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Abstract

Over recent years, several developed countries have implemented earned income tax credits in order to encourage welfare recipients to move into work. Here, we investigate the impact of 'Working Credits', which increased the incentives for welfare recipients to work, but only for a temporary period. Using differences-in-differences and regression-adjusted differences-in-differences, we find evidence that the introduction of the Working Credit increased employment rates, earnings and exits for those on income support. Results from matched differences-in-differences are less precise, but generally consistent with the other two empirical strategies. Back-of-the-envelope estimates suggest that on a cost-per-job basis, the Working Credit compares favourably with existing labour market programs.

1. Introduction

Over recent decades, a major feature of welfare reform in developed countries has been the introduction or expansion of earned income tax credits (Gradus 2001; Banks et al. 2005). In general, studies of these policies have found that they had the effect of boosting participation rates, hours and earnings for those eligible to receive them.[1] Yet such programs are also extremely expensive, potentially raising questions over their long-term sustainability. This in turn raises the question of whether a time-limited policy might be able to affect labour supply at a lower cost.

In 2003, Australia implemented one such low-cost policy in the form of the Working Credit.[2] The initiative aims to encourage working-age welfare recipients (particularly those with long spells on welfare) to take up full-time, part-time or casual work. Through this initiative, Working Credits are accumulated during periods in which working-age recipients have little or no earnings. These credits are used when they commence a job to allow the retention of welfare benefits to temporarily supplement their earnings. Accumulation of Working Credits is, in essence, proportional to current-spell duration on benefits (although credits can be used and then re-acquired with additional time on payments). It is therefore worth little to those who have only just gone on to payments, and is in general largest for those who have been on payments the longest. This is consistent with a goal of targeting resources towards reducing long-term unemployment and welfare reliance.

In this respect, Working Credit bears some resemblance to the broad-based earned income tax credit programs employed in the US and the UK. However, these programs differ from the Working Credit in three respects. First, the Working Credit is designed as a temporary credit, for the period when individuals move from welfare into work. By contrast, earned income tax credits are not time-sensitive, in that they are not contingent on the respondent having been on welfare in the past, nor do they cease after the respondent has been in the

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[1] Reviews of the US EITC literature include Hoffman and Seidman (2002), Meyer and Holtz-Eakin (2002), Hotz and Scholz (2003), and Eissa and Hoynes (2006). Studies of the UK earned income tax credit (variously known as the Family Income Supplement, the Family Credit, the Working Families Tax Credit and the Working Tax Credit) include Blundell et al. (2000), Gregg et al. (1999), Paull et al. (2000), Brewer et al. (2003), Gregg and Harkness (2003), Francesconi and van der Klaauw (2007), and Leigh (2007).

[2] So far as we are aware, there is no existing external research examining the effects of Working Credit. Within the Department of Education, Employment and Workplace Relations, the Wallis Group was engaged to undertake surveys as part of the Australians Working Together evaluation. Their findings in relation to Working Credit focussed mainly on recognition and understanding of the program and customer perceptions of the initiative.

labour force for a particular duration. Second, Working Credits are not directly conditioned on having children (although there may be some indirect effect, since some welfare payments are linked to having children). By contrast, earned income tax credits are generally much more generous for families with children than for other families. And third, Working Credits are not conditioned on the income of the recipient's spouse (although again, some payments may take this into account). By contrast, earned income tax credits in other countries are generally contingent on the income of the recipient's spouse. Given these differences, the existing findings on earned income tax credits must be regarded as merely suggestive for the purposes of understanding the impact of the Working Credit on labour supply.

This study examines the effectiveness of the contribution of the Working Credit initiative to achieving increased economic participation and self-reliance among working-age welfare recipients. Our study is based upon administrative data, which has the advantage that our sample is very large, but the limitation that we can only observe employment and total earnings, not hours worked or hourly wage rates. Moreover, the duration of our data and our empirical strategies limit us to looking at relatively short-term outcomes (around one year). This means that we are not able to draw conclusions about the effectiveness of the policy at achieving enduring changes in employment patterns.

We use a number of different research designs to separate the effects of the Working Credit from the effects of prevailing economic conditions and the duration that a recipient is on welfare. Using differences-in-differences, or regression-adjusted differences-in-differences, we find evidence that the introduction of the Working Credit increased employment rates, earnings and exits for those on welfare. Matching estimators produce similar results, but are less precisely estimated. Back-of-the-envelope estimates suggest that, on a cost-per-job basis, the Working Credit compares favourably with existing labour market programs.

The remainder of the paper is structured as follows. In Section 2, we outline the structure of the program, followed by our empirical strategies in Section 3. In Section 4, we discuss the data used. In Section 5, we provide descriptive statistics on Working Credit balances. In Section 6, we present a differences-in-differences analysis. In Section 7, we show regression-adjusted analyses. In Section 8, we present matched analyses. Section 9 outlines a robustness check to take account of the change in economic circumstances over this period. The final section discusses the findings and provides an assessment of the cost-effectiveness of the program.

2. The Working Credit program

Introduced on 20 September 2003, the Working Credit program is open to most workforce-age income support (welfare) recipients. This includes all persons below the official retirement age who are in receipt of unemployment benefits (Newstart Allowance or Youth Allowance (job seeker)), the Disability Support Pension or lone parent benefits (Parenting Payment Single).[3] Under the program, fortnightly earnings less than the accrued credits of the income support recipient are not taken into account in determining benefit entitlement. Credits are accrued when fortnightly non-welfare income is less than $48 and are depleted by earnings when non-welfare income exceeds the 'free area' applicable to the payment type of the recipient. A maximum of 48 credits are accrued each fortnight, while the maximum Working Credit balance is 1000. More formally, the change in Working Credit balance from one fortnight to the next is given by:

$$\begin{aligned}\Delta WC_t &= A_t - D_t \\ &= \left[\min\left\{1000 - WC_{t-1}, \max(48 - E_t - U_t, 0)\right\}\right] - \left[\min\left\{WC_{t-1}, \max\left(E_t - \max\left(F - U_t, 0\right), 0\right)\right\}\right]\end{aligned}$$

where A is accruals, D is depletions, E is earned income, U is unearned income and F is the 'free area', which is $62 for most allowances and variable for pensions, contingent on partner status and dependent children. For couples in which at least one member is a pensioner, E and U are the totals for the couple divided by two. Working credit balances are preserved for 12 months after exit from income support payments. As an indication of the magnitude of the program, nearly 540,000 customers depleted their Working Credits in the first nine months after the program came into effect.

Prior to the implementation of Working Credit, income support recipients were sent letters providing information on the program, and recipients continue to be regularly notified of their Working Credit balance. This occurs on a fortnightly basis for Newstart Allowance recipients (who make up approximately 45% of persons in receipt of an eligible payment in any given fortnight), on a quarterly basis for others with fortnightly income reporting and less regularly (or sometimes not at all) for income support recipients on other programs. These regular statements are likely to make the Working Credit more salient for income

[3] Other payment types for which recipients can accrue Working Credits are Partner Allowance, Mature Age Allowance, Sickness Allowance, Widow Allowance, Parenting Payment Partnered, Wife Pension, Widow B Pension, Carer Payment and Bereavement Allowance.

support recipients than it would otherwise be. Unfortunately, we are unable to separately identify the impact of the letters from the program itself.

The Australian government does not estimate the budgetary cost of the Working Credit. This is because the Working Credit is not a payment. Instead, income support recipients use their Working Credit balances so that their payments are not reduced as a result of their earnings. In effect, the budgetary cost of the Working Credit comes through paying higher levels of income support to individuals with earnings.

However, some sense of the cost of the Working Credit can be gleaned from the depletion patterns of income support recipients presented in Tables 5 and 6. For example, of those on unemployment benefits, 8 percent deplete their Working Credit balance each fortnight. Among depleters who receive unemployment benefits, the mean depletion amount is $178 per fortnight. Assuming 500,000 unemployment benefit recipients in an average fortnight, this suggests that the annual expenditure on the Working Credit for this group alone is $0.08 \times \$178 \times 500,000 \times 26 = \$185$ million.

3. Empirical strategy

The study uses administrative data on income support recipients and takes a multi-faceted approach in terms of both the types of effects investigated and the methods employed.

Potential effects of the Working Credit program include:

a) Increasing the take-up and rate of employment among income support recipients while on income support

b) Increasing the level of earnings among income support recipients while on income support

c) Increasing the rate of exits from income support payments via increased employment of income support recipients (which can occur if part-time or temporary work acts as a stepping stone to more enduring and substantial employment)

d) Increasing the extent of 'churn'. Since Working Credit balances cease to accumulate when they reach $1,000 (which can occur after 42 weeks with zero earnings), the program creates an incentive for income support recipients whose Working Credit balance is $1,000 to get a job, run down their Working Credit balance to zero, and then move back onto

income support. Such a strategy would allow an individual to maximise his or her gains from the Working Credit program; potentially benefiting by more than $1,000 per year.

