

Department of Economics

Labour Supply Disincentives of Income Support: An Analysis of Single Mothers with No Qualifications in the UK

Zeenat Soobedar

Working Paper No. 656

December 2009

ISSN 1473-0278



Queen Mary
University of London

Labour Supply Disincentives of Income Support: An Analysis of Single Mothers with No Qualifications in the UK

Zeenat Soobedar*

Queen Mary, University of London, The Open University

December 15, 2009

Abstract

This paper examines the labour supply disincentives of the Income Support system among single mothers with no qualifications in the UK. It uses a regression discontinuity approach that exploits the age-eligibility rule establishing automatic withdrawal of Income Support for single mothers whose youngest child turns 16. At this cut-off age, barely ineligible mothers experience an 8.5% increase in their probability of working and an increase in hours of work of about 3. This is consistent with pronounced labour supply disincentives of the income support policy.

JEL code: C21, I38, J12

Keywords: Single Mothers, Income Support, Labour Supply, Regression Discontinuity

*Department of Economics, Queen Mary, University of London, Mile End Road, Mile End London E1 4NS, UK, z.soobedar@qmul.ac.uk. I am grateful to my supervisor, Marco Manacorda, for invaluable comments and suggestions.

1 Introduction

This paper examines the labour supply disincentives of the Income Support (*IS*) system among single mothers with no qualifications. For this, it uses a regression discontinuity (RD) approach that exploits the age-eligibility rule that a single parent qualifies for *IS* so long as she is responsible for a cohabiting child under the age of 16. *IS* is Britain's principal income tested benefit which serves as a financial safety net for several million people and their dependants. As many social security benefits, *IS* is a means of replacing earnings where no earnings exist or supplementing them where they are low. According to a report by the Department of Work and Pension (henceforth, DWP), state support was the main source of income for the bottom quintile of the income distribution in the UK in 2007. Families with children, particularly lone parent families, are more at risk of low income than their childless counterparts (Adams et al., 2008).

Reducing, and ultimately eradicating, child poverty and stimulating labour supply amongst families with children are two key objectives of the current government. Promoting equality of opportunity is also at the heart of the government's agenda. There were 3.9 million children living in poverty in 2006-2007 (after housing costs) (Adams et al., 2008). Very low employment rates among single mothers, alongside a large rise in the number of children living in these one-parent families, are two of the highest incidences of child poverty (OECD, 1998; Micklewright, 2000). The increase in worklessness among single parents in Britain and the rise in the number of children living in single parent households with no work were the biggest factors to account for the poverty rise among single parents in the 1990s (Dickens and Ellwood, 2003). Over the last thirty years, the share of families with children headed by lone parents has risen to nearly one in four. The UK is almost alone among OECD countries in having employment rates for lone mothers far below other countries, such as Spain, where employment is higher among single mothers than married mothers. Programs are constantly being reviewed or put in place to help single mothers, who are normally more at risk of falling into poverty, bring their standard of living to a reasonable level. One such policy was the Income Support program, implemented in April 1988, which replaced

Supplementary Benefits. Although this welfare program gives rise to equity gains, it also brings about efficiency losses. By increasing the income of the poor, this creates an income effect tending potentially to reduce their labour supply (Meghir and Phillips, 2008).

Do the transfer programs in place lead to desired human capital investment and welfare gains among single mothers? This study exploits the age-eligibility rule for the entitlement of *IS* to answer this question. It assesses the implications of this rule on the work incentives of single mothers, both theoretically and empirically. Theoretically, it shows the implications for work effort suggested by the basic economic model of labour supply. Empirically, the paper reports how work and hours of work of single mothers are affected when their youngest child turns 16. Under the current *IS* system, single parents have little reason to work between 4 and 16 hours per week because their income support entitlement is reduced pound by pound for any earnings in excess of £20 per week (Bell et al., 2008). However, once the youngest child turns 16, the parent can no longer claim *IS* unless she fits in one of the other groups of people which can claim¹.

The paper is novel in a number of ways. Although studies, mainly either descriptive or qualitative in nature, have documented on the destinations of *IS* leavers (Evans et al., 2003) for a descriptive analysis; Shaw et al., 1996 for a qualitative study), they do not look into the likely labour supply disincentives which emerge from the *IS* system currently in place. Surprisingly little attention has been paid to quantifying the behavioural impacts of Income Support. This is all the more surprising given the continued growth and level of policy attention currently devoted to increasing single mothers' participation in the labour market. In addition, to my knowledge, quasi-experimental evidence on this subject is non-existent. The institutional features of the UK benefits system allow for a sharp research design. The break in the eligibility of *IS* arising when the youngest child turns 16 provides a natural setting for analyzing the impact of this age-eligibility rule on labour market and benefits outcomes using a regression discontinuity

¹Other types of people who are eligible for *IS* are pensioners, the long and short-term sick, people with disabilities and other special groups. Special groups include people in private residential care and nursing homes, people in a local authority home, people in a hospital, asylum seekers and other types of people from abroad.

approach. The design has proven useful in evaluating the socioeconomic impacts of a diverse set of government programs and laws. The RD approach was adopted to evaluate the impacts of a social assistance program in Quebec (Lemieux and Milligan, 2007), a US anti-discrimination law (Hahn, Todd and van der Klauuw, 1999), expansions in government-provided health insurance to low-income households (Card and Shore-Sheppard, 2004) and a federal disability insurance program (Chen and van der Klauuw, 2008). In all these applications, the treatment variable or the probability of receiving treatment changes discontinuously as a function of one or more underlying (potentially endogenous) variables, which is the defining characteristic of RD data designs (van der Klauuw, 2008). The key advantage of the RD approach is that it provides estimates that are “as credible as those from a randomized experiment” under relatively weak conditions (Lee, 2008). In the RD design, participants are assigned to program or comparison groups solely on the basis of a cutoff score on a pre-program measure. Thus the RD design is distinguished from randomized experiments and from other quasi-experimental strategies by its unique method of assignment. Unlike its randomized or quasi-experimental alternatives, the RD design does not require the assignment of potentially needy individuals to a no-program comparison group in order to evaluate the effectiveness of a program. The identification assumption used in this paper is based solely on the age-eligibility rule in *IS*. In other terms, variations in a cross section arising from the discontinuity at the age-16 are used to capture the causal effect of *IS* withdrawal on labour market outcomes. One potential source of concern which may invalidate the RD design is that changes in welfare policies to encourage single parents to enter work (e.g. the National Minimum Wage was introduced in 1999 and the Working Families Tax Credit which replaced Family Credits in 1999) may contaminate the evaluation of the *IS* benefit policy *per se* if they are correlated with the age rule. This is unlikely to be the case since the age-eligibility in the policy did not vary discontinuously over time. Another worry is that there might be changes in the entitlement for other benefits (namely housing benefits, council tax benefits and the UK’s welfare to work program for lone parents, the New Deal) which are also related to the age-16

eligibility rule. As a result the separate effect of the automatic withdrawal of *IS* on labour market outcomes may not be identified. In fact while the loss of housing and council tax benefits is likely to overestimate the labour supply effect the ineligibility to participate in the New Deal for Lone Parents may lead to an underestimation of the same effect (in this way strengthening the results). A more serious source of concern could arise if there are behavioural responses to other benefits entitlement which are systematically related to the age-eligibility rule (e.g. the Child Benefits and the Working Families' Tax Credit). This might generate some non-random selection which can violate the identification assumption and hence invalidate the RD approach.

For the purpose of the analysis, this study uses the quarterly Labour Force Surveys which are longitudinal in nature between the period 1994 and 2002. Although there were reforms in the UK benefits system over this time period, especially in 1999, they are not likely to substantially alter the results in the paper and invalidate the RD approach as briefly mentioned above and extensively discussed in section 6.3. The panel structure of the data allows to control for mother fixed effects, i.e. unobserved time invariant mothers' characteristics that might be correlated with their labour supply and welfare reciprocity.

The empirical analysis leads to two main findings, which hold up against a wide array of robustness checks. First, there is evidence of pronounced and statistically significant labour supply disincentives of the age-rule in the *IS* system for single mothers. As they lose eligibility, their work disincentives weaken. Following an exogenous drop in their income mainly attributable to the fall in *IS* (which potentially leads to further falls in related benefits correlated with the entitlement of *IS*), single mothers maximize their utility not only by entering work but those who are already in work are also more likely to work more hours per week. This conforms to the intuition that the removal of maintenance programs lead to efficiency gains (Hoynes and Moffitt, 1996). This finding is analogous to that found by Lemieux and Milligan (2007) who conclude that more generous social assistance benefits reduce the employment probability of low-educated men without children.

Second, the *IS* system reveals a positive effect on the proportion of unemployment benefit claims which might presumably be an income effect of the *IS* withdrawal. Yet, New Deal policy reforms in the UK may force these mothers to search for work.

The structure of the paper is as follows. Section 2 provides background information on the benefits system for single mothers in the UK. Section 3 sets out a simple labour supply model for single mothers, which integrates welfare programs. Section 4 presents the specification of the regression model and the identification behind the empirical strategy proposed. Section 5 describes the data followed by Section 6 on a discussion of the regression results. Finally, Section 7 concludes.

2 Institutional Features

2.1 Brief Overview of the UK Benefit System

There are many different benefits available in the UK depending on individuals' needs and circumstances. Panel a in Figure A1 in the Appendix displays a summary of the main UK benefits. They are either means-tested or non-means tested. Means-tested benefits are benefits which depend on the claimant's income, personal and family characteristics. For instance *IS* are available to people on low income who do not have to look for work (e.g. lone parents, carers, sick or disabled people). Unemployed people, who are not eligible for *IS*, can instead claim Jobseekers' Allowance (*JSA*). In October 1996, *JSA* was introduced to replace unemployment benefits and *IS* for unemployed people. It is intended for people who are available for and actively seeking employment, including those in remunerative work for less than 16 hours a week. Entitlement to *IS* or *JSA* is also a passport to other benefits, namely the Housing Benefits (*HB*) and the Council Tax Benefits (*CTB*). On the other hand people who are on low income but who work more than 16 hours per week can claim tax credits (either the Working Families' Tax Credits

or Family Credit)². In March 2003 the *WFTC* was replaced by a Working Tax Credit (*WTC*) and a Child Tax Credit (*CTC*). In this way, the current tax credit system now provides in-work support for households with or without children.

Non-means tested benefits are either contributory or non-contributory. While to qualify for contributory benefits, such as Incapacity Benefits (*IB*), a person must have paid enough national insurance contributions, a person does not have to have paid them to be entitled to non-contributory benefits. These benefits, such as child benefits (*CB*), are usually paid irrespective of the claimant's income level and are universally available to people who meet some qualification criteria. Child benefits amount to £18.80 per week for the first born and equals £12.55 per week for each subsequent child.

There has been substantial changes in the UK benefits system, summarised in Table A1 in the Appendix, in the 1990s where welfare-to-work programmes were developed and implemented to "make work pay". The central ones were the introduction of the *WFTC* (which replaced the Family Credit, *FC*, in 1999) and the New Deal. The *WFTC* reform was more generous than *FC* in four ways: there was a higher credit for younger children (from £81.60 to £93.05 per week); the income threshold for eligibility was increased (from £80.65 to £90 per week); benefit reduction rate was lowered from 70% to 55% and a childcare credit (up to 70% of childcare costs of up to £120 a week) was introduced.

The New Deal programs introduced between 1997 and 1999 were designed to help unemployed individuals into work. There were four distinct programmes: the New Deal for Young Persons (for those aged 18–24) and the New Deal 25+ (for those aged 25–49) compulsory for claimants of *JSA* and providing employment subsidies and training grants to employers; the New Deal 50+ which was voluntary and included a training grant and finally the New Deal for Lone Parents (*NDLP*)

²Families with a net income (income after income tax and national insurance) below a certain threshold (£90 a week in October 1999) receive the maximum amount of *WFTC* which varies with the number and ages of children. Any increase in the net income above this income threshold reduces the amount of *WFTC* at a rate of 55% (was 70% under *FC* regime). As a result, for every extra £1 earned over the threshold the family loses 55 pence in *WFTC* payments.

which was also voluntary and offered training grants and childcare assistance to participants³.

2.2 Benefits to Single Mothers

Under the current benefits system single mothers can claim certain types of benefits depending on the age of their youngest child as shown in Panel b of Figure A1. Benefits which do not require this age condition are sickness and disability benefits and *JSA* (in the latter case single mothers must work less than 16 hours per week to qualify). When their youngest child is less than 16 years single mothers are automatically entitled to *CB* and if they also work less than 16 hours per week, they can top up their benefits by claiming *IS*, *HB* and *CTB*. They can also participate in the *NDLP* programme. As noted above *NDLP* is specifically designed to assist single parents to enter or re-enter the labour market to increase their living standards. Participation is voluntary and it aims to provide individualised help and advice to meet their needs. If single mother work more than 16 hours per week, although they cannot claim *IS* they may claim both *CB* and tax credits. However single mothers whose youngest child is aged 16 or more are not entitled to *IS*. They may claim *JSA*, *HB* and *CTB*. Receipt of both child benefits and tax credits is automatic when their children are less than 16 and can be extended if children between the ages of 16 and 20 stay in full-time non-advanced education. *CB* and tax credits can be claimed provided that their youngest child is between 16 and 20 years old and remains in full-time non-advanced education⁴.

2.3 Income Support

IS is one of the largest means-tested welfare transfers in the UK. It was introduced in April 1988 to replace Supplementary Benefits and is intended to help people on low incomes who do not have to be available for employment. The amount of *IS* is currently £60.50 per week for women who

³A more detailed summary and a more extensive list of major welfare reforms can be found in Gregg and Harkness (2003).

⁴Non-advanced education means attendance at an educational establishment up to and including GCE A levels, Scottish Certificate of Education (Higher level) or equivalent.

are aged 18 or over. While this amounted to roughly 15% of the median gross weekly earnings of full-time employed women, it represented more than 40% of the median earnings of part-time women (overall 21% of all women) in 2007 (ASHE, 2007). The rates prevailing between 1994 and 2002 (the sample period used in the paper) are shown in Tables A1 and A2 in the Appendix.

Single mothers whose youngest cohabiting child is less than 16 years old (which is also the minimum school leaving age in the UK) are automatically entitled to *IS*. Receipt of *IS* is also a passport to housing and council tax benefits. There are obvious built-in disincentives to work in this policy for two reasons. Firstly, there are no job search requirements for eligibility. Consequently, mothers who have low labour market attachment and do not work can still receive *IS*. Secondly, if single mothers are in employment they can claim *IS* so long as they work less than 16 hours per week and are entitled to a £20 earnings disregard (which is equivalent to working 4 hours per week at a minimum wage of £5), after which *IS* is reduced pound by pound. In practice, for minimum wage workers, *IS* is exhausted when they work just over 16 hours per week⁵.

As the youngest child turns 16, single mothers automatically lose their entitlement for *IS* except on a health basis, in which case they are eligible for Income Support with a disability premium (Soobedar, 2009). The expected break in the eligibility of *IS* allows for a regression discontinuity design. In this case the RD design is "fuzzy"⁶ because the probability of treatment jumps discontinuously by less than 1 at the cutoff point (because some mothers may still claim *IS* on other grounds after their youngest child turns 16). They also lose their eligibility to participate in the *NDLP* programme. The automatic loss of *IS* at the age-16 discontinuity implies that mothers lose their housing and council tax passported benefits. However, mothers may still claim child benefits and working family tax credits if their children stay in full time education up to the age of 19. As already hinted in the introduction, mothers who take advantage of these rules comprise self-selected groups and this in turn might raise some issues on identification, which will

⁵Hours at benefit exhaustion = $\frac{IS + Earnings\ Disregard}{Minimum\ Wage} = \frac{60.5+20}{5} \approx 16$.

⁶In a "sharp" RD design, the probability of treatment jumps discontinuously from 0 to 1 at the cutoff point.

be discussed in section 6.3.

The automatic loss of *IS* also seems to interact strongly with the unemployment benefits system in the UK, i.e. with the Jobseeker's Allowance (henceforth, *JSA*)⁷. Contrary to the entitlement for *IS*, single mothers have to register as unemployed (i.e. actively looking for work) or else risk being sanctioned under this benefit scheme. *JSA* was introduced in 1996 and changes were represented by a substantial increase in job search requirements for eligibility and more intensive contact with the employment offices. Petrongolo (2009) found that tighter job search requirements were successful in moving individuals off unemployment benefits in the UK. It is anticipated that when their youngest child turns 16, single mothers might be forced into this welfare programme. Indeed, there is pressure from the Government which requires single mothers to attend social security offices and register as unemployed because it is no longer considered necessary that they remain at home to look after their children, once they turn 16.

