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Changing Families' Financial Support and Incentives for Working

Annex Report 2

Employment incentives for couple parents: Labour market effects of changes to financial incentives and support

**Centre for Social Research and Evaluation
Te Pokapū Rangahau Arotake Hapori**

**Inland Revenue
Te Tari Taake**

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Disclaimer

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Contents

| | |
|--|-----------|
| List of Tables | 4 |
| List of Figures | 4 |
| 1. Introduction | 5 |
| 2. The expected effect of Working for Families | 7 |
| 3. Data | 9 |
| 3.1 Household Labour Force Survey | 9 |
| 3.2 MSD-IR administrative data | 11 |
| 4. Methods | 14 |
| 4.1 Difference-in-differences | 14 |
| 4.2 Survival analysis | 16 |
| 4.3 Regression model for longitudinal binary data | 18 |
| 5. Results | 20 |
| 5.1 Difference-in-differences | 20 |
| 5.1.1 Secondary earners' employment | 20 |
| 5.1.2 Couple parents' hours in paid employment | 22 |
| 5.1.3 Couple parent families with lower educational qualifications | 24 |
| 5.2 Survival analysis | 25 |
| 5.2.1 Transitions from one to two income earners | 25 |
| 5.2.2 Transitions from two to one income earner | 29 |
| 5.3 Regression model for longitudinal binary data | 32 |
| 6. Discussion | 37 |
| References | 39 |
| Appendix: Additional tables | 40 |

List of Tables

| | | |
|-----------|--|----|
| Table 1: | Simulated labour supply responses to WFF | 8 |
| Table 2: | Characteristics of couple families, June quarter 2007 | 9 |
| Table 3: | Rules used to determine primary and secondary earners in couples (applied sequentially) | 10 |
| Table 4: | Characteristics of primary and secondary earners in couple families, June quarter 2007 | 11 |
| Table 5: | Characteristics of couples with children in MSD–IR analysis dataset, April 2007 | 13 |
| Table 6: | Pre-programme tests of the relationship between couple parent families and couples without children, 2003–2004 | 15 |
| Table 7: | Percentage of families who have a child under the age of one, by whether the child is the first or an additional child | 16 |
| Table 8: | Estimated impact of WFF on the employment of secondary earners in couple parent families | 21 |
| Table 9: | Estimated impact of WFF on the full-time/part-time employment status of secondary earners in couple parent families | 22 |
| Table 10: | Estimated impact of WFF on couple parent families meeting the 30-hours requirement of the in-work tax credit | 22 |
| Table 11: | Estimated impact of WFF on secondary earner hours in paid employment | 23 |
| Table 12: | Estimated impact of WFF on primary earner hours in paid employment | 23 |
| Table 13: | Difference-in-differences results for couples with less than a degree qualification | 24 |
| Table 14: | Hazard model for exits from one income | 26 |
| Table 15: | Hazard model for exits from two incomes | 30 |
| Table 16: | Regression model for probability of two incomes | 34 |
| Table 17: | Summary of the results from analysis examining the impact of the WFF changes on the percentage of couple families with two earners | 37 |
| Table A1: | Additional difference-in-differences results for primary earner hours in paid employment | 40 |
| Table A2: | Additional difference-in-differences results for secondary earner hours in paid employment | 41 |

List of Figures

| | | |
|-----------|---|----|
| Figure 1: | Changes in the percentage of couples with both adults employed | 21 |
| Figure 2: | Survival curves for time in spells of one income | 28 |
| Figure 3: | Survival curves for time in spells of two incomes | 32 |
| Figure 4: | Impact of WFF changes on the probability that an average couple has two incomes | 36 |

1. Introduction

Over the period October 2004 to April 2007, the New Zealand government introduced substantial changes to in-work incentives and financial support for families with dependent children as part of the Working for Families (WFF) package.

Inland Revenue (IR) and the Ministry of Social Development (MSD) have previously published an analysis of the impact of these changes on employment and benefit receipt outcomes for sole parents (Dalgety, Dorsett, Johnston and Spier, 2010). This report extends the previous analysis to consider the impact of the WFF changes on employment outcomes for couple families with dependent children.

The Working for Families package

The WFF package changed the financial incentives for low-to-middle income families with dependent children to be in paid work and increased the amount families received from entitlements such as family tax credit, Accommodation Supplement and Childcare Assistance.

The objectives of the WFF changes set out by Cabinet were to:

- make work pay by supporting families with dependent children, so that they are rewarded for their work effort
- ensure income adequacy, with a focus on low and middle income families with dependent children to address issues of poverty, especially child poverty
- achieve a social assistance system that supports people into work, by making sure that people get the assistance they are entitled to, when they should, and with delivery that supports them into, and to remain in, employment.

One of the key changes was the introduction in April 2006 of an in-work tax credit. This payment is conditional on the family not being in receipt of a main benefit, and on couple parents being in paid employment for at least a combined total of 30 hours a week or sole parents being in paid employment for at least 20 hours a week.

Further details about the WFF package can be found in earlier evaluation reports on the MSD and IR websites.¹

Approach

The evaluation of the impact of the WFF changes on couple parents' employment used two analytical approaches:

- Difference-in-differences analysis using data from the Household Labour Force Survey, comparing couple parents to couples without dependent children.
- Survival analysis and longitudinal regression modelling of employment patterns for a subset of couples receiving WFF, using a research dataset of linked MSD and IR administrative data.

¹ See <http://www.msd.govt.nz/about-msd-and-our-work/publications-resources/evaluation/receipt-working-for-families/> or <http://www.ird.govt.nz/aboutir/reports/research/>

Key findings

The difference-in-differences and longitudinal regression modelling results provide evidence that couples with children were less likely to both be in employment after WFF, by around two percentage points.

The survival analysis results suggest that couples' spells with one income earner were longer, and their spells with two income earners were shorter, after WFF.

2. The expected effect of Working for Families

This section considers the impact the WFF package was predicted to have on couple parents' employment.

Dalgety et al (2010) established that the WFF changes increased sole parents' employment. An estimated additional 8,100 sole parents were in paid employment in 2007 due to the changes. By building on the earlier stages of the WFF package, the introduction of in-work tax credit appeared to drive the increase in sole parents' employment: the percentage of sole parents in paid employment for more than 20 hours a week increased over the period June 2004 to June 2007.

Before WFF was implemented, an expected trade-off of gains in sole parents' employment from the changes was a possible decrease in the labour market participation of couple parents (Dyer, 2005; OECD, 2005). Johnson (2005) cites international evidence that women's, and specifically partnered mothers', labour force participation is quite responsive to financial incentives. In the case of WFF, the in-work tax credit certainly provides an incentive to work at least 30 hours a week. However, most couples with children already worked at or above this threshold before WFF (92% of couples with children had combined hours of 30 or more a week in June 2004).

For some couple parent families, the increased income from WFF Tax Credits may induce them to reduce their combined hours, while still remaining above the threshold. Also, the income threshold where in-work tax credit begins to abate is based on the combined earnings of both partners, so WFF resulted in higher effective marginal tax rates (EMTRs) for some secondary earners. For both of these reasons, WFF may act to reduce the hours worked by couples with children, possibly by discouraging employment among secondary earners in the couple.

Regarding how big the impact might be, Johnson (2005) used results from the international literature about the relationship between changes in EMTRs and changes in employment rates for married women. He applied these results to expected EMTRs for couples with children before and after WFF, derived from the Treasury's TaxMod micro-simulation model. He estimated the WFF changes might result in around 9,000 secondary earners dropping out of employment. Based on the TaxMod estimates of the number of families in New Zealand Johnson used in his calculations, this equates to 2.7% of couples with children.

A second estimate comes from work commissioned by the Treasury before the introduction of WFF. The Melbourne Institute used the TaxModB behavioural micro-simulation model to predict how labour supply would change in response to the changes in incentives brought about by WFF. The summary results from Buddelmeyer et al (2007) are reproduced here as Table 1.

The predictions for married men and women cover couples both with and without dependent children, so they are not directly comparable with the results presented later in this report. Nevertheless, for couples, the analysis predicted a greater tendency to exit work than to enter work. The net effect on married women was predicted to be a decrease of 0.63 percentage points in the employment rate of salaried workers, from 53.24% to 52.61%. This equates to around 5,000 fewer married women in employment.

Table 1: Simulated labour supply responses to WFF¹

| | Married | | Single | | |
|---|------------------|--------------------|------------------|--------------------|---------|
| | Men ² | Women ² | Men ³ | Women ³ | Parents |
| All workers (% before reform) | 77.20 | 61.43 | 62.35 | 45.86 | 49.58 |
| Salaried workers ⁴ (% before reform) | 62.21 | 53.24 | 54.94 | 43.75 | 45.70 |
| Salaried workers ⁴ (% after reform) | 61.84 | 52.61 | 54.92 | 43.79 | 47.47 |
| Behavioural response⁵ | | | | | |
| Non-work to work (%-points) | 0.14 | 0.11 | 0.05 | 0.07 | 1.84 |
| Work to non-work (%-points) | 0.50 | 0.74 | 0.07 | 0.03 | 0.07 |
| Workers working more (%-points) | 0.07 | 0.06 | 0.00 | 0.00 | 1.93 |
| Workers working less (%-points) | 0.43 | 0.19 | 0.05 | 0.10 | 2.41 |
| Average hours change (in hours) | -0.22 | -0.23 | -0.03 | -0.02 | 0.63 |

Source: Buddelmeyer et al (2007), Table 12.3.

