009 | 0.002 | 0.009 | 0.001 |
| University degree | 0.013 | 0.003 | -0.001 | 0.002 |
| Vocational education (female spouse) | 0.002 | 0.002 | -0.002 | 0.001 |
| University degree (female spouse) | 0.003 | 0.003 | -0.006 | 0.002 |
| *Linear term in women's hours worked* | | | | |
| constant | 0.053 | 0.013 | 0.062 | 0.010 |
| Children 0-2 years old | -0.062 | 0.002 | -0.048 | 0.002 |
| Children 3-4 yrs old | -0.042 | 0.003 | -0.037 | 0.002 |
| Children 5-9 yrs old | -0.023 | 0.002 | -0.022 | 0.002 |
| Number of children | -0.010 | 0.001 | -0.009 | 0.001 |
| Age/10 | 0.049 | 0.006 | 0.050 | 0.004 |
| Age squared/100 | -0.008 | 0.001 | -0.007 | 0.001 |
| Vocational education (male spouse) | 0.000 | 0.002 | 0.000 | 0.001 |
| University degree (male spouse) | -0.005 | 0.002 | -0.009 | 0.002 |
| Vocational education | 0.013 | 0.002 | 0.014 | 0.001 |
| University degree | 0.033 | 0.002 | 0.030 | 0.002 |
| *Fixed cost of working* | | | | |
| Male | 17.725 | 0.635 | 49.804 | 2.056 |
| Female | 6.828 | 0.277 | 21.731 | 0.989 |

*Notes:* Estimates based on pooled cross-sectional surveys from the mid to late 1990s (1994/95, 1995/96, 1996/97, and 1997/98) and from 2011 to 2016 (2011/12, 2013/14 and 2015/16)
*Sources:* Authors' estimates based on the Survey of Income and Housing.

**Table D.7 Labour supply parameters for single persons**

| | 1994/98 | | 2011/16 | |
|---|---|---|---|---|
| | Coef. | SE | Coef. | SE |
| *Quadratic terms* | | ***Single men*** | | |
| Income squared/100,000 | -0.010 | 0.022 | 0.005 | 0.003 |
| Hours worked squared/100 | -0.437 | 0.034 | -0.279 | 0.018 |
| *Cross product* | | | | |
| Inc. x hrs. /10,000 | -0.475 | 0.139 | 0.172 | 0.058 |
| *Linear term in income /100* | | | | |
| constant | 0.205 | 0.076 | 0.073 | 0.015 |
| Age/10 | 0.118 | 0.030 | 0.015 | 0.010 |
| Age squared/100 | -0.013 | 0.004 | -0.002 | 0.001 |
| Vocational education | 0.014 | 0.010 | 0.001 | 0.001 |
| University degree | 0.010 | 0.016 | -0.004 | 0.003 |
| *Linear term in hours worked* | | | | |
| constant | 0.144 | 0.035 | 0.319 | 0.227 |
| Age/10 | 0.082 | 0.010 | 0.085 | 0.007 |
| Age squared/100 | -0.011 | 0.001 | -0.010 | 0.001 |
| Vocational education | 0.017 | 0.004 | 0.009 | 0.003 |
| University degree | 0.024 | 0.006 | 0.002 | 0.004 |
| *Fixed cost of working* | | | | |
| Constant | 20.033 | 3.431 | 139.290 | 88.366 |
| Live in capital city | -0.441 | 0.249 | 3.045 | 1.746 |
| Live in NSW | -0.332 | 0.293 | -0.684 | 1.271 |
| *Quadratic terms* | | ***Single women*** | | |
| Income squared/100,000 | -0.095 | 0.077 | 0.081 | 0.016 |
| Hours worked squared/100 | -0.266 | 0.023 | -0.206 | 0.019 |
| *Cross product* | | | | |
| Inc. x hrs. /10,000 | -1.701 | 0.213 | -0.727 | 0.103 |
| *Linear term in income /100* | | | | |
| constant | 0.798 | 0.154 | 0.138 | 0.042 |
| Age/10 | 0.081 | 0.069 | 0.151 | 0.026 |
| Age squared/100 | -0.001 | 0.009 | -0.017 | 0.003 |
| Vocational education | -0.003 | 0.029 | -0.019 | 0.010 |
| University degree | 0.112 | 0.049 | 0.027 | 0.013 |
| *Linear term in hours worked* | | | | |
| constant | 0.008 | 0.017 | -0.056 | 0.012 |
| Age/10 | 0.093 | 0.007 | 0.093 | 0.005 |
| Age squared/100 | -0.013 | 0.001 | -0.012 | 0.001 |
| Vocational education | 0.011 | 0.003 | 0.011 | 0.002 |
| University degree | 0.032 | 0.004 | 0.033 | 0.003 |
| *Fixed cost of working* | | | | |
| Constant | 5.253 | 0.631 | 12.360 | 1.289 |
| Live in capital city | -0.042 | 0.147 | 0.555 | 0.478 |
| Live in NSW | 0.093 | 0.143 | 0.658 | 0.580 |