2.3.1 Application Process

The application for *IS* as a single parent is trivial. To claim *IS*, the single mother has to fill in a specific form which is sent by post to the DWP or can be completed on the spot at her local Jobcentre Plus Office. She is then required to sign a statement recording her details, after which she presents evidence and information in an arranged work-focus interview or by post if the latter is not needed.

The maximum amount that a claimant can receive depends on her income sources. The rate of *IS* payable to a claimant is normally the amount needed to bring the resources of the benefit unit up to their applicable amount (i.e. $IS = \text{Applicable Amount} - \text{Total Resources}$). Resources of a benefit unit consist of its total income (e.g. from other DWP benefits, earnings from part-time employment, etc.) and assumed income from capital assets⁸. Applicable amounts are specified by

⁷The rates of *IS* and income-based *JSA* are usually the same. Mothers may want to claim *JSA* instead of *IS* to receive national insurance contribution credits.

⁸Claimants aged under 60 whose income of assets is worth under £3,000 are ignored (some assets may also be disregarded, e.g. property occupied by an aged relative). Savings between £3,000 and £8,000 are treated as if

regulation and consist of a personal allowance which depends upon the age of the claimant and the presence and age of any dependants.

3 Labour Supply Model for Single Mothers

In this section, the standard model of labour supply is used to analyze the behavioural impact of the *IS* welfare program in both the labour market and the welfare benefit systems. The model assumes that individuals' preferences depend on hours of work and net income. Net income is computed as the product of hours of work and the gross hourly wage plus investment income plus transfer payments minus all taxes. Individuals thus maximize their utility function subject to a budget constraint. The decision to work is based on the comparison of the market wage, which indicates how much individuals will earn for an hour of work, and the reservation wage, which is the wage rate that makes them indifferent between working and not working. Assume that there is a representative agent in the economy who is a single mother. For simplicity, suppose that the woman does not have any non-labour income and is paid a minimum wage of £5 per hour if in work.

A model without the £20 earnings disregard is considered first to shed some light on the labour supply disincentives in-built in the *IS* program followed by a more complex model which includes the £20 earnings disregard and the working family tax credits.

3.1 Model without Earnings Disregard

Assume that the welfare system consists only of *IS* (ignoring the £20 earnings disregard for the time being). First, consider a mother who has no child younger than 16. Figure 1 depicts the tangency condition between the budget line and the slope of the indifference curve for utility maximization. Income is plotted on the vertical axis and leisure is on the horizontal axis. It also

each £250 or part of £250 brings in an income of £1 per week (tariff income). If capital assets total more than £8,000, the claimant is not entitled to *IS*.

shows two solutions: a tangency solution (where the economic agent allocates her time between work and leisure - point X) and a corner solution (where it is optimal not to work at all - point A). From Figure 1, panel a, in the absence of IS , the representative mother's budget line is LBC . If she decides not to work, she locates at point L , where she has zero income. However she is better off working (i.e. locating on any part of LBC except at point L). For example she can decide to locate at point X , at which she divides her time between work and leisure. Contrast this with a mother, with a child who is aged less than 16, who is eligible to claim IS . With the introduction of IS , of say £60, her budget line shifts in two ways. First, because of the guaranteed income of £60 when the woman does not work, the endowment point shifts from L to A . Her reservation wage rises. Second, the program changes the slope of the budget line. This is because IS is reduced by £1 for every pound earned in the labour market, i.e. equivalent to a 100% tax rate on her earnings. Because IS amounts to £60 and the woman is paid at a minimum wage of £5, benefit exhaustion occurs at 12 hours worked⁹. The net wage of the woman on IS is zero between 0 and 12 hours, which is graphically represented by the segment of the constraint having a slope of zero (AB). Her budget line is now ABC . The entitlement of IS increases the reservation wage of the poor by moving the lower end of the budget constraint out from LB to AB . The static effect of the entitlement to the IS policy on the labour supply of a single mother is unequivocally negative, provided leisure is a normal good.

There are two reasons for this. First, the single mother is now affected by the welfare program. Since she does not need to be available for work and assuming that she has low labour market attachment, she locates at point A . Second, the shift in the budget line creates an income effect tending to reduce the labour supply from the hours associated with point X to those associated with point Y . However, it also causes the wage to drop to zero due to the 100% withdrawal rate in IS . This induces a substitution effect, causing those claiming IS to reduce their hours of work to zero (point A). Of course, if a person's indifference curves were sufficiently flat, then

⁹Recall that hours at benefit exhaustion = $\frac{IS + Earnings\ Disregard}{Minimum\ Wage} = \frac{60.5+0}{5} \approx 12$.

the person's utility would be maximized by choosing work over welfare, as shown in Figure 1, panel b. In this case, the person attaches a much lower value to leisure than someone who has a steep indifference curve. As such labour supply responses depend on the slope of the indifference curves, in other words the extent to which the mother is attached to the labour market (a steeper indifference curve will suggest a weak labour market attachment). In this paper single mothers with no qualifications are more likely to be welfare reliant (Evans, Harkness and Ortiz, 2004) and jobless (Gregg, Harkness and Smith, 2009) and hence more likely to have steep indifference curves. Overall, this simple model suggests that labour supply disincentives are in-built in the *IS* system. As the single mother loses her entitlement to *IS* when her child turns 16, she is less likely to stay inactive and more prone to engage in labour market activities. Mothers located at point *A* are prompted to start working and those located along *AB* increase their number of hours worked.

3.2 Model with Earnings Disregard

The current benefit system is however not as simple as the one described above. There are human capital enhancement programs inherent in the welfare schemes in the UK which are aimed at getting individuals into jobs as soon as possible and focussing on job search assistance (Blank, 2002). The next step is therefore to include tax credits and the £20 earnings disregard in the model. For simplicity, housing and council tax benefits are excluded from the incentive structures. The inclusion of these benefits will only result in a stronger effect on the work incentives¹⁰. Child benefits are also ignored at this stage. In these circumstances, the labour supply model for single mothers developed by Blundell et al. (2000) presents the work incentives stemming from the tax-benefit system in the UK and can serve as a guidance in the interpretation of the empirical results of this paper. The budget constraint in Figure 2 is non-linear due to the complexities

¹⁰Recall that people who receive *IS* are automatically passported to full housing and/or council tax benefits. As soon as entitlement to *IS* is lost, eligibility is based on the mothers' income and the rules of housing and council tax benefits.

of the system. For brevity and with minimal loss of generality, the work disincentives of the representative single mother with one cohabiting child aged less than 16 years who is paid the minimum wage of £5 is presented. With the entitlement of *IS*, the mother's budget line is *ABCDE*. At zero hours, the representative agent receives *AL* of *IS*. Between *A* and *B*, the budget constraint is upward sloping, representing the earnings disregard. In this case, the mother can work 4 hours without having her *IS* payments reduced. Between *B* and *C* (corresponding to 4 to 16 hours respectively), the budget line is horizontal because of the 100% withdrawal rate under *IS*. The benefit exhaustion point is *C*, equivalent to the mother working 16 hours per week. Beyond point *C*, *IS* is exhausted and there is a sharp jump in net income as the single mother becomes entitled to tax credits. From *D* onwards, the overall withdrawal rate remains quite high as a result of the combination of tax credits and direct taxes.

With the *IS* program, a single mother, who has a child aged less than 16, has a high incentive to locate below 16 hours (referred to as "mini-jobs" as defined by Bell et al., 2008) per week, more precisely at most 4 hours (when the earnings disregard is exhausted). If the mother has a very strong preference to leisure, she may not work at all and will choose to locate at point *A*. On the other hand, a mother working more than 16 hours will not be entitled to *IS* and has no incentive to reduce her labour supply because she maximizes welfare by locating anywhere along the segment *DE*.

So, how does the age-policy rule in *IS* eligibility affect a single mother's labour supply? When her youngest child turns 16, she automatically loses entitlement to *IS* (except if she falls in one of the other categories mentioned in Section 1). Her budget line shifts to *LCDE*. The mother's endowment point shifts from *A* to *L* and the budget line changes slope up to point *C*. A mother, who was located on the *ABC* segment before the change in the benefit entitlement, is unequivocally worse off. A mother, who did not work or worked at most 4 hours, will have an incentive to increase her hours of work. If she attaches a low value for leisure, she is most likely to work 16 or more hours per week and vice versa.

In sum, what this model suggests is that there are large disincentives for single mothers who are on *IS* to work more than 4 hours per week because of the 100% withdrawal rate or work at all. The *IS* program works in such a way that mothers who have a child aged less than 16 and who attach a low value for work choose to be inactive rather than engage in job search. However the age-policy rule in the entitlement to *IS* appears to play a significant role in achieving the desired labour supply incentives among single mothers. The intuition behind the above labour market adjustments lies in the fact that the exogenous drop in income associated with a loss in *IS* - which is exacerbated by a fall in other benefits correlated with the entitlement to *IS* - acts as a lump sum tax on net income. In an attempt to offset the effect of this tax, single mothers are less likely to remain inactive or work very few hours, if in work, to compensate for the loss.

4 Specification and Identification

This section sets out the regression strategy aimed at identifying the impact of the age rule in the *IS* program on labour market and benefits outcomes. The main difficulty in identifying the disincentive effect of the *IS* program on labour market outcomes is that there is a potential reverse causality between labour supply and the propensity to claim *IS*. For instance, a mother who works more than 4 hours but less than 16 hours per week loses *IS* because of the 100% withdrawal rate. There are also concerns about possible omitted variables although a multivariate regression can improve upon the bivariate relationship between the outcomes of interest and the entitlement to *IS* by controlling for factors likely to influence outcomes of interest. Because of these confounding effects, the impact of the loss in the entitlement for *IS* on labour market outcomes is likely to be overestimated.

In order to circumvent the classical identification problem which arises from reverse causality, the paper uses the age-eligibility rule in the *IS* program, applicable to single mothers, which establishes an automatic loss of entitlement for *IS* for those mothers whose youngest child turns

16. It further exploits the discontinuity in the probability of claiming *IS* induced by this age-rule to assess the causal impact of the benefit withdrawal on labour market and benefits outcomes.

Ignoring for simplicity other covariates, suppose that an outcome, Y , depends additively on a continuous function, $f(\cdot)$, in the age of the youngest child, a , also called the running variable and on the age-eligibility rule for the entitlement to *IS*. The reduced form model¹¹ is written as follows:

$$Y_{ia} = \beta_0 + \beta_1 TREAT_{ia} + \delta(a) + \beta_2 [TREAT_{ia} * \delta(a)] + \varepsilon_{ia} \quad (1)$$

where the subscript ia represents individual i whose youngest child is aged a . β_0 is the intercept term, $\delta(a)$ is a smooth, continuous function in the age of the youngest child. ε is an unobserved determinant of Y and is possibly correlated with $\delta(a)$. $TREAT$ is a treatment dummy defined as

$$TREAT_{ia} = \begin{cases} 0 & \text{if } a < 16 \\ 1 & \text{if } a \geq 16 \end{cases} \quad (2)$$

where $TREAT$ equals 0 so long as the youngest child is less than 16 but switches to 1 as the latter turns 16. A "Fuzzy" Regression Discontinuity (RD) design is used in this paper because the probability of claiming *IS* is not likely to fall from 1 to 0 at the age-16 threshold. The probability of claiming *IS* is not equal to 1 prior to the age-16 threshold because some mothers may be working more than 16 hours per week and hence not eligible for *IS*. At the cutoff point, the probability of treatment is likely to jump by less than 1. This is because while the *IS* eligibility is mainly determined by the age-16 cut off rule for lone parents, they can still be eligible for *IS* if they fall in other categories (see footnote 1). In this case the reduced form estimate, β_1 ¹², is

¹¹Instead, one can estimate a first stage equation, $IS_{ia} = \gamma_0 + \gamma_1 TREAT_{ia} + \delta(a) + \gamma_2 [TREAT_{ia} * \delta(a)] + \nu_{ia}$, where IS is an indicator for whether the mother claims *IS* and which is used as an instrumental variable (*IV*) for the entitlement to *IS* in the second stage regression, $Y_{ia} = \alpha_0 + \alpha_1 IS_{ia} + \delta(a) + \alpha_2 [IS_{ia} * \delta(a)] + \epsilon_{ia}$.

¹²The *IV* estimator can be recouped by dividing the estimator from the reduced form regression with that of the first stage regression.

the classical ("Fuzzy") RD estimator, which carries a causal interpretation of the effect of the age-eligibility rule for the entitlement to *IS* on *Y* under one key assumption. The assumption underlying the consistency of the RD estimator is that the dependent variable is a continuous function of the running variable in the absence of treatment. Most notably, the causal effect of the policy can be identified when single mothers with similarly aged children are also similar in other observable and unobservable dimensions both to the left and to the right of the discontinuity.

To estimate the reduced form Equation (1), a fixed effect regression is used by exploiting the longitudinal nature of the quarterly Labour Force Survey. The fixed effect approach is preferred because it absorbs all time invariant observed and unobserved characteristics (e.g. gender, education, occupation, ethnicity, region of residence, immigration status, preferences) of mothers that may affect the outcome variables and be correlated with the treatment. As already hinted above, single mothers' labour supply and the loss in the entitlement to *IS* might be correlated for reasons other than the causal effect of the latter variable on the former. For instance, it could be that mothers who have a stronger preference to work are more likely to work more hours per week and less likely to be on *IS*, leading to overstate the effect of their *IS* ineligibility on their labour supply. In order to control for such unobserved differences amongst mothers, the following fixed effects model is used

$$Y_{iat} = \beta_0 + \beta_1 TREAT_{iat} + \delta(a) + \beta_2 [TREAT_{iat} * \delta(a)] + m_i + \varepsilon_{iat} \quad (3)$$

where m_i represents a set of individual effects which are taken to be constant over time and specific to the mother, $TREAT$ equals 1 when the youngest child is aged 16 or over and 0 otherwise and ε_{iat} is the disturbance term. Time varying characteristics, X_{it} , can also be included in Equation (3). In practice, the functional form of $\delta(\cdot)$ is unknown. In this paper, it is approximated by a number of polynomials (up to degree 5), interacting the linear and the higher-order terms with the $TREAT$ variable (Lee and Card, 2008). While β_1 from Equation (1) is based on the assumption that people close to the discontinuity are similar in observed characteristics,

the fixed effects RD estimator, β_1 in Equation (3), is based on the assumption that barely eligible mothers (mothers to the left of the discontinuity) are similar to barely ineligible mothers (mothers to the right of the discontinuity) in both observable and unobservable ways, except in whether they have a child who is about to turn 16 and hence their probability of receiving treatment.

5 Data

This paper uses data from the UK Quarterly Labour Force Survey (QLFS). The survey is continuous, with a sample drawn each quarter of approximately 57,000 households, representing around 135,000 respondents. The main reason for choosing this survey, as well as the fact that it contains extensive socio-demographic and benefits information, is its size. The micro data runs from the Winter Quarter of 1994 to the Autumn Quarter of 2002 (excluding Winter 1996 and all quarters of 1997 because *IS* claims were not recorded in the LFS following the introduction of *JSA*). Data on the age and the date of birth of individuals beyond Autumn 2002 are not available from the UK data archive for reasons of confidentiality. The QLFS datasets are merged together to increase the sample size. As such the longitudinal dimension of the QLFS is exploited in this paper. Each sample household is retained and followed through for five consecutive quarters and a fifth of the sample is replaced each quarter. This enables the construction of a unique identifier for each individual, who can then be linked across the quarters.

In view of the fact that people with low market opportunities (low skills or qualifications) are more likely to claim benefits (Bound and Burkhauser, 1999; Faggio and Nickell, 2003), this paper restricts the analysis to single mothers with no qualifications¹³. The analysis also focuses on these mothers because they are not only the group which is most reliant on welfare, in terms of both participation rate and spell length (Evans et al., 2004) but is also the target of the current

¹³Regression (3) was run separately using the total sample of single mothers, a sample of single mothers who were graduates (8%), who had an intermediate level of education (29%), who had a low level of education (33%) and finally who had no qualifications (30%). A discontinuity at the age-16 threshold on the probability of claiming *IS* was more pronounced for single mothers with no qualifications than the other groupings, hence the selection.

government in reducing their joblessness and poverty (Gregg et al., 2009). For instance, research in the 1990s showed that more than two-third of lone parents claimed Income Support (McKay and Marsh, 1994). Hoxhallari, Connolly and Lyon (2007) report that only 5% of lone parents work in jobs of less than 16 hours, compared to 53% in jobs of 16 hours or more and 42% not in paid employment. With no pay single mothers are more likely to stay within the poverty circle.