In this paper, we investigate the first three theories. We also describe Working Credit balances and the depletion of Working Credits of eligible income support recipients, including examination of differences by payment type and other recipient characteristics.

The fourth potential effect of the program (d) is clearly of interest, and indeed is the most closely connected to the question ultimately of most policy-relevance: does the Working Credit program increase employment and reduce reliance on income support in the long run? However, we do not investigate the extent of churning, or other longer-term effects of the Working Credit program, because the data available do not permit this. The data set available to us (discussed in Section 5) ends only 15 months after the program became fully operational (in the sense that the maximum Working Credit balance could be reached). It is therefore not possible to investigate long-term effects, or even intermediate effects for a sufficiently large sample.

The strategies we adopt to identify the effects of Working Credits are based on two key features of the program. First, the Working Credit program did not involve replacement of an existing (similar) program, so the period immediately prior to its introduction can be used to assist in inferring outcomes in the absence of the program. The second feature of the program that we exploit is that potential Working Credit balances are increasing in spell duration (reaching the maximum balance of $1000 only after 21 fortnights with no earnings), implying the potential benefits of Working Credits will in general be increasing in spell duration. Because short-term recipients receive only a small Working Credit, and long-term recipients receive a large Working Credit, we can potentially use short-term recipients as a control group, and long-term recipients as a treatment group.

Taking these features into account, we use three empirical strategies to evaluate the impact of the Working Credit:

(1) Differences-in-differences (unconditional): Utilising both the period prior to the introduction of the Working Credit program and the fact that the benefits of the program are generally higher for those with longer spell durations, this approach involves comparing the difference in the outcome measures in the period before the program was introduced (the ‘before’ period) and the period after the program was introduced (the ‘after’ period) for long-term recipients with the same difference for short-term recipients, i.e.,

Policy Effect on outcome Y = {Y(after, long-term) – Y(before, long-term)} – {Y(after, short-term) – Y(before, short-term)}

We define 'short-term' as 'spell durations of 6 fortnights or less' and adopt two alternative definitions of 'long-term': 'spell durations of 21-27 fortnights', and 'spell durations of 14-20 fortnights'. (Note that Working Credits can first reach the upper limit of $1000 in the 21st fortnight.) This approach controls for all other changes over time between the before and after periods that could affect outcomes, on the assumption that these changes affect short-term and long-term recipients in the same way.

(2) Differences-in-differences regression models: This differences-in-differences approach attempts to control for observed differences between the 'treatment' and 'control' groups by estimating regression models of the outcome of interest on the full sample (in the before and after periods) and including regressors for observed characteristics. Differences-in-differences program effects are identified by including a 'post-Working Credit introduction' indicator variable and interacting this with a 'long-term recipient' indicator variable.

(3) Matched differences-in-differences: This strategy involves undertaking the comparisons between individuals matched on characteristics available in the data we use, including age, location, local labour market conditions and income support receipt history. It thereby controls for differences in the composition of recipients across the four comparison groups in terms of observed characteristics.

Simple before-after comparisons are not made to ascertain the effects of the program, since – for reasons unrelated to the Working Credit program – general labour market conditions were improving over the period under study. Note that our approaches involve comparing one set of persons in the 'after' period with *different* persons in the 'before' period – that is, in general, we do not examine the same person before and after the introduction of the program.[4]

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[4] A feature of the program that in principle could be used to identify effects of the program is the asymmetry between the determination of accruals and the determination of depletions. Depletions D are a function of earnings E, whereas accruals A are a function of earnings plus unearned income U, i.e., as described earlier,

$$\begin{aligned}\Delta WC_t &= A_t - D_t \\ &= \left[\min\left\{1000 - WC_{t-1}, \max(48 - E_t - U_t, 0)\right\}\right] - \left[\min\left\{WC_{t-1}, \max(E_t - F, 0)\right\}\right]\end{aligned}$$

where F is the 'free area' ($62 for most allowances and variable for pensions, contingent on partner status and dependent children. U could possibly be considered an exogenous source of variation in Working Credit balances: two individuals the same in all respects other than the value of U during the spell will have different

Our analysis focuses on all individuals in receipt of unemployment benefits, and women in receipt of the two main parenting payments, Parenting Payment Single (PPS) and Parenting Payment Partnered (PPP).[5] We focus on these income support categories because they are the groups of recipients that – ex ante – one would expect to be most affected by the Working Credit. This is particularly true of unemployment benefit recipients, who not only have a greater attachment to the labour market than recipients of other allowances and pensions,[6] but were also notified more regularly about their Working Credit balances than recipients of other payments.[7]

In the case of PPS, coincident policy changes make it more difficult to discern the precise impact of the introduction of Working Credit. Most notably, the government changed the PPS income test on 20 September 2003 from an annual to a fortnightly income test. Associated with this change were more onerous income reporting requirements for many recipients. These changes have the potential to impact not only labour supply, but also earnings (as reported in the administrative data). A further policy change at the time of introduction of Working Credit was the extension to PPS of a rule known as the 'six-fortnight nil rate rule'. This rule has been in place for allowances for many years, but was only introduced for other payments on 20 September 2003. The rule provides that a person can go off income support for up to six fortnights and come back on to payments without going through the re-application process. This also may have affected labour supply. For example, recipients of these payments may have been more likely to exit payments for employment given the knowledge that they could easily return within six weeks if their new job did not work out.

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accumulated Working Credits balances (so, in essence, differences in subsequent behaviour could be attributed to Working Credits). The practical problem for this approach is that unearned income is not a significant feature of receipt for most recipients; and U would in any case be expected to independently affect labour supply.

[5] An analysis of the impact on other income support groups is available from the authors on request.

[6] As evidence of the higher degree of labour market attachment among unemployment benefit recipients, we find that 8-9% of unemployment benefit recipients deplete working credit balances in any given fortnight (shown in Table 5), whereas for other payment types only 2-4% of recipients deplete balances.

[7] The SU19 claim form that must be lodged fortnightly by unemployment benefit recipients is pre-printed with the recipient's Working Credit balance. This would tend to raise awareness of the program amongst this group of recipients, and for that reason they might be expected to be more responsive to the policy than other income support recipients, who do not need to lodge fortnightly claim forms. Indeed, some recipients, such as most Disability Support Pension recipients, received no information about Working Credit balances.

In addition to our analysis for the full working-age population, we also focus on prime-aged males and females aged 25-44 on unemployment benefits. These are groups with a particularly strong attachment to the labour market and are therefore particularly likely to have obtained employment in the event of exit from payments. Note also that prime-aged women are a demographic group generally found to have high labour supply elasticities, and are therefore potentially more responsive to incentives created by Working Credits.

In defining the 'before' and 'after' periods appropriate to our analysis, we need to take into account two factors. First, it is useful (although not crucial) to define windows that span the full year, so as to take account of seasonal factors. More importantly, it is necessary to define an 'after' window that includes a period in which eligible income support recipients have had the chance to build up a maximum balance. Although the Working Credit program came into effect on 20 September 2003, individuals began with zero balances on that date. It was only 42 weeks later – in the first fortnight of July 2004 – that income support recipients could potentially have accumulated the maximum Working Credit balance of 1,000.

Our analysis correspondingly takes into account the lower potential for program impacts in the period up to July 2004. For the unconditional and matched differences-in-differences analyses, this is achieved by excluding the 'build-up' period. Thus, we define the 'before' period to be July 2002 to June 2003 and the 'after' period to be July 2004 to June 2005. For the regression models, we retain the build-up period as part of the 'after' period, which is defined to be 20 September 2003 to 20 September 2005, while the 'before' period is analogously defined as 20 September 2001 to 20 September 2003. In these models, we take account of the build-up period by including explanatory variables capturing program effects that distinguish the period from September 2003 to July 2004 from the post-July 2004 period. This allows us to identify both the impacts in the transitional period up to July 2004 and the impacts when there is maximum potential for program effects.

4. Data and sample selection

To investigate the impact of the Working Credit program, we use de-identified payments administration data spanning the period January 1995 to September 2005.[8] The data set comprises all fortnightly payment records over the period January 1995 to September 2005

[8] The data set was provided by the Australian Government Department of Families, Housing, Communities and Indigenous Affairs.

of a 10% random sample of individuals who received an income support payment at some stage in that period. A separate record is generated for an individual in every fortnight in the period in which an income support payment was received. Each payment record includes details on the individual's sex, date of birth, postcode of residence, whether partnered, partner income support status, number of dependent children, age of youngest dependent child, earned income, unearned income, payment type, payment entitlement and, depending on the payment type, potentially other information (such as 'activity type' for Newstart Allowance recipients).