*Notes:* As for Table D.6.

*Sources:* As for Table D.6.

**Table D.8 Labour supply parameters for single parents**

| | 1994/98 | | 2011/16 | |
|---|---|---|---|---|
| | Coef. | SE | Coef. | SE |
| *Quadratic terms* | | | | |
| Income squared/100,000 | -0.705 | 0.250 | 0.034 | 0.017 |
| Hours worked squared/100 | -0.017 | 0.035 | -0.173 | 0.028 |
| *Cross product* | | | | |
| Inc. x hrs. /10,000 | -1.149 | 0.514 | -0.473 | 0.131 |
| *Linear term in income /100* | | | | |
| constant | 1.685 | 1.231 | 0.750 | 0.226 |
| Children 0-2 yrs old | 0.675 | 0.385 | 0.232 | 0.096 |
| Children 3-4 yrs old | 0.324 | 0.374 | 0.176 | 0.086 |
| Children 5-9 yrs old | 0.883 | 0.327 | 0.070 | 0.052 |
| Number of children | 0.089 | 0.094 | 0.005 | 0.013 |
| Age/10 | 0.246 | 0.584 | -0.159 | 0.091 |
| Age squared/100 | -0.029 | 0.070 | 0.019 | 0.011 |
| Vocational education | -0.133 | 0.135 | -0.028 | 0.017 |
| University degree | -0.086 | 0.203 | 0.016 | 0.028 |
| Female | -0.128 | 0.276 | -0.137 | 0.032 |
| *Linear term in hours worked* | | | | |
| constant | -0.077 | 0.037 | 0.050 | 0.041 |
| Children 0-2 yrs old | -0.047 | 0.018 | -0.040 | 0.009 |
| Children 3-4 yrs old | -0.032 | 0.015 | -0.039 | 0.009 |
| Children 5-9 yrs old | -0.056 | 0.015 | -0.010 | 0.005 |
| Number of children | -0.001 | 0.003 | -0.002 | 0.003 |
| Age/10 | 0.056 | 0.016 | 0.048 | 0.016 |
| Age squared/100 | -0.008 | 0.002 | -0.006 | 0.002 |
| Vocational education | 0.022 | 0.004 | 0.012 | 0.003 |
| University degree | 0.027 | 0.009 | 0.038 | 0.005 |
| Female | -0.040 | 0.013 | -0.049 | 0.007 |
| *Fixed cost of working* | | | | |
| Constant | 2.146 | 0.355 | 14.376 | 3.391 |
| Live in capital city | 0.053 | 0.054 | -0.026 | 0.365 |
| Pre-school child(ren) | 0.050 | 0.278 | -5.403 | 3.360 |
| School-age child(ren) | -0.519 | 0.252 | -3.802 | 2.306 |
| Live in NSW | 0.235 | 0.070 | 0.134 | 0.404 |
| Female | -0.336 | 0.246 | -1.290 | 0.965 |

*Notes*: As for Table D.6.

*Sources:* As for Table D.6.

