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The Intergenerational Impact of Reduced Generosity in the Social Safety Net[*]

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Abstract

This paper provides new causal evidence on how a reduction in welfare cash assistance to newly separated parents impacts the parents themselves and their young-adult children. Our paper differs from the rest of the literature evaluating the intergenerational impacts of welfare policy because it focuses on the role of welfare assistance specifically at the point of parental relationship separation. A priori, it is unclear if a policy that provides welfare assistance to newly separated mothers produces work-disincentive effects and/or whether, on balance, it helps or hinders recovery from the event of separation. We use a reform that withdrew welfare eligibility from mothers who separated from their partners on or after 1 July 2006, while mothers who separated before this date were exempt from the new rules. We exploit this discontinuity in a Regression Discontinuity framework using biweekly administrative social security records. We find that the loss of welfare eligibility at the time of relationship breakdown reduces mothers' welfare benefits, but increases their personal and family income. The reform is found to decrease young adults' reliance on unemployment benefits, but this result is weaker and less robust. The effects on young adults' receipt of other types of welfare payments, fertility, homelessness or financial independence cannot be identified precisely.

JEL: J12, J18, H53

Keywords: Intergenerational impacts, single parents, welfare reform, young adults

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1   Introduction

Policy makers around the developed world increasingly use the social safety net as a set of tools to promote work among single parents rather than to redistribute income to economically insecure families. This demands a greater understanding of the potential unintended consequences of welfare reforms on families. While evidence points to these reforms having increased labour force participation among single parents (Duncan & Chase-Lansdale 2001; Dahl & Lochner 2012; Grogger & Karoly 2009; Hoynes & Schanzenbach 2018), several studies have also documented unintended consequences. For example, these reforms have been shown to increase single parents' non-claimant unemployment, disability benefits, or their incidence of repartnering (Avram, Brewer & Salvatori 2018; Low, Meghir, Pistaferri & Voena 2018; Fisher & Zhu 2019). Leading from the impacts on parents, welfare reforms can also have unintended consequences for the children of affected families. Most of the literature has focused on the impacts on young and adolescent children and much less is known about the impacts on young-adult children. Evidence here is still emerging because of data availability issues. For example, in the United States, the children of parents affected by the large welfare reforms beginning in 1996 are just now entering early adulthood.

In this paper, we aim to understand the impact of an Australian welfare-to-work policy aimed at low-income single parents on the outcomes of their young-adult children. We examine outcomes such as young adults' welfare use, unemployment patterns, and homelessness status. The reform significantly reduced the welfare receipt of newly divorced or separated parents and increased their own private earnings. This means that we study the impact of an exogenous decrease in the generosity of a government support program and a subsequent increase in parental employment and earnings. We focus on mothers as they are most likely to undertake the majority of the caring responsibilities for children after a relationship separation.

Evaluations of welfare reform need to consider the potential unintended effects on children of all ages: age-of-exposure to the reform matters. For example, preschool and elementary children's health and academic outcomes were shown to either benefit or remain unaffected by the reforms of the 1990s in the United States (Duncan & Chase-Lansdale 2001; Blank 2007; Dahl & Lochner 2012; Grogger & Karoly 2009). By contrast, very young children, especially below age one, but also up to age three, as well as children from highly disadvantaged families were adversely impacted as were adolescents based on school attendance and behavioural outcomes (Hoynes & Schanzenbach 2018; Grogger & Karoly 2009; Dave, Corman, Kalil, Schwartz-Soicher & Reichman 2021).

Young-adult children can be just as impacted as their younger counterparts since welfare reforms can also change their access to parental time, parental income, information exchanges (about the welfare system) and/or attitudes. Older children may be additionally impacted, compared to younger children, if they are relied upon for household chores, such as caring for younger siblings, in response to policy-driven increases in maternal employment (Morris, Gennetian, Duncan & Huston 2007). Older children can also face reduced exposure to adult supervision (Teitler, Reichman & Nepomnyaschy 2004). For example, while formal child care is an option for pre-school children, and has been found to offset the potential negative effects of reduced maternal time, it is not a viable option for young-adult children (Grogger & Karoly 2009; Hartley, Lamarche & Ziliak 2017; Bastian & Michelmore 2018; Dave, Corman, Kalil, Schwartz-Soicher & Reichman 2021). Such channels of welfare reform effect can subsequently affect young adults' behaviour, preferences, and attitudes towards factors such as welfare, employment, study, and place of residence.

We contribute to the literature by looking at the little-examined outcomes of homelessness status and living arrangements, as well as the intensity of welfare use by young-adult children. These are important outcomes to examine because they are salient experiences associated with parental relationship separation (Painter & Levine 2000, Gruber 2004, Moschion & van Ours 2019). Changes in a young adult's welfare receipt intensity, for example, can proxy for both the young adult's economic circumstance, as well as their attitude towards welfare. Also, homelessness is becoming increasingly prevalent given the rising housing costs in many major cities around the developed world and it has been shown to have scarring effects on young adults' future outcomes (Cobb-Clark & Zhu 2017).

Furthermore, more knowledge is required about which dimensions of welfare reforms have the most impact and the ways in which young-adult children may be affected. Previous evaluation studies have been prevented from isolating the impact of a particular policy dimension because reforms often change several policy components simultaneously. For example, evaluations of the PROWORA reforms in the U.S. capture the combined impacts of time limits, earnings credits, and potential macroeconomic effects (Waldfogel 2001, Duncan, Morris & Rodrigues 2011, Hartley, Lamarche & Ziliak 2017). Similarly, studies in the U.K. looking at the expansions to in-work credits combine the effects of these changes with reforms to Income Support generosity such as increases in the child premia (Blundell 2000, Anderberg 2008).

We fill this gap in the literature because we can measure the impact of a reduction in government cash assistance rather than a bundle of reform components. The reform in

Australia removed access to payments for one segment of the single-parent population and made another segment exempt. Specifically, parents separating on or after 1 July 2006 and whose youngest child was 8 to 15 years at the point of separation were affected by the new rules (treated group); parents with similar-aged children separating before 1 July 2006 were bound by the old rules (control group). The new rules acted to reduce income support levels for the former group relative to the latter group.

Following from this, we are one of the first in the literature to specifically link reductions in the generosity of income support payments to changes in total income for single mothers. When low-income individuals receive less financial support from the government, it is unclear how their income may change. Even if they do lift their employment participation and/or hours of work (Gong & Breunig 2014), such increased work does not necessarily offset the lost income from government payments (Grogger & Karoly 2009). Also, they can turn to alternative sources of income, such as repartnering (Fisher & Zhu 2019) or indeed they can be left out of the labour market and/or the welfare system altogether (Blank 2007). An increase in total maternal income may moderate the impact of the welfare reform, as it has been shown to do so for younger children (Duncan & Chase-Lansdale 2001), or it can have no protective impacts, as it has been shown for adolescent children (Dave, Corman, Kalil, Schwartz-Soicher & Reichman 2021). Currently, it is unclear how it may affect young-adult children.

Another point of differentiation of our paper is that we focus on mothers who recently experienced a relationship breakdown. By contrast, the existing literature tends to focus on the impact of welfare policies aimed at mothers with a disability or mothers who have been separated for longer average durations. This is important because mothers who have recently separated may respond differently to lower welfare supports than those who have been separated for longer. For example, they may face different employment and non-economic constraints. This is because the event of relationship separation itself constitutes a significant income (and emotional) shock, particularly for mothers and children (Amato 2010). A-priori, it is unclear if welfare cash assistance upon separation may divert mothers onto a trajectory of future welfare use or may serve to facilitate a smoother transition into employment and provide income-related benefits to affected children.

Our estimates are based on a Regression Discontinuity Design using administrative government assistance records of over 10,000 mothers and their young-adult children. These data are collected at a high frequency (bi-weekly) and covers a long time-span (from 2001 to 2013). Our data have comprehensive coverage: they include recipients of both highly-targeted income support payments as well as recipients of a near-universal family payment. This means the sample are representative of the population of low- to middle-

income Australian mothers. Another key benefit of using the family payment data is that we continue to observe mothers in our data even if they stop receiving income support payments because of, for example, the stricter eligibility rules or because of higher employment earnings.

We observe information on a cohort of children recorded any-time under the mother's care and we follow these children to young adulthood (up to age 26 years). As every member in the household has a unique identifier in the administrative data, we can observe young adult children even once they have left their mother's household. This is important for our paper since we are interested in young adults' housing situation, financial-independence, and longer-term outcomes.

The key finding of this paper is that the reform greatly affected newly separated mothers. In the first year after the separation, the reform significantly reduced Parenting Payment receipt rates (by 39 percentage points) and the overall amount of welfare benefits (by close to A$2,000 per year, or 35% relative to the average benefits of the mothers who separated just before the reform). In response to the reduced parenting benefits, mothers affected by the reform turned to other sources of income. Some mothers increased their personal income, which is consistent with the findings of Gong & Breunig (2014). The estimated effect of the reform on personal annual income is A$5,500 in the first year after the separation. We find even larger effects of the reform on household annual income, which increased by almost A$8,000 in the first year after the separation. Many other mothers turned to unemployment benefits: the receipt of unemployment benefit increased by 16 percentage points in the first year after the separation. These effects persist in the second year (and for some outcomes up to the fifth year) after the separation. The impacts of the reform on the mother can be interpreted as causal since we find little evidence of pre-reform differences in the socio-economic status and demographic characteristics of affected and unaffected mothers. We also find little evidence that mothers were pulling forward their separation date in order to avoid the reform implications.

As for young adult outcomes, we find evidence, albeit quite weak, of a reduction in young adults' reliance on unemployment benefits. Specifically, the reform is found to decrease young adults' average annual unemployment benefits by A$358 in the first five years after the separation. This represents a substantial decrease in the annual benefit levels (30% relative to the average benefit amount of the young adults whose mothers separated just before the reform). There are no statistically significant reform effects on other types of welfare benefits (disability or parenting), homelessness, or financial independence, but these effects are too imprecisely estimated to draw any definite conclusions.

The paper proceeds by first outlining key features of the Australian welfare system and the 2006 reform in Section 2. Section 3 describes the administrative dataset used, and Section 4 outlines our empirical strategy based on Regression Discontinuity Design. Section 5 presents our results, and Section 6 concludes.

2   The 2006 Welfare to Work Reform

The Australian welfare system provides a number of payments to families with children, and is managed by a central agency called Centerlink. The key payments targeted at low income parents are (1) the Parenting Payment Partnered (PPP) scheme, which provides payments to low income couples with young children, and (2) the Parenting Payment Single (PPS) scheme, which is paid to low income single parents.[1] Other types of payments in the Income Support system include the following: New Start Allowance (NSA) for unemployed individuals; Disability Support Pension (DSP) for individuals with a disability; and Carers Allowance for those with large caring responsibilities for elderly or disabled family members. In Australia, individuals can only receive one income support payment at a time.

The 2006 Welfare-to-Work (W2W) reform in Australia introduced significant changes to a number of income support payments. The reform was announced on 11 May 2005, and implemented on 1 July 2006. The objective of the reform was to reduce welfare dependency and to increase economic participation. The changes to the Parenting Payment Single are the focus of this paper. The reform introduced new rules that tightened eligibility for new applicants of single parent benefit as well as participation requirements (along with sanctions for those who fail to comply with the new participation requirements).[2]

The key change was the tightening of the eligibility criteria for Parenting Payment Single. Prior to 1 July 2006, a low-income single parent with a youngest child aged below 16 years was eligible to receive this payment. After 1 July 2006, newly-separated low-income single parents were only eligible for Parenting Payment, if their youngest child was below age 8.[3] Note that only new applicants were affected; all single parents who were already in receipt of Parenting Payment Single at 1 July 2006 were grandfathered, meaning they

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[1]There are also Family Tax Benefits, Child Care Rebates and Subsidies, but the rules for these payments were unchanged in the 2006 reforms.

[2]We later show that the changes to participation requirements and other payments such as PPP and DSP do not confound the effects stemming from changes to PPS eligibility.

[3]Some single parents whose youngest child was 8-15 years old were exempt from the new rules. They include those who were foster carers; those with a severely disabled child; those who were single parents with four or more children; and those who experienced domestic violence.

could continue to receive the payment until their youngest child reached age 16 even after the new policy rules were implemented. Therefore, we can compare those parents who separated before and after 1 July 2006 to study the effects of the reform on Parenting Payment Single receipt.

The main consequence of not being eligible for single parent benefit is reduced government cash assistance. Single parents who were no longer eligible for Parenting Payment Single may have been eligible for Newstart Allowance, if they satisfied a more restrictive income and assets test. For every level of earned income, Parenting Payment Single is, however, more generous than Newstart Allowance, and the returns from paid work are much higher under single parent benefit than under unemployment benefit.

Under Parenting Payment Single, single parents with one child and no private income could receive about A\$257 a week on average in 2006-07. They could continue to receive the maximum payment until their private income reached A\$76 a week.[4] For every dollar earned beyond this 'penalty-free income threshold', the payment reduced by 40 cents, which meant that a single parent could earn up to A\$718 per week until their entitlement to Parenting Payment extinguished.

Newstart Allowance is less generous in several ways. First, the maximum payment was A\$228 a week in 2006-07, which is A\$29 a week less than the Parenting Payment Single rate. Second, Newstart Allowance has a lower 'penalty-free income threshold' than that associated with Parenting Payment Single. The payments reduce as soon as private income reaches A\$31 a week. Third, the taper rates are higher than those associated with the Parenting Payment Single[5] and the payments cut out when an applicant reaches a private income of A\$426 per week. Therefore, the entitlement to income support ceases at a much lower level of earnings for those subject to the new Newstart Allowance test than for those on the existing single parent benefit.[6]

The aim of this paper is to separate the effect of the reduced government cash assistance from the introduction of participation requirements, and changes to other income support payments such as disability and partnered parenting benefits. For the reduced government cash assistance to the post-reform separators to explain our results, we require that participation requirements and other income support payment changes had no direct

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[4]The threshold was higher for additional children, increasing by A\$12.30 for every additional child.

[5]Specifically, the payment is reduced at 50 cents for every dollar above the free area of A\$31 and below A\$125 per week. The taper rate then further increases: for every earned dollar beyond A\$125, the payment is reduced by 60 cents.

[6]For those with more than one child the difference will be even greater, as the 'penalty-free income threshold' under Newstart Allowance does not vary with the number of children.

impact on a single mother's outcomes after the separation. We can confirm that there were no other policy changes at this date (Ey 2012).

The W2W reform introduced more stringent participation requirements for mothers in receipt of Parenting Payment Single. Specifically, parents who had separated from their partners on or after 1 July 2006, and whose youngest child was aged six or more were required to participate in employment, education or job-search activities for at least 15 hours per week.[7] The new participation requirements were imposed on the existing recipients of Parenting Payment Single one year later - on 1 July 2007 - if their youngest child had turned seven. These changes may have directly affected welfare receipt patterns of mothers, because they were introduced at the same time as the tightening of the eligibility criteria for single parent benefit. We show, however, that participation requirements did not directly affect mother's welfare participation.

Since the W2W reform also brought changes to payments other than Parenting Payment Single, such as Disability Support Pension and Parenting Payment Partnered, these other changes may confound the effect of changes in single parent benefit. The eligibility for disability benefit tightened, such that new applicants only became eligible for the benefit if they passed an activity test assessment that confirmed they could not work for 15 hours or more (down from 30 hours). The eligibility conditions for partnered parent benefit were also tightened: mothers who applied after 1 July 2006 could only receive the benefit if their youngest child was below six (down from 16 for those who applied before 1 July 2006). Participation requirements to engage in 15 hours of work, study, or job search per week were also introduced for new applicants of Parenting Payment Partnered. The tightening of eligibility for these benefits around the same time as the changes to single parent benefit may be a concern for our identification strategy, if they were to give mothers more incentives to separate from their partners just before 1 July 2006 in order to be eligible to receive Parenting Payment Single. We find no evidence, however, of changes to separation rates around 1 July 2006.

Other factors that may confound the effect of changes to Parenting Payment Single eligibility include: seasonal trends in relationship dissolution and potential differential reporting behaviour of mothers separating before and after 1 July 2006. These factors do not invalidate our analysis, however. In the Regression Discontinuity Design, used in

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[7]Some mothers were exempt from these requirements including if childcare costs made employment financially unviable or if the job required a commute of more than 60 minutes. Anecdotally, Centrelink welfare officers were unprepared for the sudden increase in administrative duties associated with processing the participation requirements of newly affected mothers. Instead, officers activated a clause that has historically existed in the Centrelink rules: mothers who endured a difficult break-up were exempt from any participation requirements for 16 weeks.

the empirical analyses, seasonal trends are accounted for by the inclusion of the so-called running variable, which accounts for any continuous changes over time, as explained in Section 4. Furthermore, a couple's optimal *reporting* choice does not change after the reform: income support payments are always higher when two individuals do not report a relationship than when they do. For example, before the reform, combined gross income of a mother with no private income and a man with an income of A$35,000 was 31% higher when *not* reporting a cohabiting relationship than when admitting to it; after the reform, combined gross income when *not* reporting a relationship is 28% higher than when admitting to it.[8] Hence, a couple seeking to maximise their combined income through misreporting their relationship status will always report that they are separated, regardless of the policy regime.

3 Data and Variables

3.1 Administrative Social Security Records

The administrative data we use for the analysis are a subset of the family payment and income support payment recipients and are based on a cohort of children born between 1 October 1987 and 31 March 1988, which we call the 'focal children'. Comparisons of the number of young adults in these administrative data to census data suggests that over 98% of young people born between 1 October 1987 and 31 March 1988 are included in this sample (Breunig et al. 2009). Information on this cohort of children (and their parents) were extracted by the government agency - Department of Social Services - from the mainframe of welfare data to use for the purpose of research. For more details on our data, see Online Appendix B.

3.2 Mother's and Young Adult's Outcome Variables

The administrative records comprise detailed information on individuals who have received payments (past and present) from Centrelink: the type, amount and frequency of the social security payments received as well as background information such as age, gender, relationship status (single, married, or de-facto), residential location, number of children living in the household and those living away from home, and the ages of

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[8]Authors' own calculations. These numbers are based on a couple with one child aged eight years, and incorporate Family Tax Benefit Parts A and B, Parenting Payment and Newstart Allowance.

these children. This information is recorded every fortnight in order to help Centrelink routinely test if individuals are eligible for payments.

For the subsample of mothers who remain in the Social Security system, the data on the mother's personal income and the family's income are available.[9] Both income measures include income from any source *besides welfare*, but for the vast majority of mothers and families, it measures earned income. Over time, the size of this subsample declines as the age of the youngest child reaches 16 or above, which can render the mother ineligible for family and income support payments.

In addition to the basic information about every child living under the care of the parent, each child has a unique identifier. This allows us to link a parent's payment history to the future payment receipt patterns of all their children. We are unable to identify whether or not the relationship between the carer and the child is biological. Instead, we observe the person who has the primary caring responsibility for the child at every point in time while the child is growing up. We use this information to identify the person with the longest duration of primary care responsibility for the length of time the child is present in the data. In prior research that used a subset of our data linked to survey data, this strategy successfully identified biological mothers (biological parents) in 96.5 (98.6) percent of cases (Breunig et al. 2009). Young adults who are ever listed in the care of an adult recipient are followed in the administrative data and are registered in the system at any time they receive a social security payment in their own right.