Notes:

1. Percentages in the table apply to the population aged 15 years and over.
2. Married men and women include those with dependent children and those without dependent children.
3. Single men and women are without dependent children.
4. Salaried workers exclude the self-employed.
5. The micro-simulation model assumes that the self-employed, those over 65 years of age, full-time students and disabled individuals do not change their labour supply in response to the policy reforms.

3. Data

This section describes the two sources of data used to estimate the effects of WFF on couple parents' employment.

3.1 Household Labour Force Survey

The data used in the difference-in-differences analysis comes from the June quarters of the Household Labour Force Survey (HLFS) for the period from 2003 to 2007. Information about the HLFS and about creating the dataset we used for our WFF analyses, including how we defined 'WFF families', is contained in Dalgety et al (2010).

The analysis in this report used data for working-age couple families (ie where at least one of the adults in the couple is aged 18 to 64 years), with or without dependent children.

Table 2 presents summary statistics from our analysis dataset on the characteristics of couple families in June 2007, by whether or not they had dependent children.

Fathers tend to be older and have higher qualifications than mothers. Parents are more likely to be aged in their 30s and 40s, and more likely to be Māori or Pacific peoples, compared with adults in couples without children.

Table 2: Characteristics of couple families, June quarter 2007

| | Couples with children | | Couples without children | |
|------------------------------------|---------------------------|-----------------|------------------------------|-----------------|
| | Female adults (%) | Male adults (%) | Female adults (%) | Male adults (%) |
| Aged <20 | 1 | 0 | 1 | 1 |
| Aged 20–29 | 13 | 9 | 17 | 14 |
| Aged 30–39 | 41 | 35 | 13 | 13 |
| Aged 40–49 | 38 | 40 | 18 | 15 |
| Aged 50–59 | 7 | 13 | 36 | 31 |
| Aged 60+ | 0 | 2 | 16 | 26 |
| European | 69 | 70 | 80 | 81 |
| Māori | 11 | 11 | 6 | 6 |
| Pacific peoples | 5 | 6 | 2 | 2 |
| Other ethnicity | 15 | 14 | 12 | 10 |
| No qualifications | 15 | 17 | 22 | 20 |
| Secondary qualification | 24 | 17 | 22 | 18 |
| Other post-secondary qualification | 36 | 42 | 35 | 42 |
| Degree | 24 | 23 | 20 | 20 |
| Qualifications not specified | 1 | 1 | 1 | 1 |
| | Couples with children (%) | | Couples without children (%) | |
| Youngest child aged <5 | 43 | | - | |
| Youngest child aged 5–12 | 37 | | - | |
| Youngest child aged 13+ | 20 | | - | |
| | Couples with children | | Couples without children | |
| Mean number of children | 1.94 | | - | |
| Sample size | 3,385 | | 3,612 | |
| Weighted population estimate | 405,700 | | 426,100 | |

Source: Unpublished HLFS data for working-age couples.

Defining the primary and secondary earner

Some of our difference-in-differences analyses looked at outcomes for the primary and secondary earners in couple families separately. Table 3 outlines the rules we used to determine in each couple which adult was the primary earner and which was the secondary earner.

Table 3: Rules used to determine primary and secondary earners in couples (applied sequentially)

| | Percentage of cases |
|--|----------------------------|
| When only one person in the couple is employed, the secondary earner is the person not in paid employment | 26 |
| When both are employed, the secondary earner is the person who was in paid employment for the least number of hours | 54 |
| When both are employed for the same number of hours (or hours data is not available), the secondary earner is the person who has the lowest weekly earnings from the labour market | 10 |
| When both are unemployed, the secondary earner is the person who is not in receipt of a main benefit or other government supplement (excluding WFF payments) | 2 |
| Otherwise, the primary earner is the male adult ¹ | 8 |

Source: Unpublished HLFS data for working-age couples, June quarters from 2003 to 2007.

Notes:

1. Where the primary earner could not be determined based on employment arrangements, the primary earner was assumed to be the male in heterosexual partnerships and the oldest adult in same-sex partnerships. Gender was used in these cases because 79% of the primary earners identified through employment arrangements were male. Using age instead of gender identified the same primary earner in 77% of the cases where the primary earner could not be identified by employment arrangements.

The principle behind the rules in Table 3 is that we are trying to capture which adult has the greatest attachment to the labour market, rather than which adult earns the most. If we had just used earnings information (so that the primary earner is the adult who earns the most), we would have identified the same primary earner in 89% of cases.

Table 4 presents the characteristics of primary and secondary earners (as defined above) in June 2007.

Primary earners in couples with children are predominantly male. Primary earners also tend to have higher qualifications than secondary earners, and are slightly older.

Table 4: Characteristics of primary and secondary earners in couple families, June quarter 2007

| | Couples with children | | Couples without children | |
|------------------------------------|-----------------------|----------------------|--------------------------|----------------------|
| | Primary earner (%) | Secondary earner (%) | Primary earner (%) | Secondary earner (%) |
| Male ¹ | 85 | 15 | 75 | 25 |
| Female | 15 | 85 | 25 | 75 |
| Aged <20 | 0 | 1 | 1 | 1 |
| Aged 20–29 | 9 | 13 | 15 | 16 |
| Aged 30–39 | 36 | 40 | 13 | 13 |
| Aged 40–49 | 41 | 37 | 16 | 17 |
| Aged 50–59 | 12 | 8 | 33 | 34 |
| Aged 60+ | 1 | 1 | 23 | 20 |
| European | 70 | 69 | 81 | 80 |
| Māori | 11 | 11 | 6 | 6 |
| Pacific peoples | 6 | 5 | 2 | 2 |
| Other ethnicity | 14 | 15 | 10 | 11 |
| No qualifications | 16 | 16 | 19 | 23 |
| Secondary qualification | 17 | 24 | 17 | 22 |
| Other post-secondary qualification | 41 | 37 | 42 | 36 |
| Degree | 25 | 22 | 22 | 19 |
| Qualifications not specified | 1 | 1 | 1 | 1 |

Source: Unpublished HLFS data for working-age couples.

Notes:

1. Excluding the records where the primary earner was determined by gender (see Table 3), the primary earner was male in 84.5% of couples with children and 72.9% of couples without children.

3.2 MSD–IR administrative data

The WFF evaluation has available a series of research datasets constructed from the linked administrative records of the MSD and IR. At the time of this study they contained five years of data from April 2003 to March 2008, and included all families who at some point over this period received a WFF payment.²

The data includes monthly amounts of income received from:

- salary and wages from employment
- main benefits (eg the Unemployment Benefit and the Domestic Purposes Benefit)
- WFF payments
- some other sources (eg Student Allowance, New Zealand Superannuation, ACC and Paid Parental Leave).

Income from self-employment is not available on a monthly basis as it is only assessed annually.

The data also has details of the composition of each family on a monthly basis.

² A small number of families who did not receive WFF, but who took part in a WFF evaluation survey, are also included.

We used the monthly data from the linked MSD–IR data for couples with dependent children who received WFF in any month from April 2003 to March 2008.

As our analysis focused on the impact of WFF on couples' monthly patterns of employment over time, we excluded (sequentially):

- couples who earned income from self-employment (38% of all couples with children in the linked MSD–IR data), because monthly data on employment is not available for them
- couples who, according to the data, were not together as a couple for a continuous spell of at least six months (21%)
- couples who did not have a continuous spell of at least six months where at least one of the adults was employed (14%).

The first of these exclusions poses the largest limitation to our subsequent analyses of the linked MSD–IR data. We considered it was worthwhile to continue to analyse the usable data, though, to provide a counter-point to the difference-in-differences analysis of the HLFS data.

The latter two exclusions are probably less damaging, as couples who were not together very long or who did not have a strong attachment to the labour market are less relevant to estimating the impact of WFF on secondary earners' employment.

The final analysis dataset contained just over 80,000 couples with children. For each couple we had between six and 60 months of data. In each month, the key variable of interest was the number of adults in the couple who earned salary and wage income (ie were employed at some point during) that month.

Table 5 presents summary statistics from our MSD–IR couples analysis dataset for the month of April 2007.

Couples receiving WFF tended to be younger, were more likely to be Māori or Pacific peoples, and had younger children, compared with all couples with dependent children (Table 2).

Table 5: Characteristics of couples with children in MSD–IR analysis dataset, April 2007

| | Couple parents | |
|--------------------------------------|---------------------------|-----------|
| | Females (%) | Males (%) |
| Aged <20 | 0 | 0 |
| Aged 20–29 | 20 | 15 |
| Aged 30–39 | 47 | 42 |
| Aged 40–49 | 28 | 34 |
| Aged 50+ | 4 | 9 |
| European | 50 | 44 |
| Māori | 15 | 14 |
| Pacific peoples | 10 | 10 |
| Other ethnicity | 8 | 7 |
| Ethnicity missing | 19 | 25 |
| | Couples with children (%) | |
| Youngest child aged <5 | 52 | |
| <i>Aged 0</i> | 16 | |
| <i>Aged 1</i> | 13 | |
| <i>Aged 2</i> | 9 | |
| <i>Aged 3</i> | 7 | |
| <i>Aged 4</i> | 6 | |
| Youngest child aged 5–13 | 39 | |
| Youngest child aged 14+ | 9 | |
| Primary earner monthly income | | |
| Less than \$2,000 | 3 | |
| \$2,000 to <\$3,000 | 19 | |
| \$3,000 to <\$4,000 | 34 | |
| \$4,000 to <\$5,000 | 24 | |
| \$5,000+ | 19 | |
| Receiving Paid Parental Leave | 3 | |
| Receiving Student Allowance | 0 | |
| Northland | 5 | |
| Auckland | 27 | |
| Waikato | 10 | |
| Bay of Plenty | 6 | |
| Gisborne/Hawke's Bay | 6 | |
| Taranaki | 3 | |
| Manawatu/Wanganui | 7 | |
| Wellington | 9 | |
| Tasman/Marlborough/Nelson/West Coast | 4 | |
| Canterbury | 15 | |
| Otago | 5 | |
| Southland | 3 | |
| | Couples with children | |
| Mean number of dependent children | 2.13 | |
| Sample size | 65,526 | |

Source: Linked MSD–IR administrative data.