Table A3 in the Appendix provides some descriptive statistics on all single mothers, single mothers with no qualifications and single mothers with a youngest cohabiting child aged just below and above 16. Age of the youngest child is measured in months. As expected 95% of single mothers with no qualifications are likely to claim at least one benefit on average as compared to 70% of all single mothers. Statistics on benefits should be taken with caution because benefit claims have been shown to be under-reported in the longitudinal Labour Force Surveys (Brook, 2004). For example, child benefits take-up of 65% for all single mothers appear to be low compared to "universal" take-up of about 98% (CPAG Policy Briefing). On average, single mothers with no qualifications are one year older than all single mothers on average. They are in their mid thirties and live mainly in the south east (greater than 10%) and outer London (6.2%). They are also more likely to be inactive (62% compared to 42% for all single mothers). Barely eligible and barely ineligible mothers are not statistically different from one another and have similar age and regional characteristics. A single mother is defined as the head of the family unit, is unmarried¹⁴ and has at least one cohabiting child. Unmarried women with children in the first quarter in which they appear in the data are included in the sample, irrespective of whether they are married or without cohabiting children in the following quarters. Because of the built-in attrition in the QLFS, there is no guarantee that the panel is balanced, with each mother observed for at least 2 out of 5 consecutive periods. Indeed, the final sample contains 25,428 observations over 8,138 single mothers¹⁵. According to the standard labour supply model, these benefits generally lead

¹⁴If mothers with an unmarried cohabiting partner are excluded from the sample, estimates are very similar to those reported in this paper.

¹⁵About 3,286 single mothers with no qualifications drop out of the sample and about 743 mothers change marital status since they enter the sample.

to labour supply disincentive effects.

The QLFS is rich in information and carries a wide range of standard demographic characteristics such as day, month and year of birth of each individual, qualifications, ethnicity and region of residence as well as details on the presence and ages of dependent children within the family unit. It also includes a wide array of information on benefit claims and labour market features. Benefit claims include *IS* (defined as income support for all groups except for income support for the disabled people - also referred to as "income support with a disability premium") (see Soobedar, 2009), unemployment-related benefits (which include unemployment benefits before Spring 1995 and *JSA*, after Winter 1996), housing benefits, council tax benefits and working family tax credits.

6 Empirical Results

This section provides both graphs and regression estimates for the effects of the age-policy rule in *IS* on the labour market and potentially related benefits outcomes as the youngest child turns 16, using the fixed effects model described in section 4.

6.1 Income Support

Figure 3 plots the actual and predicted proportions of single mothers with no qualifications claiming *IS* with children aged between 1 and 20 years by age of their youngest child for mothers. The sample is restricted to single mothers with children in this age band because entitlement to certain benefits depends on whether the child is aged less than 20. For instance, one condition that individuals have to satisfy to remain eligible for child benefits and working family tax credits if their children are aged 16 or above is that the children have to be aged between 16 and 20 and in full-time non-advanced education. This age window is also chosen because the narrower the area that is examined the less data there are. Hence expanding the analysis to observations outside

the immediate neighbourhood of the discontinuity may improve the statistical precision. The inclusion of polynomials (linear and higher order) have more flexibility and hence more capacity to match the data.

Predicted values are obtained by estimating the fixed effects model which absorbs all time invariant characteristics of the mothers (i.e. education, ethnicity, immigration status, preferences). $\delta(a)$ is modeled as a parametric (linear in this case) polynomial in a , whose shape and intercept are allowed to vary on either side of the discontinuity point (Lee and Card, 2008). Further the actual values are obtained by regressing the outcome of interest on a set of dummies for the age of the youngest child and a set of time invariant mother fixed effects. Coefficients on the age dummies are reported. Standard errors are clustered by the age of the youngest child.

While the probability of claiming *IS* is roughly about 55% for those with a youngest child aged 15 years or less, this falls sharply to about less than 40% when the child turns 16 and steadily falls afterwards. This is consistent with the age-policy rule, which establishes that single mothers lose their entitlement to claim *IS* when their youngest child is 16 (unless they fall in the other groups which can claim *IS*). While the probability of claiming *IS* is not equal to 1 prior to 16 years because some mothers are not eligible to claim *IS* either because of high earnings or high working hours (hours greater or equal to 16) or high wealth, the proportion does not drop to 0 after the age of 16 because some mothers claim other types of *IS* apart from *IS* for single parents (like *IS* as pensioners or *IS* for people on training courses or *IS* as a carer other than their own child). In fact, Table 1, column (1), reports the fixed effects RD estimates with controls for benefits outcomes, using a linear specification for $\delta(a)$. The proportion claiming *IS* falls roughly by 15 percentage points at the discontinuity point and the negative jump is precisely estimated and highly significant.

6.2 Labour Market Outcomes

Following the evidence that the age-eligibility rule leads to the expected negative effect on the proportion of single mothers claiming *IS*, this section assesses the behavioural effects of the *IS* program on numerous labour market outcomes. Figure 4, in which a linear fit is superimposed on the actual data, illustrates the trend in the employment rates of mothers with low market opportunities by the age of the youngest child. There appears to be a slight positive jump when the youngest child is 16 and the employment rate increases at a slightly faster rate thereafter. This conforms to the intuition behind the model of labour supply. Indeed labour market disincentives of *IS* are detected. Table 2, column (1), reports the fixed effects RD estimates¹⁶. It is clear that the estimated treatment effect on the work outcome is precisely estimated (and significant at 5% level). Specifically, as their youngest child turns 16 and hence as they lose entitlement to *IS*, mothers with no qualifications have a lower incentive to stay inactive. In fact, the probability of finding a job jumps upwards, by about 3 percentage points (i.e. about 20% of single mothers with no qualifications who leave *IS*). These mothers also increase their number of hours worked per week (including zeros) as shown by the sudden jump in Figure 5 at the age 16 for the youngest child and the upward trend continues thereafter. Table 2 reports a highly significant estimated increase of about 2.6 hours worked equivalent to about £13 if paid at the minimum wage of £5. Table 2 also shows the effect of the age-eligibility rule on hours of work. The estimated effect on the proportion of zero hours is -3 percentage points (equivalent to the +3 percentage points effect on the employment probability). This is mirrored by a 10 percentage points increase in the proportion of mothers who work 16 or more hours per week (panel c of Figure 6 and column 1 of Table 2) and a fall of 7 percentage points in the proportion of mothers working between 0

¹⁶Time varying covariates were also included in the regression. These included age, marital status and level of qualifications of the mother. RD results were almost unchanged as the ones reported in Table 2. Less than 0.2% of single mothers change from marital status and less than 1% acquired some qualifications over the quarters they were observed. So the analyses in the paper do not include these time varying covariates. In addition there is no evidence of a discontinuity at the age-16 threshold for these covariates. According to Lee and Lemieux (1999), by construction the assignment to treatment is independent of covariates because of the randomisation of the experiment. As such consistent estimates are obtained even in the absence of these covariates.

and 16 hours. The age-policy rule in-built in the *IS* program therefore inhibits labour market participation at both the extensive and intensive margins. As already hinted by the labour supply model for single mothers, the exogenous income loss (fall in income following *IS* withdrawal and loss of potentially other benefits correlated to *IS*) pushes mothers into the labour market to compensate for the income loss. Figure 7 plots the log of mothers' real family income (i.e. the sum of earned and unearned income of all the members in the household)¹⁷ by age of the youngest child. While there is an upward trend in real family income over all ages of the youngest child, one can notice an acceleration in the rate of increase in real family income after the age-16 threshold but it is not straightforward to infer a discontinuity at the cut-off point. The latter is confirmed by statistically significant RD estimates of the treatment effect displayed in Table 2. Indeed, as the youngest child turns 16, single mother's real family income falls by about 17-30%¹⁸. These figures should be taken with caution because the income variable in the Labour Force Surveys are not very reliable and benefits payments included in the calculation of total family income and mothers' income are available up to 1999.

Turning to job search, Figure 8 plots the probability of claiming unemployment-related benefits and displays a clear discontinuity at the age-16 threshold. Table 1 reports a 5.5 percentage points increase in the proportion claiming unemployment benefits as the youngest child turns 16. However one has to take into account that this effect is in-built in the benefit structure since the same benefits office deals with *IS* and *JSA*. Mothers are forced to attend job centres where they have no alternative than to register as unemployed. Although this effect is probably largely mechanical, it may potentially lead to an increase in job search effort and most importantly the likelihood of finding a job. Not surprisingly, Figure 9 displays a negative jump at age 16 with

¹⁷All members in the households, i.e. the mother and the cohabiting child(ren), who are not in work, are assigned an earnings level of £5 (equivalent to 1 hour of work paid at the minimum wage) in order to solve the problem of zero earnings with logs. The analysis was also conducted for varying levels of earnings and results are not sensitive to smaller values. Real family income include earnings and state support of both the mother and her cohabiting child(ren).

¹⁸Single mothers' real income falls by about 11-20%. It appears that there are some changes occurring in the real income (earned and unearned) of the other members of the family when the youngest child turns 16.

respect to the inactivity rate. However no conclusive results can be drawn for the unemployment rate, displayed in Figure 10. This may be an indication that a proportion of single mothers with no qualifications were already registered as unemployed but instead of claiming *JSA*, they were claiming *IS* prior to their youngest child turning 16.

6.3 Identification Issues

Another potential explanation for the work patterns observed at the age-16 threshold is that there might be changes in the entitlement for other benefits which are also related to the age-16 eligibility rule. In this case the separate effect of the automatic withdrawal of *IS* on labour market outcomes may not be identified. As already hinted in section 2, receipt of *IS* implies automatic receipt of housing and/or council tax benefits. Following the loss in entitlement to *IS*, it is highly likely that the proportion of single mothers who claim housing and council tax benefits will fall discontinuously at or around the discontinuity point too. This is confirmed in Figure 11 and Table 2 that show a fall in both housing benefits claims of 4.7 percentage points and in council tax benefits of 4.3 percentage points at the threshold. The exogenous fall in the mothers' income at the cutoff point is therefore amplified by the withdrawal of these benefits. In turn this negative income effect may drive more mothers to enter the labour market to compensate for the loss. As a result the observed effect on labour market outcomes may not capture the genuine impact of the automatic withdrawal of *IS* but also that of losing the passported benefits. However the withdrawal of these benefits does not change substantially the results in this paper but is likely to imply that the impact of *IS* withdrawal on the labour supply decisions of single mothers with no qualifications is overestimated.

The additional concern is that there might be a behavioural response to other benefits entitlement which might generate some non-random selection. The New Deal for Lone Parents program participation is subject to the age-16 rule. Single mothers can take part in the welfare-to-work programme until their youngest child reaches 16. With the removal of individualised help and

advice to get back into work as their youngest child turns 16, some mothers may find it hard to participate in the labour market. As such the main RD estimates are more likely to be an underestimation of the true effect of the *IS* withdrawal on labour market outcomes rather than an overestimation, hence only strengthening the results. The entitlement for child benefits and working family tax credits are subject to an age-16 eligibility rule as well. Mothers can claim these benefits so long as they are responsible for a child under 16 or aged between 16 and 20 and in full-time non-advanced education. For instance mothers with lower attachment to the labour market might push their children to stay in school (and cohabit with them) as a response to *IS* withdrawal. This might underestimate the impact of *IS* withdrawal on labour supply (if these women would have otherwise been employed) or on unemployment (if they would have otherwise sought employment). Similarly single mother headed households might respond to *IS* withdrawal through an increase in the labour supply of children turning 16, which is also the minimum school leaving age in the UK¹⁹. A study on UK dropouts by Oreopoulos (2007) indicates that 16-25 year olds leave school at the minimum school leaving age because they are either better off working or they see no point in continuing or they need money. This might generate an income effect and reduce mothers' labour supply (Willis, 1973; Basu, 1999). Because of this one might see a change in mothers' labour supply as the youngest child turns 16. In this case the effect of *IS* withdrawal on mothers' labour supply will again be underestimated. Unfortunately, this possibility cannot be directly tested because information on children's schooling and labour supply before age 16 is not available in the data.

Although these concerns might be funded in theory, in practice the available evidence makes them of little relevance. Figure 11 shows the proportion of single mothers claiming child benefits as a function of the youngest child's age. Although the figure may suggest that there is a discontinuous jump at the age-16 threshold, the RD estimates in Table 1 are not statistically

¹⁹Children under school leaving age can only be employed in light work which does not harm them in the UK. However there are restrictions on the type of jobs they can do, when they can work and the total number of hours they can work (Council of Europe, 1998).

significant for third and higher order polynomials. This suggests that the changes in mothers' labour supply may not be contaminated by changes in the entitlement to child benefits as the youngest child turns 16. Furthermore there is no evidence of a discontinuity in the proportion of mothers claiming tax credits (i.e. Working Families' Tax Credits which replaced Family Credits), which is confirmed by non-significant RD estimates in Table 1. It may therefore be reasonable to claim that the drop out rate and the subsequent labour supply of children at the minimum school leaving age are not major sources of concern for the empirical results.

Another concern on the validity of the RD design may arise if the age-eligibility rule creates incentives for single mothers to sort around the discontinuity point in a non-systematic manner. If manipulation of the running variable (age of the youngest child) is possible and if mothers with potential gains from locating on one side of the threshold actually endogenously do so, then barely eligible mothers will not be identical to barely ineligible mothers. As mentioned by Lemieux and Milligan (2007), people may "cheat" (e.g. falsifying birth certificates) on the age of their children so that they remain eligible for *IS*. In this case, the RD estimate will not be consistent. Although this might appear impossible, the age-eligibility rule may further affect household formation. Children may delay leaving their mothers and single women may get married (or postpone marriage until the youngest child turns 16) in which case mothers observed around the age-eligibility cut-off comprise self-selected groups. If the propensity for children to leave the parental nest or for mothers to get married is correlated with the unobserved determinants of mothers' labour supply this might again invalidate the consistency of the RD estimate. Empirically, one can investigate whether there is a discontinuity in the density of the covariate which underlies the assignment at the discontinuity point (McCrary, 2008). A discontinuity in this case may indicate a violation of the no-manipulation assumption since this may be suggestive of children's (or mothers') ability to manipulate the running variable in a fashion that is correlated with the entitlement for benefits. As long as these selection biases are a smooth function of the running variable, they will be captured by the function $\delta(\cdot)$ and the RD

approach will remain valid. Figure 12 displays a smoothed histogram of the proportion of single mothers with a youngest child on either side of the age-16 threshold. It is reassuring to see that there is no excess bunching of mothers below the threshold (DiNardo and Lee, 2004; McCrary, 2008) which implies that the identification assumption appears to hold. In other terms, there is no indication of eligible single mothers just below the age-16 threshold being overrepresented relative to those just ineligible²⁰. Manipulation of the age eligibility does not appear to be responsible for the effects on single mothers' labour supply responses.

6.4 Robustness Checks

6.4.1 A Variety of Specifications

The remaining columns of Tables 1 and 2 report tests of robustness of the estimated impact of *IS* withdrawal to a variety of specifications. Columns (2) - (5) present the fixed effects RD estimates for polynomial specifications of degrees 2 to 5 respectively. In practically all cases the estimates are similar, have the same sign and are statistically significant (except for unemployment and inactivity rates). The estimated labour supply effects are also precisely estimated and have the expected sign across the specifications. There is no discontinuous jump in the probability of claiming child benefits and working family tax credits at the age-16 threshold. It may therefore be concluded that in most cases the fixed effects RD estimates are robust to a variety of specifications.

6.4.2 Narrowing Age Window

An additional check for the robustness of the results consists in estimating the model in Equation (3) for an increasingly narrow age window around the discontinuity point. Both the fit of the

²⁰McCrary (2008) suggests a formal test for the presence of manipulation in a RD design. A local linear regression of the proportion of single mothers with a youngest child is estimated below and above the discontinuity point. The test consists of checking whether the proportion of single mothes predicted to be at the age-16 threshold is the same for the two local linear regressions. The point estimate of the log difference at the threshold is just 0.031 (with a standard error of 0.038). The fact that the estimate is not significantly different from zero implies that the null that the distribution is continuous at the age of 16 for the youngest child cannot be rejected.

model (F-test) and the significance of the interaction terms (see Table A5) suggest the use of a linear and quadratic specification. Indeed the F-statistics decays after the quadratic specification and the interaction terms are less precisely estimated. Higher order polynomials are not feasible when the age window is reduced because they may tend to reflect random noise rather than the underlying trend. The age windows considered are four years above and below the discontinuity point, narrowing them down to 1 year above and below the cut-off point. Table 3 reports that the fixed effects RD estimates are statistically significant for “+/-2 years or less” age windows. Reassuringly the signs are as expected in most cases. Non-significance of results appears to be driven by high standard errors, in turn due to the small sample sizes as the age window is narrowed.