Mothers are eligible for the following payments: Newstart Allowance, unemployment support for adults; Disability Support Pension; Parenting Payment (Single and Partnered); and Carer Payment. Young adults are additionally eligible for Youth Allowance to aid them in finding employment (for job seekers) and/or assisting with full-time study (for students and apprentices). If young adults are not in full-time study, to be eligible for Youth Allowance, they need to be actively looking for a full-time job or combining part-time study with looking for work, undertaking approved activities or volunteering, or have a temporary exemption from the activity test due to illness. Youth Allowance is paid at the same rate as Newstart Allowance. Specifically, the maximum payment was A\$228

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[9]In our data, the mother's and the family's incomes are available for the financial year, which starts on 1 July in Australia. We define the income variables in the following way: the income in the first year after the separation refers to the income of the financial year starting in the calendar year of the separation. For example, for mothers who separated in 2006, we assign their 2006-07 financial year income as their income in the first year after the separation. Thus, for the mothers who separated just before or just after the reform implementation date this variable exactly measures their income in the first year after the separation. For mothers who separated farther away from the cut-off, income in the first year after the separation is measured with error. However, this measurement error is captured by the running variable. Incomes in the second to fifth year after the separation are measured accordingly.

a week in 2006-07. However, compared to Newstart Allowance, Youth Allowance has a lower income threshold before the payment cuts out: when young adults earn A\$308.25 or more a week, they lose eligibility to Youth Allowance.

Youth Allowance is the most common payment among young adults. In 2006, 12% of young adults aged 16 to 24 received Youth Allowance; 11.5% received Newstart Allowance[10]; 3% received Parenting Payment; 1.2% received Disability Support Pension; 0.3% received Carer Payment; and 72% did not receive any income support payment from the government.[11] We combine Youth Allowance for *job seekers* and Newstart Allowance into one variable measuring unemployment benefit. We do not study the effects of the W2W reform on Youth Allowance for *students and apprentices*, because we do not consider study to be inactivity in the same way we consider unemployment.

Payments for young adults are highly targeted, based on age, circumstance, parental income and assets, and the young adult's own income and assets. This means that we can view welfare receipt as an indicator of social disadvantage in young adulthood - either stemming from the youth's own circumstance or that of their parent's circumstances. The eligibility criteria also depends on the type of payment. In most cases, there is an age limit. For example, for Youth Allowance the minimum age of eligibility is 16.[12] The maximum age of eligibility is 21 (or 24 for full-time students and apprentices). As for the other payments, young adults can begin to receive Newstart Allowance at age 22; Disability Support Pension at age 16, and Parenting and Carer Payments as soon as they have a child or start caring for a child or another member of the household with a disability. The young adult is also subject to an income and asset test, and there are activity test requirements, as detailed above. For Youth Allowance, there is also a parental income test, applicable to young adults who are dependent on their parents.[13] Other types of payments have their own additional eligibility criteria. For example, in order for a young adult to receive disability pension they must have a certified disability.

Two other outcomes of interest are the young adult's housing arrangements and the level of financial independence they have from their parents. We are able to observe these outcomes in the administrative data, because at age 15, young adults become

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[10]Young adults who are aged 22 or older are no longer eligible for Youth Allowance unless they are in full-time study.

[11]Additionally, 7% received family payment and 2% received child care benefit.

[12]The exception to this rule is for young adults who declare themselves to be independent from their parents at age 15.

[13]Children whose parents receive an income support payment are not subject to the parental income test. Otherwise, the combined parental income threshold was A\$30,526.4 for a one-child family with a child aged less than 18 or A\$30,724.4 for a one-child family with a child aged 18 or older in 2006. The thresholds increase significantly when there are more children in the household.

eligible to two types of government allowances, if they become homeless or financially independent of their parents, called the Homelessness Allowance and the Independence Allowance, respectively. These allowances are provided to young adults up to age 20 (up to 24 for those in full-time study).[14] Centrelink personnel can direct Homelessness and Independence Allowances to young adults; however, in most cases young adults are required to self-report their circumstances and apply themselves. Centrelink case workers are required to confirm that young adults' circumstances at home accurately reflect what they have reported before they can receive these payments.

Young adults are considered to be homeless if they "cannot live in the parent's home because of circumstances such as domestic violence, sexual abuse or comparable exceptional circumstances". This encompasses street homelessness, as well as those who are required to access shelter services, and those temporarily living on another person's couch, in caravans, motels or other forms of transitional accommodation.

To be considered independent, young adults must show that they no longer rely on their parents for financial assistance. This often involves the young adult moving out of the parents' home. Alternatively, independent young adults are those who have supported themselves through full time (averaging 30 hours a week) paid work for at least 18 months within any two-year period. Additionally, young adults between the ages of 15 and 24 may be considered independent if they are orphans, refugees or homeless; their parents cannot provide suitable care; they have a child of their own; they have lived with a partner for at least one year; or they have a partial capacity to work.

3.3 Definition of a Separation

A separation date is defined as the first fortnight where a mother reports to Centrelink that she has separated from her partner. Our definition of relationship breakdown follows administrative guidelines. For our study period, a couple (married or unmarried) is generally recognised as separated when the "couple are living separately and apart on a permanent or indefinite basis" (DSS 2018). In a small number of cases, a separated couple could be 'living under the same roof'. In both cases, an individual would be legally required to report a change in their relationship status within 14 days of the change. The reporting involves the individual submitting a form, which then allows Centrelink staff to determine whether the relationship has indeed dissolved. The questions on the forms

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[14]Homelessness and Independence Allowances are supplemental to Youth Allowance payments. In 2006, young adults could receive up to A\$201.70 if aged less than 18 (or A\$152.2 if aged 18 and above) per fortnight.

include information about: 1) the emotional and social nature of the relationship, 2) the physical nature such as whether the couple live at different locations, 3) sexual nature of the relationship such as whether the couple share the same bed, 4) the financial nature including shared mortgage, debt, rent, housing, transfers etc., and 5) the nature of the commitment such as whether there are children involved. Couples are also required to provide two witnesses to verify that they have indeed separated.

3.4   Estimation Sample and Descriptive Statistics

In our estimation sample, we include focal children who first show up in the data because they had a parent who received a government payment (family or income support payment). We then select mothers of these children who experienced a relationship separation between 1 July 2001 (5 years before the reform implementation date) and 31 December 2008 (2.5 years after the reform implementation date) and who had a youngest child in their care aged between 8 and 15 years at the point of separation. We censor the post-reform separations to observe the mother's and young adult's outcomes for at least five years after the separation for everyone.

Our main analysis sample comprises 10,606 mother-young adult pairs. Of these mothers 13.73% separated after the reform implementation date (1 July 2006). Table 1 presents the descriptive statistics of mother and young adult characteristics (Panel A) as well as mother's and young adult's outcome variables (Panels B and C, respectively) separately for mothers who separated before and after 1 July 2006. Welfare benefits are measured annually with the date of the separation being the reference point.[15]

Panel A shows that mothers who separated after the reform were on average older at the time of separation as expected (44.3 versus 41.6), but they were younger at the time of the young adult's birth (24.7 versus 26.2). They are less likely to have been in a formal relationship in January 2001 (72.9% versus 81.5%). Similar proportions of mothers in both groups are born in Australia (around 75%) and are of Aboriginal or Torres Strait Islander (TSI) origin (close to 6%). The average age of the youngest child at the separation is close to 13 years in both groups. The average age of young adults at the time of the separation is 19.6 in the post-reform period and 15.5 in the pre-reform

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[15]Therefore, variables measured 'one year before the separation' are measured in the 1-365 day period before the separation date; variables measured 'two years before the separation' are measured in the 366-730 day period before the separation date, etc.; variables measured 'one year after the separation' are measured in the 1-365 day period after the separation date; variables measured 'two years after the separation' are measured in the 366-730 day period after the separation date, etc.

period. As for pre-separation welfare income, the total welfare benefits[16] two years before the separation are higher for mothers who separated before the reform versus those who separated after the reform (A\$2,719 versus A\$2,482). On the contrary, the young adult's total benefits one year before the separation[17] are substantially higher if their mothers separated after the reform (A\$1,345 versus A\$76), reflecting the difference in age between the two groups.

All in all, these descriptive statistics show that mothers who separated before and after the reform (and their young-adult children) are not comparable along a number of demographic and economic characteristics. This does not create problems for our identification strategy, based on a Regression Discontinuity Design, because the identification relies on the comparison of mothers who separated just before the reform implementation date and mothers who separated just after, as explained in Section 4.

Turning to the outcome variables, almost no mothers who separated after the reform receive Parenting Payment Single in the first year after the separation, as expected[18], compared to 62% of mothers who separated before the reform. Mothers who separated after the reform are also less likely to receive Parenting Payment Partnered (8.2% versus 18.9%), which reflects the changes in eligibility and the difference in age between the two groups. Mothers affected by the reform, however, are more likely to receive unemployment benefit (36.5% versus 10.2%) and disability benefit (7.1% versus 4.3%) in the first year after the separation. These differences suggest that some of the mothers who separated after the reform compensate for the loss of Parenting Payment Single by applying for other types of welfare benefits. The mother's total welfare benefits in the first year after the separation are, however, lower if she had separated after (as opposed to before) the reform (A\$3,957 versus A\$5,707). In contrast, the mother's earned income (as well as the family's income) is higher, if she had separated after the reform (A\$28,199 versus A\$23,113), and the difference in income is larger than the differences in welfare benefits. As a result, the mother's total income, which includes both welfare benefits and earned income, is higher among the mothers who separated after the reform (A\$32,264 versus A\$29,137).

Figure 1 presents the means of Parenting Payment Single receipt (Graph A) and total welfare benefits (Graph B) in the first to fifth year after the separation. It shows that

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[16]Total welfare benefits include payments from all income support schemes, except for Youth Allowance for students and apprentices (only relevant for young adults), as explained in Subsection 3.2.

[17]We do not report young adult's benefits two years before the separation, as we do for the mothers, because most of the young adults in the sample are too young to receive welfare benefits at that time.

[18]As described in Section 2, a small number of mothers were exempted from the changes to the eligibility rules after 1 July 2006. This explains why 3.5% of mothers receive Parenting Payment Single after the reform.

the gap in welfare benefits between mothers who separated before and after the reform narrows over time. This can be partially explained by grandfathered mothers becoming ineligible for single parent benefit once their youngest child reaches 16 years of age. In fact, in the third to fifth year after the separation, mothers who separated after the reform receive more benefits. This reversal is a result of the differential trends between the two groups: total benefits decrease in each year after the separation among mothers who separated before the reform, whereas among mothers who separated after the reform, total benefits start increasing in the third year after the separation.

Turning to young adult outcomes, young adults whose mothers separated after the reform compared to those whose mothers separated before the reform have higher rates of homelessness (8.7% versus 5.7%) and financial independence (10.0% versus 1.2%) in the first year after the separation. They are also more likely to have a child five years after separation (16.8% versus 8.96%). Furthermore, young adults whose mothers separated after the reform, on average, receive more benefits in the first five years after the separation, both in terms of total welfare benefits and specific types of payments (unemployment, disability, and parenting).[19] These differences can be partly attributed to the differences in age between the two groups.

4 Empirical Strategy

Our aim is to estimate how a removal of eligibility for cash assistance to single mothers affects them and their young adult children. We exploit a natural experiment created by the change in eligibility for Parenting Payment Single, a welfare program targeted at newly single parents. As described in Section 2, parents who separated after 30 June 2006 were no longer eligible for the single parent benefit, if their youngest child was aged eight or more. Existing recipients were, however, grandfathered and remained eligible for the payment until their youngest child turned 16 years of age. Thus, the reform created a sharp discontinuity in Parenting Payment Single eligibility on 1 July 2006 among single mothers whose youngest children were 8 to 15 years old at the time of the separation.

We exploit this discontinuity and employ the Regression Discontinuity Design (RDD) to test whether the W2W reform impacted mothers and their young adult children. The idea behind the RDD is that the mothers who separated *just before* the reform implementation date and the mothers who separated *just after* this date are comparable in all their characteristics besides the eligibility for Parenting Payment Single. Therefore,

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[19]The 'average annual benefits' are calculated as averages of annual benefits over the five years after the separation.

by comparing them we can identify causal effects of the reform on mothers and their young adult children. The key identifying assumption is that mothers did not *precisely* manipulate the timing of their separation. We test this assumption in several ways in Subsection 5.1 and find no evidence of manipulation.

The separation date ($sepd_i$) is our running variable, because it defines a mother's eligibility for Parenting Payment Single and thus clearly determines treatment status. The separation date also captures the trends in the mother's and young adult's outcomes over time. We normalize the separation date with respect to the reform implementation date (the cut-off in RDD terms), so that $sepd_i = 0$ for mothers who separated on 1 July 2006. A binary variable $post_i$ is our treatment indicator: it takes the value one if a mother separated on or after 1 July 2006 and therefore lost eligibility for Parenting Payment Single, and the value zero if a mother separated before 1 July 2006 and therefore retained eligibility. We first estimate the following regression for mothers:

$$PPS_i = \alpha_0 + \alpha_1 f(sepd_i) + \alpha_2 post_i + \alpha_3 f(sepd_i) \cdot post_i + \varepsilon_i \tag{1}$$

where PPS_i takes the value one if the mother receives Parenting Payment Single and zero otherwise, and $f(sepd_i)$ is a function of the separation date. We allow the slope of this function to differ before and after the reform by including interactions between $f(sepd_i)$ and $post_i$. Parameter ε_i is the error term. The coefficient of interest is α_2, which captures the causal effect of the reform on the mother's receipt of single parent benefit. We also estimate the impact of the reform on the mother's receipt of other types of benefits, total welfare income as well as her personal and family income.

For young adults, we estimate the following regressions:

$$Y_{il} = \beta_{0l} + \beta_{1l} g_l(sepd_i) + \beta_{2l} post_i + \beta_{3l} g_l(sepd_i) \cdot post_i + \eta_{il}, \tag{2}$$

where Y_{il} ($l = 1, \ldots, L$) is one of the young adult's outcome variables, $g_l(sepd_i)$ is a function of the separation date for that outcome, and the rest of the variables are defined in the same way as in equation (1). The coefficients β_{2l} capture the causal effects of the removal of the mother's eligibility to Parenting Payment Single on their young-adult children's outcomes. We focus on these reduced form regressions, because they produce policy-relevant parameters. Policy makers can directly control the eligibility rules for welfare payments, but not the actual participation in welfare programs by individuals.

Additionally, we employ fuzzy RDD to estimate the following instrumental variable equations:

$$Y_{il} = \gamma_{0l} + \gamma_{1l}\widehat{PPS}_i + \gamma_{2l}h_l(sepd_i) + \gamma_{3l}h_l(sepd_i) \cdot post_i + \nu_{il}, \tag{3}$$

where $\widehat{PPS}_i$ is the mother's predicted Parenting Payment Single receipt from equation (1) and coefficients γ_{1l} capture the effects of the mother's receipt of single parent benefit on the young adult's outcomes.

There are two approaches to the estimation of RD models: global polynomial (GP) and local linear regression (LLR) (Lee & Lemieux 2010). The GP approach involves including a polynomial function of the running variable and using all the available observations. The LLR approach instead involves using only the observations in close proximity to the cut-off, and including a linear function of the running variable to approximate the unknown underlying function. We follow the latter approach, although we also present the GP estimates as a sensitivity check. We show that the GP estimates are quite sensitive to the order of the polynomial function. Young adult outcomes evolve over time in a highly non-linear manner, which is directly a function of the age-related welfare eligibility rules. As a result, it is difficult to find functional forms that flexibly fit these trends.

The key decision in the estimation of a LLR is the selection of the bandwidth, that is, which observations to use for the estimation. The narrower the bandwidth, the smaller the misspecification bias[20], but the larger the variance of the RD estimator. The most common approach to selecting the optimal bandwidth is the minimization of mean squared error (MSE), which is the sum of the bias and the variance (Cattaneo et al. 2020). We allow for the bandwidth to differ below and above the cut-off, given the differences in the number of observations and variance on each side of the cut-off. We use the triangular kernel function in the estimation of the LLRs that assigns larger weights to the observations closer to the cut-off within the selected bandwidth. According to Cattaneo et al. (2020), it is important to account for the misspecification bias in LLR estimates in order to make valid inferences. Therefore, we report robust (to misspecification) bias-corrected 95% confidence intervals[21], computed using the *rdrobust* command in Stata (Calonico et al. 2014, 2017). In all figures and tables, statistical significance is indicated by the stars based on robust bias-corrected p-values.[22]

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[20]Misspecification bias refers to how well a linear function approximates the true function of the running variable.

[21]These confidence intervals are centered on the bias-corrected estimate of the discontinuity, and thus are not symmetric around the presented estimates of the discontinuity.

[22]The robust biased-corrected p-value is the probability $2P(z > |z - stat|)$, where $z - stat$ is the ratio of bias-corrected discontinuity estimate and robust to misspecification standard error.

5 Results

5.1 Tests of Identifying Assumptions

Before discussing the impact of the W2W reform on mothers and young adults, we investigate the validity of our identification strategy. The main concern is that some mothers may have brought their separation date forward before the reform came into effect in order to remain eligible for Parenting Payment Single. This type of manipulation would be problematic, as it may invalidate the assumption that mothers who separated just before 1 July 2006 and mothers who separated just after this date are similar in all other characteristics besides the eligibility to Parenting Payment Single. For example, the mothers who brought their separation date forward may have greater knowledge of the welfare system, which in turn may be correlated with their socioeconomic status and other characteristics affecting young adult outcomes. We find no evidence of such manipulation.

First, we conduct a test to detect any discontinuity in the density of separations on 1 July 2006. The idea underlying the test is that if mothers indeed manipulated their separation date, there should be more mothers separating just before 1 July 2006 than just after this date. In turn, we would expect to see a discontinuity in the density of separations at 1 July 2006. We perform the standard test suggested by McCrary (2008) as well as an alternative test based on a novel local polynomial density estimation technique developed by Cattaneo et al. (2018). The advantage of the latter approach is that it does not require any pre-binning of the data, which leads to improved size properties, namely, a lower probability of falsely rejecting the null hypothesis of there being no discontinuity in the density (Cattaneo, Jansson & Ma 2018).

Figure 2 presents the results of the McCrary test. An important choice in implementing this test is the choice of a bandwidth over which a local linear regression is estimated to smooth the histogram of the running variable and obtain its density function (McCrary 2008). Graphs A and C are based on the automatically-selected bandwidth, and in Graphs B and D, the bandwidth is set to be half as narrow (or the narrowest possible bandwidth so that there are at least ten bins in each window). Graphs A and B are based on all available data. The shape of the density function is explained by life-cycle effects in our sample. Specifically, fewer separations occur over time among mothers with a youngest child aged 8 to 15. In both graphs, there is a small discontinuity in the density of separations at 1 July 2006, but it is not statistically significant. In Graphs A and B, the log differences in height are equal to -0.105 and -0.044, and the corresponding

standard errors are 0.096 and 0.139, respectively. In both cases the null hypothesis of no discontinuity cannot be rejected. In Graphs C and D, we perform McCrary test only on the observations close to the cut-off, which are used in the estimations on local linear regressions (separations within 1.5 year before and 0.75 year after the reform). The estimated discontinuities are 0.034 and 0.099, respectively and the null hypothesis of no discontinuity also cannot be rejected (standard errors are 0.165 and 0.193, respectively).