4. Methods

This section describes the approaches used to estimate the effects of WFF on couple parents' employment. The first, difference-in-differences (DiD), used the HLFS data. The second approach used two different longitudinal data analysis methods applied to the linked MSD–IR administrative data.

4.1 Difference-in-differences

For a policy targeted to a group of interest (the 'treatment' group), DiD compares the change in an outcome over time for that group with the corresponding change for a group for which the policy should have no effect (the 'comparison' group). The intuition behind DiD is that, in the absence of the policy, the outcomes for the treatment and comparison groups would have changed in a similar way over time.

In this study, the treatment group was working-age couples with children and the comparison group was working-age couples without children.

The primary outcome of interest was the number of adults in the couple who were employed, but we also considered outcomes based on hours worked.

Outcomes from the June quarters of 2005, 2006 and 2007 were compared with June 2004, to enable conclusions to be drawn about the impact of the WFF changes that occurred from late-2004 onwards on couple parents' employment.

We produced regression-adjusted DiD estimates (see Dalgety et al, 2010, for details), including in the regression model the following characteristics of couples observed in the HLFS: age of the oldest adult, ethnicity³, highest educational qualification and region. We also included the regional unemployment rate to control for variations in local labour market conditions.

Pre-programme tests

Table 6 presents 'pre-programme tests' for the outcomes of interest. These are DiD estimates for couple parent families compared with couples without children, using HLFS data for the June quarters of 2003 and 2004 (before the first WFF changes).

None of the pre-programme tests are significantly different from zero. This suggests the treatment and comparison groups were changing similarly over the time before the introduction of WFF. This gives us some reason to believe that, in the absence of the WFF changes, this relationship would have held in the period of interest.

³ We created a prioritised ethnicity for the couple, based on the prioritised ethnicities of the adults. That is, if the adults in the couple have different ethnicities, the couple was assigned to only one ethnic group using the following prioritisation: Māori, Pacific peoples, other ethnic groups, European.

Table 6: Pre-programme tests of the relationship between couple parent families and couples without children, 2003–2004

| | DiD estimate ¹ (pp) |
|--|-----------------------------------|
| Secondary earner employed | -1.5 (± 3.4) |
| Secondary earner employed full-time | 0.1 (± 3.5) |
| Secondary earner employed part-time | -1.6 (± 3.2) |
| Couple working combined 30+ hours a week | -1.2 (± 2.3) |
| | DiD estimate ¹ |
| Secondary earner mean weekly hours | -28m (± 1h 19m) |
| Primary earner mean weekly hours | -8m (± 1h 11m) |

Notes:

1. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2003 and 2004, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.

Regression sample size is n=14,369 couples.

Other assumptions behind DiD

The DiD method also assumes the composition of the treatment and comparison groups did not change systematically over time. That is, we assume the unobserved characteristics that may influence employment outcomes did not change (on average) over the time period considered, to a different extent for couple parent families compared to couples without children.

The main concern about this assumption is whether WFF changed the rate at which couples without children become parents. If this happened, it is conceivable the changed composition of couple parents might be accompanied by a change in other (unobserved) characteristics likely to influence employment outcomes.

There have not been any sizable changes in the percentage of couples having their first child over the period 2003 to 2007, despite a 6% increase in the number of births between 2006 and 2007.⁴ There was a small increase in the percentage of couples with children under the age of one, which was evenly distributed across couples having their first child and couples having second or subsequent children (Table 7).

There are no other obvious changes in the composition of couples moving from the comparison to the treatment group: there is no change in the median age of women giving birth or in the age distribution of women in couples who have first become mothers over the period 2003 to 2007.

⁴ The 6% increase in the number of births between 2006 and 2007 followed a five-year period of steady growth, where the increase in the number of births averaged around 2% a year.

Table 7: Percentage of families who have a child under the age of one, by whether the child is the first or an additional child

| | Percentage of sole parent families | | |
|---|--|------|--------------------------|
| | 2006 | 2007 | Change from 2006 to 2007 |
| Have a child under the age of one | 1.2 | 1.0 | -0.2 |
| <i>Only children under the age of one</i> | 0.6 | 0.5 | -0.1 |
| <i>Children under the age of one and other children</i> | 0.7 | 0.5 | -0.1 |
| | Percentage of couple parent families | | |
| | 2006 | 2007 | Change from 2006 to 2007 |
| Have a child under the age of one | 5.4 | 6.0 | 0.7 |
| <i>Only children under the age of one</i> | 2.3 | 2.5 | 0.3 |
| <i>Children under the age of one and other children</i> | 3.1 | 3.5 | 0.4 |
| | Percentage of all families with children | | |
| | 2006 | 2007 | Change from 2006 to 2007 |
| Have a child under the age of one | 3.4 | 3.6 | 0.2 |
| <i>Only children under the age of one</i> | 1.5 | 1.5 | 0.1 |
| <i>Children under the age of one and other children</i> | 1.9 | 2.0 | 0.1 |

Source: Unpublished HLFS data for working-age families with dependent children, June quarters.

4.2 Survival analysis

Survival analysis is a method of analysing data on the time taken for an event of interest to occur. Survival analysis models can be used to help understand how the variation in time taken is related to possible explanatory factors (eg characteristics of the individuals or families).

In this study we considered couple parent families in our MSD–IR couples analysis dataset. We were interested in the lengths of time couples spent in spells where only one of them was earning salary and wage income, and in spells where both of them were earning salary and wage income.

We fitted two survival analysis models:

- The first models how quickly one-income couple parent families make a transition to two incomes, measuring the time taken from the start of their one income spell.
- The second models how quickly two-income couple parent families make a transition to one income, measuring the time taken from the start of their two income spell.

We used the models to evaluate the impact of WFF on the lengths of time couple parent families spend in spells of either one income or two incomes, while controlling for other factors that affect transitions between these two states.

A further restriction of the data

To fit the survival analysis models to our data, we needed to exclude the first spell (of either one or two incomes) for each couple who were in the dataset as at April 2003, because we did not know when these spells started. This excluded around 12,000

couples from the survival analysis, many of whom had very stable employment patterns. Around three-quarters of the excluded couples had the same number of income earners for the entire 60 months covered by the data.

A consequence of this further restriction of the data is that the survival analysis results presented later probably under-estimate the median spell lengths and may over-estimate the effect of WFF on the rate of couples' transitions.

The survival analysis models

The survival analysis models for couples' employment spells have the same form as the models for sole parents' benefit receipt in Dalgety et al (2010), and were estimated in the same way.

The models allow the discrete-time hazard function to vary with:

- the length of the couple's current spell of one or two incomes (the 'baseline hazard')
- individual and couple characteristics
- seasonal factors
- the strength of the economy
- the stages of the roll-out of WFF changes.

Our parameterisation of the baseline hazard allowed the hazard of making a transition out of the current state to:

- vary by month over the first quarter of the spell
- vary by quarter for the remainder of the first year
- be constant over the second year
- be constant at a different rate after two years.

The couple characteristics included were:

- the age and ethnicity of the female parent
- the age and ethnicity of the male parent
- the number of dependent children
- the age of the youngest child
- the monthly income of the primary income earner
- whether the couple were receiving Paid Parental Leave or a Student Allowance
- region.

The seasonal pattern in transitions between one earner and two earners (principally around the summer school holiday period) were captured in the models through the inclusion of dummy variables for each month of the year.

Real, production-based, seasonally-adjusted gross domestic product (GDP) and the regional unemployment rate were included to control for economic conditions.

The models allowed the hazard of making a transition to change in each of the time periods following the implementation of a set of WFF changes. That is, there are dummy variables in the models for each of the periods:

- October 2004 to March 2005
- April 2005 to September 2005
- October 2005 to March 2006
- April 2006 to March 2007
- April 2007 to March 2008.

For each model it is the April 2007–March 2008 variable that reflects the key outcome of interest, capturing the effect of all the WFF initiatives combined.

4.3 Regression model for longitudinal binary data

This section describes an alternative approach to modelling the MSD–IR administrative data on couples. The approach makes use of the data for all the months observed for each couple in the dataset.

A disadvantage of the survival analysis approach to modelling the impact of WFF on couple parent families' employment patterns was the need to exclude data for spells (of one or two incomes) that were already in progress in April 2003, the first month of data available in the linked MSD–IR administrative data. As noted in the previous section, we excluded these spells because we did not know when they started.

We fitted a marginal model for longitudinal binary data, using the Generalised Estimating Equations (GEE) approach (eg see Diggle et al, 2002; Agresti, 2002).

The binary response variable is whether or not a couple had two income earners in a month, and for each couple in our analysis dataset we have repeated measurements over at least six months.

The specification of the GEE model is in two parts. Firstly, we describe how the mean of the response variable (ie the probability of a couple having two income earners in a month) is related to the explanatory variables. We modelled this relationship as:

$$\log\left(\frac{\pi_{it}}{1 - \pi_{it}}\right) = \boldsymbol{\beta}'\mathbf{X}_{it}$$

where π_{it} is the probability that couple i had two income earners in month t , \mathbf{X}_{it} is a vector of covariates (the values that couple i had for a set of explanatory variables in month t), and $\boldsymbol{\beta}$ are the parameters to be estimated. We used the same set of explanatory variables as in the survival analysis above, except the baseline hazard terms were not included.