The structure of the data allows us to identify detailed patterns of income support receipt and earnings while on income support, which is very useful for evaluating the effects of the Working Credit program. However, there are some limitations of the administrative data, such as the absence of information during the time a recipient is off payments. The information on human capital and labour market activities is also very limited. For example, there is no information on working hours or wage rates, which is clearly important to assessments of program effects on labour market activity. Furthermore, the dataset is a series of fortnightly snapshots and does not contain retrospective updates. For example, if a recipient reports earnings for preceding fortnights, this will not appear in the dataset at all. This can cause Working Credit balances to unaccountably drop. In general, earnings will be under-reported because of this. The issue arises more for non-unemployment benefit payment types.[9] These limitations of the data should be kept in mind when interpreting the results.

The sample comprises all payment records for eligible payments in the July 2002 to June 2003 'before' period and all payment record for eligible payments in the July 2004 to June 2005 'after' period. As noted in Section 3, distinct payment-type categories are examined separately, on the basis that the greatly different circumstances of individuals receiving different payment types would suggest it is inappropriate to examine them as one group.

Table 1 presents, for each of the payment type categories we examine, counts of the number of recipients and the number of person-fortnight observations in the September 2001 to September 2005 sample period. We have around 16 million person-fortnight observations in this sample period, covering 262,414 individuals. Given we have a 10% sample, this implies

[9] Working Credit balances and benefit entitlements are calculated on a daily basis. Also note that data extraction dates in general (most cases) do not correspond to pay days (which vary across recipients).

2.6 million individuals were observed on an eligible income support payment between 21 September 2001 and 30 September 2005, generating a total population of 160 million fortnightly payment records. Of the 262,414 individuals in the sample, 238,549 individuals (147,271 men and 91,278 women) are observed on unemployment benefits (note that a person may be observed in more than one payment type category in the sample period). In addition 68,452 females are observed on PPS and 44,509 females are observed on PPP.

Table 1: Raw Data Counts (21 September 2001 – 30 September 2005)

	No. of recipients	No. of observations						
		Total	By (incomplete) spell duration category (fortnights)					
			1-6	7-13	14-20	21-26	27-39	40+
Male UB	147,271	4,821,452	789,796	596,491	414,017	276,935	458,631	2,285,582
Male UB 25-44	67,912	2,087,786	369,443	276,979	188,763	124,940	202,670	924,991
Female UB	91,278	2,321,512	388,373	286,886	196,226	131,329	215,668	1,103,030
Female UB 25-44	30,381	756,469	126,814	90,686	59,771	39,189	63,357	376,652
Female PPS	68,452	4,322,490	163,081	182,175	173,896	141,782	291,100	3,370,456
Female PPP	44,509	1,760,309	143,844	132,976	107,645	78,332	143,994	1,153,518
Total	318,418	13,225,763	1,485,094	1,198,528	891,784	628,378	1,109,393	7,912,586

Note: An observation is a person-fortnight.

The counts of person-fortnight observations are also disaggregated by spell duration category in Table 1. That is, each observation is assigned to a duration category as at the date of the observation. Of the 16 million observations in the data, over 13 million are at spell durations of 40 fortnights or more. Of the 7 million unemployment benefit payment records, about 3½ million are for 40 fortnights or more. Thus, even though the typical unemployment benefit spell is relatively short (approximately 11 fortnights), observations that belong to long spells will tend to dominate person-fortnight analyses that do not condition on spell duration. This simply reflects the fact that persons who experience long spells each contribute many more fortnightly payment records than do persons who experience short spells. It makes it clear that person-fortnight analyses that do not condition on spell duration need to be interpreted with caution.

5. Working Credit balances, accruals and depletions

Table 2 shows the number of person-fortnight observations with a positive Working Credit balance, over the period from late-2003 to late-2005. Among unemployment benefit recipients, we have 3,297,251 person-fortnight observations with positive Working Credit balances. In Table 3, we show the mean and median Working Credit amounts for all

individuals who were eligible to receive the Working Credit (including those with zero balances). As can be seen, average balances rose steadily from the fourth quarter of 2003 (when the program was introduced) to the third quarter of 2004. From this point onwards, the mean and median balances have remained reasonably constant. Note that the median Working Credit balance from the fourth quarter of 2004 onwards was $1,000, indicating that over half of those eligible for the Working Credit had the maximum balance.

Table 2: Number of observations with Working Credit balance, by quarter and income support payment type

Year	Quarter	UB	PPS	PPP
2003	4	451,434	307,136	126,736
2004	1	398,774	266,917	109,436
	2	445,796	313,974	125,271
	3	373,697	269,094	106,062
	4	425,692	314,044	121,234
2005	1	376,014	270,201	103,490
	2	418,458	315,245	118,404
	3	407,386	311,731	116,555
Total		3,297,251	2,368,342	927,188

Table 3: Mean and median Working Credit balance by quarter

Year	Quarter	Mean	Median
2003	4	136.09	93.43
2004	1	287.79	276.57
	2	461.75	537.96
	3	576.93	698.92
	4	591.56	805.71
2005	1	593.46	823.91
	2	597.85	859.87
	3	601.57	891.24
Total		477.89	380.57

Table 4 breaks down mean Working Credit balances into the different income support programs, and into male and female income support recipients. The smallest balances are for women on unemployment benefit. When comparing across benefits, however, it is important to recognise that the size of the balance is a function of both accrual and depletion. Table 5 shows the proportion of recipients depleting their Working Credit balance each fortnight (giving equal weight to each person-fortnight observation). The highest rate of depletion is for unemployment benefit recipients. On average, 8 percent of unemployment benefit recipients (9 percent of men, and 8 percent of women) deplete their Working Credit balances in a given fortnight. The next highest rate of depletion is for Parenting Payment Partnered, with a depletion rate of 7 percent.

Table 4: Mean Working Credit balance, by quarter and payment type category

Year	Quarter	Males – UB	Females – UB	Females – PPS	Females – PPP
2003	4	141.15	142.18	123.52	145.75
2004	1	314.53	309.22	288.93	191.08
	2	465.95	433.86	485.43	422.01
	3	558.01	513.85	595.05	652.43
	4	576.96	526.93	598.29	688.61
2005	1	580.60	530.76	596.65	698.57
	2	585.72	533.14	597.55	707.86
	3	591.34	541.91	597.23	710.52
Total		469.82	440.10	486.21	521.88

Table 5: Mean proportion depleting Working Credit balances per fortnight

Year	Quarter	Males – UB	Females – UB	Females – PPS	Females – PPP
2003	4	0.041	0.049	0.019	0.016
2004	1	0.081	0.089	0.052	0.145
	2	0.082	0.098	0.046	0.096
	3	0.079	0.091	0.030	0.074
	4	0.087	0.100	0.043	0.055
2005	1	0.079	0.094	0.042	0.051
	2	0.082	0.092	0.041	0.055
	3	0.081	0.089	0.039	0.053
Total		0.076	0.088	0.039	0.067

Note: Equal weight assigned to each fortnight.

In Table 6, we estimate the mean fortnightly depletion amount among those depleting their Working Credit balances. This figure is a reflection of the hourly wage and the number of hours worked by income support recipients (our data do not allow us to separately identify these factors). We observe that the mean depletion amount across all income support programs is $179. By way of comparison, the federal minimum wage in mid-2005 was $484.40 per week (or $968.80 per fortnight).[10] Our figures therefore suggest that if the typical depleter is paid at the minimum wage, he or she is most likely working around 14 hours per fortnight, or one full day per week. Moreover, it is interesting to note that if an income support recipient took on a full-time minimum wage job, he or she would deplete the maximum Working Credit balance ($1,000) in slightly over a fortnight.

[10] This was the level of the minimum wage following the Australian Industrial Relations Commission's decision on 7 June 2005.

Table 6: Mean fortnightly depletion amount among those depleting Working Credits

Year	Quarter	Males – UB	Females – UB	Females – PPS	Females – PPP
2003	4	100.33	102.63	75.96	95.09
2004	1	178.90	168.43	189.27	256.10
	2	177.08	165.03	108.32	263.75
	3	192.82	182.46	165.11	238.94
	4	192.86	177.61	153.64	218.97
2005	1	192.83	182.29	161.14	205.93
	2	195.47	183.89	176.47	225.33
	3	201.40	186.10	163.05	225.75
Total		183.17	172.11	153.36	235.70

Note: Equal weight assigned to each fortnight.