We reach the same conclusion using the alternative test developed by Cattaneo et al. (2018), implemented with Stata's command *rddensity*. The p-value of the test statistic is equal to 0.231. We have also considered that mothers with younger children have a stronger motivation to manipulate the outcome, since their total potential loss in years of Parenting Payment is greater than mothers of older children.[23] Therefore, we group the mothers by the age of the youngest child (8-10, 11-13, and 14-15), and perform the manipulation tests for these subgroups. Online Appendix Figure A.1 shows that there are no statistically significant discontinuities in the densities at the reform implementation date in either of these groups.[24]

As a second test for manipulation, we check for any discontinuities in the pre-determined characteristics of mothers and young adults at the reform implementation date. As mentioned above, if manipulation exists, we would expect the mothers who separated just before the reform implementation date to be different in their characteristics from the mothers who separated just after this date. In this case, we may also expect differences in the characteristics of the young-adult children of these mothers. The results are presented in Figures 3 and 4. Time-varying mother's variables (welfare benefits, income, and local area house prices) are measured two years (366-730 days) before the separation to avoid capturing any potential anticipation effects.[25]. For young adults, we measure welfare benefits one year (1-365 days) before the separation, as explained in Subsection 3.4. Figures 3 and 4 are based on the observations used in the estimations of corresponding local linear regressions, so that it would be easier to see the variation in the raw data around the cut-off. In each graph, the dots represent bin-averages of the respective variable, where the bins are selected using the mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5 using Stata's command *rdplot* (Calonico

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[23]Both before and after the reform, single mothers become ineligible for Parenting Payment Single once their children turn 16 years of age.

[24]The alternative test by Cattaneo et al. (2018) confirms this.

[25]We have also tested the discontinuity in the mother's time-varying variables in the year before the separation and found similar results. There are no statistically significant discontinuities in most of the variables. The only exception is the mother's income one year before the separation, which is found to be lower for the mothers who separated just after the reform compared to those who separated just before the reform. These results are presented in Appendix Figure A.2.

et al. 2017).[26] The lines in the graphs represent the fitted values of the local linear regressions. We also report the estimated discontinuities and robust bias-corrected 95% confidence intervals. The other regression discontinuity (RD) plots in the remainder of the paper follow this convention.

Figure 3 shows that there are no statistically significant discontinuities in the mother's age at the young adult's birth, country of birth, Aboriginal or TSI status, marital status in 2001, pre-separation earned income, house prices in the local area she lived in prior to the separation, and measures of pre-separation welfare receipt. There are also no discontinuities in the youngest child's characteristics (age and gender). The only statistically significant discontinuity is in mother's unemployment benefit receipt two years before the separation. Figure 4 shows no discontinuities in the characteristics of the young adult, including pre-separation welfare receipt, experiences of homelessness, financial independence from parents, and fertility. The only significant discontinuity is in the young adult's gender: the children of mothers who separated just after the reform are less likely to be male. When we test for the joint significance of discontinuities in all mother's and young adult's characteristics, we cannot reject the null hypothesis that all the coefficients are equal to zero (p-value = 0.618).[27,28] It should be noted that some of the discontinuities are imprecisely estimated due to few separations occurring after the reform in the data, which reduces the power of the test.

Overall, both tests suggest that manipulation is not a major concern in our case. One explanation for the lack of manipulation is the difficulty for mothers to precisely time a separation. The procedure for reporting a separation to Centrelink can be involved and time-consuming. For example, Centrelink has processes in place to verify whether a separation has taken place, including visitations by Centrelink staff to the recipient's residence or verifications through third-parties. Some of the requirements for formalizing a separation may take time to implement. The partner's cooperation is also required, because they are expected to complete and sign a form confirming the separation. Another

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[26]This method chooses a number of bins on each side of the cut-off so that the numbers of observations are equalized across the bins and mimics the overall variability of the raw data (Cattaneo et al. 2020). As a result the chosen number of bins is quite large, which often makes it difficult to see any patterns in the data. For this reason we reduce the number of selected bins by half. Note that the number of bins selected this way is still substantially larger than the number selected by Integrated Mean Squared Error (IMSE)-optimal quantile-spaced method, which balances bias and variance in binned data.

[27]We perform this test by running a seemingly unrelated regression and restricting the sample to the mothers who separated between 1.5 year before and 0.75 year after the reform to accommodate the optimally selected bandwidths in the individual regressions presented in Figures 3 and 4. In most of the regressions, the bandwidth below the cut-off is between 1 and 2 years, and the bandwidth above the cut-off is between 0.5 and 1 year.

[28]If we test the joint significance of the discontinuities in the mother's and the young adult's characteristics separately, the p-values are 0.711 and 0.232, respectively.

explanation for the lack of evidence of manipulation is the long time-period between the announcement of the policy and its implementation (more than a year). The mothers who were aware of the policy and wanted to avoid losing eligibility to Parenting Payment Single with certainty could have separated well before 1 July 2006.

We also address the concern there are discontinuities in some of the outcome variables yet that our sample is not sufficiently large enough to detect them. We conduct a power analysis, using a method proposed by Cattaneo et al. (2019) and command *rdpow* in Stata. For a given hypothesized treatment effect, *rdpow* makes power calculations using robust bias-corrected local polynomial inference procedures (used by *rdrobust*). For each outcome, we have calculated the power under a hypothesis that the treatment effect is equal to a half of the standard deviation in the untreated group. Appendix Table A.1 presents the results of the power analysis. This table shows that our analysis is sufficiently powered. For nearly all of the outcomes, the power is above the acceptable level of 0.8, that is, the probability of correctly rejecting a false null hypothesis (at the 5% significance level) is higher than 80 percent. The only outcome with low power (0.476) is the young adult's financial independence 1 year after the separation.

5.2   Effects of the W2W Reform on Mothers

Figure 5 graphically presents the RD results for the two main outcomes pertaining to the mother: the receipt of Parenting Payment Single and the total dollar amount of welfare benefits in the first year after the separation.[29] Figure 5 shows that the reform induced a large drop in Parenting Payment Single rate (by 38.8 percentage points) in the first year after the separation, as expected.[30,31] The total welfare benefits also decreased (by A\$1,849), which corresponds to a 35% reduction relative to the mean value of welfare benefits among mothers who separated just before the reform. Both discontinuities are statistically significant at the 1% level.

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[29]This figure is based on the observations used in the estimations of corresponding local linear regressions. A similar figure based on all observations in the sample is presented in Online Appendix (Figure A.3).

[30]Figure 5 displays a lower rate of Parenting Payment Single receipt for mothers who separated in the estimation bin immediately before the cut-off, compared to those who separated in the estimation bins further to the left of the cut-off. This is likely to stem from some mothers failing to qualify for the grandfathering arrangements, which required mothers to both separate from their partners and to apply for Parenting Payment Single before 1 July 2006. Mothers who had separated before the cut-off yet did not apply for Parenting Payment Single in time, for example, would not have been grandfathered.

[31]The negative slope in Parenting Payment Single rate before the cut-off reflects the decrease in eligibility because of the increasing age of the youngest child (as shown in the graph entitled 'Youngest Child's Age at Separation' in Figure 3).

To investigate the persistence of these effects, Figure 6 presents the estimated effects of the W2W reform on mothers' welfare receipt up to the fifth year after the separation. In addition to Parenting Payment Single receipt and the total benefit amount, we present the effects on unemployment, disability, partnered parent benefit receipt to evaluate the extent of substitution between Parenting Payment Single and other welfare programs. Graph A shows that the gap in the Parenting Payment Single rate between unaffected and affected mothers persists up to five years after the separation, but becomes smaller (although still statistically significant at the 5% level), as unaffected mothers become increasingly ineligible for the payment. The gap closes to 7 percentage points in the fourth and fifth years after the separation. Graph B shows that some of the affected mothers shift to unemployment benefits. In the first and second year after the separation, affected mothers are 16 and 10 percentage points more likely to be receiving unemployment benefit (statistically significantly at the 5% level). The difference in the unemployment benefit rate decreases and becomes statistically insignificant in the third to fifth year after the separation, as mothers unaffected by the reform leave the Parenting Payment Single scheme. There are no statistically significant differences in disability benefit or Parenting Payment Partnered receipt in any of the years (Graphs C and D). The difference in total welfare benefits (Graph E), in turn, remains relatively large (A$1,750 per year) and statistically significant at the 1% level in the second year after the separation. Online Appendix Figures A.4, A.5, and A.6 present corresponding RD plots for the outcomes significantly affected by the reform (single parent and unemployment benefit receipt and total welfare benefits).

5.2.1 A Test for an Alternative Explanation

Participation requirements also changed as a result of the reform, however, we argue that our estimated effects are unlikely to reflect this change. Specifically, as explained in Section 2, on 1 July 2006 participation requirements were imposed on newly separated mothers with a youngest child six years of age or older at the point of separation. Thus newly separated mothers of 6-7 year old children were affected by the participation requirements, but maintained eligibility to Parenting Payment (until their youngest child turned 8 years old). If participation requirements confound the effect of reduced income support, then we should find significant effects of the W2W reform on this group of mothers. We check this in Online Appendix Figure A.7, and do not find any statis-

tically significant reform effects on mothers of six year old children[32]: their parenting, unemployment, or disability benefit receipt, and total benefit amount in the first year after the separation are not statistically significantly affected. These results suggest that the introduction of the participation requirements do not confound the effects of reduced income support. It is possible, however, that we fail to reject the null hypotheses of no discontinuities due to the small sample size (706 mothers) and imprecise estimates.

5.2.2 How Did Mothers Respond to the Loss of Eligibility for Parenting Payment Single?

In this subsection, we investigate ways in which newly separated mothers affected by the W2W reform reacted to the reduced welfare support. Previous research finds that affected single mothers were more likely to be employed (Gong & Breunig 2014) and to repartner (Fisher & Zhu 2019). Thus first, we check what effect the reform had on mother's personal income from other sources than welfare as well as family income.

Given the imperfect substitution of Parenting Payment Single with other welfare programs, we expect mothers who separated after the reform to be more likely to be employed and thus have higher earned incomes compared to mothers who separated before the reform. It is uncertain, however, whether this increase in earned income is sufficient to compensate for the decrease in welfare income. Graph A of Figure 7 suggests that it is: we find that in the first year after the separation, the personal income of mothers increases by A\$5,500 (statistically significantly at the 5% level) because of the reform. This increase in earned income persists in the second year after the separation, but declines and becomes statistically insignificant in the following years when some of the mothers who separated before the reform lose their eligibility to single parent benefit and enter the labour market. In Graph B, we present the results for the mother's total (earned and welfare) income. The mother's total income is found to increase by A\$4,187 per year in the first year after the separation due to the reform (statistically significantly at the 10% level)[33], as expected, to a lesser extent than her earned income due to the decrease in welfare income. The mother's total income is estimated to be higher also in the second and third year after the separation among the mothers who separated after the reform

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[32]We do not include mothers of seven year old children in the sample, as they may modify their behaviour in anticipation of the loss of Parenting Payment Single once their youngest child reaches eight years of age.

[33]The increase in the total income is not exactly equal the sum of the increase in earned income and the decrease in welfare income, because selected bandwidths are somewhat different. If we restrict the bandwidth to be the same, the increase in total income is estimated to be A\$3,596 and the decrease in welfare income is estimated to be -A\$1,903.

(but not statistically significantly). In Online Appendix Figures A.8 and A.9, we present corresponding RD plots to complement the results on the mother's income presented in Graphs A and B.

We also analyze the effect of the reform on the family's income, which includes the partner's income for the mothers who re-partner (as well as other family members' income). Graph C of Figure 7 shows that the family's income in the first year after the separation is higher by A\$7,761 because of the reform (statistically significantly at the 5% level).[34] The increase in the family's income persists (and is even larger) in the second to fifth year after the separation.[35] The larger and more persistent increase in the family's income compared with the increase in the mother's income suggests that mothers affected by the reform are more likely to re-partner and/or have have higher earning new partners. (If there were no differences in repartnering rates or earnings of new partners, the increase in family income would be comparable to the increase in personal income of the mother.) This is consistent with the findings of Fisher & Zhu (2019) who find that mothers affected by the reform are, indeed, more likely to repartner and have have higher earning partners conditional on repartnering than mothers not affected by the reform.

5.3 Effects of the W2W Reform on Young Adults

The results presented in the previous section show that the mothers who separated after the W2W reform have lower welfare income, but their earned personal and family incomes are higher. As the increase in earned income is larger than the decrease in welfare income, the total family income is in fact higher post-reform. Additionally, the affected mothers are more likely to re-partner, as shown by the earlier studies (Fisher & Zhu 2019).

How are these changes likely to impact the young adult children of affected mothers? On the one hand, the increase in household income is expected to have a positive effect, because the additional money can be invested in the young adult's education, health, and other needs. Affected young adults may also be more likely to stay in education after secondary school rather than seek employment, as there is less pressure to help the family financially. Since mothers act as role models for their children, witnessing the mother pursue employment as opposed to relying on welfare may reduce the likelihood of reliance on welfare by the young-adult themselves.

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[34]Corresponding RD plots are presented in Appendix Figure A.10.

[35]The increase in family income remains statistically significant at least at the 10% level, with an exception of the fourth year after the separation (p-value = 0.110).

On the other hand, the reform may have negatively affected young adults, because it had removed a financial safety net for families immediately after relationship breakdown. Consequently, in the short-term the families affected by the reform may experience a larger financial shock than non-affected families. This may have particularly negative effects on young adults because the reduction in welfare benefits coincides with a sensitive and a transitional phase of the young adult's life.[36] Additionally, the higher rate of employment among affected mothers means that mothers may spend less time at home. Although maternal supervision becomes less important as children become young adults, the mother's presence at home may prevent the young adults from engaging in risky behaviours and encourage them to study and attend classes (Dave, Corman, Kalil, Schwartz-Soicher & Reichman 2021). Repartnering may also negatively affect children if there is greater conflict in the family. Therefore, a priori it is unclear how the W2W reform may have affected young-adult children.

In Figure 8, we graphically present the estimated effects of the W2W reform on young adults' outcomes measured only in the first year after parental separation: homelessness and financial independence. Figure 8 shows that there are no statistically significant discontinuities at the reform implementation date in either young adults' homelessness or financial independence. In Figure 9, we turn to the effects of the W2W reform on young adults' outcomes observed up to five years after the separation: fertility (having at least one child) and welfare benefits. Welfare benefits are measured as average annual welfare benefits in the five years after the separation. Graphs A and B of Figure 9 show that there are no statistically significant differences between the young adults whose mothers separated just after the reform and the young adults whose mothers separated just before the reform in terms of fertility and total welfare benefits.

We next explore whether the reform affected young adult's participation in the following specific income support schemes - unemployment, disability, and parenting - up to five years after the separation. Among the young adults in our sample, the rates of disability and parenting benefit receipt are low because not many young adults are disabled or have children. The reform, therefore, may not have had any impact on the young adults' participation in these programs. In comparison, it is more common for young adults to receive unemployment benefits because it is easier to qualify for them. Graphs C, D and E of Figure 9 suggest that the reform, indeed, reduced young adults' reliance on unemployment benefits but did not affect their participation in disability and parenting schemes, one to five years after the separation. We find that the average annual unem-

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[36]At the time the reform was implemented (on 1 July 2006), the age of young adults was, on average, 18.5 years.

ployment benefits over these five years are lower by A\$358 per year among the young adult children of mothers who separated just after the reform compared to those whose mothers separated just before the reform.[37] This effect is statistically significant at the 10% level. A decrease by A\$358 corresponds to 30% drop in unemployment benefits compared to the mean for the young adults whose mothers separated just before 1 July 2006 and thus were not affected by the reform.[38]

The amount of unemployment benefits captures both the duration and the level of benefits. Holding duration constant, the higher level of benefits generally indicates greater detachment from the labour market since the amount of welfare benefits received depends on the income of the individual. We have also estimated the effect of the welfare reform on the average annual number of fortnights on unemployment benefits to isolate the effect on benefit duration. We find that the reform reduced young adults' unemployment benefit duration by 0.834 fortnights per year, although not statistically significantly (p-value = 0.113).

We also estimate fuzzy RD model for the young adult outcomes. In these (instrumental variable) regressions, the mother's predicted Parenting Payment Single receipt from the 'first stage' regression is used as the independent variable, as explained in Section 4. The coefficients on this variable are interpreted as the effects of the mother's receipt of single parent benefit in the first year after separation on the young adult's outcomes. We find that average unemployment benefits in the first five years after the separation are A\$845 higher among the young adults whose mothers receive single parent benefit in the first year after the separation compared to the young adults whose mothers do not receive this benefit. This effect is statistically significant at the 10% level. There are no statistically significant effects of Parenting Payment Single receipt on the other outcomes consistent with the reduced form results. These results are not reported, but can be provided upon request.

We next analyse whether there are any dynamic effects of the reform on young adults' unemployment benefit receipt. Online Appendix Figure A.11 suggests that the welfare reform reduced young adult's benefits in all five years after the separation (by A\$170-A\$670 per year), but the effect is only statistically significant (at the 10% level) in the fourth year.[39] We find qualitatively similar results on annual unemployment benefit

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[37]In t years after the reform implementation date, young adults are $18.5 + t$ years old, on average.

[38]We have also separately estimated the effects of the reform on New Start Allowance and Youth Allowance for job seekers, as young adults are eligible for both. We find that the reform reduced both types of unemployment benefits (by A\$83 and A\$223 per year on average, respectively). However, only the effect on Youth Allowance for job seekers is statistically significant at the 10% level.

[39]Across all years, there are no statistically significant effects of the reform on other types of benefits.

duration: young adults whose mothers separated just after the reform are found to spend less time on unemployment benefits in each year, especially two to four years after the separation (by 0.761-1.506 fortnights per year), although only the effect in the fourth year is statistically significant at the 5% level.

We would like to note that the statistically insignificant estimates (on homelessness, independence, fertility, disability and parenting benefits) do not necessarily imply that removing mothers' eligibility to single parent benefit does not impact on these young adult outcomes. The 95% confidence intervals contain both negative and positive values of non-negligible size. A larger sample would be needed to more precisely identify the effects on these outcomes.

5.4   Heterogeneity in W2W Reform Effects

We continue by analysing the variation in the effects of the W2W reform across sub-samples of mothers. For this analysis, we select characteristics that may affect a mother's willingness and ability to adapt to the loss of parenting benefits by transitioning to either other welfare programs, employment, or repartnering. Specifically, we assess heterogeneity by the mother's welfare benefit history, country of birth, and youngest child's age.