Secondly, we specify a correlation structure to describe the dependence between the repeated measurements for the same subject (couple family), assuming this correlation structure is the same for all subjects. Taking account of this dependence is what makes

the GEE model different from, for example, a simple logistic regression model that assumes independent observations.

In our case, whether a couple had two income earners in a particular month is quite strongly correlated with whether they had two income earners in previous or subsequent months, but pairs of monthly observations for a given couple are more similar at short time lags than at longer ones. We fitted the GEE model using PROC GENMOD in SAS, specifying an 'unstructured' working correlation matrix that allows the correlation structure between all possible pairs of monthly observations to be freely estimated from the data.

The parameter estimates for the WFF variables in the model then provide information about the effect of WFF on the probability of both adults in a couple being in work, controlling for other factors that affect this.

5. Results

5.1 Difference-in-differences

This section presents DiD estimates of the effect of WFF on couple parents' employment outcomes.

The estimates are based on four waves of HLFS data: the June quarters of 2004, 2005, 2006 and 2007. The estimates capture the cumulative effect of the stages of WFF's implementation by comparing each of 2005, 2006 and 2007 with the pre-WFF state in 2004.

One consequence of using June quarter data is that, in the years when WFF changes came into effect at the beginning of April, the impact of those changes on couple parents' employment is probably not seen in the DiD estimates until the following year. That is, it seems unlikely we will have seen the full extent of changes in people's behaviour in response to changed incentives when they were interviewed during the first three months following those changes.

In particular, the impact on employment outcomes of the key change in April 2006 to introduce the in-work tax credit is unlikely to be seen in the HLFS data for the June quarter of 2006, but should be fully captured in the DiD estimate for 2007.

5.1.1 Secondary earners' employment

WFF may have decreased the employment rate of secondary earners

Table 8 presents DiD estimates of the impact of WFF on the percentage of couple parent families where both parents were employed.⁵

The increase in the percentage of secondary earners employed between 2004 and 2007 may have been larger if WFF had not been implemented. WFF is estimated to have decreased the employment rate of secondary earners by 2.3 (\pm 3.5) percentage points (pp). This impact on couple parents' employment is in the direction, and of around the size, predicted before WFF was implemented (see Section 2), but it is not a large enough effect to be statistically significant using the HLFS sample.

⁵ The percentage of couples where both adults were employed is equivalent to the percentage of secondary earners employed. Where the secondary earner was employed, the primary earner must also have been employed, because of the way we defined primary and secondary earners (see Section 3.1).

Table 8: Estimated impact of WFF on the employment of secondary earners in couple parent families

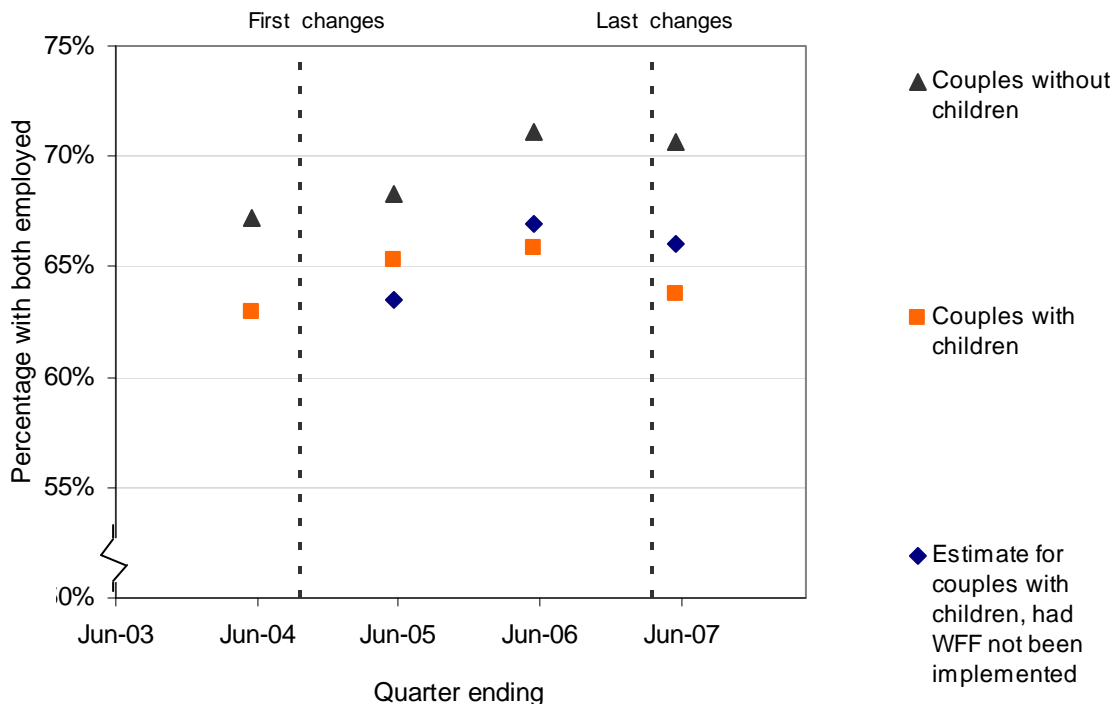
| Year | Percentage of secondary earners employed ¹ | Impact of WFF ² (pp) | Percentage of secondary earners employed, without WFF ³ |
|------|---|---------------------------------|--|
| 2004 | 62.9 | | |
| 2005 | 65.3 | 1.8 (± 3.5) | 63.5 |
| 2006 | 65.9 | -1.0 (± 3.5) | 66.9 |
| 2007 | 63.8 | -2.3 (± 3.5) | 66.1 |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
 2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
 3. Counterfactual calculated as the HLFS percentage employed minus the estimated impact of WFF.
- Regression sample sizes are n=13,955 couples for 2004–2005, n=13,729 couples for 2004–2006, and n=14,096 couples for 2004–2007.

Figure 1 displays the with WFF and without WFF results for secondary earners in couple parent families compared with the HLFS estimate of the percentage of couples without children where both adults were employed.

Figure 1: Changes in the percentage of couples with both adults employed



WFF mostly had an impact on secondary earners working part-time

Table 9 shows the biggest impact of WFF on secondary earners' employment in couple parent families was to reduce the numbers of secondary earners working part-time (less than 30 hours a week).

Table 9: Estimated impact of WFF on the full-time/part-time employment status of secondary earners in couple parent families

| Year | Percentage of secondary earners employed full-time ¹ | Impact of WFF ² (pp) | Percentage of secondary earners employed full-time, without WFF ³ |
|------|---|---------------------------------|--|
| 2004 | 32.1 | | |
| 2005 | 33.8 | -0.2 (± 3.6) | 34.0 |
| 2006 | 35.2 | 0.6 (± 3.7) | 34.7 |
| 2007 | 32.9 | 0.3 (± 3.7) | 32.6 |
| Year | Percentage of secondary earners employed part-time ¹ | Impact of WFF ² (pp) | Percentage of secondary earners employed part-time, without WFF ³ |
| 2004 | 30.8 | | |
| 2005 | 31.5 | 2.0 (± 3.3) | 29.5 |
| 2006 | 30.7 | -1.5 (± 3.3) | 32.2 |
| 2007 | 30.9 | -2.5 (± 3.3) | 33.4 |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
3. Counterfactual calculated as the HLFS percentage employed minus the estimated impact of WFF. Regression sample sizes are n=13,955 couples for 2004–2005, n=13,729 couples for 2004–2006, and n=14,096 couples for 2004–2007.

5.1.2 Couple parents' hours in paid employment

WFF did not affect the percentage of couples meeting the 30-hour threshold for the in-work tax credit

The percentage of couple parent families meeting the in-work tax credit requirement to work at least a combined total of 30 hours a week was already high before WFF. Table 10 shows that the small increase in this percentage from 2004 would have been similar if WFF had not been introduced.

Table 10: Estimated impact of WFF on couple parent families meeting the 30-hours requirement of the in-work tax credit

| Year | Percentage of couple parent families ¹ | Impact of WFF ² (pp) | Percentage of couple parent families, without WFF ³ |
|------|---|---------------------------------|--|
| 2004 | 91.7 | | |
| 2005 | 94.0 | 1.4 (± 2.3) | 92.6 |
| 2006 | 93.8 | 0.7 (± 2.4) | 93.1 |
| 2007 | 93.4 | -0.3 (± 2.4) | 93.7 |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
3. Counterfactual calculated as the HLFS percentage working 30 or more hours minus the estimated impact of WFF. Regression sample sizes are n=13,809 couples for 2004–2005, n=13,578 couples for 2004–2006, and n=13,960 couples for 2004–2007.

WFF did not affect the average hours worked by secondary earners

Table 11 presents DiD estimates of the impact of WFF on the average hours worked by secondary earners in couple parent families. The averages here include secondary earners who are not employed (who contribute zeroes to the average).

While WFF may have caused some secondary earners to drop out of employment, there was no impact on secondary earners' hours worked overall. This suggests those secondary earners remaining in work may have increased their hours to some degree.