# Appendix E: Goodness of Fit – Observed versus predicted labour supply

Table E.1 presents a comparison of average actual and predicted employment rates, hours worked, and full-time and part-time employment rates in 1994/95 and 2015/16 by demographic group for those aged 25-55 years. The actual and predicted distributions of labour supply for both years are graphically presented in Figures E.1 and E.2.

Table E.1 shows that predicted and actual labour supply are close in both years for all demographic groups. However, amongst groups where only small changes in labour supply have occurred, the relative deviation in predicted changes can be large (or even in the opposite direction as is observed for single men). Examining Figures E.1 and E.2, we see that actual and predicted distributions are similar with the exception of the 40 hours point, which is consistently underpredicted. This is due to the prevalence of employment at this standard full-time hours point, which may be fixed by introducing a specific 40-hours dummy variable or by modelling the labour demand side. The former imposes an inflexible restriction and the latter is beyond the scope of this paper. From the figures it appears that the individuals who should be at the 40 hours point are distributed over the surrounding hours points.

**Table E.1 Observed and predicted labour supply in 1994/95 and 2016/16**

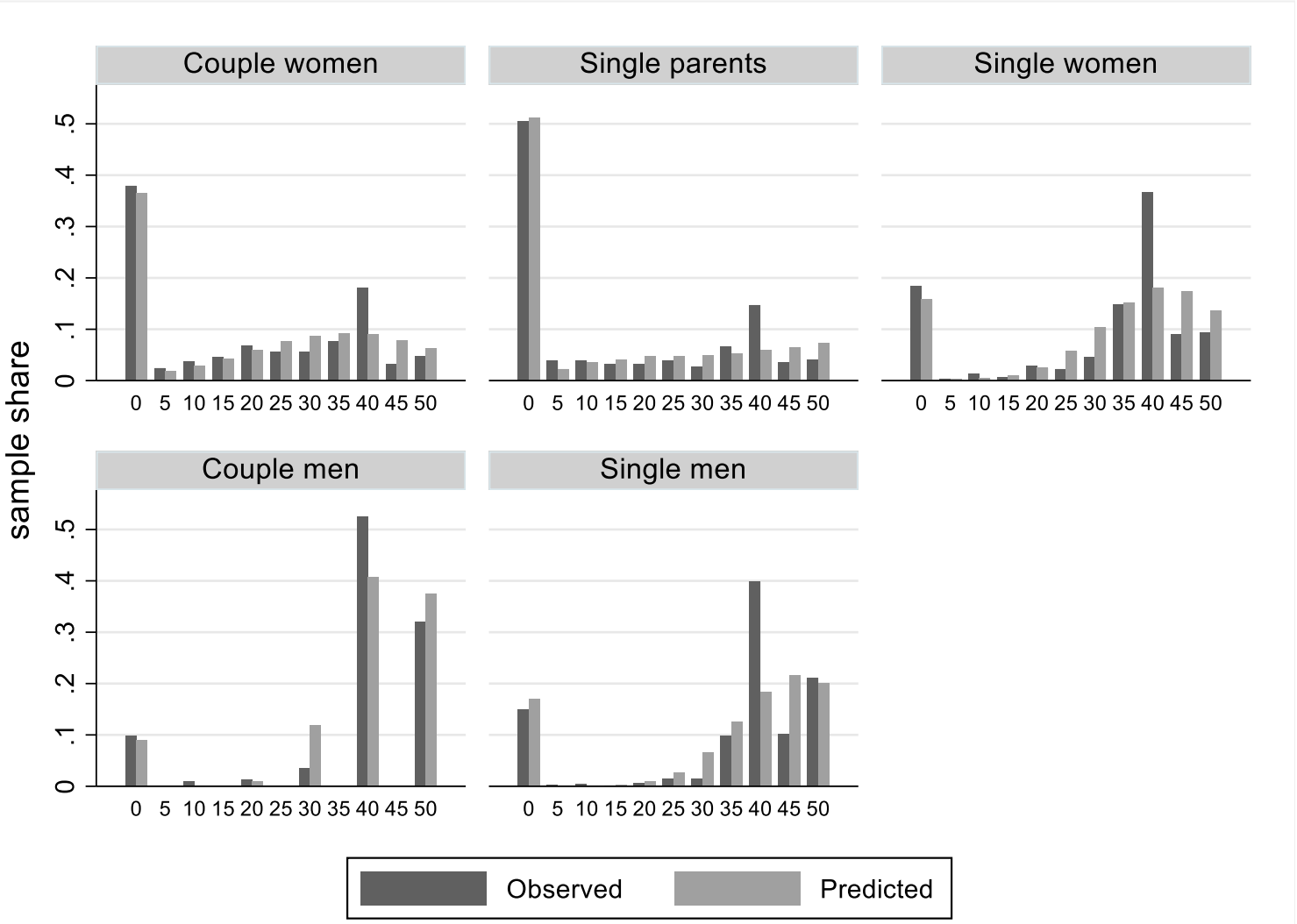
| | Employment Rate (ppt) | Average weekly hours (hours/week) | Full-time work (ppt) | Part-time work (ppt) |
|---|---|---|---|---|
| **Partnered women** | | | | |
| 1994 observed | 61.3 | 19.0 | 38.8 | 22.5 |
| | (1.13) | (0.42) | (1.13) | (0.96) |
| 1994 predicted | 63.8 | 20.3 | 41.2 | 22.6 |
| | (0.38) | (0.13) | (0.31) | (0.21) |
| 2015 observed | 75.7 | 25.1 | 51.9 | 23.8 |
| | (0.83) | (0.34) | (0.97) | (0.83) |
| 2015 predicted | 76.8 | 25.4 | 52.8 | 24.0 |
| | (0.26) | (0.10) | (0.24) | (0.17) |
| Observed change | 14.4 | 6.1 | 13.1 | 1.3 |
| Predicted change | 13.0 | 5.1 | 11.5 | 1.4 |
| **Single parents** | | | | |
| 1994 observed | 50.3 | 15.7 | 33.3 | 17.0 |
| | (2.97) | (1.10) | (2.83) | (2.14) |
| 1994 predicted | 48.3 | 15.4 | 29.9 | 18.3 |
| | (1.78) | (0.63) | (1.33) | (0.83) |
| 2015 observed | 69.3 | 23.4 | 46.9 | 22.3 |
| | (2.04) | (0.99) | (2.44) | (1.85) |
| 2015 predicted | 68.2 | 22.7 | 47.1 | 21.1 |
| | (1.21) | (0.49) | (1.12) | (0.62) |
| Observed change | 19.0 | 7.8 | 13.6 | 5.4 |
| Predicted change | 20.0 | 7.3 | 17.2 | 2.8 |