Table 2 presents the estimates of LLRs separately for each sub-sample of mothers. The first row of Table 2 shows that the reform significantly and substantially reduced the rates of Parenting Payment Single in all subsamples, although there is a variation in the size of the effect. The rest of the results for mothers (Panel A) vary quite substantially across the subsamples. Although unemployment benefit receipt, total welfare benefits, and income are found to be significantly affected by the reform in the full sample of mothers, in some sub-samples the effect of the reform is statistically insignificant. The confidence intervals in many sub-samples are wide. We only discuss the results, where the confidence intervals for two sub-samples do not overlap and we can be 95% certain that the reform effects are statistically different.

The main finding in Panel A of Table 2 is that there is heterogeneity in the effect of the reform by the country of birth of the mother. Mothers born overseas experienced a larger decrease in total welfare benefits than native born mothers. There is also suggestive evidence that the increase in earned income is larger among foreign born mothers. In this subsample of mothers, the reform appears to have been especially successful in increasing employment.

As an alternative way to identify statistically significant differences between subsamples, we estimate auxiliary linear regressions using the same observations as in the respective local linear regression for each outcome. In these regressions, we interact the post-reform dummy (as well as the running variable) with the characteristics of the mother (in a separate regression for each characteristic).[40] The estimates, presented in Online Appendix Table A.2[41], also show statistically significant differences in the effects of the reform on the mother's total benefits and earned income by the country of birth. Additionally, larger effects on single parent and unemployment benefit receipt are observed for mothers who were receiving welfare benefits two years before the separation. This is consistent with the point estimates of the subsample regressions in Table 2, although the estimates would not be considered to be significantly different by welfare history between these subsamples. In neither table there are any statistically significant differences by the age of the youngest child of the mother.

The effects of the reform on the young adult's outcomes in most of the subsamples are not statistically significant (Panel B of Table 2). One exception is the negative statistically significant decrease in young adult's employment benefit receipt (by A$984) among the children of mothers with welfare benefit history. Additionally, children with older youngest siblings are found to have statistically significantly lower total welfare benefits because of the reform (by A$985). Given the large number of regressions, the latter two results need to be interpreted with caution, as they could be statistically significant by chance. None of the differences in the reform effects on young adults between the subsamples are statistically significant in either Table 2 or Online Appendix Table A.2.

5.5   Sensitivity Analysis

In this subsection, we check the robustness of our baseline results. We focus on the mother's and the young adult's outcomes, for which we find statistically significant effects of the W2W reform in the baseline model. First, we test sensitivity of the estimates to the estimation method. In Online Appendix Table A.3, we present the global polynomial estimates of the effects of the W2W reform on the mother's and young adult's outcomes.

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[40]These results should be interpreted with caution, as they may not be consistent estimates of the effects of the reform (Cattaneo et al. 2020).

[41]There are differences between the estimates presented in Online Appendix Table and Table 2 because of the differences in the estimation method and sample sizes. In Table 2 the bandwidth is selected optimally in each subsample and the sum of the effective observations in both subsamples is generally somewhat larger than the sample size in Online Appendix Table A.2. Additionally, triangular kernel weights are used in the estimation of local linear regressions, but not linear regressions.

The estimates are sensitive to the order of the polynomial, and the estimates of the model selected by the Akaike Information Criterion (AIC) are not always in line with the local linear regression estimates. On the one hand, mothers who separated after the reform are estimated to be 37.2 percentage points less likely to receive Parenting Payment Single in the first year after the separation compared to those who separated before the reform, which is consistent with local linear regression estimates. On the other hand, the global polynomial estimates of the effect of the reform on total welfare benefits are smaller and the effect on earned income is statistically insignificant. No statistically significant effects on the young adult's unemployment benefits are found. This is consistent with visual inspection of the data: for many outcomes it is difficult to fit the data with a polynomial function. For this reason, the local linear regression model is preferred in this case.

Second, we check how sensitive our local linear regression estimates are to alternative bandwidths. Column (1) of Table 3 presents the results based on the bandwidth selected using two different coverage error (CER)-optimal bandwidth selectors (below and above the cut-off), instead of two MSE-optimal selectors, as in the baseline. The CER-optimal bandwidth minimizes the asymptotic coverage error rate of the robust bias-corrected confidence interval (Cattaneo et al. 2020). Cattaneo et al. (2020) recommend using MSE-optimal bandwidth to obtain point estimates of the treatment effect[42], but CER-optimal bandwidth may be used to construct robust bias-corrected confidence intervals. The CER-optimal bandwidth is always smaller than the MSE-optimal bandwidth. In columns (3) and (4), we present the results based on a bandwidth that is twice as large as CER-optimal and MSE-optimal bandwidth, respectively.

Table 3 shows that the estimated effects of the reform on the mother's outcomes remain statistically significant as the bandwidth is decreased or increased. Importantly, the confidence intervals based on the smaller CER-optimal bandwidth do not contain zero for any of the outcome variables pertaining to the mother. As the bandwidth increases in columns (3) and (4), the estimated effects of the reform on parenting and unemployment benefit receipt remain rather stable, but the effects on total welfare benefits and income decrease in absolute value, suggesting that misspecification bias increases as expected. As to the young adult's unemployment benefits, using the CER-optimal (instead of MSE-optimal) bandwidth results in a statistically insignificant effect of the reform, although the point estimates are comparable. In Appendix Table A.12, we also present local linear regression estimates based on the bandwidth that is manually varied from 0.5 to 2 years before and after the cut-off. The results exhibit a similar pattern to that observed in Table

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[42]Using CER-optimal bandwidth results in a point estimator that has too much variability relative to bias (Cattaneo et al. 2020).

3. As the bandwidth increases, the estimated effects of the reform on the mother's single parent and unemployment benefit receipt become more precisely estimated and remain quite stable, but the effects on total welfare benefits, and especially income, decrease in absolute value, likely due to bias.

Third, we test the sensitivity of our baseline estimates to the addition of control variables. In a local linear regression, predetermined covariates may be included to improve precision of the estimates (not to address any identification issues), and the inclusion of covariates should not affect point estimates substantially (Cattaneo et al. 2020). In column (1) of Table 4, we reproduce the baseline estimates with no controls, and in column (2) we add the following fixed characteristics of the mother: mother's age at young adult's birth, migrant status, aboriginal/TSI status, marital status in 2001, and youngest sibling's gender and age at separation. Regressions in column (3) additionally control for pre-separation welfare benefits of the mother and the young adult. As expected, the point estimates in columns (2) and (3) are similar to the baseline estimates, but generally more precisely estimated.

In Table 5, we present additional sensitivity checks. In column (1), we estimate local regressions with a quadratic instead of a linear function of the running variable. The estimates of these regressions are consistent with local linear regression estimates. We find comparable effects of the reform on mother's parenting and unemployment benefit receipt and income. There is also suggestive evidence that the reform decreased the young adult's unemployment benefits (p-value = 0.102), consistent with the local linear regression estimate.

Next, we apply the randomization inference framework, proposed by Cattaneo et al. (2015), and conduct finite-sample exact inference in a narrow window around the cut-off, where local randomization, underlying RD designs, is most likely to hold. The presented figures are the differences in the means of the outcome variables between the treatment and control groups in this narrow window. The window is selected using pre-determined covariates.[43] We start with a window of 14 days around the cut-off and increase it by 7 days at a time, until we reject the hypothesis that the means of at least one of the covariates are equal between the treatment and the control groups.[44] In our analysis, this happens when the window is increased to 49 days; therefore, we select 42 day window.

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[43]These covariates are mother's age at young adult's birth, migrant, aboriginal/TSI, and marital status in 2001, youngest sibling's age at separation, the mother's welfare benefits two years before the separation, and the young adult's welfare benefits one year before the separation. We do not use the gender of the young adult or the youngest child in the family, because we reject the equality in means between treatment and control groups in these covariates in the narrowest 14 day window, although the equality cannot be rejected in wider windows.

[44]To minimize Type II error, p-value of 0.15 (instead of 0.10) is used in hypothesis testing.

The estimation is implemented using commands *rdwinselect* and *rdrandinf* in Stata. The results presented in column (2) of Table 5 are generally consistent with the baseline estimates, but less precisely estimated. As a result, no statistically significant effect of the reform is found on the young adult's unemployment benefits, although the point estimate is comparable to the baseline estimate.

In columns (3) and (4) of Table 5, we investigate sensitivity of the results to the weight placed on the observations close to the cut-off in the estimations of local regressions. These estimations may be considered as tests for the manipulation of separation timing and are complementary to the tests shown earlier in the paper. In column (3), we use uniform, instead of triangular, kernel function to construct local linear estimator. The uniform kernel function assigns equal weight to all observations within the selected bandwidth, unlike the triangular kernel function that assigns larger weights to the observations closer to the cut-off. Most of the results in column (3) are qualitatively similar to the baseline estimates, although the effects on the mother's welfare benefits and income and the young adult's unemployment benefits are somewhat smaller in absolute value and less precisely estimated, when uniform kernel function is used.

In column (4), we perform a 'donut' RD estimation to test how our results would change, if we did not rely at all on the separations closest to the reform implementation date. Specifically, we exclude mothers who separated within a month of the reform implementation date (in June-July 2006). The disadvantage of the donut method is that it compromises the purity of the RD strategy in comparing mothers who separated immediately before and after the reform implementation date. This may explain why the estimated reform effects on mothers' single parent, unemployment, and total benefit receipt in the donut LLRs are larger and the effects on income variables are smaller in absolute value than those in the baseline model. The estimated effect of the reform on the young adult's unemployment benefits is also smaller in absolute value and statistically insignificant.

As a last check in Table 5, we perform a placebo test by estimating the effects of the reform on mothers whose youngest child is 16 years of age of older at the time of the separation. These mothers are not affected by the reform, because they are not eligible for Parenting Payment Single both before and after the reform. Therefore, we do not expect any statistically significant effects of the reform on the mother's and the young adults' outcomes in this subsample. Column (5) of Table 5 shows that the estimated effects are, indeed, statistically insignificant.

We also have re-estimated the local linear regressions for statistically significant outcomes, changing the cut-off to 1 July in other years available in the data (2002-2005 and 2007-

2008). The results are displayed in Table A.4. This is an imperfect placebo test, however, because 1 July is the start of the financial year, and many policy changes come into effect on this precise date in Australia. For example, on 1 July 2003, a different policy came into effect, prohibiting any new entrants to Partner Allowance or Mature Age Allowance and forcing them onto unemployment benefit. This is likely to explain the increase in unemployment benefit receipt rate at this date. Furthermore, the stricter income test settings and taper rates associated with unemployment benefit, compared to these other payments, mean that individuals may have responded by reducing earned income (in order to become eligible for unemployment benefit). In a similar vein, on 1 July 2007, a participation requirement was enforced on existing Parenting Payment recipients, which may explain the decline in the Parenting Payment Single receipt rate at this date. In any case, for all the placebo years, we do not find the large-sized discontinuities in mothers' outcomes that we observe in 2006, pointing to the distinct impact of the W2W reform. We can also confirm that there were no other policy changes at this date (Ey 2012).

6   Conclusion

Relationship separation brings with it a significant source of financial instability, particularly for low-income mothers, and the welfare system has traditionally served to insure them against this sensitive life-event (Amato 2010). This paper examines the impact of a reduction in welfare support on newly separated mothers and their young-adult children. It uses an Australia-wide reform, which unambiguously reduced the amount of government-provided payments to a subset of single mothers. In particular the reform removed eligibility to Parenting Payment for mothers whose youngest child was 8-15 years old. The key aspect of the reform is that it affected only the mothers separating on or after the date of the reform implementation (1 July 2006), while the mothers separating before this date were exempt from the new rules. We exploit this discontinuity in the Regression Discontinuity framework. For the empirical analyses, we use biweekly administrative data, which provide information on separations among low and middle income couples. The data contain precise measures of mothers' and young adults' welfare histories.

Our key contribution to the literature on the intergenerational impacts of welfare reforms is that we examine the impact of the reform on *newly separated* mothers and their young-adult children. We argue that the event of relationship separation may be a particularly sensitive and critical time period to consider when examining the impact of changes to welfare payment generosity. While governments have traditionally tried to

insure mothers against financial instability at this vulnerable time period, it may also present an opportunity for policy to mobilise mothers into work. This is because recently separated mothers are less reliant on welfare than mothers who have been separated for longer. To date, little is known about the impact of a reduction in welfare assistance on the behavioural response of newly separated mothers and the subsequent impacts on their young-adult children. We make a number of other contributions to the literature, including: examining young-adult outcomes that are novel to the literature such as homelessness; isolating the impact of government assistance reduction rather than the overall impact of a bundle of reform components; and assessing the impacts on a population that has been historically highly reliant on welfare.

We find that the reduction in government assistance available at the time of relationship breakdown has strong and persistent effects on mother's welfare receipt and income recovery patterns. Mothers affected by the reform responded to the loss of access to Parenting Payment in the following three ways: (1) by increasing earned income, (2) by repartnering and increasing family income, and/or (3) by churning onto a less-generous unemployment benefit. The increase in unemployment benefits was not sufficient to offset the loss of parenting benefit. Thus, the reform reduced the total welfare income received by affected mothers in the first year after the separation relative to grandfathered mothers by almost A\$2,000, or 35% of the mean of pre-reform benefits. Affected mothers were able, however, to more than offset the welfare income loss from the reform via increases in earned income (by A\$5,500) and even larger increases in family income (by close to A\$8,000). This provides suggestive evidence that higher levels of welfare assistance do indeed provide disincentives to work for newly separated mothers.

We observe some evidence of intergenerational effects of the reduction in income support for newly separated mothers on their young adult children's welfare dependence, even if it is quite weak. In particular, we find a decrease in the young adult's annual unemployment benefits in the first five years after the separation (by A\$358), which is statistically significant at the 10% level. This represents a substantial decrease (30%) relative to the mean for the young adults whose mothers separated just before the reform. The reduction in young adults' unemployment benefits suggests that a policy that restricts mothers' welfare access upon separation may in fact decrease the welfare reliance of their young-adult children. One explanation for this finding may be that mothers offset any negative impacts by turning to other sources of income, as we have shown. The higher total income in the family may in turn increase investment in the child's education or human capital development, which explains the reduction specifically to unemployment benefits. Increased employment among affected mothers may also have direct positive

spill-over effects on their young-adult children by acting as positive role models. Other possible channels include: promoting attitudes about the value of self-reliance; increasing stigma associated with welfare receipt; and reducing the exchange of information about the welfare system or the application process.

We do not find any statistically significant effects on young adults' homelessness or financial independence in the first year after the separation, the other types of benefits (disability or parenting), or early childbirth decisions in the first five years after the separation. The absence of the statistical significance does not, however, necessarily lead to a conclusion that a reduction in income support to single mothers does not have any impact on these outcomes, because the estimates are too imprecise to rule out non-negligible positive or negative effects. Larger sample sizes are needed to identify the effects of the welfare reform on these relatively rare outcomes.

This research can be extended by further analysing the channels through which a decrease in the mothers' welfare receipt reduces their young-adult children's reliance on unemployment benefits. The finding that the reform impacts are mainly pronounced in terms of young adults' unemployment benefits suggests a number of potential channels may be in effect, as discussed above. Another possible extension is to examine the impact of similar reforms implemented in different economic conditions. The Australian economy around the time of the reform was relatively strong, and there is evidence to suggest that a weaker economy may severely curtail mothers' ability to find alternative sources of income (Hartley, Lamarche & Ziliak 2017). These future research avenues will help us to understand the broader impacts of a policy that reduces welfare assistance to newly separated mothers on the long-term well-being of their children.
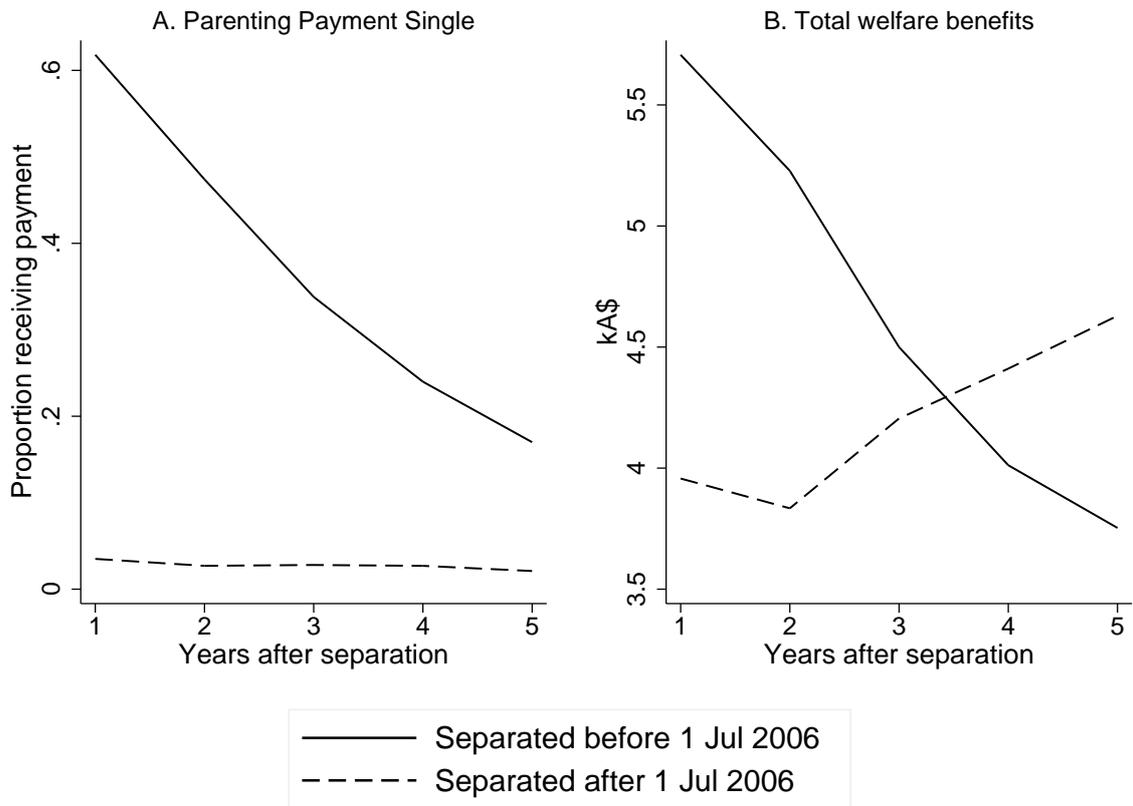
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Figure 1: Trends in mother's welfare receipt before and after W2W reform

A. Parenting Payment Single

B. Total welfare benefits

Separated before 1 Jul 2006

Separated after 1 Jul 2006

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Sample size is 10,606.