Table 11: Estimated impact of WFF on secondary earner hours in paid employment

| Year | Secondary earner mean weekly hours ¹ | Impact of WFF ² | Secondary earner mean weekly hours, without WFF ³ |
|------|---|----------------------------|--|
| 2004 | 17h 36m | | |
| 2005 | 18h 16m | 10m (± 1h 21m) | 18h 6m |
| 2006 | 18h 29m | -15m (± 1h 23m) | 18h 44m |
| 2007 | 17h 52m | -2m (± 1h 21m) | 17h 55m |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
3. Counterfactual calculated as the HLFS mean hours minus the estimated impact of WFF. Regression sample sizes are n=13,941 couples for 2004–2005, n=13,716 couples for 2004–2006, and n=14,079 couples for 2004–2007.

WFF may have decreased the average hours worked by primary earners

Table 12 estimates the average hours worked by primary earners in couple parent families may have increased by around one hour a week between 2004 and 2007 if WFF had not been introduced. Instead, the average hours worked by primary earners after WFF remained relatively unchanged.

Table 12: Estimated impact of WFF on primary earner hours in paid employment

| Year | Primary earner mean weekly hours ¹ | Impact of WFF ² | Primary earner mean weekly hours, without WFF ³ |
|------|---|----------------------------|--|
| 2004 | 43h 22m | | |
| 2005 | 44h 15m | 32m (± 1h 10m) | 43h 43m |
| 2006 | 43h 41m | -14m (± 1h 11m) | 43h 55m |
| 2007 | 43h 14m | -1h 5m (± 1h 9m) | 44h 19m |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
3. Counterfactual calculated as HLFS mean hours minus the estimated impact of WFF. Regression sample sizes are n=13,809 couples for 2004–2005, n=13,579 couples for 2004–2006, and n=13,961 couples for 2004–2007.

Additional DiD results about the distribution of hours worked by primary and secondary earners can be found in the Appendix.

5.1.3 Couple parent families with lower educational qualifications

WFF components are income-tested, so not all couple parent families would have been affected by the WFF changes. Around half of all couples with dependent children received some WFF financial support in the 2007 and 2008 tax years.

In this section we provide a check on the results presented above, by restricting the DiD analysis to couples whose highest educational qualification was less than a university degree. That is, the analysis compared couple parent families without a degree to childless couples without a degree.

We can't directly condition the analysis on income because a couple's income is dependent on the employment decisions that are our outcomes of interest. Instead, we assume couples with lower educational qualifications were more likely to be eligible for the WFF components and therefore were more likely to be affected by the WFF changes.

Excluding those couples whose highest qualification was a university degree still left a reasonably-sized sample from which to estimate the effects of the WFF changes. Using more restrictive criteria based on qualifications – eg no qualifications or school qualifications only – would have meant much smaller sample sizes and much wider confidence intervals for the results.

Table 13 presents the DiD results for couples with less than a degree qualification.

The estimated impacts of WFF on couples with less than a degree qualification are generally smaller in magnitude than the DiD estimates presented earlier in this section, but it is reassuring they are in the same directions.

Table 13: Difference-in-differences results for couples with less than a degree qualification

| | Impact of WFF ¹ (pp) |
|--|------------------------------------|
| Secondary earner employed | -1.1 (± 4.1) |
| Secondary earner employed full-time | 0.4 (± 4.3) |
| Secondary earner employed part-time | -1.5 (± 3.9) |
| Couple working combined 30+ hours a week | -0.1 (± 2.8) |
| | Impact of WFF ¹ |
| Secondary earner mean weekly hours | 4m (±1h 33m) |
| Primary earner mean weekly hours | -46m (±1h 22m) |

Notes:

1. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and 2007, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.

Regression sample size is n=10,522 couples.

5.2 Survival analysis

This section presents results from a survival analysis of the lengths of time couple parent families spent in spells of having one or two income earners.

The analysis used monthly administrative data from April 2003 to March 2008 for a subset of couples with children who received WFF over this time. The analysis was restricted to couples for whom monthly salary and wage income was available and to spells starting after April 2003 (see Section 4.2 for a discussion of the limitations of the survival analysis, given the second of these restrictions).

5.2.1 Transitions from one to two income earners

Table 14 shows the parameter estimates from fitting a discrete-time logit model for the hazard of exiting one income spells. That is, the parameters describe how the explanatory variables influence the speed at which couples in a one income spell make a transition to two income earners.

Dalgety et al (2010) describe the interpretation of parameter estimates from this type of survival analysis model in the context of modelling exits from benefit. Here, we just note that:

- Positive coefficients imply the explanatory variable increases the probability of making a transition from one to two incomes (compared to the reference category), while negative coefficients imply a decrease in the probability of making a transition.
- In general, the magnitude of the coefficient reflects the size of the effect of the explanatory variable on the probability of making a transition, relative to other variables in the model.⁶

The probability of couples with children making a transition from one to two incomes:

- decreased with the length of time in the spell of one income
- was highest in January and February, and lowest in December
- was higher when the economy (GDP) was stronger
- was lower for very young couples (parents under 20 years of age)
- was lowest for couples with very young children, and increased with the age of the youngest child.

⁶ This is because most of the explanatory variables were binary variables, taking the values 1 or 0 to indicate the presence or absence of some characteristic. The exceptions were the three numeric variables: number of children (0, 1, 2, etc), GDP (included in the model in units of billions of dollars) and the regional unemployment rate (included in the model as a percentage).

Table 14: Hazard model for exits from one income

| Explanatory variable | Parameter estimate¹ |
|---------------------------------|---------------------------------------|
| Intercept | -4.07 (± 0.88) * |
| Baseline hazard | |
| Month 1 of spell | 1.87 (± 0.03) * |
| Month 2 of spell | 1.15 (± 0.03) * |
| Month 3 of spell | 0.96 (± 0.03) * |
| Quarter 2 of spell | 0.65 (± 0.03) * |
| Quarter 3 of spell | 0.47 (± 0.03) * |
| Quarter 4 of spell | 0.38 (± 0.03) * |
| Year 2 of spell | 0.09 (± 0.02) * |
| Seasonal effects | |
| January | 0.67 (± 0.03) * |
| February | 0.48 (± 0.04) * |
| March | 0.07 (± 0.04) * |
| May | -0.01 (± 0.03) |
| June | 0.02 (± 0.03) |
| July | 0.19 (± 0.03) * |
| August | 0.12 (± 0.03) * |
| September | 0.16 (± 0.03) * |
| October | 0.26 (± 0.03) * |
| November | 0.18 (± 0.04) * |
| December | -0.17 (± 0.04) * |
| Strength of the economy | |
| Real production GDP | 0.05 (± 0.03) * |
| Regional unemployment rate | 0.01 (± 0.01) |
| WFF effects | |
| Oct 2004–Mar 2005 | 0.03 (± 0.03) |
| Apr 2005–Sep 2005 | -0.10 (± 0.05) * |
| Oct 2005–Mar 2006 | -0.11 (± 0.05) * |
| Apr 2006–Mar 2007 | -0.22 (± 0.06) * |
| Apr 2007–Mar 2008 | -0.21 (± 0.09) * |
| Couple characteristics | |
| Female's characteristics | |
| Aged Under 20 | -0.48 (± 0.09) * |
| Aged 20–29 | -0.12 (± 0.02) * |
| Aged 40–49 | 0.02 (± 0.03) |
| Aged 50+ | -0.03 (± 0.06) |
| Age unknown | -0.71 (± 0.78) |
| Māori | -0.01 (± 0.03) |
| Pacific peoples | -0.05 (± 0.05) * |
| Other ethnicity | -0.08 (± 0.05) * |
| Ethnicity missing | 0.02 (± 0.03) |
| Male's characteristics | |
| Aged Under 20 | -0.27 (± 0.15) * |
| Aged 20–29 | -0.05 (± 0.03) * |
| Aged 40–49 | 0.01 (± 0.02) |
| Aged 50+ | -0.14 (± 0.05) * |
| Age unknown | -0.11 (± 0.46) |
| Māori | 0.05 (± 0.03) * |
| Pacific peoples | 0.07 (± 0.05) * |
| Other ethnicity | -0.01 (± 0.05) |

| | |
|--------------------------------------|------------------------|
| Ethnicity missing | 0.01 (± 0.03) |
| Number of children | -0.04 (± 0.01) * |
| Age of youngest child (years) | |
| 0 | -0.40 (± 0.05) * |
| 1 | -0.16 (± 0.05) * |
| 2 | -0.13 (± 0.05) * |
| 3 | -0.06 (± 0.05) * |
| 4 | 0.01 (± 0.05) |
| Under 5, not otherwise specified | -0.12 (± 0.19) |
| 5 to 13 | 0.23 (± 0.05) * |
| 14+ | 0.22 (± 0.05) * |
| Primary earner monthly income | |
| \$2,000 to <\$3,000 | -0.15 (± 0.03) * |
| \$3,000 to <\$4,000 | -0.16 (± 0.03) * |
| \$4,000 to <\$5,000 | -0.20 (± 0.03) * |
| \$5,000+ | -0.25 (± 0.03) * |
| Receiving Paid Parental Leave | -0.18 (± 0.03) * |
| Receiving Student Allowance | -0.16 (± 0.08) * |
| Region | |
| Bay of Plenty | 0.07 (± 0.04) * |
| Canterbury | 0.12 (± 0.03) * |
| Gisborne/Hawke's Bay | 0.17 (± 0.04) * |
| Manawatu/Wanganui | 0.08 (± 0.04) * |
| Northland | 0.05 (± 0.05) * |
| Otago | 0.19 (± 0.05) * |
| Southland | 0.27 (± 0.06) * |
| Taranaki | 0.05 (± 0.06) |
| Waikato | 0.07 (± 0.04) * |
| Wellington | 0.04 (± 0.04) * |
| Tasman/Marlborough/Nelson/West Coast | 0.14 (± 0.05) * |

Notes:

1. 95% confidence intervals are in parentheses. Parameter estimates marked with an asterisk are significantly different from zero, at the 5% level of significance. Sample size is n=58,137 couples.