| | Employment Rate (ppt) | Average weekly hours (hours/week) | Full-time work (ppt) | Part-time work (ppt) |
|---|---|---|---|---|
| **Single women** | | | | |
| 1994 observed | 80.7 | 31.1 | 73.9 | 6.7 |
| | (1.91) | (0.81) | (2.11) | (1.18) |
| 1994 predicted | 84.2 | 32.3 | 74.5 | 9.6 |
| | (0.89) | (0.37) | (0.90) | (0.36) |
| 2015 observed | 86.7 | 33.5 | 77.5 | 9.2 |
| | (1.19) | (0.56) | (1.48) | (0.99) |
| 2015 predicted | 86.8 | 33.2 | 74.7 | 12.1 |
| | (0.54) | (0.25) | (0.61) | (0.33) |
| Observed change | 6.0 | 2.4 | 3.6 | 2.4 |
| Predicted change | 2.6 | 0.9 | 0.2 | 2.4 |
| **Partnered men** | | | | |
| 1994 observed | 90.1 | 38.3 | 87.9 | 2.3 |
| | (0.70) | (0.33) | (0.76) | (0.34) |
| 1994 predicted | 91.1 | 38.8 | 90.1 | 0.9 |
| | (0.20) | (0.10) | (0.20) | (0.03) |
| 2015 observed | 93.7 | 39.7 | 90.9 | 2.8 |
| | (0.46) | (0.24) | (0.54) | (0.29) |
| 2015 predicted | 93.9 | 39.8 | 92.1 | 1.9 |
| | (0.10) | (0.05) | (0.10) | (0.03) |
| Observed change | 3.6 | 1.3 | 3.1 | 0.5 |
| Predicted change | 2.9 | 1.0 | 2.0 | 0.9 |
| **Single men** | | | | |
| 1994 observed | 85.6 | 35.6 | 82.5 | 3.0 |
| | (1.39) | (0.63) | (1.52) | (0.72) |
| 1994 predicted | 83.5 | 34.6 | 79.6 | 3.9 |
| | (0.67) | (0.31) | (0.68) | (0.15) |
| 2015 observed | 82.6 | 33.6 | 76.1 | 6.5 |
| | (1.28) | (0.62) | (1.45) | (0.81) |
| 2015 predicted | 83.7 | 33.8 | 75.7 | 8.0 |
| | (0.56) | (0.26) | (0.59) | (0.23) |
| Observed change | -2.9 | -2.1 | -6.4 | 3.5 |
| Predicted change | 0.2 | -0.8 | -3.9 | 4.1 |