6.5 Interpretation

In this section, an interpretation of the findings in the context of the standard labour supply model is given in order to assess the magnitude of mothers’ labour supply responses and to infer their labour supply elasticities. Because assignment to the program near the age-16 threshold is “as good as random”, problems of reverse causality, endogenous labour supply of children and omitted variables are not major concerns for the results. Therefore, fixed effects RD estimates reported so far, i.e. the impact of the *IS* automatic withdrawal on the labour market responses of single mothers with no qualification, are reliably estimated. There is an 8.5% rise in the proportion of mothers who enter work following *IS* withdrawal. This is consistent with the predictions of the theoretical model of labour supply in section 3. While this represents 20% of single mothers with no qualifications who were initially on *IS*, about 37% of mothers who leave *IS* upon its withdrawal move onto unemployment benefits. There is also an added-in effect from the fall in housing and council tax passported benefits. Additionally, due to the functioning of the tax credits system in the UK these mothers have more incentive to increase their hours of work per week. The income

elasticity of labour supply approximately equals 0.5²¹ and is within the range of elasticities of other studies. The participation elasticity using net income for single parents in the UK ranges between 0.17 (Devereux, 2004) and 1.8 (Ermisch and Wright, 1991; Jenkins, 1992).

7 Discussion and Conclusion

The objectives of income transfer systems in the UK for low-income families are to reduce poverty and encourage work, amongst others. As part of its strategy to meet the objectives of tackling poverty and ensuring adequate financial incentives to work the Government has set a target to have 70% of single parents in employment by 2010. There has been considerable success in encouraging single parents to work 16 hours or more since 1997, with the single parent employment rate rising from 45% to around 56% today. Research has focussed on the work incentives of in-work benefits like the Working Families Tax Credits (*WFTC*). Simulations by Blundell et al. (2000) indicate that *WFTC* had the strongest incentives to work for single mothers. Francesconi and van der Klauuw (2004) calculated that *WFTC* increased the employment rate of lone mothers by about 7 percentage points. However, there is a lack of research on the disincentives of means-tested benefits.

This paper assesses the work disincentive effects of the Income Support program system on single mothers and exploits the eligibility rule that a single parent qualifies for *IS* so long as she is responsible for a cohabiting child under the age of 16. A regression discontinuity approach is used based on the institutional features of the UK benefits system which allow for a sharp research design. The break in the age-eligibility rule of *IS* provides a natural setting for analyzing its impact on labour market and benefits outcomes. The study also takes advantage of the longitudinal nature of the Quarterly Labour Force Survey and estimates the effects using a fixed effects model to account for unobserved heterogeneity of individuals. In the last section of the paper, a number

²¹The labour supply elasticity is calculated as the percentage change in labour supply (w) given a percentage change in total family income (I), i.e. $\epsilon = \frac{\% \Delta w}{\% \Delta I} = \frac{\delta w}{\delta I} \cdot \frac{I}{w} = \frac{\delta w}{\delta \ln I} \cdot \frac{1}{w}$ where w is evaluated at $a = 16$.

of robustness checks are performed. Narrowing the age window does not drastically change the effects.

First, as expected, the empirical estimates show a strong and discernible impact of the age-eligibility rule on the probability of claiming *IS* by single mothers when their youngest child turns 16. This is accompanied by a fall in other related benefits, namely housing and council tax benefits. It is obvious that at the cut-off age of 16 of the youngest child, single mothers “most-at-risks” of falling into poverty experience an exogenous fall in total family income and this in turn, affects their labour market behaviour.

This leads to the second finding of the paper which is consistent with the labour supply model underlying the analysis. A loss in transfer income induces an increase in the labour force participation of poorly educated mothers. Indeed, this study shows that the proportion of single mothers with no qualifications who start working rises by 3 percentage points, i.e. 20% of mothers who lose *IS* increase their labour supply. A proportion of mothers also increases their hours of work beyond 16. This finding is consistent with those of Evans et al. (2003) who show that since October 1998, 51% of all leavers from the programme entered work of at least 16 hours per week. Bell et al. (2008) analyzed whether encouraging lone parents to work in jobs of less than 16 hours a week (“mini-jobs”) could increase the employment rate of lone parents and tackle the high rates of poverty among this group. They conclude that a cut in the qualifying hours for Working Tax Credits (which replaced *WFTC* in March 2003) or an increase in the earnings disregard for *IS* or housing benefits and council tax benefits will be mostly beneficial to relatively low-income lone parents.

Some care has to be exercised in inferring the channels behind the estimated effect of the age-eligibility rule of *IS*. Compulsory schooling laws and labour supply decisions of children who reach the minimum school leaving age of 16 are likely to be confounding factors affecting the labour supply of mothers. The child’s decision to leave school and work at the age of 16 may increase the total family income in such a way that it compensates or outweighs the fall in

welfare benefits experienced by the mother. The results show that there is no clear jump in child benefits and working families tax credits claims at the discontinuity point implying that it is the entitlement to the *IS* program that creates labour supply disincentives (with an added-in effect following receipts of housing and council tax passported benefits) among single mothers with low labour market potential, so long as their youngest child is aged less than 16.

An additional result is the ensuing effect on the job search effort which is induced by Government actions as soon as the youngest child of single mothers turns 16. They are directed to job centres where they are registered as unemployed. Although mechanical, this directive increases the likelihood of finding a job for these mothers and this can explain the rise in unemployment benefits.

References

- [1] Adams, Nick, George Johnson, Peter Matejic, Charlotte Murray, Nicolas Toufexis, and Julia Whatley. 2008. Households Below Average Income: An Analysis of the Income Distribution 1994/95 – 2006/07. Households Below Average Income (HBAI) series, Department for Work and Pensions, London, HMSO.
- [2] Basu, Kaushik. 1999. Child labour: Cause, Consequence, and Cure, with Remarks on International labour Standards. *Journal of Economic Literature* 37: 1083-1119.
- [3] Bell, Kate, Mike Brewer, and David Phillips. 2008. Lone parents and ‘mini-jobs’. Report to Joseph Rowntree Foundation. <http://www.jrf.org.uk>.
- [4] Blank, Rebecca M. 2002. Evaluating Welfare Reform in the United States. *Journal of Economic Literature* 40: 1105-66.

- [5] Brook, Keith. 2004. Linkage of Labour Market Survey Data with Administrative Records. ESRC Research Methods Programme Seminar on Linking Survey Responses and Administrative Records, London. www.esrc.ac.uk/methods/events/linkage.
- [6] Blundell, Richard, Alan Duncan, Julian McCrae, and Costas Meghir. 2000. The Labour Market Impact of the Working Families' Tax Credits. *Fiscal Studies* 21, no. 1: 75-104.
- [7] Bound, John, and Richard, V. Burkhauser. 1999. Economic Analysis of Transfer Programs for People with Disabilities. *Handbook of Labor Economics* 3C: 3417-3528.
- [8] Card, David, and Lara D. Shore-Shephard. 2004. Using Discontinuous Eligibility Rules to Identify the Effects of Federal Medicaid Expansions on Low-income Children. *Review of Economics and Statistics* 86, no. 3: 752-66.
- [9] Chen, Susan, and Wilbert van der Klauuw. 2008. The Work Disincentive Effects of the Disability Insurance Program in the 1990s. *Journal of Econometrics* 142, no. 2: 757-84.
- [10] Council of Europe (1998). Children and Work in Europe. Council of Europe publishing.
- [11] CPAG Policy Briefing. http://www.cpag.org.uk/MakeChildBenefitCount/ChildBenefit_3.htm.
- [12] Devereux, Paul J. 2004. Changes in Relative Wages and Family Labor Supply. *Journal of Human Resources* 39: 696-722.
- [13] Dickens, Richard, and David T. Ellwood. 2003. Child Poverty in Britain. In *The Labour Market Under New Labour*, ed. Richard Dickens, Paul Gregg and Jonathan Wadsworth. Basingstoke: Palgrave Macmillan.
- [14] DiNardo, John E., and David Lee. 2004. Economic Impacts of New Unionization on Private Sector Employers: 1984-2001. *Quarterly Journal of Economics* 119, no. 4: 1383-1441.
- [15] Ermisch, John F. and Robert E. Wright. 1991. Welfare Benefits and Lone Parents' Employment in Great Britain. *Journal of Human Resources* 26, no. 3: 424-56.

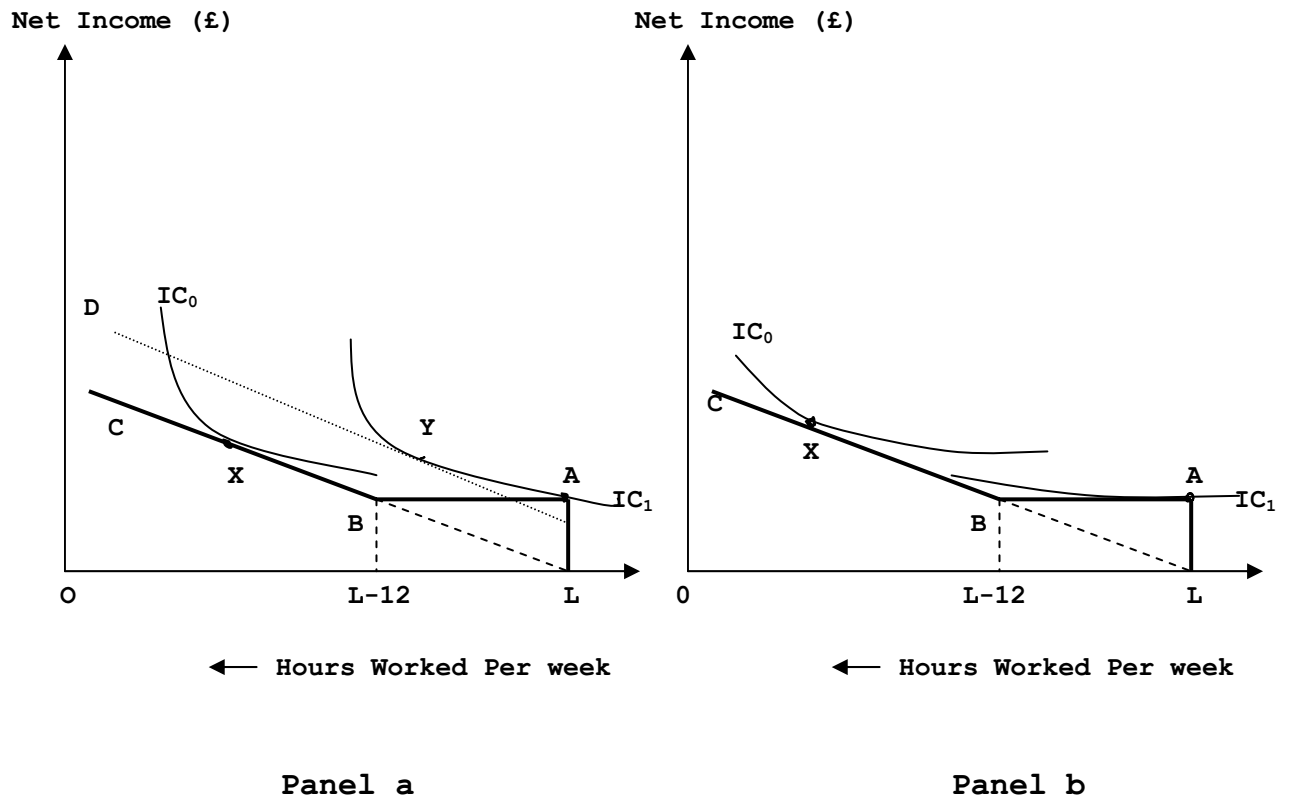
- [16] Evans, Martin, Jill Eyre, Jane Millar, and Sarre Sophie. 2003. *New Deal for Lone Parents: Second Synthesis Report of the National Evaluation*. Department for Work and Pensions Report no. 163, Department of Work and Pensions, London, HMSO. <http://www.dwp.gov.uk>.
- [17] Evans, Martin, Susan Harkness, and Ramis A. Ortiz. 2004. *Lone Parent Cycling Between Work and Benefits*. Department for Work and Pensions Report no. 217, London, HMSO.
- [18] Faggio, Giulia, and Stephen J. Nickell. 2003. *The Rise in Inactivity Among Adult Men*. In *The Labour Market Under New Labour*, ed. Richard Dickens, Paul Gregg and Jonathan Wadsworth. Basingstoke: Palgrave Macmillan.
- [19] Francesconi, Marco, and Wilbert van der Klauuw. 2004. *The Consequences of the 'In-Work Benefit Reform in Britain: New Evidence from Panel Data*. IZA Discussion Paper no.1248.
- [20] Gregg, Paul, and Susan Harkness. 2003. *Welfare Reform and Lone Parents Employment in the UK*. *The Centre for Market and Public Organisation Working Paper Series 03/072*, University of Bristol, UK.
- [21] Gregg, Paul, Susan Harkness, and Sarah Smith. 2009. *Welfare Reform and Lone Parents in the UK*. *Economic Journal* 119, no. 535: 855-82.
- [22] Hahn, Jinyong, Petra Todd, and Wilbert van der Klauuw. 1999. *Evaluating the Effect of an Antidiscrimination Law using a Regression-Discontinuity Design*. NBER Working Paper no. 7131, Cambridge, MA.
- [23] Hoxhallari, Lorenc, Anne Connolly and Nick Lyon. 2007. *Families with Children in Britain: Findings from the 2005 Families and Children Study (FACS)*. DWP Research Report no. 424, Leeds: CDS.
- [24] Hoynes, Hilary, and Robert Moffitt. 1996. *The Effectiveness of Financial Work Incentives in DI and SSI: Lessons from Other Transfer Programs*. In *Disability, Work and Cash Benefits*,

ed. Jerry, L. Mashaw, Virginia Reno, Richard Burkhauser and Monroe Berkowitz. Upjohn: Kalamazoo, Michigan.

- [25] http://findarticles.com/p/articles/mi_qn4158/is_20070130.
- [26] Jenkins, Stephen P. 1992. Lone Mothers' Employment and Full Time Work Probabilities. *The Economic Journal* 102, no. 411: 310-20.
- [27] Lee, David (2008), "Randomized Experiments from Non-random Selection in U.S. House Elections", *Journal of Econometrics*, 142(2), pp675-97.
- [28] Lee, David, and David Card. 2008. Regression Discontinuity Inference with Specification Error. *Journal of Econometrics* 142, no. 2: 655-74.
- [29] Lemieux, Thomas, and Milligan, Kevin (2007) "Incentive effects of social assistance: A regression discontinuity approach", *Journal of Econometrics*, 142(2), pp807-28.
- [30] McKay, Stephen, and Alan Marsh. 1994. Lone Parents and Work: The Effects of Benefits and Maintenance. London, HMSO.
- [31] McCrary, Justin. 2008. Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test. *Journal of Econometrics* 142, no. 2: 698-714.
- [32] Meghir, Costas, and David Phillips. 2008. Labour Supply and Taxes. In *Reforming the Tax System for the 21st Century*. The Mirrlees Review, The Institute for Fiscal Studies.
- [33] Micklewright, John. 2000. A League Table of Child Poverty in Rich Nations. Report Card 1, UNICEF Innocenti Research Centre, Florence.
- [34] OECD. 1998. OECD Employment Outlook 1998. OECD, Paris.
- [35] Oreopoulos, Philip. 2007. Do Dropouts Drop Out Too Soon? Wealth, Health, and Happiness from Compulsory Schooling. *Journal of Public Economics* 91, no. 11-12: 2213-29.