Couples' spells of one income were longer after WFF

The five WFF variables in Table 14 describe the cumulative effect of the stages of the WFF changes. The parameter estimate for 'April 2007–March 2008' suggests the odds of a couple parent family making a transition from one income to two incomes with WFF fully implemented were 0.81 times that (ie 19% less than) in the pre-WFF period, controlling for the other explanatory variables in the model.

To illustrate this result, Figure 2 plots 'survival curves', which are predictions from the model of the survivor function – the probability of a couple remaining with one income in each month since the start of a spell of one income.

The line labelled 'With WFF' summarises the pattern of exits from one income spells in the situation where all the stages of WFF are in place. The line labelled 'Without WFF' corresponds to the situation if the WFF changes had not been introduced. The predicted probabilities were calculated holding all the other explanatory variables in the model constant at their average values (taken across all one income spells for all couples in the analysis dataset), so that we can think of them as predictions for a hypothetical average couple on one income.

The difference between the two lines is a graphical illustration of the effect of WFF estimated by the model.

In Figure 2, the 'With WFF' line lies above the 'Without WFF' line. This indicates that after WFF was implemented couples were exiting one income spells later than they would have if WFF had not been introduced.

Figure 2: Survival curves for time in spells of one income

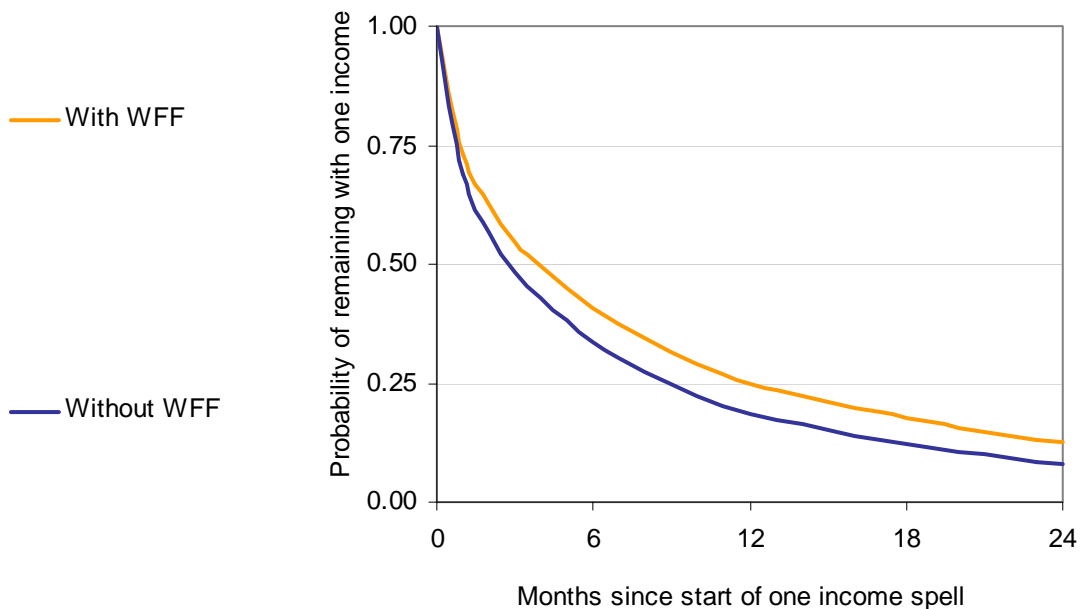


Figure 2 also reinforces that many spells of one income were very short. The median length of a one income spell (for a hypothetical couple with average characteristics) was just 3 months without WFF, increasing to 4 months with WFF.

5.2.2 Transitions from two to one income earner

Table 15 shows the parameter estimates from fitting a discrete-time logit model for the hazard of exiting two income spells. That is, the parameters describe how the explanatory variables influence the speed at which couples in a two income spell make a transition to one income earner.

The probability of couples with children making a transition from two incomes to one income:

- decreased with the length of time in the spell of two incomes
- was high in December, and lowest in February
- was lower when the economy (GDP) was stronger
- was higher for couples with very young mothers (under 20 years of age)
- was lower for couples with Māori and Pacific parents
- was highest for couples with very young children, and decreased with the age of the youngest child
- was high for those receiving Paid Parental Leave or a Student Allowance.⁷

⁷ A couple receiving Paid Parental Leave will generally have a newborn baby, while the receipt of a Student Allowance indicates one of the parents was studying full-time.

Table 15: Hazard model for exits from two incomes

| Explanatory variable | Parameter estimate ¹ |
|--------------------------------|---------------------------------|
| Intercept | -0.86 (± 1.01) |
| Baseline hazard | |
| Month 1 of spell | 1.00 (± 0.03) * |
| Month 2 of spell | 0.68 (± 0.03) * |
| Month 3 of spell | 0.44 (± 0.04) * |
| Quarter 2 of spell | 0.26 (± 0.03) * |
| Quarter 3 of spell | 0.22 (± 0.03) * |
| Quarter 4 of spell | 0.64 (± 0.03) * |
| Year 2 of spell | 0.03 (± 0.02) * |
| Seasonal effects | |
| January | 0.10 (± 0.04) * |
| February | -0.12 (± 0.04) * |
| March | 0.03 (± 0.04) |
| May | 0.09 (± 0.03) * |
| June | 0.15 (± 0.03) * |
| July | 0.11 (± 0.04) * |
| August | 0.05 (± 0.04) * |
| September | 0.15 (± 0.04) * |
| October | -0.01 (± 0.04) |
| November | -0.04 (± 0.04) |
| December | 1.15 (± 0.04) * |
| Strength of the economy | |
| Real production GDP | -0.07 (± 0.03) * |
| Regional unemployment rate | 0.01 (± 0.01) |
| WFF effects | |
| Oct 2004–Mar 2005 | 0.05 (± 0.03) * |
| Apr 2005–Sep 2005 | 0.02 (± 0.05) |
| Oct 2005–Mar 2006 | 0.14 (± 0.05) * |
| Apr 2006–Mar 2007 | 0.13 (± 0.07) * |
| Apr 2007–Mar 2008 | 0.12 (± 0.10) * |
| Couple characteristics | |
| Female's characteristics | |
| Aged Under 20 | 0.32 (± 0.09) * |
| Aged 20–29 | 0.05 (± 0.03) * |
| Aged 40–49 | 0.03 (± 0.03) * |
| Aged 50+ | 0.19 (± 0.07) * |
| Age unknown | 0.09 (± 0.67) |
| Māori | -0.03 (± 0.03) |
| Pacific peoples | -0.13 (± 0.05) * |
| Other ethnicity | -0.01 (± 0.05) |
| Ethnicity missing | -0.01 (± 0.03) |
| Male's characteristics | |
| Aged Under 20 | 0.03 (± 0.16) |
| Aged 20–29 | 0.00 (± 0.03) |
| Aged 40–49 | 0.00 (± 0.03) |
| Aged 50+ | 0.10 (± 0.05) * |
| Age unknown | 0.34 (± 0.47) |
| Māori | -0.06 (± 0.03) * |
| Pacific peoples | -0.14 (± 0.05) * |
| Other ethnicity | -0.12 (± 0.06) * |

| | |
|--------------------------------------|------------------------|
| Ethnicity missing | -0.14 (± 0.03) * |
| Number of children | 0.03 (± 0.01) * |
| Age of youngest child (years) | |
| 0 | 0.90 (± 0.05) * |
| 1 | 0.11 (± 0.05) * |
| 2 | 0.14 (± 0.05) * |
| 3 | 0.12 (± 0.05) * |
| 4 | 0.13 (± 0.05) * |
| Under 5, not otherwise specified | 0.28 (± 0.20) * |
| 5 to 13 | -0.02 (± 0.05) * |
| 14+ | -0.07 (± 0.05) * |
| Primary earner monthly income | |
| \$2,000 to <\$3,000 | -0.32 (± 0.04) * |
| \$3,000 to <\$4,000 | -0.33 (± 0.04) * |
| \$4,000 to <\$5,000 | -0.23 (± 0.04) * |
| \$5,000+ | 0.04 (± 0.04) * |
| Receiving Paid Parental Leave | 2.42 (± 0.04) * |
| Receiving Student Allowance | 0.91 (± 0.10) * |
| Region | |
| Bay of Plenty | 0.02 (± 0.05) |
| Canterbury | -0.07 (± 0.04) * |
| Gisborne/Hawke's Bay | 0.04 (± 0.05) |
| Manawatu/Wanganui | 0.00 (± 0.05) |
| Northland | 0.03 (± 0.05) |
| Otago | 0.00 (± 0.05) |
| Southland | 0.01 (± 0.07) |
| Taranaki | -0.07 (± 0.06) * |
| Waikato | 0.01 (± 0.04) |
| Wellington | -0.05 (± 0.04) * |
| Tasman/Marlborough/Nelson/West Coast | 0.08 (± 0.05) * |

Notes:

1. 95% confidence intervals are in parentheses. Parameter estimates marked with an asterisk are significantly different from zero, at the 5% level of significance. Sample size is n=60,009 couples.

Couples' spells of two incomes were shorter after WFF

The parameter estimate for the 'April 2007–March 2008' WFF variable in Table 15 suggests the odds of a couple parent family making a transition from two incomes to one income were 1.13 times (or 13%) greater with WFF fully implemented than in the pre-WFF period, controlling for the other explanatory variables in the model.