Figure 2: McCrary test for the discontinuity in density of separations at W2W reform date
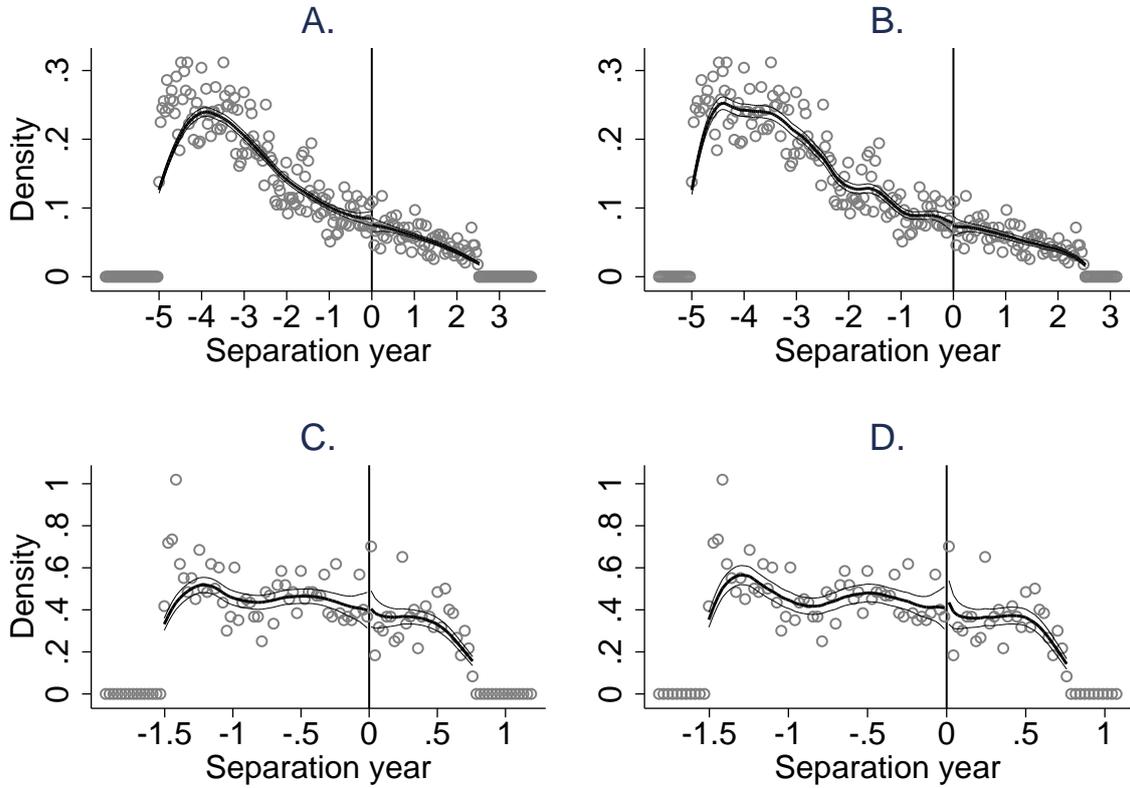
A.

B.

C.

D.

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Graphs A and C are based on the automatically-selected bandwidth, and in Graphs B and D, the bandwidth is set to be half as narrow (or the narrowest possible bandwidth so that there are at least ten bins in each window). Graphs A and B are based on all available data (10,606 observations). Graphs C and D, are based only on the observations close to the cut-off, which are used in the estimations on local linear regressions (2,261 separations within 1,5 year before and 0.75 year after 1 Jul 2006). Separation date is normalized so that 1 Jul 2006 equals 0.

Figure 3: Tests for discontinuity in mother's pre-separation variables

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure 4: Tests for discontinuity in young adult's pre-separation variables

Notes: Sample consists of young adult children of mothers with 8-15 year old youngest child at the time of separation used in the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure 5: Effects of W2W reform on mother's welfare benefits in the first year after separation, LLR estimates

A. Parenting Payment Single

Discontinuity = -0.388*** [-0.454;-0.292]

B. Total welfare benefits

Discontinuity = -1.849*** [-3.258;-0.750]

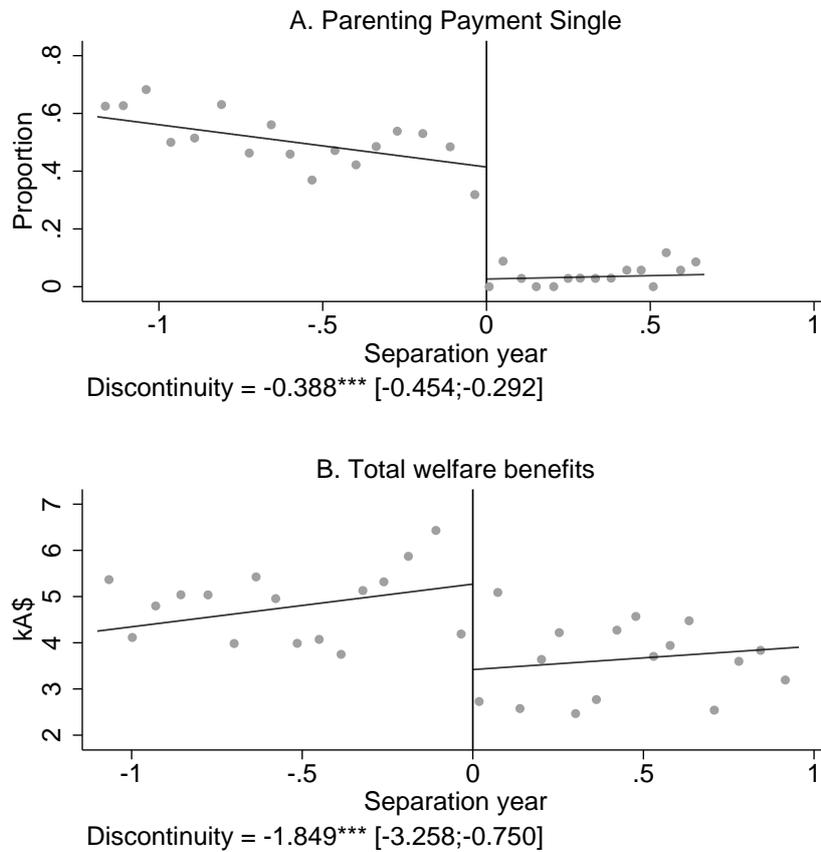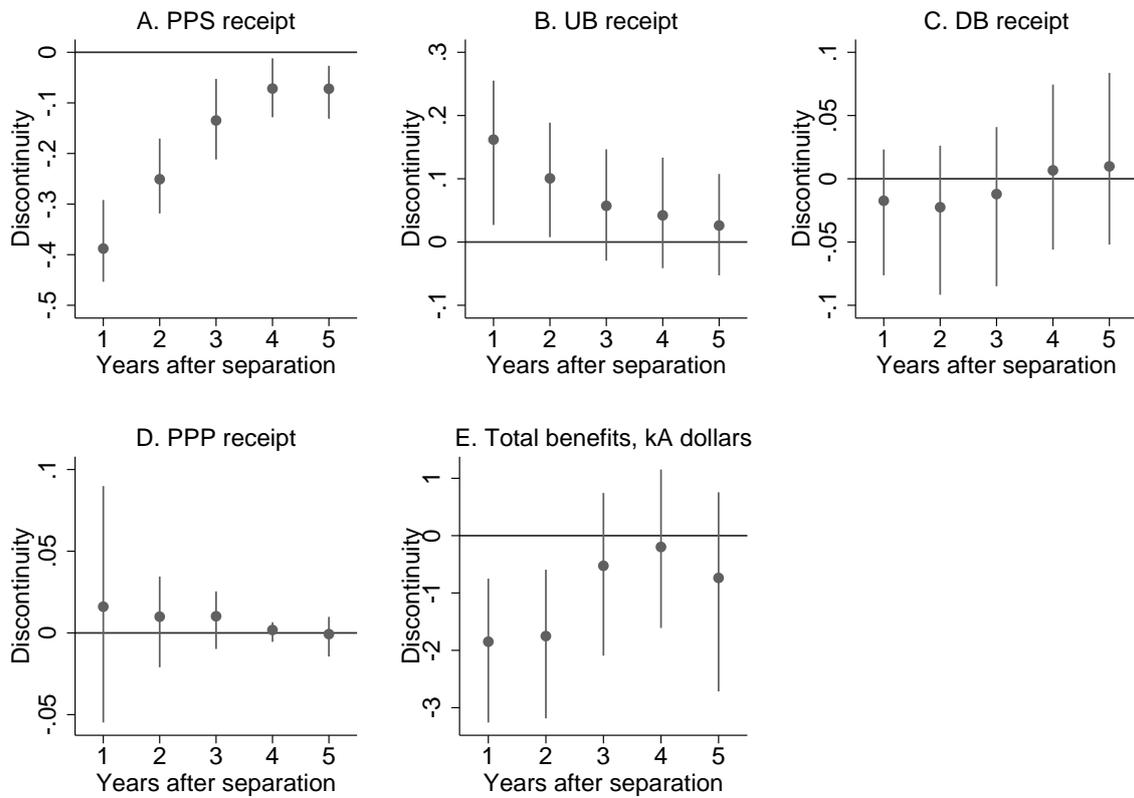*Notes*: Sample consists of mothers with 8-15 year old youngest child at the time of separation used in the estimation of LLRs. Sample size is 1,634 in Graph A and 1,704 in Graph B. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure 6: Effects of W2W reform on mother's welfare benefits by year after separation, LLR estimates

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. PPS stands for Parenting Payment Single, UB for unemployment benefit, DB for disability benefit, and PPP for Parenting Payment Partnered. The dots represent the LLR estimates of reform effects and the vertical lines corresponding robust bias-corrected 95% confidence intervals. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure 7: Effects of W2W reform on mother's personal and family's income by year after separation, LLR estimates

A. Mother's annual earned income, kA dollars

B. Mother's annual total income, kA dollars

C. Family's annual earned income, kA dollars

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. The dots represent the LLR estimates of reform effects and the vertical lines corresponding robust bias-corrected 95% confidence intervals. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure 8: Impact of W2W reform on young adult's homelessness and financial independence in the first year after separation, LLR estimates

A. Homeless

Discontinuity = -0.006 [-0.083;0.096]

B. Financially independent

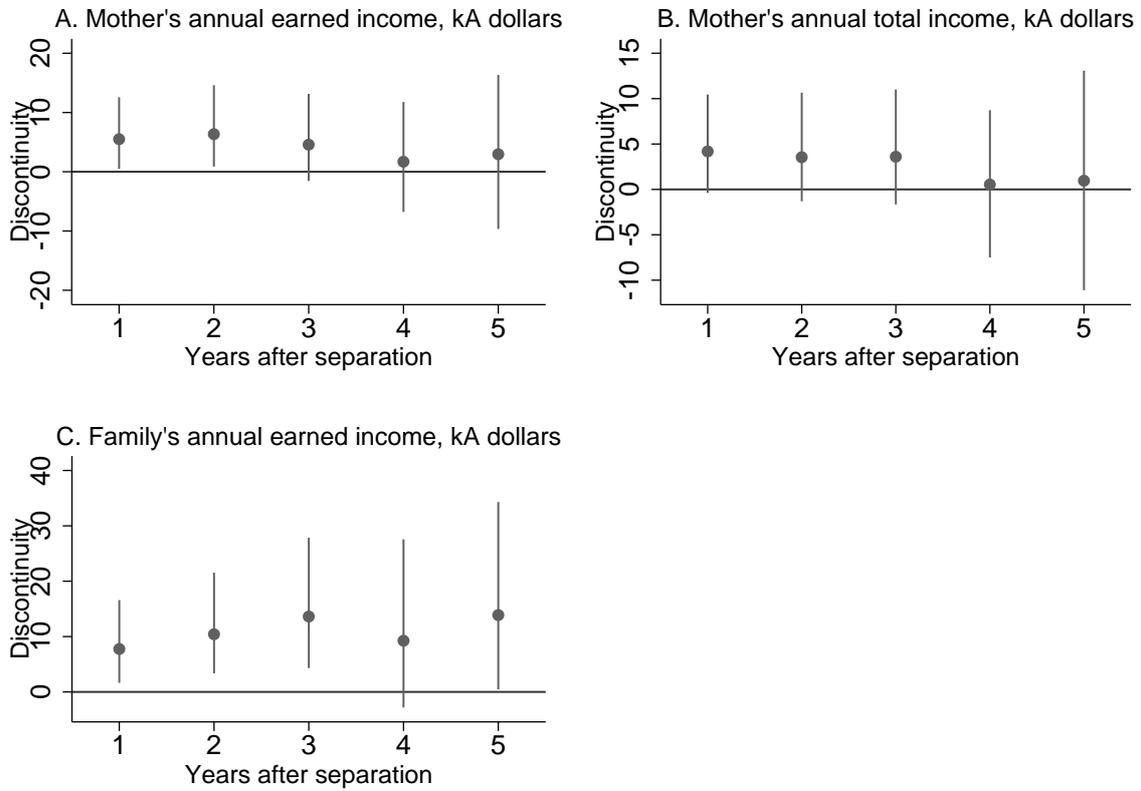Discontinuity = 0.019 [-0.060;0.110]
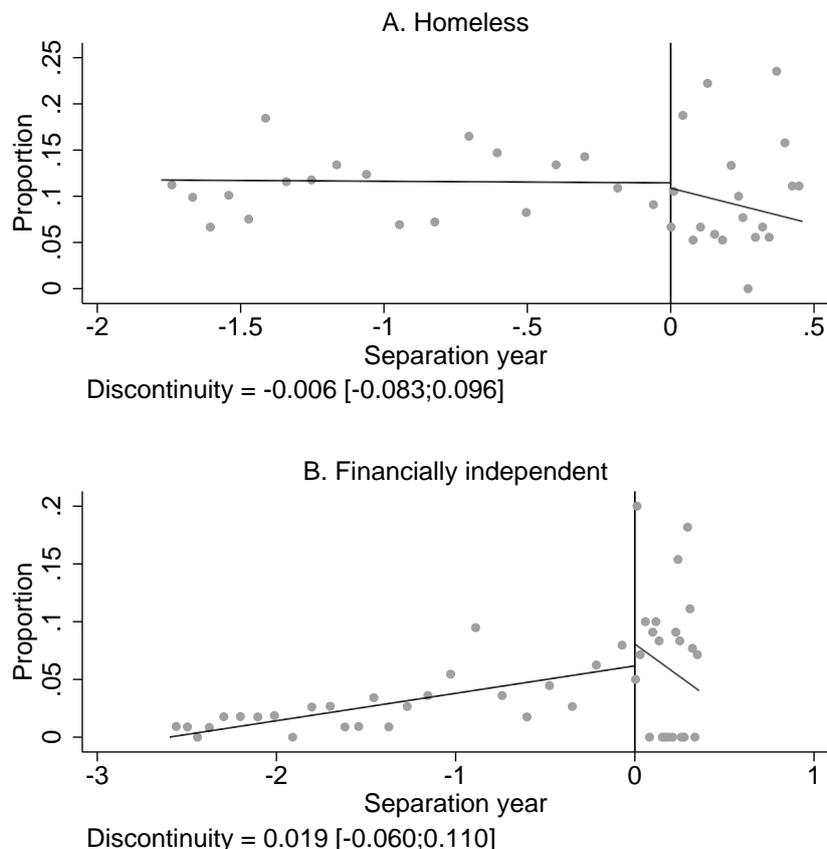
Notes: Sample consists of young adult children of mothers with 8-15 year old youngest child at the time of separation used in the estimation of LLRs. Sample size is 2,198 in Graph A, and 3,068 in Graph B. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure 9: Impact of W2W reform on young adult's fertility and welfare benefits up to 5 years after separation, LLR estimates
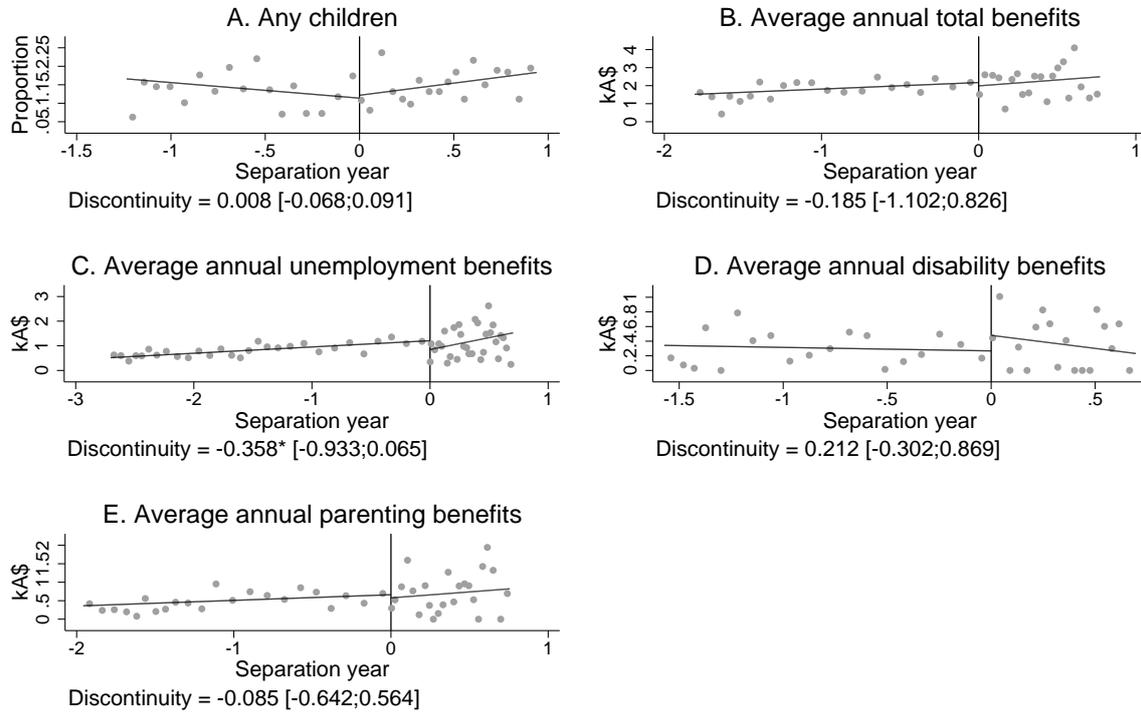
A. Any children

Discontinuity = 0.008 [-0.068;0.091]

B. Average annual total benefits

Discontinuity = -0.185 [-1.102;0.826]

C. Average annual unemployment benefits

Discontinuity = -0.358* [-0.933;0.065]

D. Average annual disability benefits

Discontinuity = 0.212 [-0.302;0.869]

E. Average annual parenting benefits

Discontinuity = -0.085 [-0.642;0.564]

Notes: Sample consists of young adult children of mothers with 8-15 year old youngest child at the time of separation used in the estimation of LLRs. Sample size is 1,844 in Graph A, 2,547 in Graph B, 3,900 in Graph C, 2,148 in Graph D, and 2,716 in Graph E. Average annual benefits are calculated as the average of annual benefits over the five years after separation. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table 1: Means of mother's and young adult's characteristics and outcome variables

	Separated before reform	Separated after reform
	(1)	(2)
A. Mother's and young adult's characteristics		
Age of mother at youth's birth	26.172	24.724
Age of mother at separation	41.636	44.298
Mother Australian	0.754	0.754
Mother Aboriginal/TSI	0.057	0.063
Mother in relationship in Jan 2001	0.815	0.729
Youngest child male	0.502	0.503
Age of youngest child at separation	12.594	12.824
Young adult male	0.503	0.514
Age of young adult at separation	15.464	19.574
Mother's benefits 2ys before separation, kA$	2.719	2.482
Young adult's welfare benefits 1y before separation, kA$	0.076	1.345
B. Mother's outcomes		
Receives Parenting Payment Single 1y after separation	0.618	0.035
Receives Parenting Payment Partnered 1y after separation	0.189	0.082
Receives unemployment benefit 1y after separation	0.102	0.365
Receives disability benefit 1y after separation	0.043	0.071
Total benefits 1y after separation, kA$	5.707	3.957
Earned income 1y after separation, kA$	23.113	28.199
Total income 1y after separation, kA$	29.137	32.264
Family's earned income 1y after separation, kA$	31.615	36.405
C. Young adult's outcomes		
Homeless 1y after separation	0.057	0.087
Independent 1y after separation	0.012	0.100
Had any children 1-5ys after separation	0.086	0.168
Average annual unemployment benefits 1-5ys after separation, kA$	0.524	1.195
Average annual disability benefits 1-5ys after separation, kA$	0.183	0.476
Average annual parenting benefits 1-5ys after separation, kA$	0.283	0.966
Average annual total benefits 1-5ys after separation, kA$	1.013	2.709
Sample size	9,150	1,456

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation.