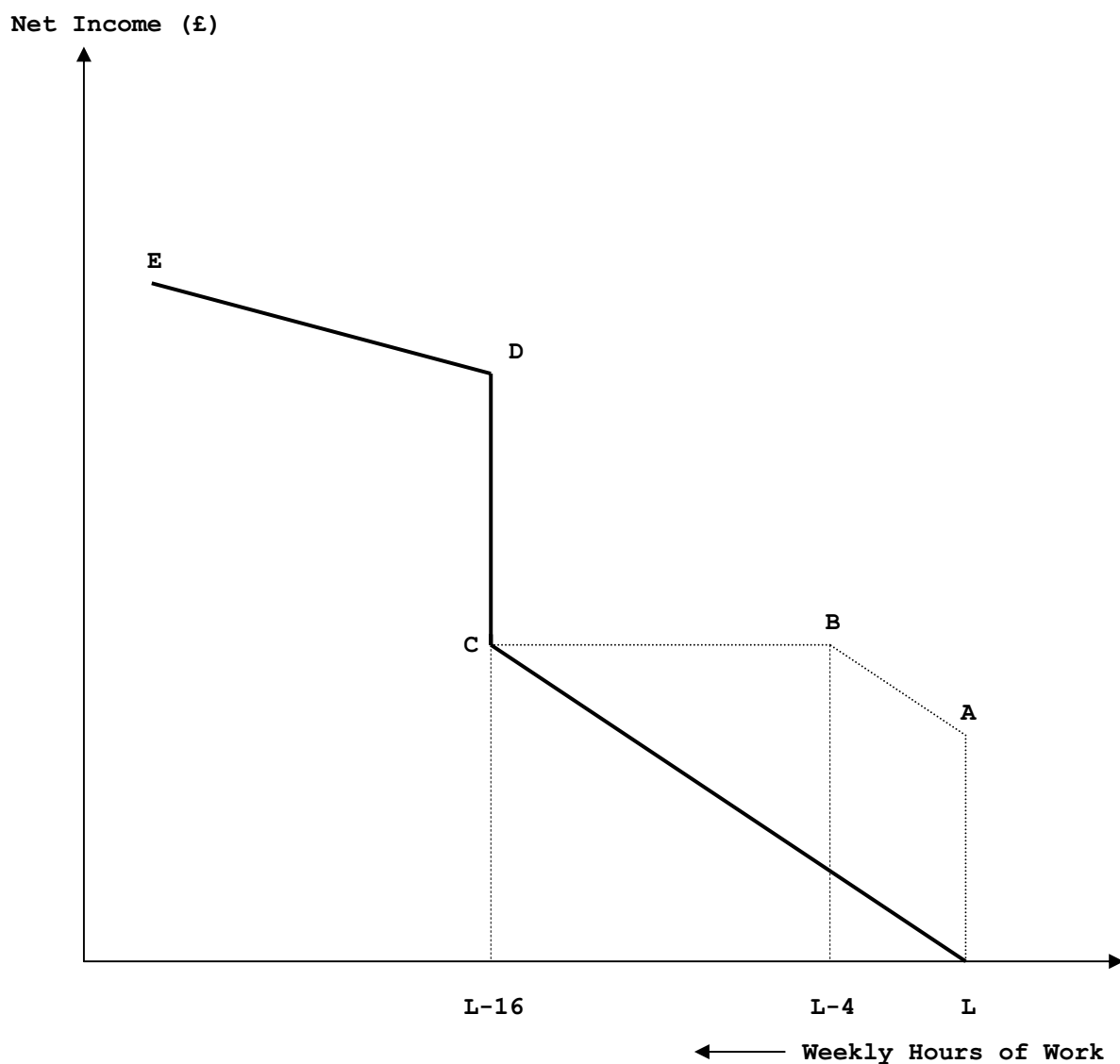
- [36] Petrongolo, Barbara. 2009. What are the long-term effects of UI? Evidence from the UK JSA Reform. *Journal of Public Economics* (forthcoming).
- [37] Shaw, Andrew, Robert Walker, Karl Ashworth, Stephen Jenkins, and Sue Middleton. 1996. Moving off Income Support: Barriers and Bridges. Department of Social Security Research Report no. 53, Department of Social Security.
- [38] Soobedar, Zeenat. 2009. Disability Benefits: A Substitute for Income Support for Single Mothers with No Qualifications in the UK. PhD diss., Department of Economics, Queen Mary University of London..
- [39] van der Klauuw, Wilbert. 2008. Regression-Discontinuity Analysis: A Survey of Recent Developments in Economics. *Labour* 22, no. 2: 219-45.
- [40] Welfare Benefits and Tax Credits Handbook 1992-2008, Child Poverty Action Group.
- [41] Willis, Robert J. 1973. A New Approach to the Economic Theory of Fertility Behavior. *Journal of Political Economy* 81, no. 2: 14-64.
- [42] Annual Survey of Hours and Earnings. 2007. ONS. <http://www.statistics.gov.uk>.

Figure 1
A Labour Supply Model with Income Support



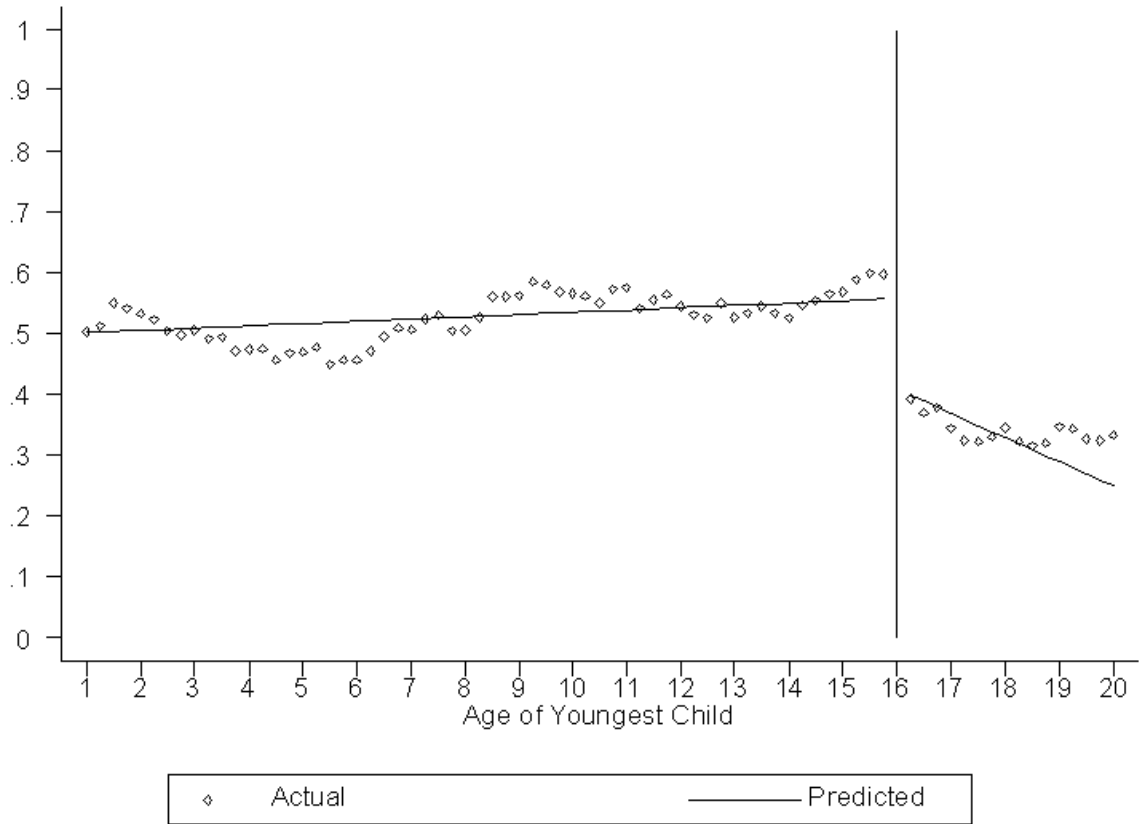
Notes: The Figure reports the labour supply model for a mother who has no qualifications and who is entitled to Income Support, which is the only transfer program of the welfare benefit system. Panel a assumes that the person attaches a high value to leisure (or low value to work) and panel b assumes that the person attaches a low value to leisure. Leisure is a normal good in both cases.

Figure 2
A Labour Supply Model with Child Benefits and Tax Credits



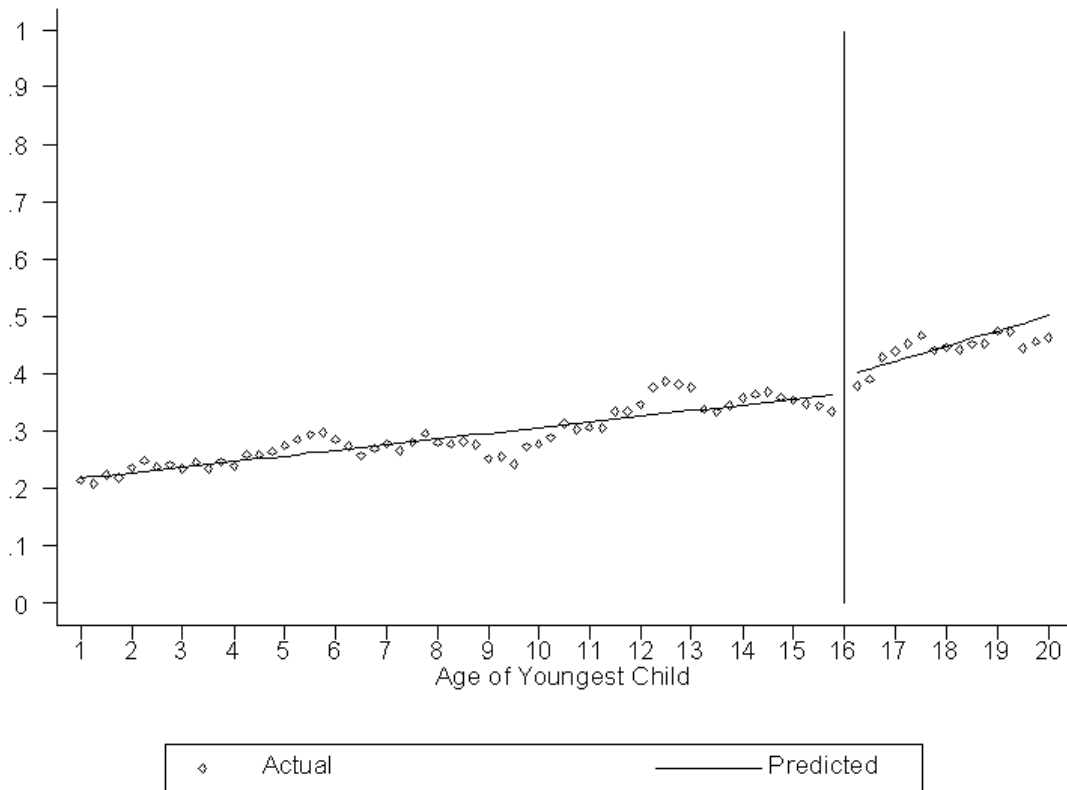
The Figure reports the budget lines of a mother who has no qualifications under different transfer programs. ABCDE is the original budget line assuming the mother claims IS (AL) and tax credits. There is also an earnings disregard of £20, equivalent to mothers working 4 hours per week. The mother does not have an incentive to work more than 4 hours under the current IS program. She locates either at A or on segment AB. As her youngest child turns 16 she loses her entitlement to IS and is faced with a decrease in her net income. The new budget line is now LCDE. To maximise her utility, she moves on segment DE, i.e. enter work (or if already in work) and work 16 or more hours per week.

Figure 3
Proportion Claiming Income Support by Age of Youngest Child



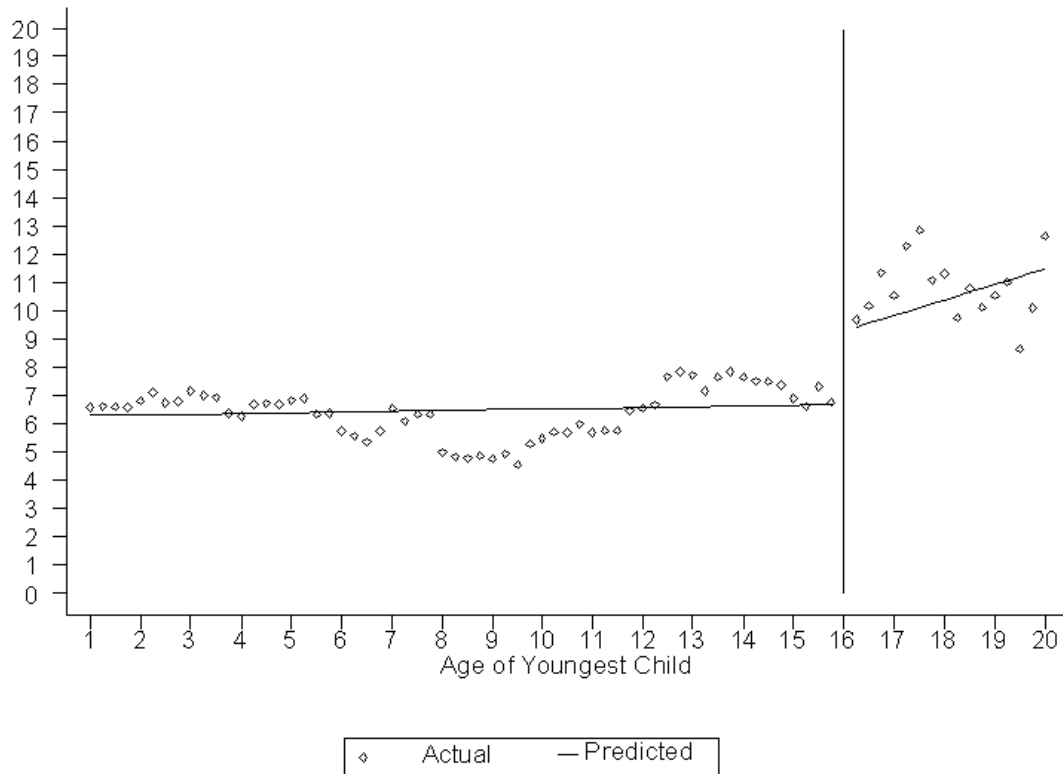
Notes: The Figure reports the proportion of mothers with no qualifications, who claim income support (excluding income support with a disability premium) by the age of their youngest child. A linear fit is superimposed to the actual data.

Figure 4
Proportion of Mothers in Work by Age of Youngest Child



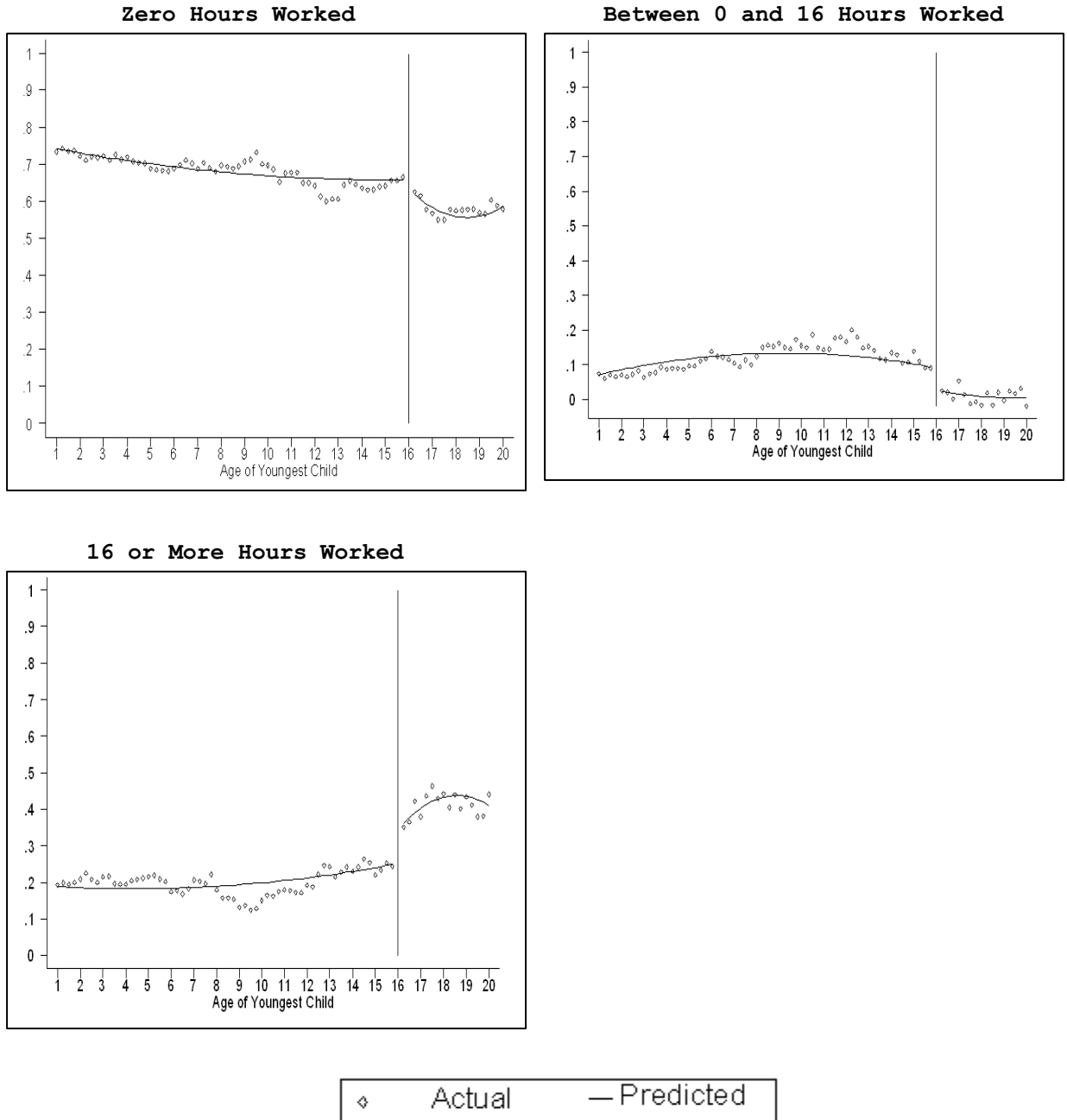
Notes: The Figure reports the proportion of lone mothers with no qualifications, who are employed by the age of their youngest child. A linear fit is superimposed to the actual data.