6. Unconditional differences-in-differences evaluation

In theory, one could assess the impact of the introduction of the Working Credit through a simple before-after comparison. However, while this would have the virtue of simplicity, its counterfactual would not be especially credible. In particular, we would like to separate the effects of the improving Australian economy over the period 2002-2005 (i.e., changes in labour *demand*) from the impact of the Working Credit on labour *supply*. In January 2003 (the middle of the 'before' period), the national unemployment rate was 6.8%. In January 2005 (the middle of the 'after' period) it had fallen to 5.6%. While it is conceivable that a portion of this change was due to the introduction of the Working Credit, it is unlikely that the policy was the sole factor driving the fall in unemployment. In that event, a simple before-after comparison would be confounded by the improvement in general economic conditions that coincided with the Working Credit's introduction.

We therefore employ a differences-in-differences analysis, where we compare the change from 2002-03 to 2004-05 for a group that we expect to be strongly affected by the Working Credit ('long-term' income support recipients) with a group that we expect to be affected much less by the Working Credit ('short-term' income support recipients). We consider three outcomes: whether respondents have earnings, the level of their earnings, and the exit rate. The first outcome measures the rate of employment of income support recipients while on income support ('potential effect (a)'), the second outcome measures the level of earnings of income support recipients while on income support ('potential effect (b)') and the third outcome measures the rate of exits from income support payments ('potential effect (c)').

An observation is a 'person-fortnight' – that is, each fortnightly payment record is treated as its own observation. An individual will therefore contribute as many observations as

fortnights that the individual was on an eligible income support payment in the sample period. To allow for dependencies between fortnightly observations for the one person, all observations for one person are treated as belonging to the same cluster for the purposes of statistical inference.

Short-term spell durations are defined to be durations of 1-6 fortnights. We take two approaches to defining long-term spell durations: first, we show results based on defining long-term as a spell duration of 21-26 fortnights, an interval in which many individuals are likely to have the maximum Working Credit balance. Second, we show results based on defining long-term spell durations as 14-20 fortnights. Persons in this spell duration category could not have reached the maximum Working Credit balance (unless a prior spell within the post-Working Credit period had been completed in the 12 months preceding commencement of the current spell), but would certainly tend to have higher Working Credit balances than those in the short-term group. Compared with the 21-26 fortnight definition of long-term, this definition has the advantage of comparing more similar individuals. That is, persons in the in the 1-6 fortnight spell duration range (the control group) are likely to be more similar to a treatment group defined as those in the 14-20 fortnight spell duration range than to a treatment group defined as those in the 21-26 fortnight range.

Table 7 shows the results from this analysis. Using proportion reporting earnings as the outcome variable (Panel A), we find that for several payment groups, the before/after change for the long-term unemployed was significantly larger than the before/after change for the short-term unemployed. This holds for men on unemployment benefit, and for women on PPP and PPS. The magnitude of these effects is quite large, ranging from a 2 percentage increase in participation among men on unemployment benefit to a 9 percentage point increase in the participation of women on PPS. These results are consistent with those in Panel B of Table 7, which uses mean reported earnings as the outcome measure, and finds that the improvement among the treatment group (long-term unemployed) exceeded the improvement among the control group (short-term unemployed) by a significant amount for men on unemployment benefit, and women on unemployment benefit, PPS and PPP. The increase in fortnightly earnings ranged from $10 for men on unemployment benefit to $84 for women on PPS.

Table 7: Unconditional differences-in-differences (D-D) estimates – 'Long-term' spell durations defined as 21-26 fortnights

	'Before' period				'After' period				Differences-in-differences estimate	Differences-in-differences SE
	Short-term		Long-term		Short-term		Long-term			
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE		
A. Proportion reporting earnings										
Males										
UB	0.137	0.001	0.183	0.003	0.142	0.002	0.205	0.003	0.018**	0.005
UB – 25-44	0.143	0.002	0.197	0.004	0.144	0.002	0.214	0.005	0.016**	0.007
Females										
UB	0.199	0.002	0.242	0.005	0.209	0.002	0.262	0.005	0.009	0.008
UB – 25-44	0.203	0.004	0.251	0.009	0.213	0.004	0.288	0.010	0.027*	0.015
PPS	0.400	0.005	0.328	0.006	0.349	0.005	0.367	0.006	0.090**	0.011
PPP	0.116	0.003	0.103	0.005	0.116	0.004	0.127	0.005	0.023**	0.009
B. Mean reported real earnings (September 2005 prices)										
Males										
UB	78.663	1.148	97.307	2.177	81.940	1.387	111.069	2.422	10.485**	3.721
UB – 25-44	86.987	1.753	106.894	3.498	88.226	2.360	111.514	3.530	3.381	5.774
Females										
UB	86.955	1.399	100.874	2.557	97.961	1.485	121.002	3.026	9.121**	4.456
UB – 25-44	102.535	2.663	113.565	4.791	112.429	2.917	145.650	6.654	22.190**	9.101
PPS	306.049	4.844	227.230	4.627	280.106	5.178	285.557	5.416	84.269**	10.051
PPP	45.504	1.639	39.195	2.216	59.035	2.340	64.058	3.357	11.332**	4.934
C. Proportion exiting income support receipt										
Males										
UB	0.067	0.001	0.037	0.001	0.060	0.001	0.040	0.001	0.010**	0.001
UB – 25-44	0.070	0.001	0.040	0.000	0.061	0.001	0.039	0.002	0.008**	0.002
Females										
UB	0.061	0.001	0.036	0.001	0.054	0.001	0.035	0.001	0.006**	0.002
UB – 25-44	0.065	0.001	0.037	0.002	0.059	0.001	0.040	0.002	0.009**	0.002
PPS	0.022	0.001	0.012	0.001	0.011	0.001	0.011	0.001	0.010**	0.001
PPP	0.050	0.001	0.026	0.001	0.029	0.001	0.027	0.001	0.021**	0.002

Note: Short-term spell durations defined as 'spell durations of 1-6 fortnights'; long-term spell durations defined as 'spell durations of 21-26 fortnights'. *SE* – Standard error. * and ** respectively indicate significance at 10 and 5 percent levels.

Turning to the differences-in-differences analysis of exit rates (Panel C of Table 7), the results suggest that the introduction of the Working Credit boosted exit rates of affected men on unemployment benefit, and exit rates of affected women on unemployment benefit, PPS, and PPP. The increase in the fortnightly exit rate is in the order of 1-2 percentage points. The findings for females represent a significant contrast with simple before-after comparisons of exit rates of long-term recipients (columns 2 and 4), which suggest there were no effects for PPS and PPP recipients. It appears that exit rates have generally declined in the 'after' period compared with the 'before' period for these recipients, perhaps because improving economic conditions have reduced the pool of recipients to those relatively more predisposed to entrenched reliance on income support. Differences-in-differences estimates

show a positive effect of the program because the decline in exit rates for longer-term PPS and PPP recipients was smaller than the decline for shorter-term PPS and PPP recipients (columns 1 and 3).

In Table 8, we define the treatment group as those with spell durations of 14-20 fortnights (rather than 21-26 fortnights). The differences-in-differences estimates from this specification are similar to those shown in Table 7, albeit tending to be slightly smaller. This is somewhat reassuring, since it suggests that our estimates are not particularly sensitive to the definition of the treatment and control groups.