Table 2: Heterogeneity in W2W reform effects on mother's and young adult's outcomes, LLR estimates

| | Mother on welfare 2 years before | | Mother native born | | Youngest child's age | |
	No	Yes	No	Yes	< 14	>= 14
A. Mother (1y after)						
PPS receipt	−0.332***	−0.485***	−0.500***	−0.341***	−0.414***	−0.337***
	[−0.409; −0.249]	[−0.620; −0.273]	[−0.605; −0.387]	[−0.419; −0.218]	[−0.508; −0.273]	[−0.444; −0.232]
UB receipt	0.107	0.251*	−0.009	0.188***	0.186*	0.124
	[−0.020; 0.210]	[−0.019; 0.429]	[−0.290; 0.156]	[0.063; 0.295]	[−0.003; 0.310]	[−0.047; 0.267]
Total benefits kA$	−1.567***	−2.496**	−4.975***	−0.856	−1.867**	−1.287
	[−2.802; −0.522]	[−4.382; −0.407]	[−7.409; −3.617]	[−2.320; 0.593]	[−3.704; −0.349]	[−3.065; 0.288]
Earned income kA$	5.148*	12.017***	16.274***	2.214	8.688**	−0.608
	[−0.711; 13.220]	[4.316; 21.238]	[8.936; 27.850]	[−3.956; 9.795]	[1.859; 18.029]	[−9.808; 8.367]
Total income kA$	2.968	12.627***	8.534**	2.105	8.384***	−2.413
	[−2.363; 10.422]	[6.111; 20.777]	[1.709; 18.939]	[−3.224; 8.853]	[2.481; 16.503]	[−10.593; 5.235]
Family's income kA$	4.631	21.485***	12.941***	5.430	14.035***	−2.519
	[−2.509; 14.292]	[11.222; 35.147]	[3.970; 27.852]	[−1.691; 15.861]	[4.927; 25.982]	[−13.256; 7.656]
B. Young adult						
Homeless 1y after	−0.034	0.130	−0.003	−0.008	−0.034	0.049
	[−0.096; 0.026]	[−0.123; 0.439]	[−0.214; 0.190]	[−0.087; 0.108]	[−0.140; 0.065]	[−0.090; 0.227]
Independent 1y after	0.032	−0.030	0.082	−0.005	0.010	0.020
	[−0.047; 0.139]	[−0.229; 0.163]	[−0.175; 0.340]	[−0.076; 0.086]	[−0.107; 0.133]	[−0.071; 0.138]
Any children 1-5ys after	0.008	−0.006	0.018	0.012	0.008	−0.006
	[−0.068; 0.090]	[−0.181; 0.203]	[−0.204; 0.192]	[−0.069; 0.109]	[−0.095; 0.129]	[−0.115; 0.111]
Total benefits 1-5ys after kA$	−0.309	−0.029	0.333	−0.239	0.649	−0.985**
	[−0.987; 0.623]	[−2.416; 2.154]	[−1.683; 2.094]	[−1.253; 0.989]	[−0.721; 2.465]	[−2.157; −0.194]
UB 1-5ys after kA$	−0.103	−0.984**	−0.361	−0.401	−0.236	−0.392
	[−0.548; 0.452]	[−2.439; −0.086]	[−1.526; 0.509]	[−1.069; 0.180]	[−0.963; 0.446]	[−1.120; 0.147]
Sample size	6,579	4,027	2,608	7,998	6,948	3,658

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. For each outcome, the LLR is estimated separately in each sub-sample. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's welfare benefits are calculated as averages of annual benefits over the five years after separation. Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table 3: Sensitivity to alternative bandwidths, LLR estimates of reform effects

	CER	MSE	$2 \cdot$ CER	$2 \cdot$ MSE
	(1)	(2)	(3)	(4)
A.Mother (1y after)				
PPS receipt	-0.377^{***}	-0.388^{***}	-0.390^{***}	-0.410^{***}
	$[-0.464; -0.280]$	$[-0.454; -0.292]$	$[-0.463; -0.283]$	$[-0.463; -0.321]$
UB receipt	0.137^{**}	0.162^{**}	0.178^{**}	0.215^{***}
	$[0.002; 0.256]$	$[0.027; 0.255]$	$[0.003; 0.249]$	$[0.056; 0.258]$
Total benefits kA\$	-2.016^{***}	-1.849^{***}	-1.579^{***}	-1.318^{***}
	$[-3.460; -0.695]$	$[-3.258; -0.750]$	$[-3.532; -0.825]$	$[-2.796; -0.602]$
Earned income kA\$	8.661^{***}	5.500^{**}	5.285^{**}	2.488^{**}
	$[2.491; 15.624]$	$[0.483; 12.589]$	$[0.593; 13.928]$	$[1.472; 13.221]$
Total income kA\$	7.792^{***}	4.187^{*}	2.873^{**}	1.426^{**}
	$[2.233; 13.982]$	$[-0.384; 10.451]$	$[1.685; 13.299]$	$[0.066; 10.446]$
Family's income kA\$	12.803^{***}	7.761^{**}	6.357^{***}	3.506^{***}
	$[5.139; 21.474]$	$[1.683; 16.586]$	$[3.470; 19.750]$	$[2.457; 16.952]$
B.Young adult (1-5ys after)				
UB kA\$	-0.393	-0.358^{*}	-0.261^{*}	-0.153
	$[-0.964; 0.126]$	$[-0.933; 0.065]$	$[-1.003; 0.057]$	$[-0.741; 0.141]$

Notes: The sample consists of mothers with 8-15 year old youngest child at the time of separation. In column (1), bandwidth is selected using two different CER-optimal bandwidth selectors (below and above the cut-off). In column (2), bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). In columns (3) and (4), bandwidth is twice as large as CER-optimal and MSE-optimal bandwidth, respectively. PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table 4: Sensitivity to adding control variables, LLR estimates of W2W reform effects

	(1)	(2)	(3)
A.Mother (1y after)			
PPS receipt	−0.388***	−0.379***	−0.374***
	[−0.454; −0.292]	[−0.443; −0.279]	[−0.437; −0.273]
UB receipt	0.162**	0.167***	0.164***
	[0.027; 0.255]	[0.040; 0.260]	[0.041; 0.256]
Total benefits kA$	−1.849***	−1.771***	−1.581***
	[−3.258; −0.750]	[−3.067; −0.542]	[−2.529; −0.627]
Earned income kA$	5.500**	5.674**	5.769**
	[0.483; 12.589]	[0.631; 12.706]	[0.841; 11.809]
Total income kA$	4.187*	4.426*	4.424*
	[−0.384; 10.451]	[−0.138; 10.622]	[−0.103; 10.140]
Family's income kA$	7.761**	7.933**	7.550**
	[1.638; 16.586]	[1.721; 16.739]	[1.347; 15.703]
B.Young adult (1-5ys after)			
UB kA$	−0.358*	−0.309	−0.369*
	[−0.933; 0.065]	[−0.833; 0.122]	[−0.844; 0.051]
Sample size	10,606	10,590	10,590
Mother's characteristics	No	Yes	Yes
Mother's and youth's welfare history	No	No	Yes

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Regressions in column (2) control for mother's age at young adult's birth, migrant, aboriginal/TSI, and marital status in 2001, and youngest sibling's gender and age at the separation. Regressions in column (3) additionally control for mother's welfare benefits two years before the separation and young adult's welfare benefits one year before the separation. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table 5: Other sensitivity checks, estimates of W2W reform effects

	LQR	Local randomization	Uniform kernel	Donut LLR	Untreated
	(1)	(2)	(3)	(4)	(5)
A. Mother (1y after)					
PPS receipt	−0.356***	−0.350***	−0.417***	−0.449***	0.071
	[−0.440; −0.257]	[−0.460; −0.240]	[−0.489; −0.319]	[−0.548; −0.365]	[−0.048; 0.231]
UB receipt	0.141**	0.182***	0.155**	0.275***	0.029
	[0.000; 0.255]	[0.060; 0.300]	[0.024; 0.252]	[0.131; 0.434]	[−0.196; 0.269]
Total benefits kA$	−2.161***	−1.360*	−1.343**	−2.977***	−0.030
	[−3.808; −0.869]	[−2.890; −0.100]	[−2.497; −0.031]	[−5.277; −1.118]	[−2.441; 2.577]
Earned income kA$	7.339**	5.886**	4.194*	2.387	−6.170
	[1.697; 14.438]	[−0.240; 10.830]	[−0.947; 11.722]	[−5.463; 11.532]	[−51.074; 33.159]
Total income kA$	5.169**	4.619*	2.239	−1.016	−8.595
	[0.188; 11.415]	[−0.520; 8.750]	[−2.328; 8.886]	[−8.246; 6.569]	[−51.916; 28.995]
Family's income kA$	11.052***	8.022**	9.076**	1.453	−13.064
	[3.403; 20.515]	[1.070; 14.970]	[1.771; 17.348]	[−10.278; 12.379]	[−69.993; 36.429]
B. Young adult (1-5ys after)					
UB kA$	−0.494	−0.391	−0.182	−0.226	−0.164
	[−1.160; 0.105]	[−0.900; 0.140]	[−0.624; 0.285]	[−0.911; 0.451]	[−0.975; 0.750]
Sample size	10,606	194	10,606	10,461	2,201

Notes: The figures in column (1) are local quadratic regression estimates; the figures in columns (3)-(5) are local linear regression estimates. In columns (1) to (4), the sample consists of mothers with 8-15 year old youngest child at the time of separation. In column (2), the sample is restricted to the mothers who separated within 42 day window around the cut-off; it is explained in the text how this window is selected. In column (3), uniform kernel is used in the estimation of local regressions, and in the rest of the columns triangular kernel is used. In column (4), mothers who separated within one month window around the reform date are excluded. In column (5), the sample consists of mothers with youngest child 16 years of age or older at the time of separation, who were not affected by the W2W reform. In each regression, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. Robust bias-corrected 95% confidence intervals are presented in square brackets in columns (1) and (3)-(5); 95% confidence intervals are presented in square brackets in column (2). *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

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Online appendix (Not for publication)
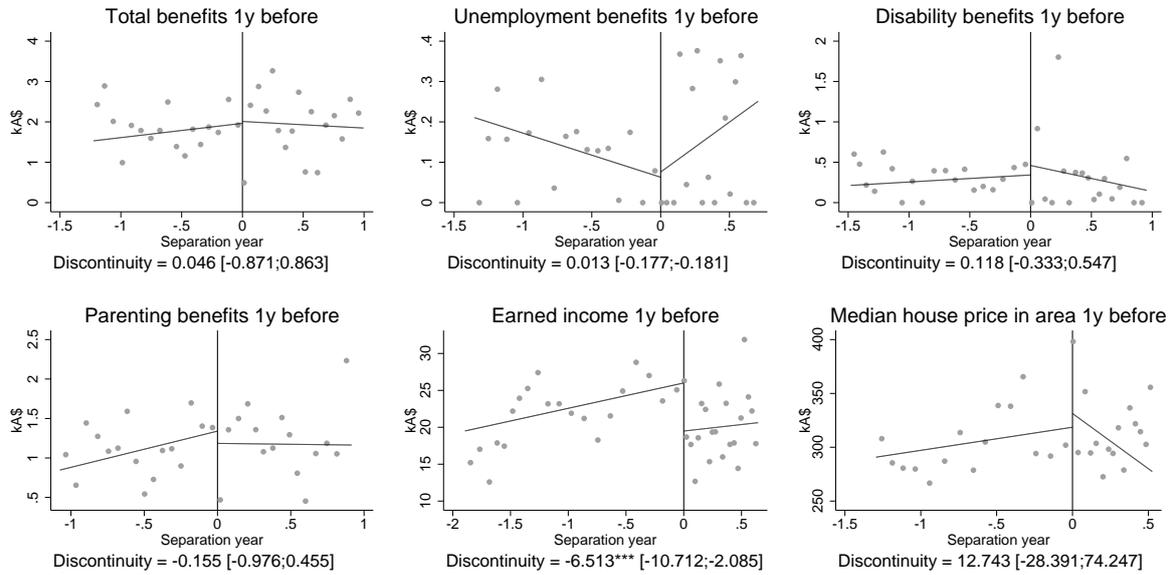
A   Supplementary figures and tables

Figure A.1: McCrary test for the discontinuity in density at W2W reform date by the age of youngest child
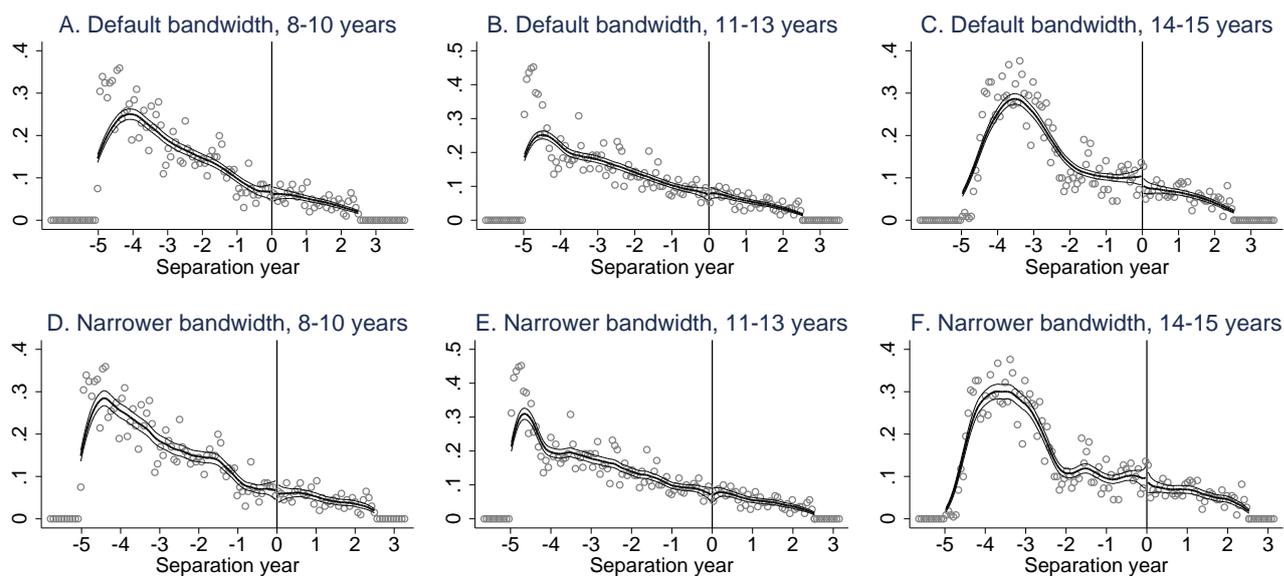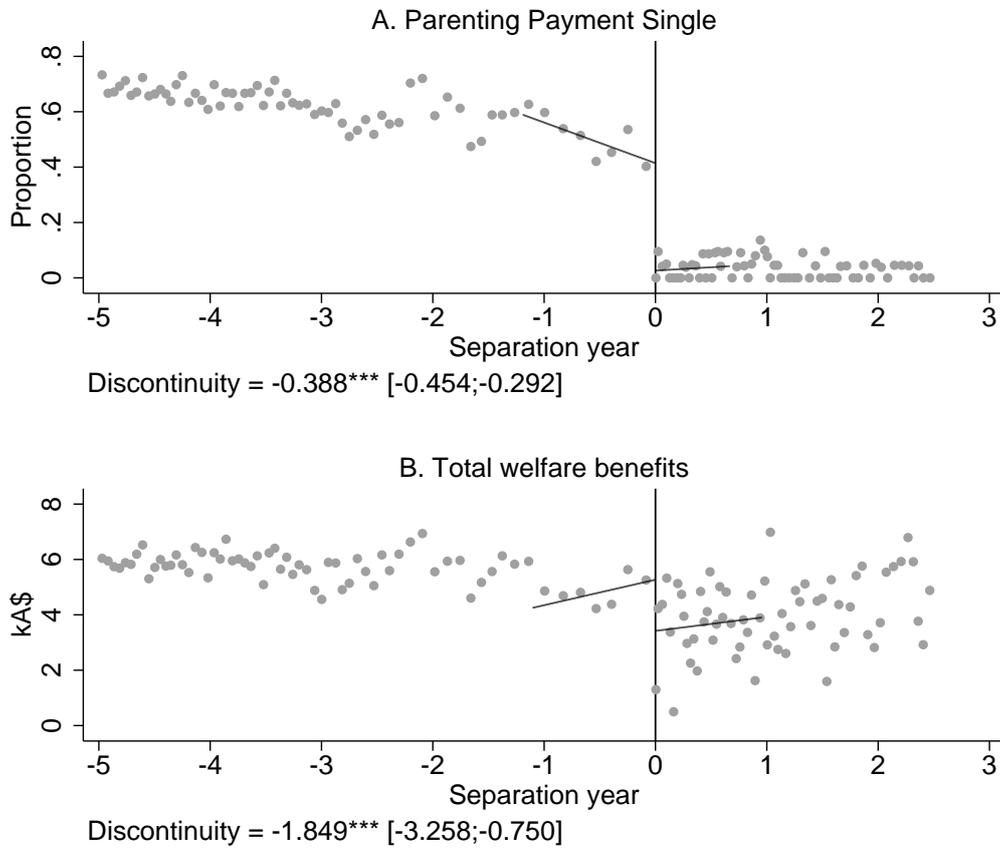

Notes: In each graph, sample consists of mothers with youngest child within respective age range at the time of separation. Graphs A to C are based on the automatically-selected bandwidth, and in Graphs D to F, the bandwidth is set to be half as narrow (or the narrowest possible bandwidth so that there are at least ten bins in each window). Separation date is normalized so that 1 Jul 2006 equals 0.