Figure 5
Number of Hours Worked by Age of Youngest Child



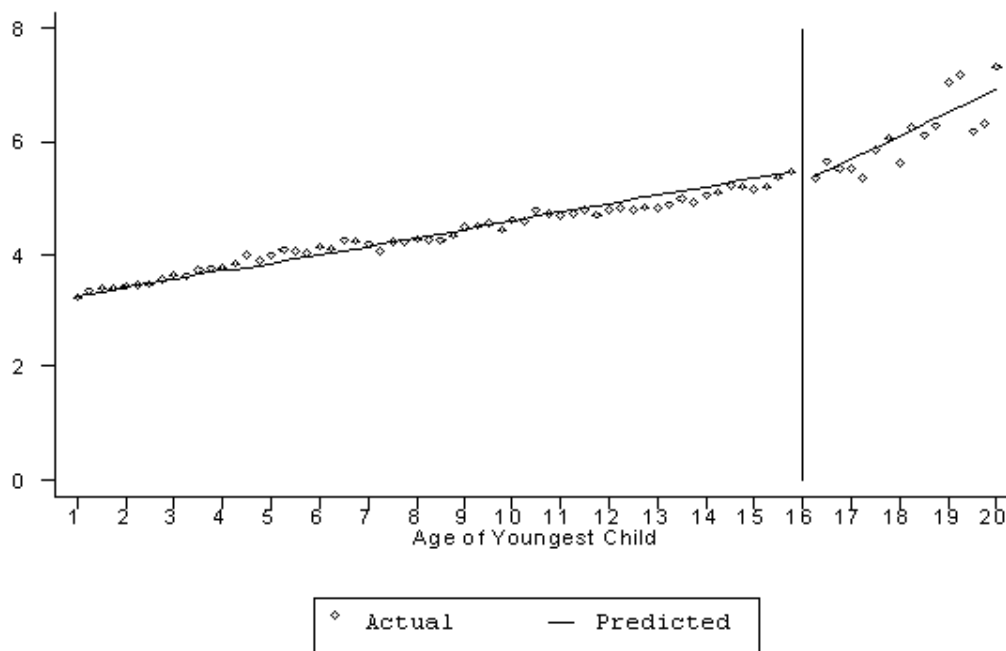
Notes: The Figure reports the number of hours worked by mothers with no qualifications, by the age of their youngest child. A linear fit is superimposed to the actual data.

Figure 6
Hours Worked by Age of Youngest Child



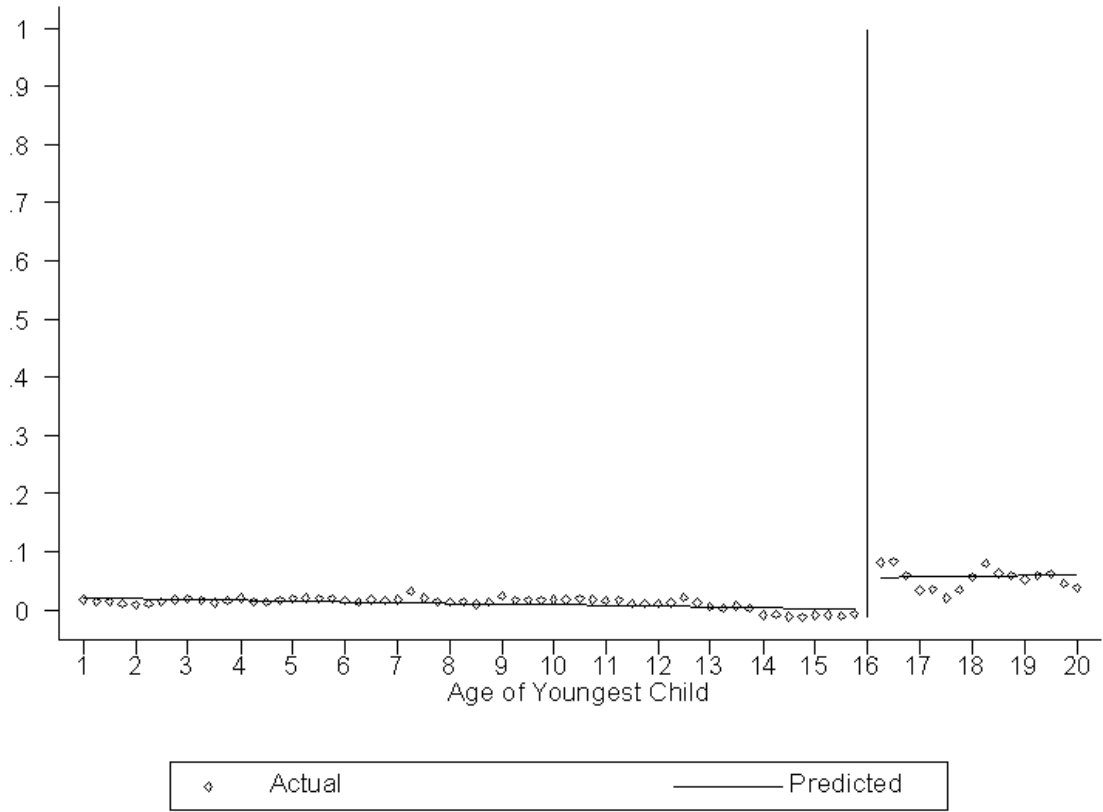
Notes: The Figure reports the proportion of mothers with no qualifications, who work zero hours (panel a, the reverse of Figure 4), between 0 and 16 hours (panel b) and more than 16 hours (panel c) per week by the age of their youngest child. A quadratic fit is superimposed to the actual data.

Figure 7
Log of Real Family Income by Age of Youngest Child



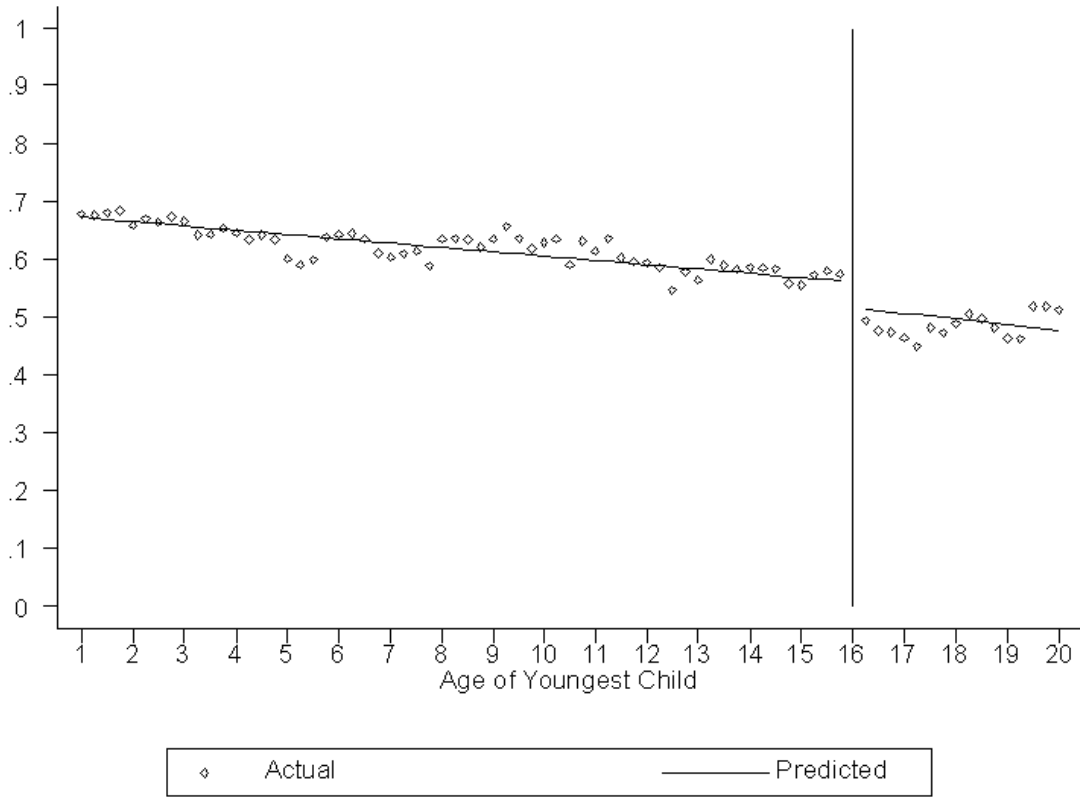
Notes: The Figure reports the log of real family earnings, which include earnings and nonlabour income of each member of the family by age of the youngest child. A linear fit is superimposed to the actual data.

Figure 8
Proportion Claiming Unemployment-Related Benefits
by Age of Youngest Child



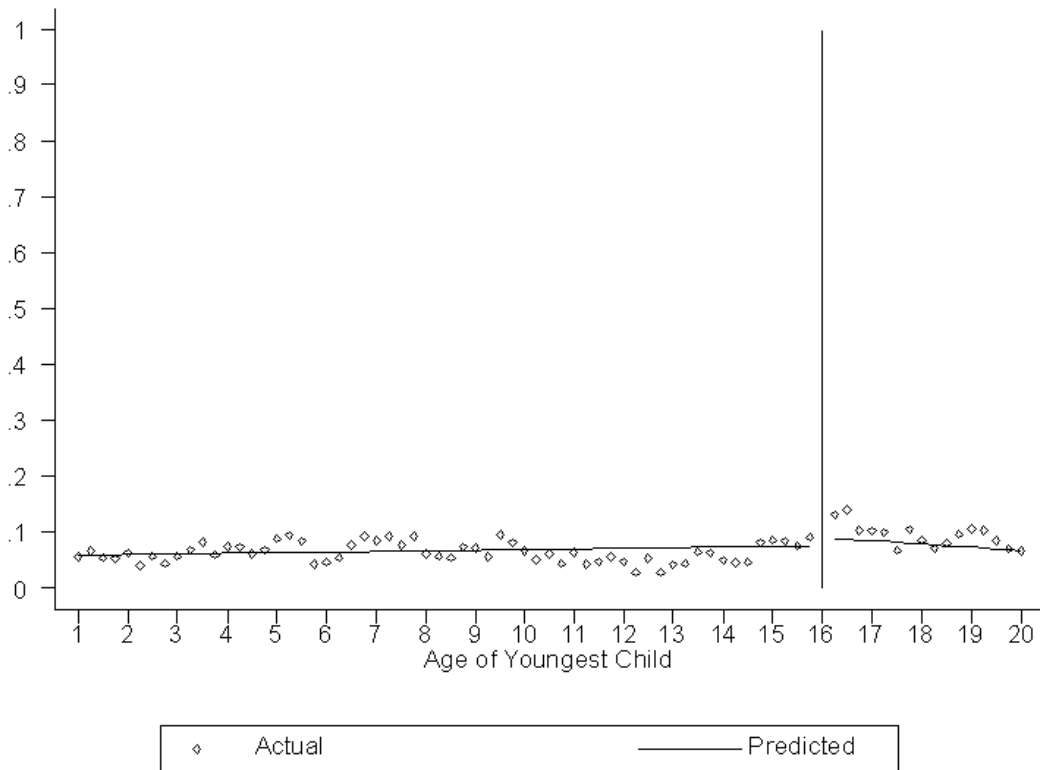
Notes: The Figure reports the proportion of mothers with no qualifications, who claim unemployment-related benefits by the age of their youngest child. A linear fit is superimposed to the actual data.

Figure 9
Inactivity Rate by Age of Youngest Child



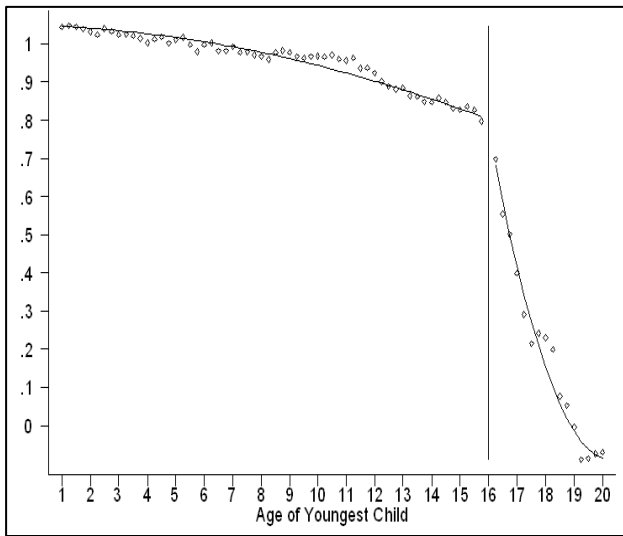
Notes: The Figure reports the proportion of lone mothers with no qualifications, who are inactive by the age of their youngest child. A linear fit is superimposed to the actual data.

Figure 10
Unemployment Rate by Age of Youngest Child

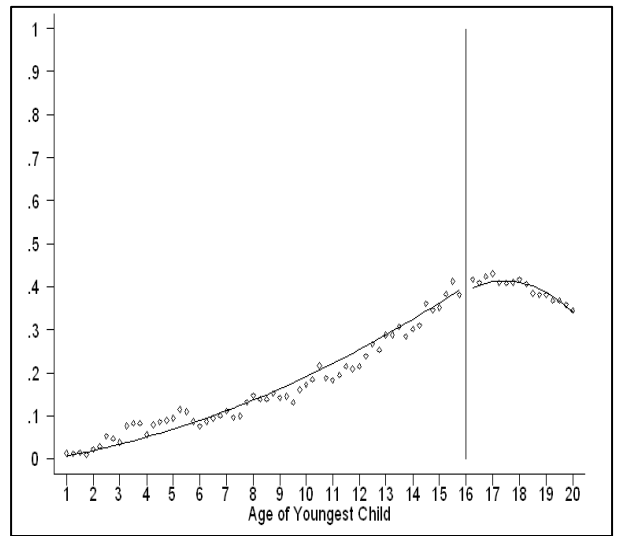


Notes: The Figure reports the proportion of lone mothers with no qualifications, who are unemployed by the age of their youngest child. A linear fit is superimposed to the actual data.