Table 8: Unconditional D-D estimates – 'Long-term' spell durations defined as 14-20 fortnights

	'Before' period				'After' period				Differences-in-differences estimate	Differences-in-differences SE
	Short-term		Long-term		Short-term		Long-term			
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE		
A. Proportion reporting earnings										
Males										
UB	0.137	0.001	0.185	0.002	0.142	0.002	0.207	0.003	0.017**	0.004
UB – 25-44	0.143	0.002	0.196	0.004	0.144	0.002	0.217	0.004	0.020**	0.006
Females										
UB	0.199	0.002	0.250	0.004	0.209	0.002	0.262	0.004	0.002	0.007
UB – 25-44	0.203	0.004	0.268	0.007	0.213	0.004	0.288	0.008	0.010	0.012
PPS	0.400	0.005	0.340	0.005	0.349	0.005	0.361	0.006	0.072**	0.011
PPP	0.116	0.003	0.106	0.004	0.116	0.004	0.129	0.005	0.022**	0.008
B. Mean reported real earnings (September 2005 prices)										
Males										
UB	78.663	1.148	102.344	1.801	81.940	1.387	117.843	2.000	12.222**	3.238
UB – 25-44	86.987	1.753	106.753	2.658	88.226	2.360	119.958	2.864	11.965**	4.890
Females										
UB	86.955	1.399	117.140	7.916	97.961	1.485	128.067	2.630	-0.080	8.588
UB – 25-44	102.535	2.663	152.003	24.019	112.429	2.917	152.447	5.517	-9.451	24.959
PPS	306.049	4.844	237.114	4.516	280.106	5.178	280.219	5.213	69.048**	9.892
PPP	45.504	1.639	40.160	1.959	59.035	2.340	65.663	3.009	11.972**	4.588
C. Proportion exiting income support receipt										
Males										
UB	0.067	0.001	0.048	0.001	0.060	0.001	0.052	0.001	0.010**	0.001
UB – 25-44	0.070	0.001	0.052	0.001	0.061	0.001	0.055	0.001	0.012**	0.002
Females										
UB	0.061	0.001	0.044	0.001	0.054	0.001	0.044	0.001	0.007**	0.002
UB – 25-44	0.065	0.001	0.048	0.002	0.059	0.001	0.050	0.002	0.008**	0.003
PPS	0.022	0.001	0.015	0.001	0.011	0.001	0.012	0.001	0.008**	0.001
PPP	0.050	0.001	0.032	0.001	0.029	0.001	0.032	0.001	0.021**	0.002

Note: Short-term spell durations defined as 'spell durations of 1-6 fortnights'; long-term spell durations defined as 'spell durations of 14-20 fortnights'. *SE* – Standard error. " * and ** respectively indicate significance at 10 and 5 percent levels.

7. Regression-adjusted differences-in-differences

Although an unadjusted differences-in-differences approach has the benefit of clarity, it potentially suffers from the disadvantage that we do not control for other factors that might affect employment status. In this section, we therefore introduce a set of statistical controls for observable characteristics that are known to affect employment outcomes. To the extent that the treatment group has 'better' or 'worse' characteristics than the control group, this may affect our estimate of the policy effect. However, if both groups have similar observable characteristics, the two estimates should be the same.

In this section, our models essentially identify the Working Credit effect by including a 'post-Working Credit-introduction' dummy interacted with a 'long-term recipient' dummy in a regression of the outcome of interest. Note that there is an 'interim' period, 3 October 2003 to 25 June 2004, during which time the Working Credit program was in place, but no-one could have reached the maximum possible Working Credit balance of $1000. We therefore distinguish three phases: no Working Credit (up to 19 September 2003), transitional Working Credit (3 October 2003 to 25 June 2004), and full Working Credit (9 July 2004 to 30 September 2005).

In all specifications, the sample period is 21 September 2001 to 30 September 2005. This facilitates examination of both 'transitional' and 'full' impacts of the program. We control for age, country of birth and indigenous status, partner status, dependent children, housing circumstances, location, the local unemployment rate, whether subject to job search requirements, income support history, quarter of year, and (incomplete) spell duration. Full details on these variables are reported in Appendix Table 1.

Formally, our differences-in-differences regressions take the form:

$$Y_{it} = \beta_1 + \sum_{j=2}^{J} \beta_j Duration_{it}^{j} + \gamma_1 Transitional_{it} + \sum_{j=2}^{J} \gamma_j Duration_{it}^{j} Transitional_{it} + \delta_1 Full_{it} + \sum_{j=2}^{J} \delta_j Duration_{it}^{j} Full_{it} + \phi' Z_{it} + \varepsilon_{it} \quad (1)$$

In Equation (1), *Y* is the outcome variable of interest for individual *i* in fortnight *t.* The *Duration* variables are dummy indicators for spell duration categories (21-26 fortnights or

14-20 fortnights, the omitted group being 1-6 fortnights).[11] *Transitional* and *Full* denote the periods 3 October 2003 to 25 June 2004 and 9 July 2004 to 30 September 2005 respectively, Z is a vector of control variables and ε is an error term. The policy impact is captured by a coefficient on the interaction between a time indicator (*Transitional* or *Full*) and an indicator for attaining the 'treatment group' spell duration. For example, if $Duration^4$ equals one for spell durations in the 21-26 fortnights range, γ_5 and δ_5 respectively provide *Transitional* and *Full* program impact estimates when the treatment group spell duration is defined to be 21-26 fortnights.[12] Note that one advantage of such a model is that the inclusion of the local unemployment rate allows us to partially account for the change in economic conditions over this period.

Analogous to the analysis presented in Section 6, the outcomes examined are 'probability report earnings', 'amount of earnings' and 'probability of exit from payments'. Estimates where the treatment group is defined as those in the 21-26 fortnight duration interval are presented in Table 9 and estimates where the treatment group is those in the 14-20 fortnight duration interval are presented in Table 10. In each table, Panel A presents employment participation results, Panel B presents earnings amount results and Panel C presents exit probability results. As in Section 6, standard errors are obtained assuming observations are clustered at the person level.

For employment participation, regressions are estimated using a probit model where the outcome is whether or not the respondent had positive earnings in the previous fortnight, with each row of estimates (*Transitional* and *Full*) derived from a separate regression. In general, the estimates accord with those from previous specifications, with the Working Credit appearing to coincide with an increase in labour force participation by male unemployment benefit recipients, female PPP recipients, and female PPS recipients. As in Section 6, our results are quite similar whether we define the treatment group as those in the 14-20 fortnight duration interval, or those in the 21-26 fortnight duration interval.

The magnitudes from this strategy are also quite similar to those obtained in Section 6, suggesting that for male unemployment benefit recipients and female PPP recipients, the

[11] The estimated specifications actually include dummies which distinguish spell durations of 1-6 fortnights, 7-13 fortnights, 14-20 fortnights, 21-26 fortnights and 27 or more fortnights.

[12] Note that it is by specifying the 1-6 fortnights category as the omitted dummy that we are able to interpret the coefficient as the differences-in-differences estimate of the program impact.

Working Credit raised employment rates by 1-2 percentage points. For female PPS recipients, the estimated impact is larger; around 3-6 percentage points. The coefficient on female unemployment benefit recipients' participation is negative, though barely statistically significant.

Table 9: Regression model D-D estimates of the effects of Working Credit – Treatment group defined as persons with spell durations of 21-26 fortnights

	Transitional		Full	
	Estimate	Standard error	Estimate	Standard error
A. Probability of reporting earnings in any given fortnight				
Males				
UB	0.006	0.0041	0.009**	0.0035
UB 25-44	0.017**	0.0064	0.018**	0.0055
Females				
UB	-0.009	0.0067	-0.010*	0.0056
UB 25-44	-0.006	0.0118	0.015	0.0108
PPS	0.036**	0.0099	0.066**	0.0080
PPP	0.019**	0.0080	0.021**	0.0067
B. Amount of real earnings (September 2005 prices) reported in any given fortnight				
Males				
UB	59.262	41.232	80.541**	37.937
UB 25-44	163.547*	91.728	165.887*	88.353
Females				
UB	-43.990	36.344	-47.863	30.977
UB 25-44	-30.630	77.591	119.738	86.422
PPS	104.047**	22.734	169.021**	17.847
PPP	110.405**	47.229	121.112**	42.458
C. Hazard rate				
Males				
UB	1.027	0.0463	1.041	0.0420
UB 25-44	0.068	1.0495	1.068	0.0630
Females				
UB	0.971	0.0662	0.905*	0.0550
UB 25-44	1.034	0.1155	0.922	0.0985
PPS	1.810**	0.2348	2.005**	0.2349
PPP	1.434**	0.1662	1.740**	0.1704

Notes: Estimates in Panel A are of the effects of Working Credit on the probability of reporting earnings in a fortnight while on income support, obtained from Probit models of the probability that earnings are reported in the person-fortnight. Estimates in Panel B are of the effects of Working Credit on the amount of earnings reported in a fortnight while on income support, obtained from Tobit models of reported fortnightly earnings. Estimates in Panel C are of the effects of Working Credit on hazard ratios, obtained from a proportional hazards model of exit from income support. An estimate greater than one denotes a positive impact on exit probability. *Transitional* – Fortnight was in the period 3 October 2003 to 25 June 2004; *Full* – Fortnight was in the period after 25 June 2004. * and ** respectively indicate significance at 10 and 5 percent levels.