Figure A.2: Tests for discontinuity in mother's pre-separation variables measured in the year before the separation
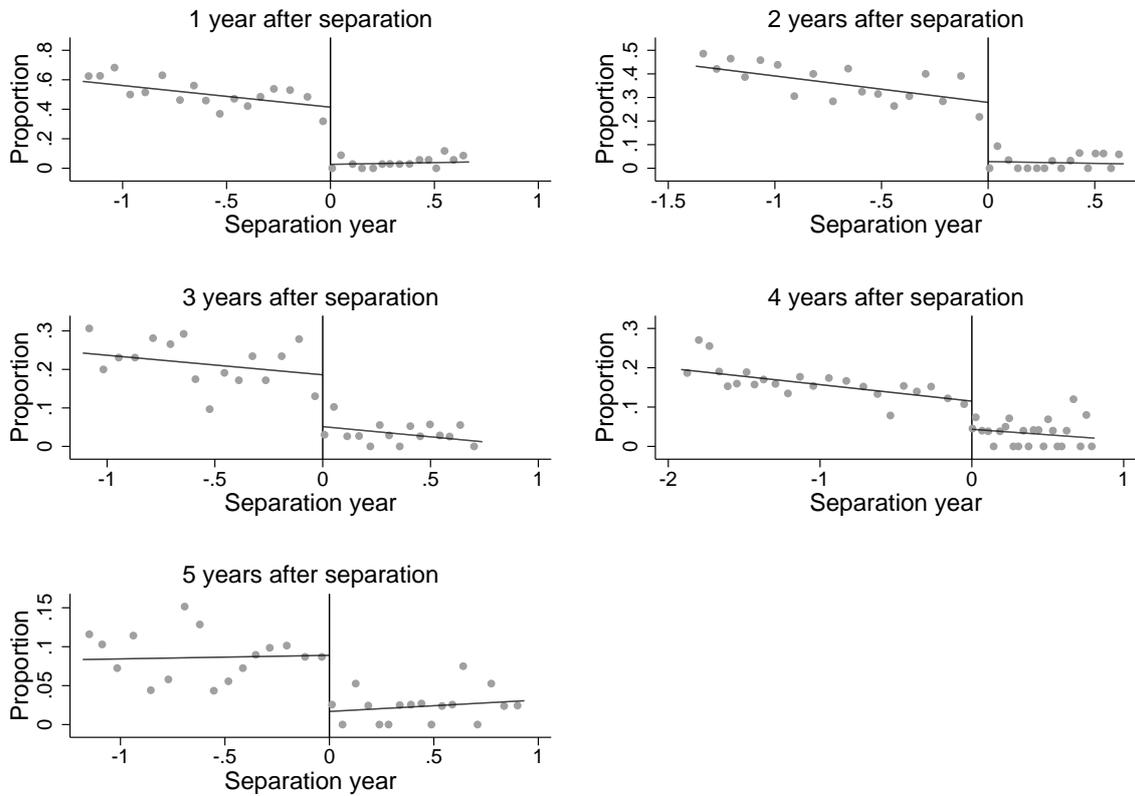

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used in the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure A.3: Effects of W2W reform on mother's welfare benefits in the first year after separation, all available data


A. Parenting Payment Single

Discontinuity = -0.388*** [-0.454;-0.292]

B. Total welfare benefits

Discontinuity = -1.849*** [-3.258;-0.750]

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Sample size is 10,606. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure A.4: Mother's Parenting Payment Single receipt in first to fifth year after separation

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure A.5: Mother's unemployment benefit receipt in first to fifth year after separation
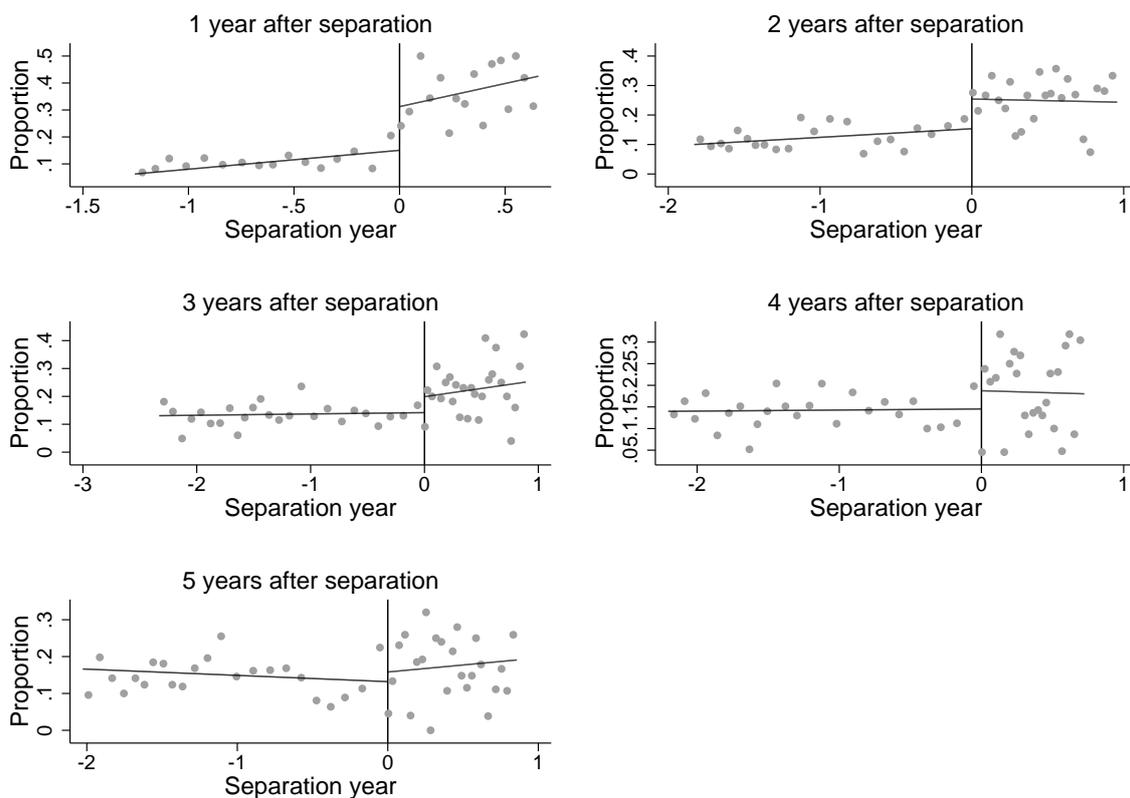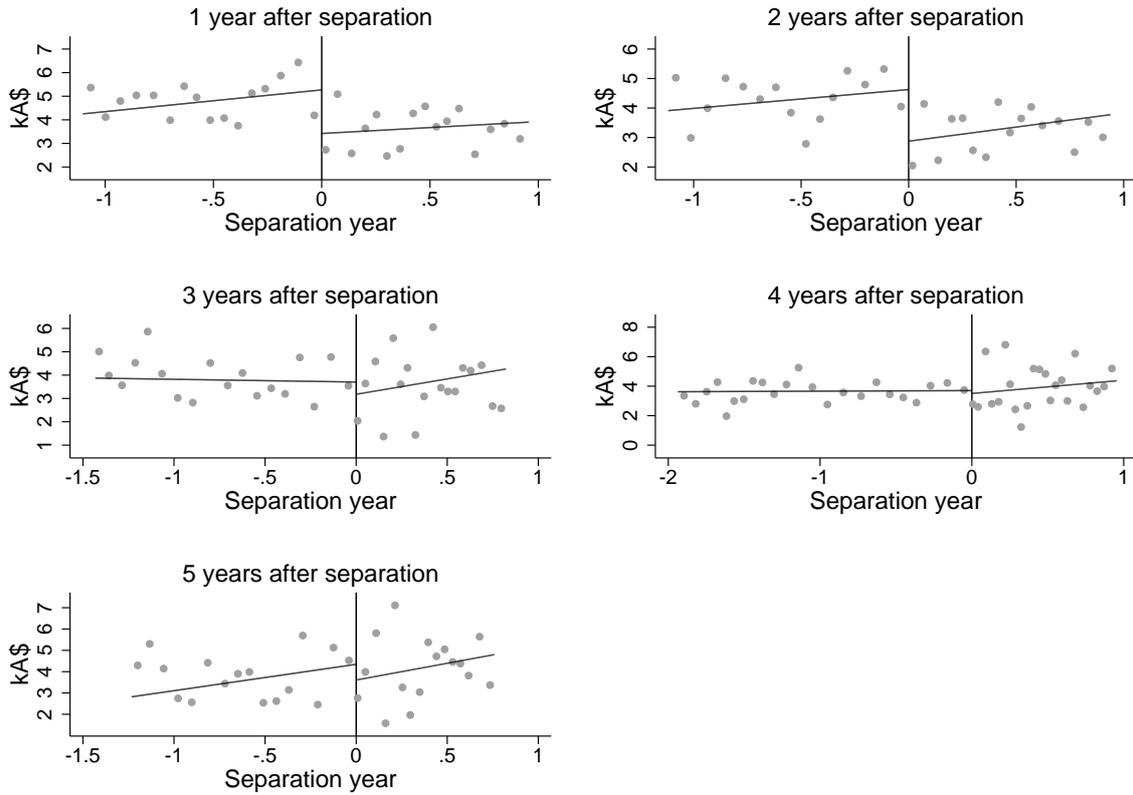

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure A.6: Mother's total welfare benefits in first to fifth year after separation
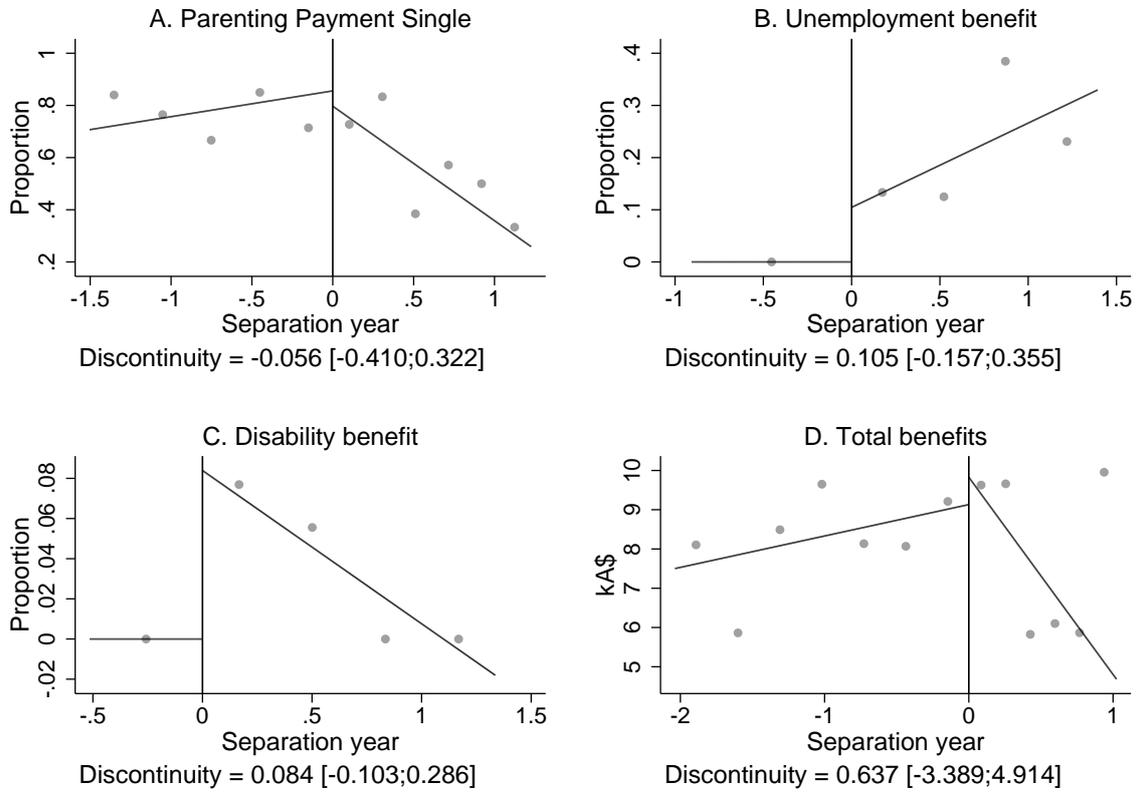

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure A.7: Testing for participation requirement effect, reform effects on mothers with 6 year old children

A. Parenting Payment Single

Discontinuity = -0.056 [-0.410;0.322]

B. Unemployment benefit

Discontinuity = 0.105 [-0.157;0.355]

C. Disability benefit

Discontinuity = 0.084 [-0.103;0.286]

D. Total benefits

Discontinuity = 0.637 [-3.389;4.914]

Notes: All variables are measured in the first year after the separation. Sample consists of mothers with a 6 year old child at the time of separation who maintained eligibility to Parenting Payment Single, but were subject to the new participation requirements, used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

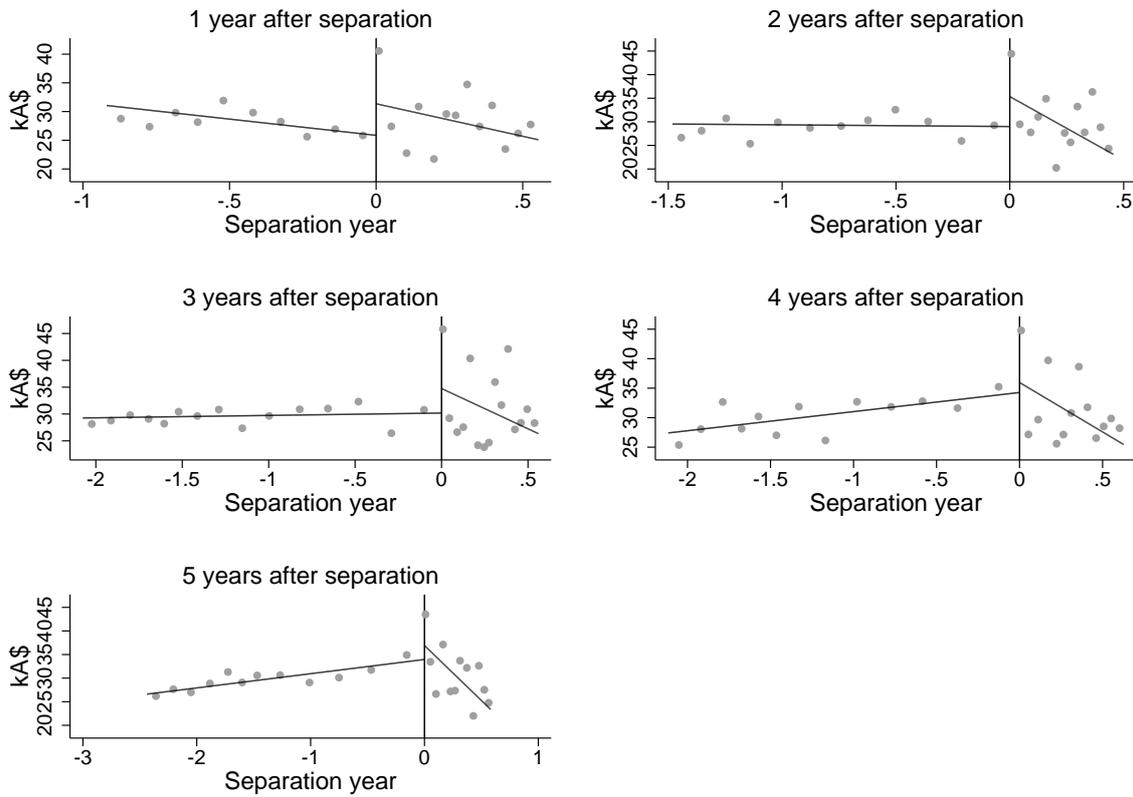Figure A.8: Mother's earned income in first to fifth year after separation

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure A.9: Mother's total income in first to fifth year after separation
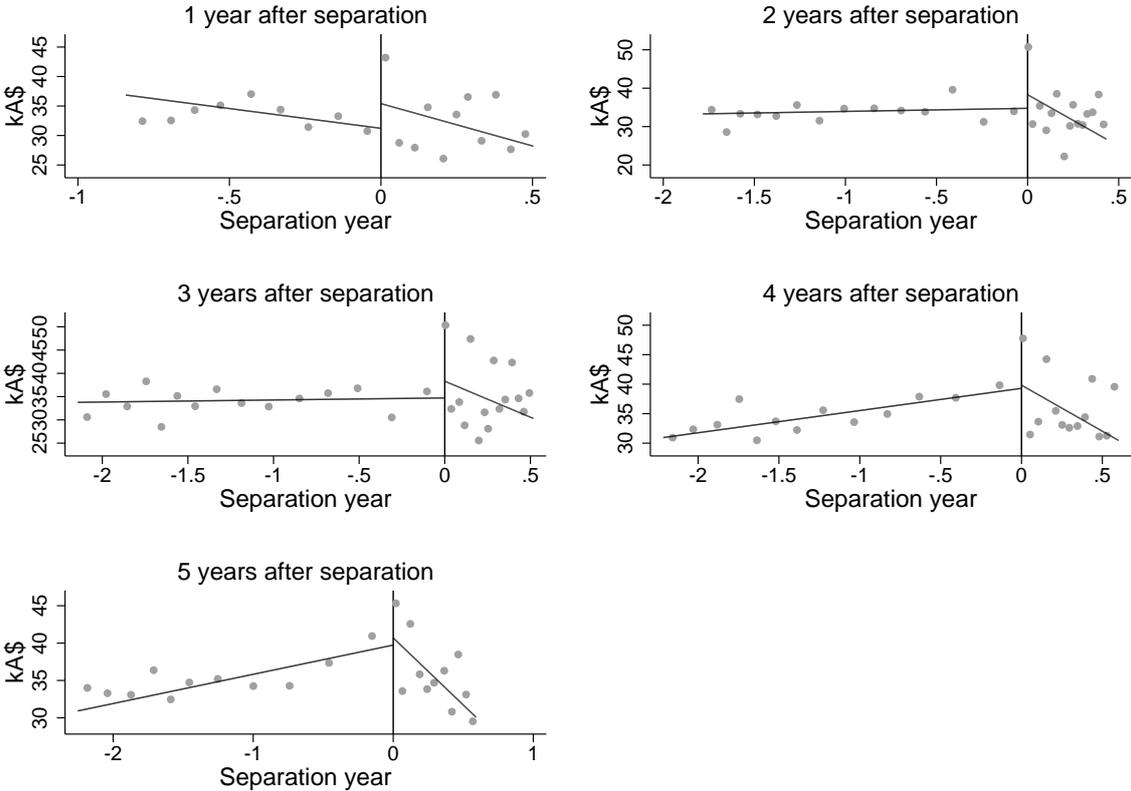
Notes: Mother's total income is the sum of her earned and welfare income. Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

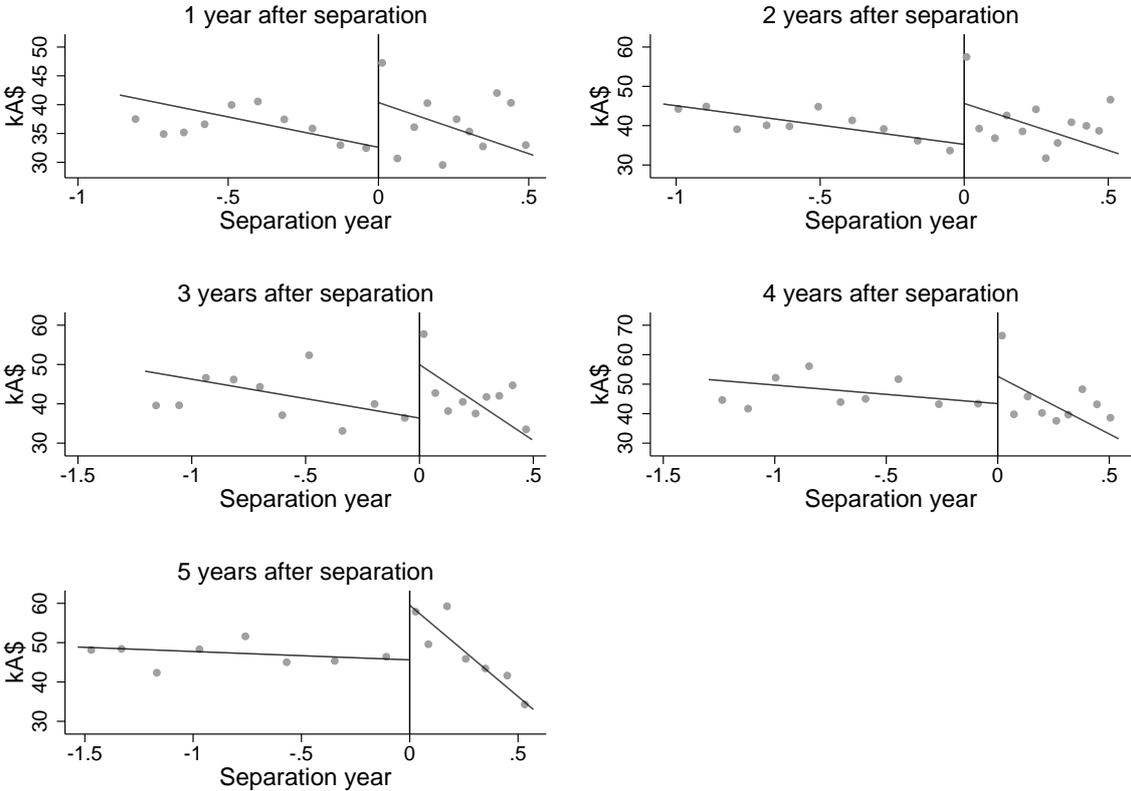Figure A.10: Family's earned income in first to fifth year after separation

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off).