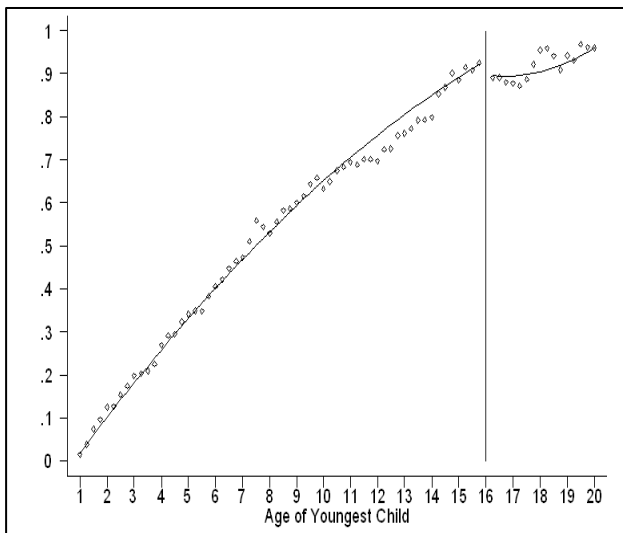
Figure 11
Proportion Claiming Other Benefits by Age of Youngest Child



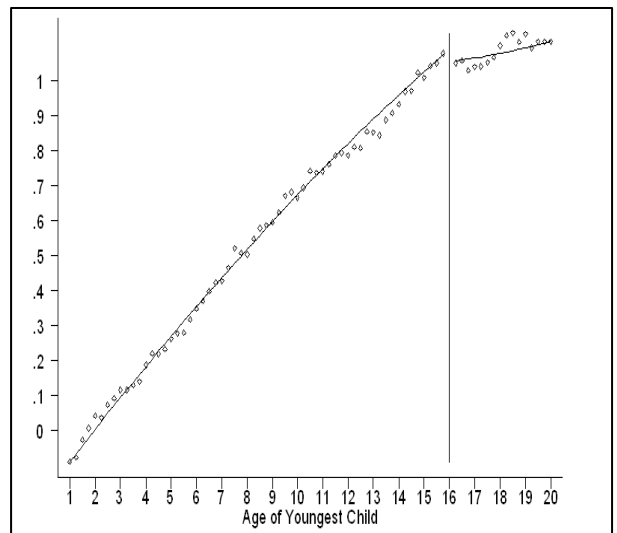
Panel a: Child Benefit



Panel b: Tax Credits



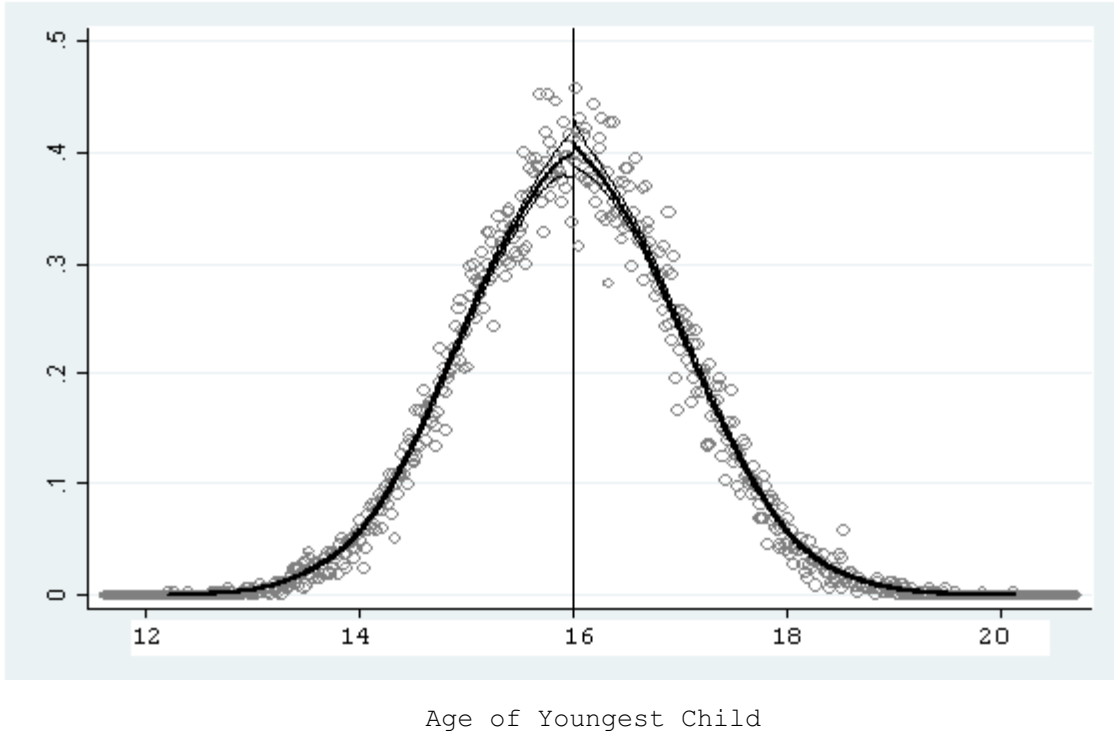
Panel c: Housing Benefits



Panel d: Council Tax Benefits

Notes: The Figure reports the proportion of lone mothers with no qualifications, who claim child benefits, housing benefits, council tax benefits, tax credits and pension benefits by the age of their youngest child. A quadratic fit is superimposed to the actual data.

Figure 12
Density of Age of Youngest Child



Notes: The Figure reports the density of the age of the youngest child with no manipulation.

Table 1
Fixed Effects Regression Discontinuity Estimates
Benefits Outcomes

	(1)	(2)	(3)	(4)	(5)	N
IS (excluding IS with Disability Premium)						
Treat	-0.149***	-0.143***	-0.131***	-0.128***	-0.157***	25388
	(0.016)	(0.017)	(0.018)	(0.020)	(0.022)	
Unemployment-Related Benefits						
Treat	0.055***	0.054***	0.054***	0.042***	0.030***	25388
	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	
Child Benefit						
Treat	-0.051**	-0.023*	-0.014	-0.004	-0.025	25388
	(0.021)	(0.013)	(0.015)	(0.023)	(0.017)	
Housing Benefit						
Treat	-0.050***	-0.037*	-0.038*	-0.039*	-0.044*	25388
	(0.018)	(0.019)	(0.021)	(0.022)	(0.025)	
Council Tax Benefit						
Treat	-0.043**	-0.035*	-0.032**	-0.030**	-0.054***	25388
	(0.018)	(0.018)	(0.012)	(0.012)	(0.020)	
Tax Credits						
Treat	0.000	-0.012	-0.024	-0.022	-0.015	25388
	(0.014)	(0.015)	(0.016)	(0.018)	(0.019)	

Notes: The Table displays the fixed RD estimates of the impact of the youngest child turning 16 on a number of benefits outcomes. Tax credits include Working Families' Tax Credits and Family Credits prior to 1999. Columns (1) to (5) refer to polynomials of degree 1 to 5 respectively. The specification includes controls for the age of the youngest child, month and year dummies. The sample includes single mothers with no qualifications who are reported to be single mothers in the first period they appear in the survey. The age of the youngest child is between 1 and 20 years. Standard errors in brackets are clustered by the age of the youngest child. ***, **, * denote significance at 1%, 5% and 10% respectively. Source: Quarterly Labour Force Surveys, Winter 1994 - Autumn 2002 (excluding Winter 1996 - Winter 1997).

Table 2
Fixed Effects Regression Discontinuity Estimates
Labour Market Outcomes

	(1)	(2)	(3)	(4)	(5)	N
Employed						
Treat	0.030** (0.013)	0.026* (0.014)	0.026* (0.015)	0.038** (0.016)	0.049*** (0.018)	25309
Unemployed						
Treat	0.015 (0.015)	0.011 (0.016)	0.003 (0.017)	-0.018 (0.018)	-0.021 (0.020)	25309
Inactive						
Treat	-0.045*** (0.017)	-0.037** (0.018)	-0.029 (0.019)	-0.020 (0.021)	-0.027 (0.023)	25309
Number of Hours Worked						
Treat	2.523*** (0.485)	2.352*** (0.509)	1.937*** (0.547)	2.664*** (0.597)	2.877*** (0.656)	25309
Hours Worked Between 0 and 16						
Treat	-0.070*** (0.017)	-0.063*** (0.018)	-0.052*** (0.019)	-0.059*** (0.021)	-0.056** (0.023)	25309
Hours Worked >= 16						
Treat	0.100*** (0.017)	0.089*** (0.018)	0.078*** (0.019)	0.096*** (0.021)	0.104*** (0.023)	25309
Log of Real Total Family Income						
Treat	-0.171* (0.089)	-0.189** (0.094)	-0.199** (0.101)	-0.236** (0.111)	-0.314** (0.122)	14189

Notes: The Table displays the fixed effects RD estimates of the impact of the youngest child turning 16 on a number of labour market outcomes. Columns (1) to (5) refer to polynomials of degree 1 to 5 respectively. The specification includes controls for the age of the youngest child, month and year dummies. The sample includes single mothers with no qualifications who are reported to be single mothers in the first period they appear in the survey. The age of the youngest child is between 1 and 20 years. Standard errors in brackets are clustered by the age of the youngest child. ***, **, * denote significance at 1%, 5% and 10% respectively. Source: Quarterly Labour Force Surveys, Winter 1994 - Autumn 2002 (excluding Winter 1996 - Winter 1997).

Table 3
Fixed Effects Regression Discontinuity Estimates with Different Age Windows

Age Window Width	(1)	(2)	N
IS (excluding IS with Disability Premium)			
+/-			
4 years	-0.155*** (0.015)	-0.154*** (0.018)	7492
3 years	-0.155*** (0.016)	-0.150*** (0.019)	5793
2 years	-0.152*** (0.017)	-0.131*** (0.023)	4038
1 year	-0.147*** (0.022)	-0.100** (0.041)	2199
Unemployment-Related Benefits			
+/-			
4 years	0.059*** (0.009)	0.055*** (0.011)	7492
3 years	0.058*** (0.010)	0.053*** (0.012)	5793
2 years	0.056*** (0.012)	0.052*** (0.016)	4038
1 year	0.053*** (0.015)	0.016 (0.028)	2199
Child Benefit			
+/-			
4 years	-0.052*** (0.017)	-0.029 (0.019)	7492
3 years	-0.047*** (0.018)	-0.028 (0.022)	5793
2 years	-0.041** (0.020)	-0.019 (0.026)	4038
1 year	-0.032 (0.025)	0.009 (0.046)	2199

Age Window Width			
	(1)	(2)	N
Housing Benefit			
+/-			
4 years	-0.049*** (0.018)	-0.041** (0.020)	7492
3 years	-0.047*** (0.018)	-0.039* (0.022)	5793
2 years	-0.048** (0.020)	0.002 (0.026)	4038
1 year	-0.031 (0.024)	0.013 (0.045)	2199
Council Tax Benefit			
+/-			
4 years	-0.045** (0.019)	-0.045** (0.022)	7492
3 years	-0.048** (0.020)	-0.037 (0.024)	5793
2 years	-0.043** (0.021)	-0.018 (0.028)	4038
1 year	-0.039 (0.026)	-0.003 (0.048)	2199
Tax Credits			
+/-			
4 years	-0.007 (0.014)	-0.010 (0.017)	7492
3 years	-0.008 (0.015)	-0.018 (0.018)	5793
2 years	-0.016 (0.016)	-0.006 (0.022)	4038
1 year	-0.015 (0.021)	0.074* (0.039)	2199
Employed			
+/-			
4 years	0.037*** (0.013)	0.037** (0.015)	7455
3 years	0.037*** (0.013)	0.029* (0.016)	5761
2 years	0.036** (0.014)	0.032* (0.019)	4011
1 year	0.031* (0.018)	0.036 (0.034)	2187

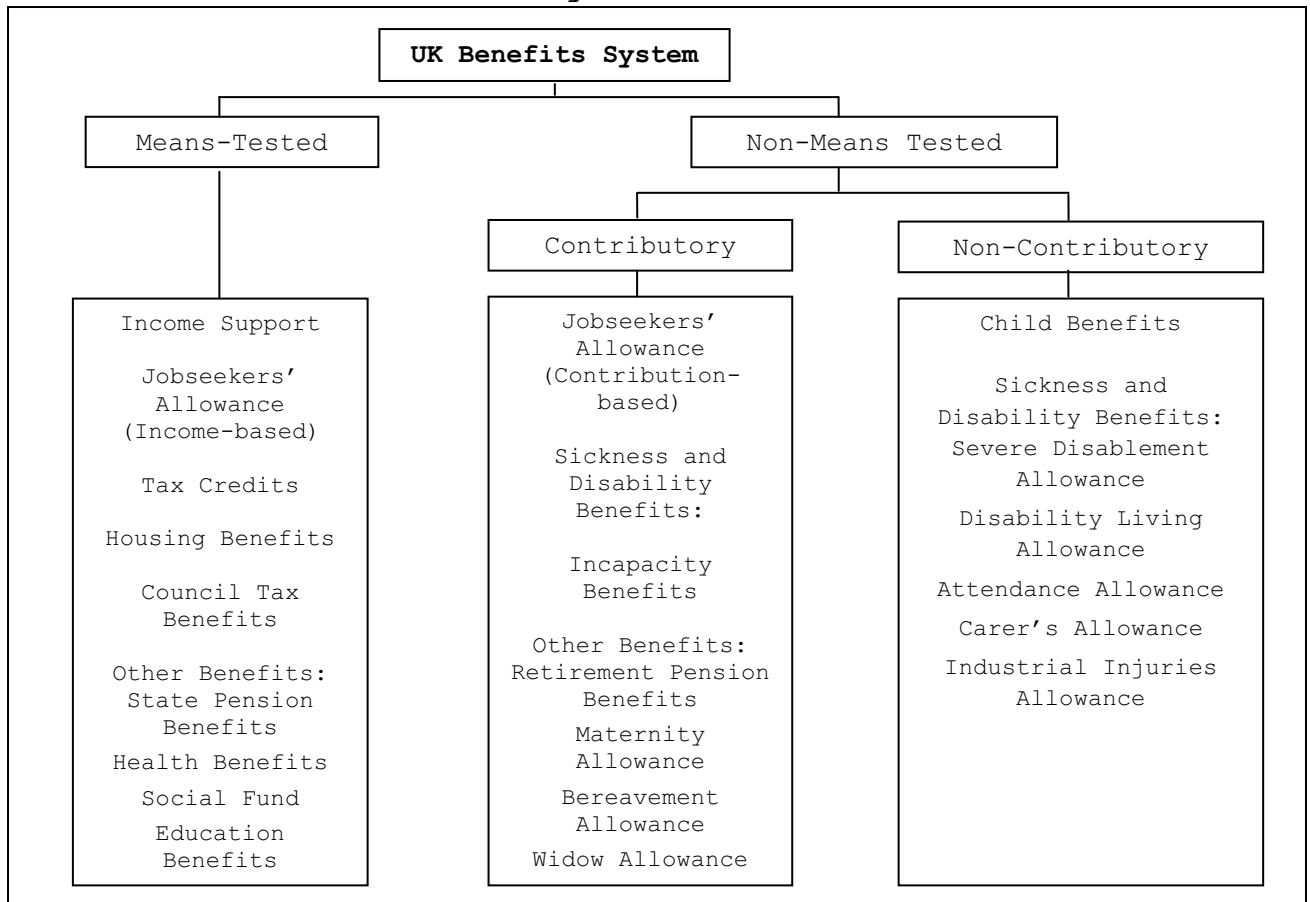
Age Window Width			
	(1)	(2)	N
Unemployed			
+/-			
4 years	0.012 (0.015)	0.005 (0.017)	7455
3 years	0.011 (0.015)	0.009 (0.018)	5761
2 years	0.006 (0.016)	0.011 (0.021)	4011
1 year	0.019 (0.021)	-0.036 (0.038)	2187
Inactivity			
+/-			
4 years	-0.048*** (0.016)	-0.042** (0.019)	7455
3 years	-0.048*** (0.017)	-0.038* (0.020)	5761
2 years	-0.041** (0.017)	-0.043* (0.023)	4011
1 year	-0.049** (0.021)	0.000 (0.039)	2187
Number of Hours Worked Including Zeroes			
+/-			
4 years	2.492*** (0.634)	2.762*** (0.730)	7455
3 years	2.577*** (0.633)	2.527*** (0.765)	5761
2 years	2.500*** (0.682)	2.452*** (0.917)	4011
1 year	2.179** (0.846)	2.045 (1.582)	2187

Age Window Width			
	(1)	(2)	N
Zero Hours Worked			
+/-			
4 years	-0.037*** (0.013)	-0.037** (0.015)	7455
3 years	-0.037*** (0.013)	-0.029* (0.016)	5761
2 years	-0.036** (0.014)	-0.032* (0.019)	4011
1 year	-0.031* (0.018)	-0.036 (0.034)	2187
Hours Between 0 and 16			
+/-			
4 years	-0.059*** (0.019)	-0.061*** (0.022)	7455
3 years	-0.057*** (0.020)	-0.060** (0.024)	5761
2 years	-0.052** (0.021)	-0.063** (0.029)	4011
1 year	-0.047* (0.024)	-0.068 (0.045)	2187
Hours >= 16			
+/-			
4 years	0.095*** (0.020)	0.098*** (0.023)	7455
3 years	0.094*** (0.021)	0.089*** (0.025)	5761
2 years	0.088*** (0.023)	0.095*** (0.031)	4011
1 year	0.077*** (0.028)	0.104** (0.052)	2187