Table 10: Regression model D-D estimates of the effects of Working Credit – Treatment group defined as persons with spell durations of 14-20 fortnights

	Transitional		Full	
	Estimate	Standard error	Estimate	Standard error
A. Probability of reporting earnings in any given fortnight				
Males				
UB	0.008**	0.0034	0.013**	0.0029
UB 25-44	0.020**	0.0054	0.023**	0.0046
Females				
UB	-0.010*	0.0056	-0.004	0.0047
UB 25-44	-0.021**	0.0097	0.013	0.0088
PPS	0.035**	0.0085	0.051**	0.0068
PPP	0.019**	0.0067	0.021**	0.0057
B. Amount of real earnings (September 2005 prices) reported in any given fortnight				
Males				
UB	62.890*	37.363	117.291**	39.532
UB 25-44	192.672**	93.958	214.291**	97.130
Females				
UB	-61.930*	32.093	-19.858	26.847
UB 25-44	-143.617*	73.996	88.904	76.731
PPS	100.734**	19.324	132.310**	15.347
PPP	114.662**	41.843	128.880**	38.795
C. Hazard rate				
Males				
UB	0.988	0.0350	1.033	0.0313
UB 25-44	1.033	0.0524	1.119**	0.0490
Females				
UB	1.074	0.0567	1.092*	0.0490
UB 25-44	1.091	0.0987	1.129	0.0883
PPS	1.375**	0.1671	1.665**	0.1780
PPP	1.322**	0.1305	1.619**	0.1338

Estimates in Panel A are of the effects of Working Credit on the probability of reporting earnings in a fortnight while on income support, obtained from Probit models of the probability that earnings are reported in the person-fortnight. Estimates in Panel B are of the effects of Working Credit on the amount of earnings reported in a fortnight while on income support, obtained from Tobit models of reported fortnightly earnings. Estimates in Panel C are of the effects of Working Credit on hazard ratios, obtained from a proportional hazards model of exit from income support. An estimate greater than one denotes a positive impact on exit probability. *Transitional* – Fortnight was in the period 3 October 2003 to 25 June 2004; *Full* – Fortnight was in the period after 25 June 2004. * and ** respectively indicate significance at 10 and 5 percent levels.

In Panel B of Tables 9 and 10 we show results from a tobit regression of fortnightly earnings. The results again suggest that the Working Credit boosted labour force participation, with the specifications over the *Full* period suggesting an increase in fortnightly earnings in most specifications. In those specifications where the effect is statistically significant, the magnitude of the increase is between $81 and $214. The largest

earnings increases appear to be among prime-age male unemployment benefit recipients, female PPS recipients, and female PPP recipients.

In Panel C of Tables 9 and 10, we examine the impact of the program on spell duration via estimation of hazard models. To date, all estimation has treated the person-fortnight as the observation. We now treat the spell as the unit of analysis in order to investigate the impact of the Working Credit program on spell durations. For this analysis, the sample comprises all payment records that commenced on an eligible payment in the period 20 September 2001 to 20 September 2005. For this analysis, observations (spells) are assigned to payment-type categories according to the *initial* payment type of the spell.

Some explanation of the definition and construction of spells is required. We define a spell to be a period in which the maximum break in payments is three consecutive fortnights. (Put another way, a four-fortnight break signals an end to a spell.) This is consistent with the *Social Security Act 1991* definition for spells less than 12 months' duration. A practical consequence of this is that in conducting spell duration analyses, we first 'fill in' fortnights within the spell that the individual was off payments – that is, create artificial payment records. Non-time-varying variables and predictable time-varying (such as age) are filled in, while unpredictable time-varying variables, most notably non-welfare income, are set to missing.[13]

Estimates reported in Tables 9 and 10 are from a complementary log-log model, $p(t) = 1 - \exp[-\exp(\beta(t))]$. Coefficient estimates β are not directly informative about absolute magnitudes of effects; we therefore report $\exp(\beta)$, which gives the effect of the covariate on the relative hazard ratio.[14] The coefficients are positive and significant for prime-aged men on unemployment benefit, and for women on PPP and PPS (and otherwise not significantly different from zero). The coefficients for PPP and PPS are substantially larger than those for men on unemployment benefit, suggesting that the Working Credit had

[13] A further consequence of our spell definition is that a spell is right-censored if a person is on payments in any of the last four fortnights observed in the data set (with the censoring point – the known minimum duration of the spell – being the date of the fortnight the individual was last observed on payments).

[14] Each spell generates an observation. We use the Stephen Jenkins' *pgmhaz8* program in Stata. Reported results are for models without unobserved heterogeneity. Models with Gamma-distributed unobserved heterogeneity were estimated, but on smaller (randomly selected) samples in order to achieve model convergence. Despite the smaller sample sizes, qualitative results were not affected, and indeed point estimates were in most cases very similar to those reported.

a particular impact on boosting the exit rate from these programs. Broadly speaking, these findings accord with the unconditional analysis reported in Section 6.

8. Matched differences-in-differences

In Table 11, we present results from matched differences-in-differences analysis. Nearest neighbour propensity score matching is used, whereby the outcome experienced by each 'treatment group' member is compared to a matched 'control group' member who has similar observed characteristics.[15]

In this analysis, a treatment group member in the 'after' period (spell duration of 21-26 fortnights, after the introduction of Working Credit) is matched with a control group member in the 'after' period (spell duration of 1-6 fortnights, after Working Credit was introduced), a treatment group member in the 'before' period (spell duration of 21-26 fortnights, before Working Credit was introduced) and a control group member in the 'before' period (spell duration of 1-6 fortnights, before Working Credit was introduced). The differences-in-differences estimate is equal to the difference between the treatment and control group members' outcomes in the 'after' period minus the difference between the treatment and control group members in the 'before' period.

Matching is undertaken on age, the local unemployment rate, income support history, family situation, housing situation, location, country of birth and indigenous status and whether required to engage in job search. Table A1 in the Appendix shows summary statistics.

Table 11: Matching approach D-D estimates

	Probability report earnings		Amount of real earnings (September 2005 prices)		Probability of exit	
	Estimate	SE	Estimate	SE	Estimate	SE
Male UB	0.041**	0.0138	10.740	12.260	-0.013	0.0092
Male UB – 25-44	0.022	0.0166	4.767	13.562	-0.010	0.0106
Female UB	0.029	0.0177	-1.171	12.340	-0.016	0.0121
Female UB – 25-44	0.024	0.0256	34.534**	16.476	0.020	0.0143
Female PPS	0.098**	0.0231	84.749**	19.521	0.000	0.0086
Female PPP	0.027**	0.0134	15.086**	6.414	0.004	0.0104

Notes: See Appendix Table 2 for tests of matching quality. *SE* – Standard error. * and ** respectively indicate significance at 10 and 5 percent levels.

[15] We use the Stata psmatch2 command (Leuven and Sianesi 2003).

Results are generally consistent with those from the simple differences-in-differences strategy, but the standard errors tend to be larger (perhaps reflecting the fact that this approach imposes less structure on the estimation of program effects). While we find no statistically significant negative impacts of the program, we do find significant positive effects on the probability of reporting earnings while on income support for male unemployment benefit recipients and for female parenting payment recipients. We also find positive and statistically significant effects on the mean value of reported earnings for prime-aged female unemployment benefit recipients and female parenting payment recipients.

Although matched differences-in-differences estimates should in theory be the most robust of our three strategies for evaluating the impact of the Working Credit, these are not our preferred estimates. The reason for this is that for a substantial share of individuals (and a substantial share of spells), the nearest neighbour matching routine matches observations with others that are too dissimilar for our liking (see Table A2). Consequently, our matched estimates are somewhat sensitive to the choice of variables that we match upon. While we show matched estimates for completeness, we prefer the (unmatched) differences-in-differences results to the matched results presented in this section.

9. Robustness check

Our differences-in-differences analysis is predicated on the assumption that the change in labour demand from 2002-03 to 2004-05 had an equal impact on both the treatment group (long-term unemployed) and the control group (short-term unemployed). If the impact of the continuing economic boom on both groups was equal (absent the policy change), then the short-term unemployed may be a good control for the long-term unemployed.

One way to test this empirically is to look at whether there is a relationship between the headline unemployment rate and the share of the unemployed who are long-term unemployed – and if so, to account for this factor. To do this, we can no longer use our administrative dataset, since it is not a full population sample, and covers only a relatively short time-span. Instead, we use monthly unemployment data from the ABS Labour Force Survey, covering the period from 1986 onwards. (An inevitable drawback of this approach is that we can only look at unemployment duration, and not at duration on other income support programs. Additionally, even in the case of unemployment, eligibility and duration

are determined differently in the administrative data than it is in the ABS Labour Force Survey.)

Figure 1 shows that there is actually a strong correlation between the two series, with the share of long-term unemployed being highly pro-cyclical. During the early-1990s recession, as unemployment rose from 6% to 11%, the share of the long-term unemployed rose from around 20% to around 35%. By the late-1990s, the unemployment rate had fallen to around 7%, and the share of unemployed who were long-term unemployed had fallen to about 25%. This suggests that an economic boom has a larger impact on reducing long-term unemployment than short-term unemployment (and conversely that economic downturns tend to be associated with rising duration of unemployment).