Figure 3 uses survival curves to provide a graphical illustration of this result. Here, the predicted probabilities were calculated for a hypothetical average couple with two incomes, where the averages were taken across all two income spells for all couples in the analysis dataset.

In contrast to the survival curves for one income spells (Figure 2), here the 'With WFF' line lies below the 'Without WFF' line. This indicates that after WFF was implemented couples were exiting two income spells sooner than they would have if WFF had not been introduced.

Figure 3: Survival curves for time in spells of two incomes

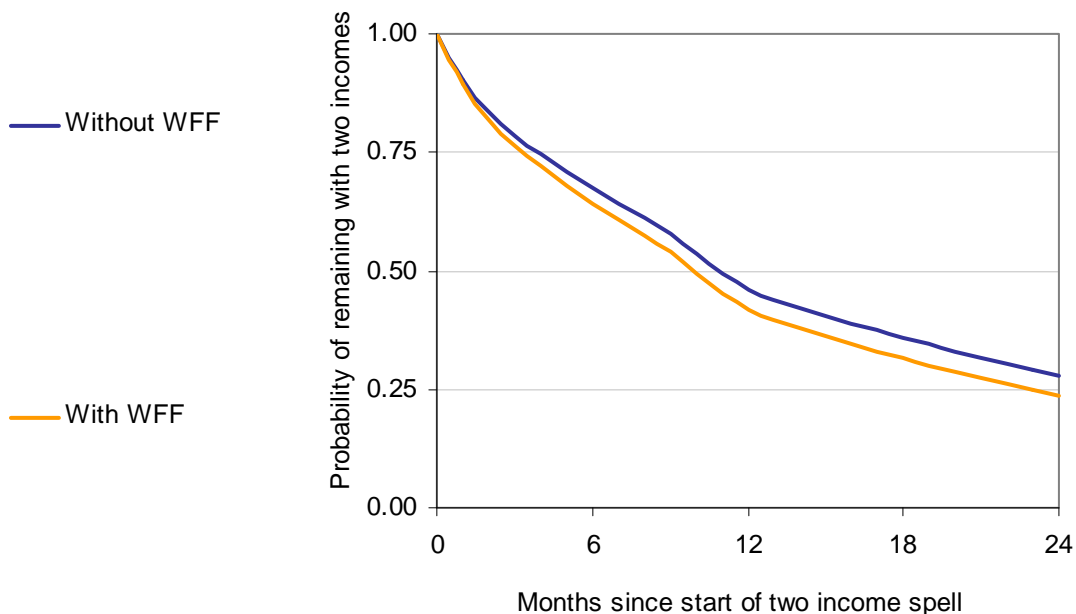


Figure 3 also shows that couples generally spent longer in two income spells than they did in one income spells. The median length of a two income spell (for a hypothetical couple with average characteristics) was 11 months without WFF, decreasing to 10 months with WFF.

5.3 Regression model for longitudinal binary data

This section presents results from modelling the propensity of couple parent families to have two income earners, using longitudinal data analysis methods.

The analysis used monthly administrative data from April 2003 to March 2008 for a subset of couples with children who received WFF over this time. The analysis was restricted to couples for whom monthly salary and wage income was available, but it was able to use data for all months from April 2003 for these couples.

Table 16 shows the parameter estimates from fitting a marginal (GEE) model for the probability a couple has two income earners in any given month, that takes into account the dependence between the monthly measurements for the same couple.

Similarly to the survival analysis models:

- Positive coefficients in Table 16 imply that the explanatory variable increased the probability of two incomes, while negative coefficients imply a decrease in the probability of two incomes.
- In general, the magnitude of the coefficient reflects the size of the effect of the explanatory variable on the probability of two incomes, relative to the effect of the other variables in the model.

The probability that a couple with children had two incomes:

- was lowest in January (and to a lesser extent February)
- was higher when the economy was stronger
- was lower for younger (under 20 years) and older (over 50 years) parents
- was higher for Māori and Pacific parents
- decreased with a greater number of children
- was lowest for couples with very young children, but increased with the age of the youngest child
- increased with the income of the primary earner
- was low for those receiving Paid Parental Leave or a Student Allowance.

Table 16: Regression model for probability of two incomes

| Explanatory variable | Parameter estimate[†] |
|--------------------------------|---------------------------------------|
| Intercept | -0.35 (± 0.24) * |
| Seasonal effects | |
| January | -0.22 (± 0.01) * |
| February | -0.07 (± 0.01) * |
| March | -0.02 (± 0.01) * |
| May | -0.01 (± 0.00) * |
| June | -0.03 (± 0.01) * |
| July | -0.04 (± 0.01) * |
| August | -0.04 (± 0.01) * |
| September | -0.03 (± 0.01) * |
| October | -0.04 (± 0.01) * |
| November | -0.01 (± 0.01) * |
| December | -0.03 (± 0.01) * |
| Strength of the economy | |
| Real production GDP | 0.03 (± 0.01) * |
| Regional unemployment rate | -0.01 (± 0.00) * |
| WFF effects | |
| Oct 2004–Mar 2005 | 0.04 (± 0.01) * |
| Apr 2005–Sep 2005 | 0.03 (± 0.01) * |
| Oct 2005–Mar 2006 | 0.02 (± 0.01) * |
| Apr 2006–Mar 2007 | -0.05 (± 0.02) * |
| Apr 2007–Mar 2008 | -0.09 (± 0.02) * |
| Couple characteristics | |
| Female's characteristics | |
| Aged Under 20 | -0.16 (± 0.06) * |
| Aged 20–29 | -0.02 (± 0.02) * |
| Aged 40–49 | 0.00 (± 0.01) |
| Aged 50+ | -0.12 (± 0.03) * |
| Age unknown | -1.48 (± 0.75) * |
| Māori | 0.06 (± 0.03) * |
| Pacific peoples | 0.15 (± 0.05) * |
| Other ethnicity | -0.14 (± 0.06) * |
| Ethnicity missing | -0.03 (± 0.03) |
| Male's characteristics | |
| Aged Under 20 | -0.09 (± 0.09) |
| Aged 20–29 | 0.00 (± 0.02) |
| Aged 40–49 | 0.02 (± 0.01) * |
| Aged 50+ | -0.06 (± 0.02) * |
| Age unknown | -0.32 (± 0.41) |
| Māori | 0.16 (± 0.04) * |
| Pacific peoples | 0.18 (± 0.05) * |
| Other ethnicity | -0.08 (± 0.06) * |
| Ethnicity missing | 0.11 (± 0.03) * |
| Number of children | -0.09 (± 0.01) * |
| Age of youngest child (years) | |
| 0 | -1.08 (± 0.03) * |
| 1 | -0.77 (± 0.03) * |
| 2 | -0.60 (± 0.03) * |
| 3 | -0.46 (± 0.03) * |
| 4 | -0.33 (± 0.03) * |

| | |
|--------------------------------------|------------------|
| Under 5, not otherwise specified | -0.44 (± 0.09) * |
| 5 to 13 | -0.15 (± 0.03) * |
| 14+ | -0.09 (± 0.03) * |
| Primary earner monthly income | |
| \$2,000 to <\$3,000 | 0.23 (± 0.01) * |
| \$3,000 to <\$4,000 | 0.29 (± 0.01) * |
| \$4,000 to <\$5,000 | 0.32 (± 0.01) * |
| \$5,000+ | 0.36 (± 0.01) * |
| Receiving Paid Parental Leave | -1.01 (± 0.02) * |
| Receiving Student Allowance | -0.60 (± 0.05) * |
| Region | |
| Bay of Plenty | 0.12 (± 0.04) * |
| Canterbury | 0.19 (± 0.03) * |
| Gisborne/Hawke's Bay | 0.17 (± 0.05) * |
| Manawatu/Wanganui | 0.14 (± 0.04) * |
| Northland | 0.05 (± 0.05) * |
| Otago | 0.24 (± 0.05) * |
| Southland | 0.23 (± 0.06) * |
| Taranaki | 0.12 (± 0.06) * |
| Waikato | 0.08 (± 0.04) * |
| Wellington | 0.12 (± 0.04) * |
| Tasman/Marlborough/Nelson/West Coast | 0.15 (± 0.05) * |

Notes:

1. 95% confidence intervals are in parentheses. Parameter estimates marked with an asterisk are significantly different from zero, at the 5% level of significance. Sample size is n=82,062 couples.

Couples with children were less likely to both be in employment after WFF

The five WFF variables in Table 16 describe the cumulative effect of the stages of the WFF changes.