Figure A.11: Effects of W2W reform on young adult's unemployment benefits by year after separation, LLR estimates

1 year after separation

Discontinuity = -0.202 [-0.721;0.373]

2 years after separation

Discontinuity = -0.408 [-0.831;0.113]

3 years after separation

Discontinuity = -0.262 [-1.006;0.242]

4 years after separation

Discontinuity = -0.670* [-1.703;0.007]

5 years after separation

Discontinuity = -0.170 [-1.078;0.563]

Notes: Sample consists of young adult children of mothers with 8-15 year old youngest child at the time of separation used for the estimation of LLRs. Separation date is normalized so that 1 Jul 2006 equals 0. The dots represent means in each bin, the number of which is selected using mimicking variance quantile-spaced method with spacings estimators applying a scale of 0.5. The lines represent fitted values of LLRs, which are used to estimate reported discontinuities. In each LLR, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Figure A.12: LLR estimates of W2W reform effects with different bandwidths
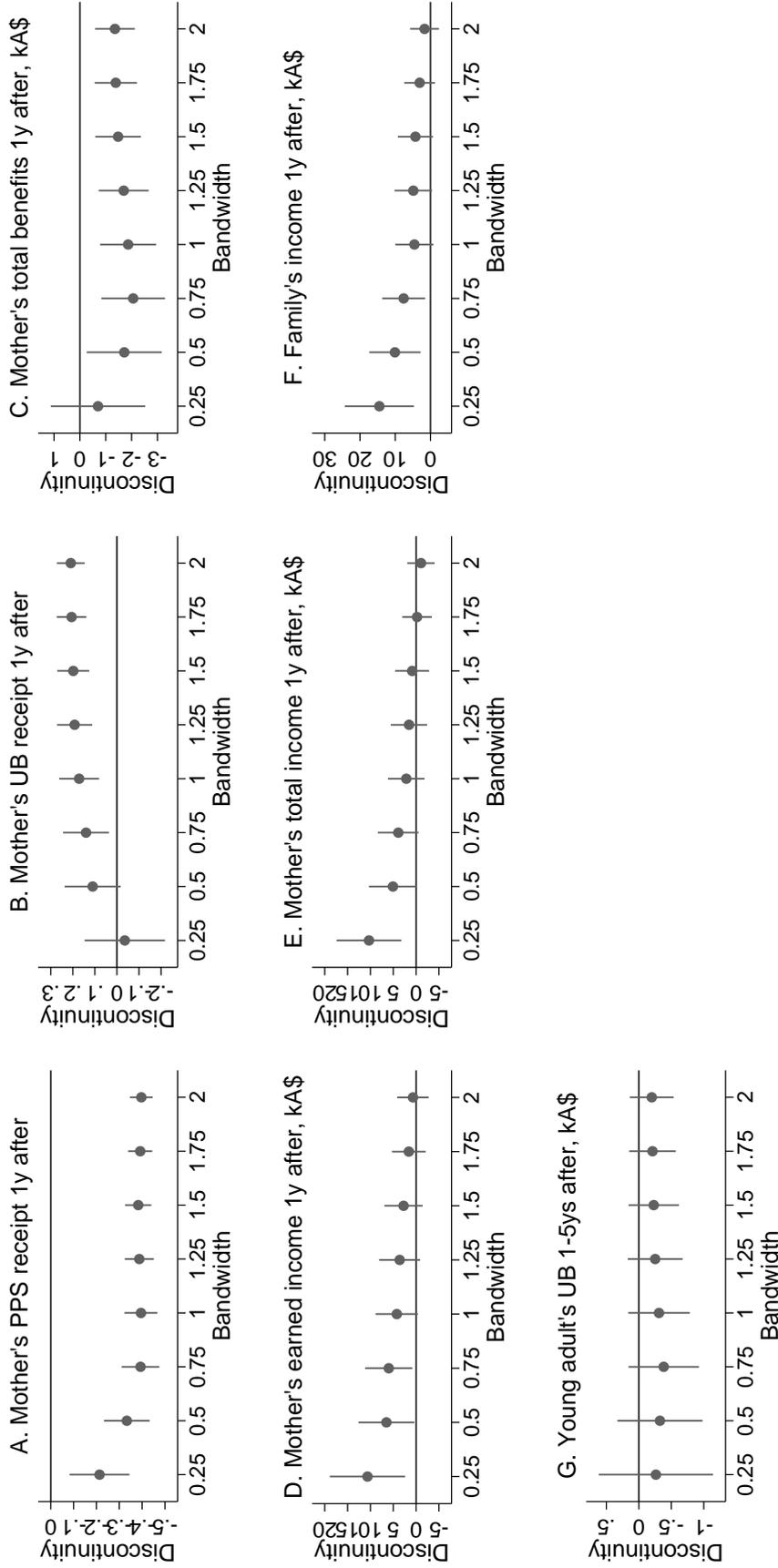
Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. PPS stands for Parenting Payment Single and UB for unemployment benefit. Young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. The dots represent the LLR estimates of reform effects (estimated using triangular weights) and the vertical lines corresponding 95% confidence intervals. The same bandwidth is used below and above the cut-off.

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Table A.1: Power analysis

	Hypothesized TE	Power
A. Mother (1 year after)		
PPS receipt	0.250	1.000
UB receipt	0.157	0.768
Total benefits kA$	2.636	0.985
Earned income kA$	10.816	0.938
Total income kA$	9.487	0.930
Family's income kA$	12.248	0.895
B. Young adult		
Homeless 1y after	0.158	0.933
Independent 1y after	0.082	0.476
Any children 1y after	0.170	0.987
Total benefits 1-5ys after kA$	1.632	0.913
UB 5ys after kA$	0.839	0.909

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. TE stands for treatment effect, PPS for Parenting Payment Single, and UB for unemployment benefit. In Panel B, young adult's welfare benefit value is calculated as an average over the five years after separation.

Table A.2: Heterogeneity in W2W reform effects on mother's and young adult's outcomes, linear regression estimates

	Mother on welfare 2 years before		Mother native born		Youngest child's age ≥ 14	
A.Mother (1y after)						
PPS receipt						
W2W reform	−0.319***	(0.053)	−0.489***	(0.097)	−0.449***	(0.057)
W2W reform × X	−0.251***	(0.094)	0.132	(0.110)	0.133	(0.090)
UB receipt						
W2W reform	0.098**	(0.046)	0.234***	(0.084)	0.212***	(0.050)
W2W reform × X	0.218***	(0.081)	−0.068	(0.095)	−0.080	(0.080)
Total benefits kA$						
W2W reform	−1.477***	(0.524)	−3.651***	(1.088)	−2.022***	(0.640)
W2W reform × X	−1.429	(0.926)	2.703**	(1.230)	0.892	(1.017)
Earned income kA$						
W2W reform	5.444*	(3.297)	13.046**	(6.009)	6.102*	(3.440)
W2W reform × X	−1.267	(5.727)	−11.503*	(6.827)	−4.496	(6.110)
Total income kA$						
W2W reform	2.806	(3.117)	6.877	(5.550)	3.746	(3.194)
W2W reform × X	−0.421	(5.471)	−6.334	(6.299)	−4.126	(5.612)
Family's income kA$						
W2W reform	2.307	(4.166)	11.289	(7.479)	8.113*	(4.315)
W2W reform × X	8.268	(7.579)	−9.058	(8.505)	−10.836	(7.626)
B.Young adult						
Homeless 1y after						
W2W reform	−0.051	(0.044)	0.017	(0.083)	−0.029	(0.048)
W2W reform × X	0.035	(0.078)	−0.057	(0.093)	0.001	(0.074)
Independent 1y after						
W2W reform	0.027	(0.025)	0.076	(0.047)	−0.001	(0.029)
W2W reform × X	−0.067	(0.051)	−0.081	(0.053)	0.025	(0.044)
Any children 5ys after						
W2W reform	−0.012	(0.040)	0.012	(0.071)	−0.016	(0.042)
W2W reform × X	−0.010	(0.070)	−0.016	(0.080)	0.026	(0.068)
Total benefits 5ys after kA$						
W2W reform	−0.559	(0.375)	0.467	(0.705)	0.186	(0.416)
W2W reform × X	0.543	(0.663)	−0.822	(0.794)	−0.961	(0.663)
UB 1-5ys after kA$						
W2W reform	−0.275	(0.196)	−0.083	(0.361)	−0.198	(0.213)
W2W reform × X	−0.059	(0.342)	−0.184	(0.406)	−0.029	(0.338)

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Presented figures are linear regression coefficient estimates on the post-reform dummy and the interaction of this dummy with the respective mother's characteristic. Standard errors in parentheses. All regressions also include the respective mother's characteristic, the running variable and its interactions with the post-reform dummy and the mother's characteristic, and the triple interaction between the post-reform dummy, the running variable and the mother's characteristic. Each regression is estimated using the same observations as in the LLR for the respective outcome. In the LLR, the bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's welfare benefit value is calculated as an average over the five years after separation. Standard errors are presented in parenthesis. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table A.3: Global polynomial regression estimates of W2W reform effects on mother's and young adult's outcomes

| | Order of polynomial | | | |
	First	Second	Third	Fourth
A.Mother (1y after)				
PPS receipt	−0.447***	−0.439***	−0.418***	−0.372***
	(0.016)	(0.024)	(0.032)	(0.041)
	[13325]	[13327]	[13326]	[13324]
UB receipt	0.227***	0.245***	0.224***	0.107*
	(0.024)	(0.036)	(0.047)	(0.057)
	[6757]	[6755]	[6758]	[6720]
Total benefits kA$	−1.802***	−1.324***	−1.209**	−1.521**
	(0.284)	(0.422)	(0.556)	(0.679)
	[64143]	[64142]	[64146]	[64149]
Earned income kA$	−1.265	−1.015	1.007	6.588**
	(1.504)	(2.184)	(2.556)	(3.183)
	[75978]	[75982]	[75984]	[75980]
Total income kA$	−3.347**	−2.539	−0.879	4.377
	(1.373)	(1.980)	(2.248)	(2.815)
	[74630]	[74634]	[74636]	[74632]
Family's income kA$	−2.747	−3.336	1.205	7.771**
	(1.891)	(2.691)	(3.067)	(3.845)
	[74648]	[74652]	[74647]	[74642]
B.Young adult(1-5ys after)				
UB kA$	−0.077	−0.217	−0.301	−0.298
	(0.121)	(0.180)	(0.229)	(0.277)
	[37718]	[37716]	[37719]	[37723]

Notes: Sample consists of mothers with 8-15 year old youngest child at the time of separation. Sample size is 10,606. PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

Table A.4: Discontinuities at placebo cut-off dates, LLR estimates

	1 Jul 2002	1 Jul 2003	1 Jul 2004	1 Jul 2005	1 Jul 2007	1 Jul 2008
	(1)	(2)	(3)	(4)	(5)	(6)
A.Mother (1y after)						
PPS receipt	−0.015	0.025	−0.053	−0.150**	−0.144**	0.009
	[−0.120; 0.082]	[−0.057; 0.148]	[−0.190; 0.069]	[−0.321; −0.024]	[−0.307; −0.006]	[−0.090; 0.124]
UB receipt	−0.007	0.075***	−0.013	−0.011	−0.042	0.100
	[−0.059; 0.036]	[0.023; 0.150]	[−0.072; 0.058]	[−0.118; 0.072]	[−0.272; 0.152]	[−0.177; 0.423]
Total benefits kA$	0.250	0.764*	−1.681***	−1.797**	−0.575	0.065
	[−0.657; 1.352]	[−0.039; 1.883]	[−3.048; −0.601]	[−3.552; −0.410]	[−3.554; 2.021]	[−2.756; 2.697]
Earned income kA$	−0.429	−7.073***	1.972	−4.256	2.858	3.834
	[−4.509; 3.999]	[−12.805; −2.545]	[−2.031; 7.330]	[−23.985; 13.244]	[−7.192; 14.541]	[−9.906; 17.554]
Total income kA$	−0.477	−5.657***	0.008	−6.427	2.476	2.830
	[−4.000; 3.289]	[−10.750; −1.816]	[−3.754; 4.573]	[−26.148; 11.031]	[−5.991; 12.716]	[−10.153; 15.888]
Family's income kA$	−5.345	−4.387*	−0.982	−6.460	1.201	1.445
	[−13.475; 1.442]	[−10.104; 0.788]	[−7.407; 4.877]	[−31.935; 17.108]	[−10.647; 14.535]	[−14.615; 19.777]
B.Young adult (1-5ys after)						
UB kA$	−0.023	0.143*	0.206	−0.227	−0.077	−0.451
	[−0.160; 0.140]	[−0.016; 0.323]	[−0.057; 0.617]	[−0.762; 0.264]	[−1.211; 0.811]	[−1.514; 0.377]
Sample size	9,150	9,150	9,150	9,150	1,456	1,456

Notes: The sample consists of mothers with 8-15 year old youngest child at the time of separation. In columns (1)-(4), mothers who separated on or after 1 July 2006 are excluded. In columns (5)-(6), mothers who separated before 1 July 2006 are excluded. In each regression, bandwidth is selected using two different MSE-optimal bandwidth selectors (below and above the cut-off). PPS stands for Parenting Payment Single and UB for unemployment benefit. In Panel B, young adult's unemployment benefits are calculated as the average of annual benefits over the five years after separation. Robust bias-corrected 95% confidence intervals are presented in square brackets. *, **, *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

B Data Appendix

We use administrative data from federal social security records spanning 2001 to 2013. In Australia, the social security system provides two main types of payments to families with children: (1) family payments assist families with the cost of raising children provided to approximately 81% of families with children (ABS 2007), and (2) income support payments targeted at low-income individuals with a disability, children or other significant caring responsibilities, or the unemployed. As the administrative data used in this paper comprise both (1) family payment recipients and (2) income support recipients, they are representative of the Australian population of low- to middle-income families with children.

Family payments are mainly made to primary carers of children (usually the mother). It consists of two parts, Family Tax Benefit Part A (FTBA) and Family Tax Benefit Part B (FTBB). FTBA is means-tested on the combined income of both partners.[45] It is provided to around 1.6 million families. Families that do not receive this regular payment include: (1) high income families[46]; (2) the approximately 10% of families who choose to receive their FTB payments annually through the tax system (most of these are high income); and (3) eligible customers who do not seek to claim their FTB payments. Median income of families receiving FTBA was A$54,080 in 2005-06. FTBB provides additional assistance to around 1.4 million single-earner families (single parent families and families where one parent has a low income or is not in paid employment).[47]

Income support payments have strict income and asset tests[48] and unemployment and parenting benefits are also subject to activity tests (e.g., seeking work, training, volunteering). In 2006, only 19% of Australians were in receipt of income support payments (ABS 2007). Both FTB and income support payments are administered and distributed by Centrelink.

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[45]In 2006, the rate of FTBA was A$137.06 per fortnight for each child aged under 13; A$173.74 per fortnight for each child aged between 13 and 15; A$44.10 per fortnight for each child aged between 16 and 17; and A$59.36 per fortnight for each child aged between 18 and 24.

[46]Income threshold for for a one child family was A$94,718 in 2006 and increased with the number of children.

[47]In 2006, the highest income earner in the family could earn up to A$150,000. The family ceases to be eligible when the secondary earner's income exceeds A$21,571 (for those whose youngest child is aged below 5) and A$16,790 (for those whose youngest child is aged between 5 to 18). All single parents earning an income below A$150,000 are eligible for FTBB. The rate of FTBB is A$117.60 per fortnight for those with a youngest child aged under 5; and A$82.04 for those with a youngest child aged 5-15 (or 16-18 if the youngest child is in full-time study).

[48]Australia ranks fifth lowest in the OECD in terms of the proportion of gross domestic product spent on public social cash transfers (OECD 2014a), but close to 80 percent of public social cash spending occurs through income and asset-tested benefits - a rate that is nearly three times that in the U.S. and U.K. (OECD 2014b).

A key advantage of using the administrative records from the family payment data is the high coverage of families with children, including families from both low- and middle-income families. Importantly, this means we expand our observation criteria significantly beyond that used in previous studies such as Fok & McVicar (2013), which require income support receipt for sample inclusion (before and after the separation). In contrast, our data captures and follows mothers and young adults before and after a relationship separation as long as they are eligible for family payments or income support payments. Eligibility for family payments is substantially less strict, as explained above.

Other benefits of using the administrative data set include overcoming concerns that are common to survey based data, especially during the tumultuous event of a relationship separation, such as attrition, recall error, and non-response. We are able to minimise these concerns in our administrative data because there are clear financial incentives (in terms of payment receipt) to families for providing their information to the government. In addition, the large sample size allows us to look at the effects of the reform on relatively infrequent outcomes, such as homelessness, and to divide the sample by mother and child characteristics.