*Notes:* The estimation sample only includes 25-55 years old who are not full-time students, self employed or receiving a disability support payment. Standard errors in brackets.

*Sources:* Authors' estimates based on MITTS and the Survey of Income and Housing.

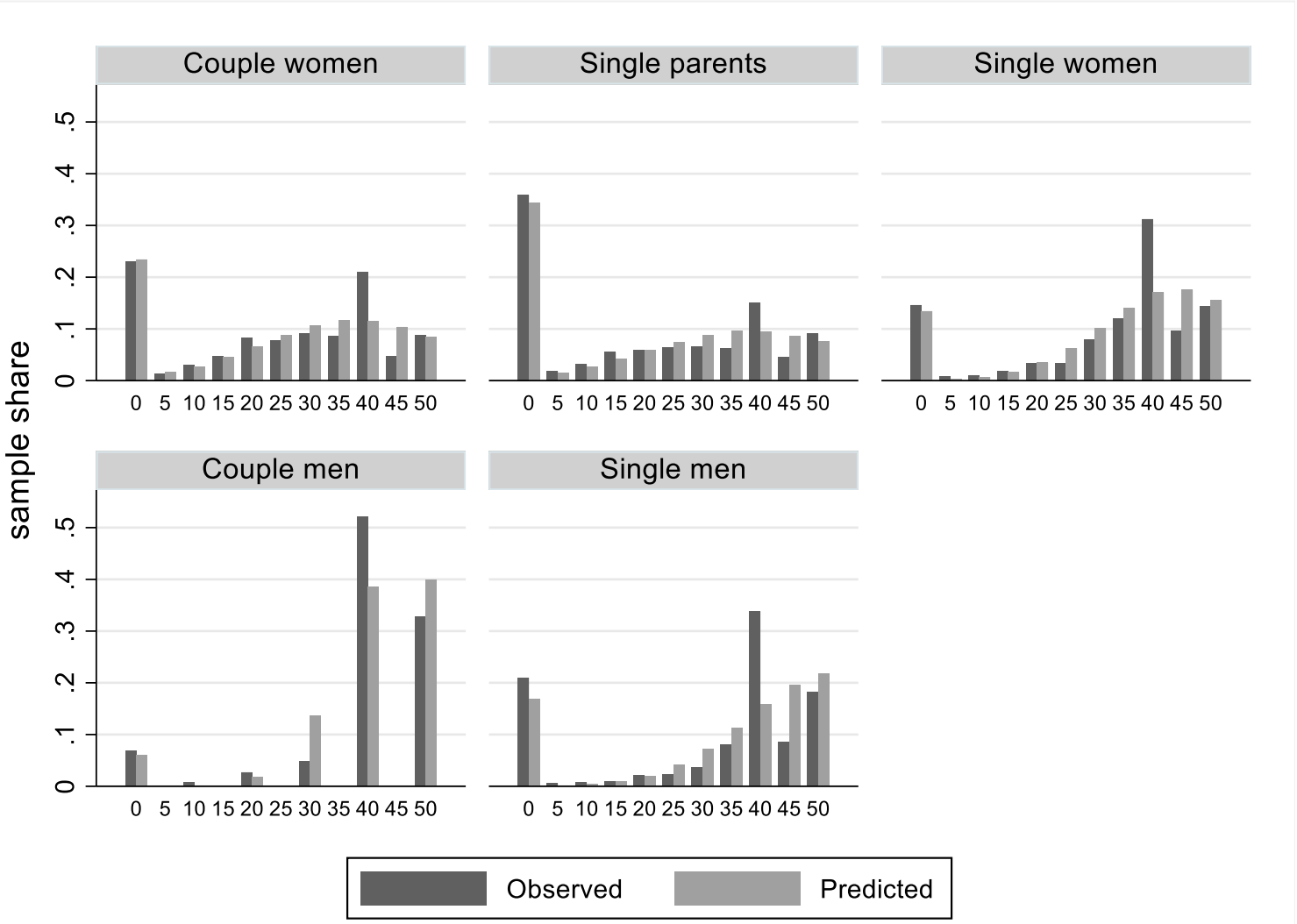
**Figure E.1 Observed and predicted weekly hours of work (1994/95)**