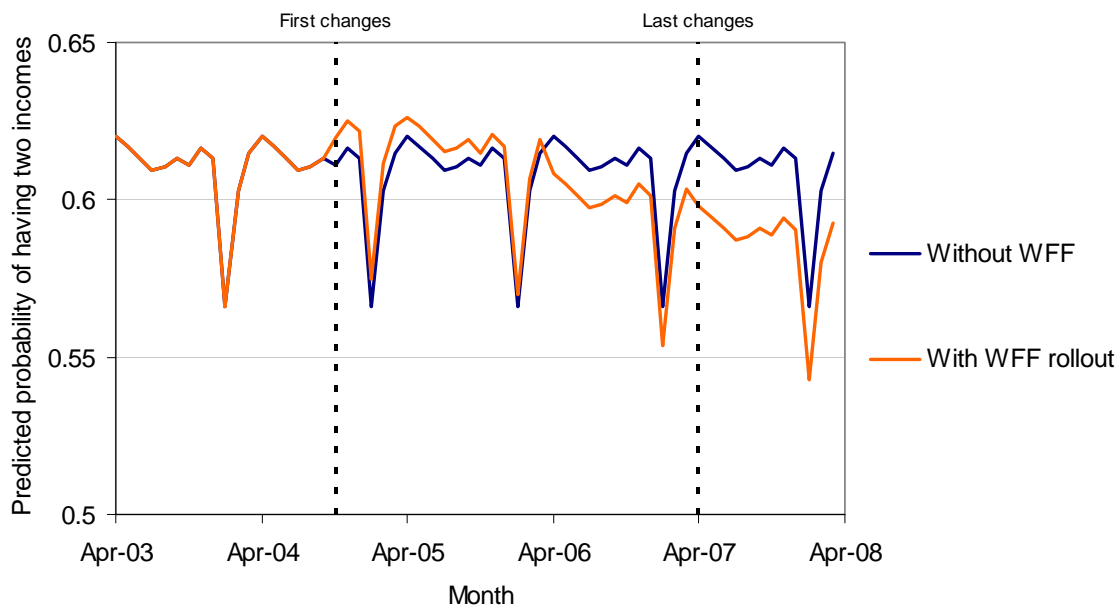
The parameter estimate for 'April 2007–March 2008' suggests the odds of a couple parent family having two incomes with WFF fully implemented were 0.91 times that (ie 9% less than) in the pre-WFF period, controlling for the other explanatory variables in the model.

In terms of predicted probabilities from the model for a couple parent family having average characteristics, the probability of having two income earners decreased by 2.2 (± 0.6) percentage points from 60.9% without WFF to 58.7% with WFF fully implemented.

Figure 4 shows the predictions from the model of the probability that a couple had two income earners. This time series graph shows both the seasonal pattern fitted by the model and the effect of WFF being rolled out over time, while holding all the other explanatory variables constant at their average values.

The 'With WFF' line shows the effect of each WFF parameter in the model changing the level of the series during each stage of the WFF rollout. The 'Without WFF' line corresponds to the situation if the WFF changes had not been introduced. Over the final year of the graph the difference between the two lines is 2.2 percentage points.

Figure 4: Impact of WFF changes on the probability that an average couple has two incomes



6. Discussion

There is some evidence that couples with children were less likely to both be in employment after WFF

This study used two sources of data and two modelling approaches to estimate the impact of WFF on the employment rate of secondary earners in couples with dependent children. Table 17 summarises our results, compared to Johnson’s (2005) pre-WFF prediction of what the impact might be.

Table 17: Summary of the results from analysis examining the impact of the WFF changes on the percentage of couple families with two earners

| Method | Impact on secondary earners’ employment | Population |
|--|---|---|
| Difference-in-differences analysis | 2.3 (\pm 3.5) pp decrease | All couple parent families |
| Regression model for longitudinal binary data | 2.2 (\pm 0.6) pp decrease | Couple parent families who: <ul style="list-style-type: none"> received WFF in any month between April 2003 and March 2008 had no income from self-employment |
| Predicted impact from the expected increase in EMTRs | 2.7 pp decrease | All couple parent families |

All of the estimates in Table 17 are in the same direction and of a similar scale.

The difference-in-differences analysis has a stronger causal interpretation than the longitudinal regression model, and it used data we can be more confident is representative of all couples with dependent children. However, the HLFS sample size means the DiD estimate is not precise enough to be statistically significant.

The larger sample size of our couples analysis dataset derived from linked MSD–IR administrative data means the longitudinal regression model estimate of the effect of WFF is more precise, and therefore statistically significant. But a major limitation of this analysis is that it did not include all couples who received WFF – most importantly it excluded couples with self-employment income because we did not have usable monthly data for them.⁸

Both results are also very similar to Johnson’s (2005) pre-WFF estimate based on international evidence about the relationship between secondary earners’ employment and increasing effective marginal tax rates.

That our two different methods, using two different data sources, give numerically very similar results adds weight to the conclusion that WFF probably did cause a drop in

⁸ Although we don’t know if the longitudinal modelling results would be different if self-employed couples were able to be included, we did look at how much the difference-in-differences results changed if the self-employed were excluded. Excluding couples with self-employed income from the HLFS analysis dataset resulted in DiD impact estimates that were very similar to the DiD impact estimates for all working-age couples with children presented in Section 5. In particular, the estimated impact on couple parents’ employment became a 2.5 (\pm 4.2) percentage point decrease in secondary earners’ employed.

secondary earners' employment of around two percentage points, albeit too small to be sure of using the HLFS data.

Couples' spells with one income earner were longer, and their spells with two income earners were shorter, after WFF

While some couples' employment situations are very stable over time, many couples with dependent children make frequent transitions between having one or two income earners. In this study we used survival analysis models, applied to MSD-IR administrative data, to look at how WFF may have influenced the rate of these transitions. This may help to shed light on the process by which the overall effect on secondary earners' employment arose.

The results from the survival analysis suggest:

- WFF slowed down the rate at which one income couples with children make a transition to two incomes, so that couples' spells of one income are longer with WFF.
- WFF sped up the rate at which two income couples with children make a transition to one income, so that couples' spells of two incomes are shorter with WFF.

However, these results are less robust than the survival analysis results for sole parents' benefit receipt described in Dalgety et al (2010). In addition to excluding couples with self-employment income, to fit the survival analysis models we also needed to exclude the first spell of one or two incomes for each couple who were in the dataset at April 2003, because we did not know when these spells started. This excluded some couples with very stable employment patterns.

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Appendix: Additional tables

In addition to the results in Section 5.1 for average weekly hours, we include difference-in-differences results for the percentage of primary and secondary earners who are working more than a specified number of hours a week.

Consistent with the conclusions in Section 5.1, the results here suggest fewer primary earners were working 50 or more hours after the WFF changes, while perhaps slightly more secondary earners were working longer hours.

Table A1: Additional difference-in-differences results for primary earner hours in paid employment

| Primary earner weekly hours | Year | Percentage of couple parent families ¹ | Impact of WFF ² (pp) | Percentage of couple parent families, without WFF ³ |
|-----------------------------|------|---|---------------------------------|--|
| 20 or more | 2004 | 92.8 | | |
| | 2005 | 94.8 | 1.1 (± 2.2) | 93.7 |
| | 2006 | 94.8 | 0.5 (± 2.2) | 94.3 |
| | 2007 | 94.4 | -0.2 (± 2.2) | 94.6 |
| 30 or more | 2004 | 91.0 | | |
| | 2005 | 93.3 | 1.4 (± 2.4) | 91.9 |
| | 2006 | 93.2 | 1.4 (± 2.5) | 91.8 |
| | 2007 | 92.5 | -0.1 (± 2.4) | 92.6 |
| 40 or more | 2004 | 86.1 | | |
| | 2005 | 87.2 | 1.0 (± 2.9) | 86.2 |
| | 2006 | 87.4 | 0.7 (± 2.9) | 86.7 |
| | 2007 | 84.6 | -1.3 (± 3.0) | 86.0 |
| 50 or more | 2004 | 33.5 | | |
| | 2005 | 34.0 | 0.3 (± 3.6) | 33.7 |
| | 2006 | 30.6 | -1.2 (± 3.6) | 31.8 |
| | 2007 | 29.4 | -4.0 (± 3.6) | 33.4 |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
 2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
 3. Counterfactual calculated as the HLFS percentage minus the estimated impact of WFF.
- Regression sample sizes are n=13,809 couples for 2004–2005, n=13,579 couples for 2004–2006, and n=13,961 couples for 2004–2007.

Table A2: Additional difference-in-differences results for secondary earner hours in paid employment

| Secondary earner weekly hours | Year | Percentage of couple parent families ¹ | Impact of WFF ² (pp) | Percentage of couple parent families, without WFF ³ |
|-------------------------------|------|---|---------------------------------|--|
| 20 or more | 2004 | 45.7 | | |
| | 2005 | 48.1 | 0.8 (± 3.7) | 47.4 |
| | 2006 | 48.2 | -0.6 (± 3.8) | 48.7 |
| | 2007 | 46.9 | -0.5 (± 3.8) | 47.4 |
| 30 or more | 2004 | 32.1 | | |
| | 2005 | 33.7 | -0.2 (± 3.6) | 34.0 |
| | 2006 | 35.2 | 0.5 (± 3.7) | 34.7 |
| | 2007 | 32.9 | 0.2 (± 3.7) | 32.6 |
| 40 or more | 2004 | 20.9 | | |
| | 2005 | 20.3 | -2.1 (± 3.4) | 22.3 |
| | 2006 | 20.1 | -2.6 (± 3.4) | 22.7 |
| | 2007 | 19.2 | 0.3 (± 3.4) | 18.9 |
| 50 or more | 2004 | 2.7 | | |
| | 2005 | 2.5 | 0.3 (± 1.5) | 2.2 |
| | 2006 | 2.4 | 0.2 (± 1.5) | 2.2 |
| | 2007 | 2.1 | 0.7 (± 1.4) | 1.3 |

Notes:

1. Unpublished HLFS data for working-age couple parent families, June quarters.
2. Regression-adjusted difference-in-differences estimates using combined HLFS data from the June quarters of 2004 and the stated year, for working-age couple parent families and couples without children. 95% confidence intervals are in parentheses.
3. Counterfactual calculated as the HLFS percentage minus the estimated impact of WFF. Regression sample sizes are n=13,941 couples for 2004–2005, n=13,716 couples for 2004–2006, and n=14,079 couples for 2004–2007.