Figure 1: Unemployment Rate and the Share of Unemployed Who are LTU

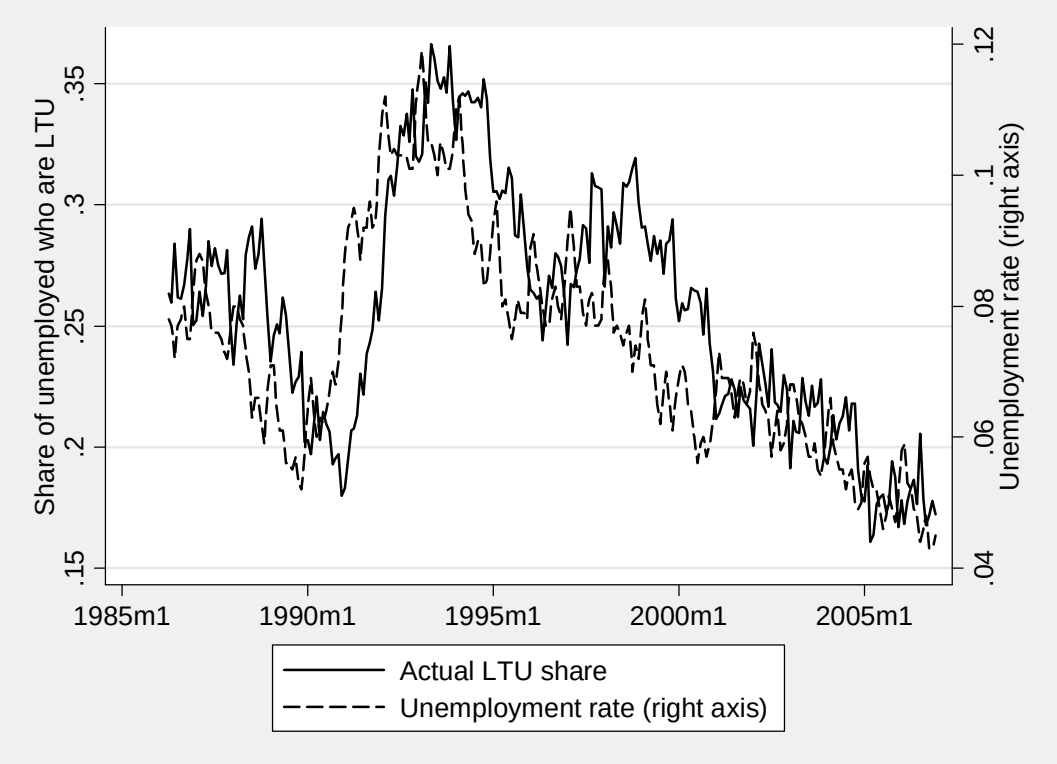
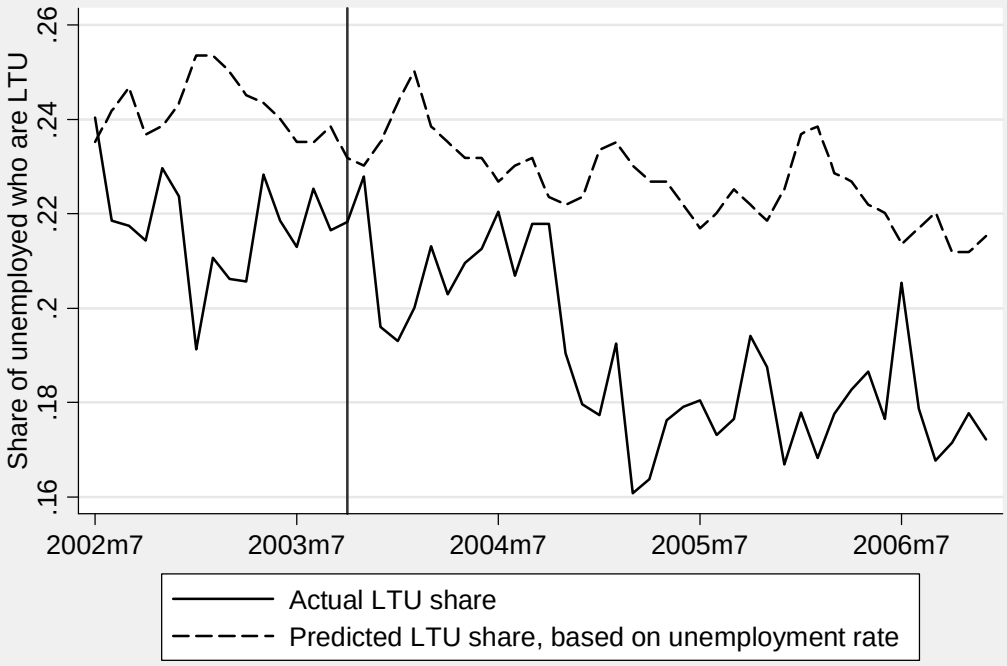


Figure 2: Predicted and Actual Share of Unemployed Who are LTU



Predicted LTU share is based on a regression of the LTU share on the unemployment rate using data from 1986-Jun 2002. We then use this to predict the share from Jul 2002 onwards.

One way of taking this pattern into account is to compare the share of long-term unemployed (LTU share) with the LTU share that one would expect, given the headline unemployment rate. To do this, we regress the LTU share on the overall unemployment rate, using data only for the pre-Working Credit period (1986 to June 2002), and use this to predict the LTU share from July 2002 onwards. We can then compare the predicted LTU share (based on the headline unemployment rate) with the actual LTU share.

Figure 2 shows the results of this analysis. Although the change in the overall unemployment rate would have predicted a fall in the LTU share over this period, the actual drop has clearly been more substantial than the fall in unemployment would lead one to expect. Comparing the period before and after September 2003 (marked on the graph with a vertical line), the headline unemployment rate would have predicted a 2% drop in the LTU share (from 24% to 22%). By contrast, the actual LTU share dropped by 6% (from 22% to 18%). This provides suggestive evidence that our results are not merely driven by changes in labour demand disproportionately affecting the long-term unemployed. Or, to put it another way, economic booms tend to help the long-term unemployed more than the short-term unemployed, but the magnitude of the fall in long-term unemployment after the

introduction of Working Credits was larger than would have been expected, even taking into account the drop in headline unemployment.

10. Discussion

Using several different empirical techniques, we estimate the impact of the September 2003 Working Credit on the employment patterns of income support recipients. With either differences-in-differences or regression-adjusted differences-in-differences, we find evidence that the introduction of the Working Credit increased employment rates, earnings and exits for those on income support. For reasons of consistency and precision, our preferred estimates are those from differences-in-differences estimates, with 'long-term' spell durations defined as 21-26 fortnights (Table 7). These suggest that the introduction of the Working Credit increased the share of income support recipients who were employed by around 2-9 percent, with the effects ranging from a 2 percentage increase in participation among men on unemployment benefit to a 9 percentage point increase in the participation of women on PPS. Working Credit also increased reported earnings by a significant amount for all groups that we study. For those groups where the fortnightly earnings increase was statistically significant, the magnitude of that increase ranged from $10 for men on unemployment benefit to $84 for women on PPS. Most importantly, the Working Credit boosted exit rates from income support by 1-2 percentage points for income support recipients in most of the affected groups.

What is the net cost per job of the Working Credit? In Table 12, we use our preferred estimates of the costs and impacts of the Working Credit to estimate the cost per job. Estimates of costs are drawn from administrative data on the share depleting (Table 5) multiplied by the mean depletion amount among depleters (Table 6). Estimates of the impact of the program are drawn from the share of respondents who leave income support (differences-in-differences estimates in Table 7). For the income support programs where we find a significant impact of the Working Credit on exits, our estimates of the cost per job range from $598 to $2,525.

The results in Table 12 can be compared with other estimates of the cost of moving welfare recipient into employment. According to an Australian government report in 2002, "Costs per employment outcome have been about $5,000−6,000 since mid-1998, compared to $8,000−9,000 in the early 1990s and within the range of $10,000 to $16,000 in the mid-

1990s." (DEWR 2002, 126). Our results suggest that on a cost-per-job basis, the Working Credit compares favourably with existing labour market programs.