*Notes:* The estimation sample only includes 25-55 years old who are not full-time students, self employed or receiving a disability support payment.

*Sources:* Authors' estimates based on MITTS and the 1994/95 Survey of Income and Housing.

**Figure E.2 Observed and predicted weekly hours of work (2015/16)**




*Notes:* The estimation sample only includes 25-55 years old who are not full-time students, self employed or receiving a disability support payment.

*Sources:* Authors' estimates based on MITTS and the 2015/16 Survey of Income and Housing.

# Appendix F: Additional decomposition results

**Table F.1 Results for all 24 decomposition paths for partnered women and single parents (component of total 1994-2015 change explained by T, W, P and PR)**

| | | Single parents | | | | Partnered women without children | | | | Partnered women with children | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Occurrences | Emp. rate | Av. hours | FT | PT | Emp. rate | Av. hours | FT | PT | Emp. rate | Av. hours | FT | PT |
| ***1994-2015 change*** | | ***20.0*** | ***7.3*** | ***17.2*** | ***2.8*** | ***11.3*** | ***5.0*** | ***12.0*** | ***-0.7*** | ***14.1*** | ***5.0*** | ***11.0*** | ***3.2*** |
| **T = Tax-transfer policy changes** | | **0.1** | **1.1** | **3.7** | **-3.6** | **1.7** | **0.5** | **0.9** | **0.8** | **0.5** | **-0.0** | **-0.4** | **1.0** |
| M1-M2 | 6 | 0.39 | 0.57 | 1.78 | -1.40 | 1.01 | 0.30 | 0.56 | 0.45 | 0.16 | -0.10 | -0.50 | 0.66 |
| M3-M4 | 2 | -0.81 | 1.58 | 5.83 | -6.64 | 2.06 | 0.60 | 1.08 | 0.98 | 0.46 | -0.17 | -0.91 | 1.38 |
| M5-M6 | 2 | 0.35 | 0.53 | 1.67 | -1.32 | 1.12 | 0.35 | 0.69 | 0.43 | 0.50 | 0.00 | -0.32 | 0.82 |
| M7-M8 | 2 | -1.27 | 1.15 | 4.88 | -6.15 | 2.53 | 0.85 | 1.78 | 0.75 | 2.19 | 0.42 | 0.26 | 1.93 |
| M9-M10 | 2 | 0.60 | 0.61 | 1.81 | -1.21 | 0.91 | 0.27 | 0.47 | 0.44 | 0.03 | -0.12 | -0.49 | 0.52 |
| M11-M12 | 2 | 1.87 | 2.45 | 7.57 | -5.70 | 2.06 | 0.57 | 0.87 | 1.19 | 0.34 | -0.13 | -0.74 | 1.08 |
| M13-M14 | 2 | 0.16 | 0.42 | 1.39 | -1.23 | 1.08 | 0.32 | 0.57 | 0.51 | 0.17 | -0.06 | -0.32 | 0.49 |
| M15-M16 | 6 | -0.29 | 1.49 | 5.20 | -5.50 | 2.48 | 0.71 | 1.25 | 1.23 | 0.73 | -0.01 | -0.42 | 1.15 |
| **W = Wage changes** | | **4.3** | **1.6** | **3.9** | **0.4** | **1.9** | **0.7** | **1.4** | **0.5** | **1.5** | **0.7** | **2.1** | **-0.6** |
| M1-M5 | 6 | 0.61 | 0.20 | 0.61 | 0.00 | 1.37 | 0.69 | 1.68 | -0.31 | 2.24 | 1.01 | 2.52 | -0.28 |
| M2-M6 | 2 | 0.57 | 0.16 | 0.50 | 0.08 | 1.48 | 0.73 | 1.82 | -0.34 | 2.57 | 1.11 | 2.70 | -0.13 |
| M3-M7 | 2 | -1.48 | -0.08 | 2.24 | -3.72 | 2.35 | 0.29 | -1.66 | 4.01 | -4.00 | -0.96 | 0.22 | -4.22 |
| M4-M8 | 2 | -1.93 | -0.51 | 1.29 | -3.22 | 2.82 | 0.54 | -0.96 | 3.78 | -2.28 | -0.38 | 1.39 | -3.67 |
| M9-M13 | 2 | 2.35 | 0.75 | 1.50 | 0.85 | 0.96 | 0.51 | 1.23 | -0.27 | 1.31 | 0.55 | 1.28 | 0.02 |
| M10-M14 | 2 | 1.91 | 0.56 | 1.08 | 0.83 | 1.12 | 0.55 | 1.33 | -0.21 | 1.45 | 0.60 | 1.45 | 0.00 |
| M11-M15 | 2 | 13.64 | 5.22 | 11.36 | 2.28 | 2.06 | 0.95 | 2.20 | -0.14 | 2.75 | 1.05 | 2.29 | 0.46 |
| M12-M16 | 6 | 11.47 | 4.25 | 8.99 | 2.48 | 2.48 | 1.08 | 2.58 | -0.10 | 3.13 | 1.17 | 2.61 | 0.52 |
| **P = Population composition changes** | | **11.0** | **3.6** | **7.1** | **3.8** | **4.5** | **2.9** | **8.2** | **-3.6** | **7.5** | **2.9** | **6.2** | **1.3** |
| M1-M9 | 6 | 4.18 | 2.01 | 4.82 | -0.64 | 3.79 | 2.35 | 6.12 | -2.33 | 4.75 | 2.18 | 5.41 | -0.67 |
| M2-M10 | 2 | 4.39 | 2.04 | 4.84 | -0.45 | 3.69 | 2.32 | 6.02 | -2.34 | 4.61 | 2.17 | 5.42 | -0.81 |
| M3-M11 | 2 | 6.17 | 1.23 | 2.65 | 3.52 | 5.66 | 3.22 | 8.11 | -2.44 | 6.90 | 2.71 | 6.35 | 0.55 |
| M4-M12 | 2 | 8.86 | 2.10 | 4.39 | 4.47 | 5.66 | 3.19 | 7.90 | -2.24 | 6.78 | 2.75 | 6.52 | 0.25 |
| M5-M13 | 2 | 5.92 | 2.55 | 5.70 | 0.21 | 3.37 | 2.17 | 5.66 | -2.29 | 3.81 | 1.72 | 4.17 | -0.36 |