Table 12: Estimates of cost to government of each 'job placement' produced by Working Credit (September 2005 prices)

	(1) Share depleting	(2) Mean depletion amount among depleters	(3) Mean depletion amount (col. 1*col. 2)	(4) Employment impact	(5) Cost per employment impact (col. 3/col. 4)
Males					
UB	0.076	$183.17	$13.92	0.010**	$1,392
UB – 25-44	0.076	$183.17	$13.92	0.008**	$1,740
Females					
UB	0.088	$172.11	$15.15	0.006**	$2,525
UB – 25-44	0.088	$172.11	$15.15	0.009**	$1,683
PPS	0.039	$153.36	$5.98	0.010**	$598
PPP	0.067	$235.70	$15.79	0.021**	$752

Notes: Mean depletion amount is the share depleting (from Table 5) multiplied by the mean fortnightly depletion amount among depleters (from Table 6). In the case of UB 25-44, we assume that these figures are the same as for all UB recipients. All estimates are averages from 2003-05. Employment impacts are the differences-in-differences estimates in Table 7, Panel C.

An alternative way of assessing cost-effectiveness is to compare the cost of the program benefits of low-wage earnings in Australia. While our sample period does not permit estimation of the medium-term or long-term effects of Working Credit on welfare receipt, it is easy to see that the benefits of low-wage employment associated with exit from income support will quickly outweigh the estimated costs of the program. For example, if we assume that those who left income support due to Working Credit worked full-time at the minimum wage prevailing in June 2005 ($484.40 per week) for the year after coming off income support, the benefit of coming off income support is $25,188 (note that this is the social benefit; the individual benefit will be only the difference between after-tax earnings and income support)

Naturally, to the extent that the typical person who leaves income support works less than full-time, this estimate will overstate the benefits of the credit; while to the extent that the typical person who leaves income support earns above the minimum wage, this estimate will understate the benefits. Also, it is important to note that this estimate does not account for the possibility of employment effects longer than one year. These could be positive (e.g., those who get off welfare manage to 'break the cycle'), or negative (e.g., if respondents 'churn' back on to income support in order to build up Working Credits again). In turn,

these ‘breaking the cycle’ and ‘churning’ effects could have long-term effects on the psyche of an individual who begins on income support.

As we noted at the outset, our results have certain inevitable limitations. Since we use administrative data, we are unable to look at the impact that the Working Credit had on recipients’ hours (conditional on working) or upon their hourly wages. In addition, we are unable to separate the ‘salience effect’ of receiving regular notification letters from the financial incentives created by the Working Credit. Teasing out the behavioural impacts of notification letters would require variation in letter receipt that was independent from the financial payments. We do not observe such variation here, but a randomised experiment might yield valuable insights into this issue.

Appendix

Table A1: Definitions of variables included in regression models and matching analysis

Variable name	Description
Age	
Exact age in years	Estimating equations contain dummies distinguishing the following categories: 15-24; 25-34; 35-44; 45-54; 55-64
Place of birth & Indigenous status	
Non-Indigenous Aus-born	Non-Indigenous Australian-born
ESB immigrant	Immigrant born in one of the main English-speaking countries
NESB immigrant	Immigrant born in a non-English-speaking country
Indigenous	Aboriginal, Torres Strait Islander or South Sea Islander
Partner status	
Single	Does not have a partner
Partner not on IS	Has a partner and that partner is not in receipt of income support
Partner on IS	Has a partner and that partner is in receipt of income support
Dependent children	
Dep. children	Recorded in data as having dependent children (dummy variable)
No. of dep. children	Number of dependent children recorded in data
Dummy variables for age of youngest child:	
Youngest ≤ 5	Youngest dependent child aged 0-5 years
Youngest 6-12	Youngest dependent child aged 6-12 years
Youngest ≥13	Youngest dependent child aged 13 years or over. A dependent child over 15 years of age must be in full-time education and under 25 years of age.
Housing circumstances	
Home-owner	Home-owner outright or with mortgage
Renting privately	Renter with private landlord
Other	Renter in public housing or does not own home and does not pay rent or board
Location	
Major city	Indicator that the individual lives in Sydney, Melbourne, Brisbane, Perth, Adelaide, Newcastle or Canberra (all cities with more than 300,000 inhabitants)

Table A1 continued: Definitions of variables included in regression models and matching analysis

Variable name	Description
Income support history	
TTO – 1 year	Proportion of time on income support payments in the year immediately preceding the current date
TTO – 3 years	Proportion of time on income support payments in the three years immediately preceding the current date
TTO – 5 years	Proportion of time on income support payments in the five years immediately preceding the current date

For each of the above TTO measures, the estimating equations contain dummies distinguishing the following categories: 0 < TTO <= 0.25; 0.25 < TTO <= 0.5; 0.5 < TTO <= 0.75; 0.75 < TTO <= 1.

Notes: (1) To enable inclusion of persons under 21 years of age, periods when a person is below the minimum age of eligibility for income support payments are treated as periods off income support payments. (For example, a person who enters income support receipt on his 15th birthday will at that point have a zero value for all three of these variables.)

(2) For hazard model regressions, these variables refer to TTO at commencement of the current income support spell.

Earned income	
Has earned income	Indicator equal to 1 if earned income reported in that fortnight; equal to 0 otherwise
Earned income amount	Amount of earned income in the fortnight (June quarter 2005 prices)
Payment types	
Unemployment benefits (UB)	On unemployment benefits: Newstart Allowance, Youth Allowance (other), Newstart Mature Age Allowance and Mature Age Allowance
PPS	Parenting Payment Single
PPP	Parenting Payment Partnered
Job search requirements	On unemployment benefits and has a reported activity type that requires significant job search or involves significant contact with the labour market through either part-time work, self-employment or other forms of employment
Local unemployment rate	Unemployment rate (%) in the person's labour force statistical region. Quarterly series. See ABS (2002) for details on the regions.

Estimating equations contain dummies distinguishing the following categories for the local unemployment rate (LUR) relative to the national average unemployment rate (UR): LUR <= 0.75UR; 0.75UR < LUR <=UR; UR < LUR <=1.25UR; 1.25UR < LUR.

Completed spell duration

Spell duration is defined to be the number of consecutive fortnights in which the maximum payment break is 3 fortnights. Dummy variables are included that distinguish the following categories for total number of fortnights in the completed spell: 1-13 fortnights; 14-26 fortnights; 27 or more fortnights. Dummies are set equal to missing for spells right-censored before a duration of 27 fortnights.

Quarter of year	Dummies for quarter of year of current fortnight

Table A2: Matching quality

	Number of observations on common support		Mean absolute bias		Pseudo R-squared	
	Treatment group	Control group	'Before' matching	'After' matching	Unmatched	Matched
Male UB						
T-C in before period	69,973	197,431	8.2	1.2	0.128	0.001
T-C in after period	54,868	176,921	7.4	1.5	0.063	0.001
T after – T before	54,868	69,973	3.8	2.1	0.026	0.002
Male UB 25-44						
T-C in before period	31,157	93,416	9.9	1.7	0.126	0.002
T-C in after period	24,075	81,652	9.5	1.4	0.095	0.002
T after – T before	24,075	31,157	3.4	2.0	0.015	0.002
Female UB						
T-C in before period	31,785	92,864	7.6	2.0	0.110	0.002
T-C in after period	31,439	92,681	6.9	1.8	0.054	0.002
T after – T before	31,439	31,785	6.2	1.9	0.037	0.002
Female UB 25-44						
T-C in before period	10,031	31,910	11.0	2.6	0.127	0.004
T-C in after period	8,145	27,966	11.5	2.6	0.102	0.005
T after – T before	8,145	10,031	3.6	2.5	0.014	0.004
Female PPS						
T-C in before period	34,286	42,262	2.8	1.6	0.009	0.002
T-C in after period	34,326	36,202	3.7	2.3	0.009	0.003
T after – T before	34,326	34,286	2.8	2.0	0.010	0.002
Female PPP						
T-C in before period	19,361	37,583	3.9	2.2	0.013	0.003
T-C in after period	17,796	29,906	3.7	2.0	0.014	0.002
T after – T before	17,796	19,361	3.3	1.7	0.016	0.002

Notes: T-C in before period: Comparison of treatment group members in the before period with control group members in the before period; *T-C in after period*: Comparison of treatment group members in the after period with control group members in the after period; *T after – T before*: Comparison of treatment group members in the after period with treatment group members in the before period; *Number of observations on common support*: Number of observations from the treatment and control groups used to produce program impact estimates – contains all treatment group members able to be matched and all control group members to whom they were matched; *Mean absolute bias*: Mean value of the absolute difference between propensity scores of treatment group and matched control group members; *Pseudo R-squared*: Obtained from Probit regression on treatment and control group members of the probability that an observation comes from the treatment group. Lower values in the matched sample indicate better matches between the matched treatment and control groups.

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