| | | Single parents | | | | Partnered women without children | | | | Partnered women with children | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Occurrences | Emp. rate | Av. hours | FT | PT | Emp. rate | Av. hours | FT | PT | Emp. rate | Av. hours | FT | PT |
| M6-M14 | 2 | 5.72 | 2.44 | 5.42 | 0.30 | 3.33 | 2.14 | 5.54 | -2.21 | 3.49 | 1.66 | 4.17 | -0.68 |
| M7-M15 | 2 | 21.29 | 6.53 | 11.77 | 9.52 | 5.37 | 3.87 | 11.97 | -6.59 | 13.65 | 4.73 | 8.42 | 5.23 |
| M8-M16 | 6 | 22.27 | 6.86 | 12.10 | 10.17 | 5.32 | 3.74 | 11.44 | -6.11 | 12.19 | 4.30 | 7.75 | 4.44 |
| **PR = Preference parameters changes** | | **4.6** | **1.0** | **2.5** | **2.1** | **3.2** | **0.8** | **1.5** | **1.7** | **4.6** | **1.4** | **3.1** | **1.5** |
| M1-M3 | 6 | 0.45 | -0.59 | -2.03 | 2.47 | 1.08 | 0.10 | 0.40 | 0.68 | 3.77 | 1.27 | 2.75 | 1.02 |
| M2-M4 | 2 | -0.75 | 0.41 | 2.02 | -2.77 | 2.13 | 0.40 | 0.92 | 1.21 | 4.06 | 1.21 | 2.33 | 1.73 |
| M5-M7 | 2 | -1.64 | -0.87 | -0.39 | -1.24 | 2.06 | -0.30 | -2.94 | 5.00 | -2.48 | -0.70 | 0.44 | -2.92 |
| M6-M8 | 2 | -3.26 | -0.25 | 2.81 | -6.07 | 3.47 | 0.20 | -1.86 | 5.32 | -0.79 | -0.28 | 1.02 | -1.81 |
| M9-M11 | 2 | 2.45 | -1.37 | -4.19 | 6.64 | 2.96 | 0.97 | 2.39 | 0.56 | 5.91 | 1.80 | 3.68 | 2.23 |
| M10-M12 | 2 | 3.72 | 0.48 | 1.58 | 2.14 | 4.10 | 1.27 | 2.80 | 1.31 | 6.23 | 1.79 | 3.43 | 2.80 |
| M13-M15 | 2 | 13.74 | 3.10 | 5.67 | 8.06 | 4.06 | 1.41 | 3.36 | 0.70 | 7.35 | 2.31 | 4.69 | 2.66 |
| M14-M16 | 6 | 13.29 | 4.17 | 9.49 | 3.80 | 5.46 | 1.80 | 4.04 | 1.42 | 7.91 | 2.36 | 4.60 | 3.32 |

*Notes*: All changes are in percentage points, except for average hours (in weekly hours of work). The 16 counterfactual distributions, used to construct the 24 decompositions, are defined in the schedule below, which indicates from which year the population, preference parameters, tax and transfer system and wages are.

| Simulation | Population | Preference parameters | Tax and transfer | Wages |
|---|---|---|---|---|
| M1 | 2015/16 | 2015/16 | 2015/16 | 2015/16 |
| M2 | 2015/16 | 2015/16 | 1994/95 | 2015/16 |
| M3 | 2015/16 | 1994/95 | 2015/16 | 2015/16 |
| M4 | 2015/16 | 1994/95 | 1994/95 | 2015/16 |
| M5 | 2015/16 | 2015/16 | 2015/16 | 1994/95 |
| M6 | 2015/16 | 2015/16 | 1994/95 | 1994/95 |
| M7 | 2015/16 | 1994/95 | 2015/16 | 1994/95 |
| M8 | 2015/16 | 1994/95 | 1994/95 | 1994/95 |
| M9 | 1994/95 | 2015/16 | 2015/16 | 2015/16 |
| M10 | 1994/95 | 2015/16 | 1994/95 | 2015/16 |
| M11 | 1994/95 | 1994/95 | 2015/16 | 2015/16 |
| M12 | 1994/95 | 1994/95 | 1994/95 | 2015/16 |
| M13 | 1994/95 | 2015/16 | 2015/16 | 1994/95 |
| M14 | 1994/95 | 2015/16 | 1994/95 | 1994/95 |
| M15 | 1994/95 | 1994/95 | 2015/16 | 1994/95 |
| M16 | 1994/95 | 1994/95 | 1994/95 | 1994/95 |