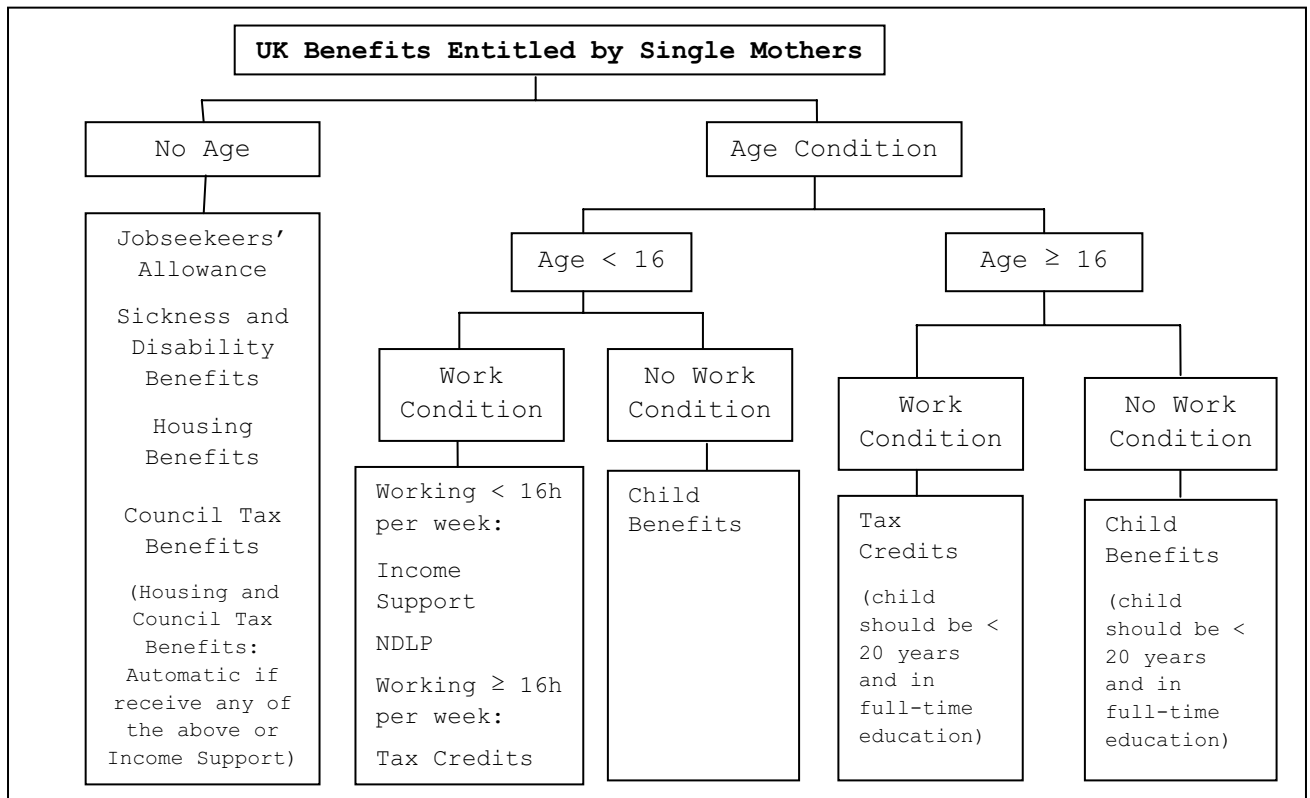
Notes: The Table displays the fixed effects RD estimates of the impact of the youngest child turning 16 for different age windows. Tax credits include Working Families' Tax Credits and Family Credits prior to 1999. Columns (1) to (2) refer to polynomials of degree 1 and 2 respectively. The specification includes controls for the age of the youngest child, month and year dummies. The sample includes single mothers with no qualifications who are reported to be single mothers in the first period they appear in the survey. The age of the youngest child is between 1 and 20 years. Standard errors in brackets are clustered by the age of the youngest child. ***, **, * denote significance at 1%, 5% and 10% respectively. Source: Quarterly Labour Force Surveys, Winter 1994 - Autumn 2002 (excluding Winter 1996 - Winter 1997).

Appendix

Figure A1



Panel a



Panel b

Notes: The Figure reports the various benefits that individuals can claim in the UK. Panel a shows that the benefits can be divided into two broad categories: means-tested and non-means tested benefits. The main benefits studied in the paper are Income Support, Housing Benefits, Council Tax Benefits, Child Benefits and Tax Credits (which include both Working Families' Tax Credits, formally known as Family Credits). Panel b displays the benefits used mainly in the analysis which is available to single mothers in the UK depending on their work condition and on the age of their youngest cohabiting child.

Table A1
Major Reforms to the Benefits System in the UK

April 1988	Income support replaced Supplementary Benefits.
April 1992	Disability Living Allowance replaced Mobility Allowance and Attendance Allowance for those aged under 65.
April 1995	Incapacity benefits replaced Invalidity Benefits and Sickness Benefits.
October 1996	Jobseeker's Allowance replaced Unemployment Benefits and Income Support for the unemployed.
1997-1999	New Deal Programmes were introduced as part of the government's "welfare-to-work" strategy:
July 1997	New Deal for Lone Parents started in some areas and was rolled out nationally in October 1998.
January 1998	New Deal for Young People (18-24 years old) was introduced.
October 1998	New Deal for Disabled People was piloted and rolled out nationally from July 2001.
April 1999	New Deal for Partners was introduced.
October 1999	New Deal 25+ began in some areas and rolled out nationally from April 2004.
October 1999	Working Families' Tax Credits replaced Family Credit (which replaced Family Income Supplement in April 1988). Disabled Person's Tax Credit replaced Disability Working Allowance.
April 2001	Children's Tax Credit was introduced.
April 2003	Working Tax Credits replaced Working Families' Tax Credits and Disabled Person's Tax Credits. Child Tax Credits replaced Children's Tax Credits.
October 2008	Employment and Support Allowance replaced Incapacity Benefit and Income Support on grounds of incapacity.

Notes: The Table displays the main reforms that occurred in the UK benefit system since the mid-1990s in chronological order. A more detailed summary can be found in Gregg and Harkness (2003).

Table A2
Income Support: Personal Allowances 1988 to 2002

£ per week

	Single Person				Lone Parent		
	Under 18		18 or over		Under 18	18 or over	
	Usual Rate	Higher Rate	18 to 24	25 or over	Usual Rate	Higher Rate	
10 April 1989	20.80	-	27.40	34.90	20.80	-	34.90
9 April 1990	21.90	28.80	28.80	36.70	21.90	-	36.70
8 April 1991	23.65	31.15	31.15	39.65	23.65	31.15	39.65
7 October 1991	23.90	31.40	31.40	39.65	23.90	31.40	39.65
6 April 1992	25.55	33.60	33.60	42.45	25.55	33.60	42.45
12 April 1993	26.45	34.80	34.80	44.00	26.45	34.80	44.00
11 April 1994	27.50	36.15	36.15	45.70	27.50	36.15	45.70
10 April 1995	28.00	36.80	36.80	46.50	28.00	36.80	46.50
8 April 1996	28.85	37.90	37.90	47.90	28.85	37.90	47.90
7 April 1997	29.60	38.90	38.90	49.15	29.60	38.90	49.15
6 April 1998	30.30	39.85	39.85	50.35	30.30	39.85	50.35
12 April 1999	30.95	40.70	40.70	51.40	30.95	40.70	51.40
10 April 2000	31.45	41.35	41.35	52.20	31.45	41.35	52.20
9 April 2001	31.95	42.00	42.00	53.05	31.95	42.00	53.05
8 April 2002	32.50	42.70	42.70	53.95	32.50	42.70	53.95

	Couple		Dependent Children			
	Both under 18	One or Both 18 or over	Under 11	11 to 15	16 to 17	18
10 April 1989	41.60	54.80	11.75	17.35	20.80	27.40
9 April 1990	43.80	57.60	12.35	18.25	21.90	28.80
8 April 1991	47.30	62.25	13.35	19.75	23.65	31.15
7 October 1991	47.30	62.25	13.60	20.00	23.90	31.40
6 April 1992	50.60	66.60	14.55	21.40	25.55	33.60
12 April 1993	52.40	69.00	15.05	22.15	26.45	34.80
11 April 1994	54.55	71.70	15.65	23.00	27.50	36.15
10 April 1995	55.55	73.00	15.95	23.40	28.00	36.80
8 April 1996	57.20	75.20	16.45	24.10	28.85	37.90

	Couple	Dependent Children		
		Under 11	11 to 16 ^(1b)	16-18 ^(1c)
7 April 1997	58.70	16.90	24.75	29.60
6 April 1998	60.10	17.30	25.35	30.30
5 November 1998		19.80	25.35	30.30
12 April 1999 ⁽²⁾	80.65	20.20	25.90	30.95
4 October 1999	80.65	24.90	25.90	30.95

	Couple	Dependent Children	
		Up to and inc 16 ^(3a)	16-18 ^(3b)
10 April 2000 ⁽³⁾	81.95	26.60	31.75
23 October 2000		30.95	31.75
9 April 2001	83.25	31.45	32.25
22 October 2001		32.95	33.75
8 April 2002	84.65	33.50	34.30

Notes: 1. From 7 April 1997 the age banding used for the benefit calculation of dependent children have changed.

From this date the banding are as follows:

- Birth to September following 11th birthday.
- From September following the 11th birthday to September following the 16th birthday.
- From September following the 16th birthday to the day before the 19th birthday.

Some children will remain eligible for a different rate of benefit i.e. have 'protected rights'. These are as follows:-

- *Child aged 11 before 7 April 1997: allowance £25.35.
- *Child aged 16 before 7 April 1997: allowance £30.30.
- *Child aged 18 before 7 April 1997: allowance £39.85.

2. From 12 April 1999 the personal allowance for married or unmarried couples where both members are not yet 18 or one of the couple is aged 18 or over depends on the couple's circumstances. They may be entitled to a couple allowance or a single person's allowance dependent upon certain criteria.

3. From 10 April 2000 there are only 2 age bands for dependents. From this date the age banding are as follows:

- Birth to September following 16th birthday.
- From September following 16th birthday to the day before the 19th birthday.

Source: Quarterly Statistical Review, 2002.

Table A3
Income Support: Rates of Premiums 1988 to 2002

	<i>£ per week</i>									
	Disabled		Disability		Enhanced Disability ⁽⁵⁾			Severe Disability		
	Child	Carer ⁽¹⁾	Single	Couple	Child	Single	Couple	Single	Couple	Couple
								(One)		(Both)
11 April 1988	6.15	-	13.05	18.60	-	-	-	24.75	24.75	49.50
10 April 1989	6.50	-	13.70	19.50	-	-	-	26.20	26.20	52.40
9 April 1990	15.40	10.00	15.40	22.10	-	-	-	28.50	28.20	56.40
8 April 1991	16.65	10.80	16.65	23.90	-	-	-	31.25	31.25	62.50
7 October 1991	17.80	11.55	17.80	25.55	-	-	-	32.55	32.55	65.10
6 April 1992	18.45	11.95	18.45	26.45	-	-	-	33.70	33.70	67.40
12 April 1993	19.45	12.40	19.45	27.80	-	-	-	34.30	34.40	68.60
11 April 1994	19.80	12.60	19.80	28.30	-	-	-	35.05	35.05	70.10
10 April 1995	20.40	13.00	20.40	29.15	-	-	-	36.40	36.40	72.80
8 April 1996	20.95	13.35	20.95	29.90	-	-	-	37.15	37.15	74.30
7 April 1997	21.45	13.65	21.45	30.60	-	-	-	38.50	38.50	77.00
6 April 1998	21.90	13.95	21.90	31.25	-	-	-	39.75	39.75	79.50
12 April 1999	22.25	14.15	22.25	31.75	-	-	-	40.20	40.20	80.40
10 April 2000	22.25	14.15	22.25	31.75	-	-	-	40.20	40.20	80.40
9 April 2001	30.00	24.40	22.60	32.25	11.05	11.05	16.00	41.55	41.55	83.10
8 April 2002	30.50	24.80	23.00	32.80	11.25	11.25	16.25	42.25	42.25	84.50
	Family ⁽²⁾			Pensioner		Enhanced Pensioner ⁽³⁾		Higher Pensioner		
	All	Couple	Lone Parent	Lone Parent ⁽⁴⁾	Single	Couple	Single	Couple	Single	Couple
11 April 1988	6.15	-	-	3.70	10.65	16.25	-	-	13.05	18.60
10 April 1989	6.50	-	-	3.90	11.20	17.05	-	-	13.70	19.50
9 October 1989	6.50	-	-	3.90	11.20	17.05	13.70	20.55	16.20	23.00
9 April 1990	7.35	-	-	4.10	11.80	17.95	14.40	21.60	17.05	24.25
8 April 1991	7.95	-	-	4.45	13.75	20.90	15.50	23.35	18.45	26.20
6 April 1992	9.30	-	-	4.75	14.70	22.35	16.65	25.00	20.75	29.55
12 April 1993	9.65	-	-	4.90	17.30	36.25	19.30	29.00	23.55	33.70
11 April 1994	10.05	-	-	5.10	18.25	27.55	20.35	30.40	24.70	35.30
10 April 1995	10.25	-	-	5.20	18.60	28.05	20.70	30.95	25.15	35.95
8 April 1996	10.55	-	-	5.20	19.15	28.90	21.30	31.90	25.90	37.05
7 April 1997	-	10.80	15.75	-	19.65	29.65	21.85	32.75	26.55	38.00
6 April 1998	-	11.05	15.75 ⁽⁴⁾	-	20.10	30.35	22.35	33.55	27.20	38.90
12 April 1999	-	13.90	15.75	-	23.60	35.95	25.90	39.20	30.85	44.65
10 April 2000	-	14.25	15.90	-	26.25	40.00	28.65	43.40	33.85	49.10
9 April 2001 ⁽⁶⁾	-	14.20	15.90	-	39.10	57.30	39.10	57.30	39.10	57.30
8 April 2002	-	14.75	15.90	-	44.20	65.15	44.20	65.15	44.20	65.15
	Bereavement									
8 April 2002	21.55									

Notes: 1. Carer premium introduced in October 1990.

2. Family Premium increased to £8.70 from 7 October 1991.

3. Enhanced Pensioner premium introduced in October 1999.

4. From 7 April 1997 Lone parents receive one premium (Family premium - Lone parent rate) instead of two separate premiums i.e. Family premium & Lone parent premium.

5. Enhanced Disability Premium introduced in April 2001.

6. Alignment of Premiums paid to 'aged 60 or over' (MIG) April 2001.

7. Bereavement Premium introduced in April 2002.

Source: Quarterly Statistical Review, 2002.

Table A4
Descriptive Statistics

Variables	Age Of Youngest Child			Lone Mothers		Sign
	15.75	16	16.25	No Qual	All	
1. Age	44	44	44	36	35	***
	5.959	5.908	6.091	9.407	8.631	
2. Ethnicity						
White	0.932	0.938	0.941	0.930	0.928	
	0.016	0.016	0.015	0.002	0.001	
Black	0.004	0.004	0.004	0.031	0.043	***
	0.004	0.004	0.004	0.001	0.001	
Asian	0.053	0.050	0.038	0.026	0.015	***
	0.014	0.014	0.012	0.001	0.000	
Mixed	0.011	0.008	0.017	0.013	0.014	
	0.007	0.006	0.008	0.001	0.000	
3. Region of Residence						
<i>North</i>						
Tyne & Wear	0.034	0.041	0.046	0.029	0.025	
	0.011	0.013	0.014	0.001	0.000	***
Rest of Northern Region	0.068	0.062	0.054	0.043	0.038	***
	0.016	0.016	0.015	0.001	0.000	
<i>Yorkshire & the Humber</i>						
South Yorkshire	0.019	0.021	0.021	0.026	0.025	
	0.008	0.009	0.009	0.001	0.000	
West Yorkshire	0.030	0.029	0.033	0.038	0.040	**
	0.011	0.011	0.012	0.001	0.000	
Rest of Yorks & Humberside	0.023	0.021	0.017	0.028	0.027	
	0.009	0.009	0.008	0.001	0.000	
<i>East Midlands</i>	0.061	0.058	0.063	0.069	0.067	*
	0.015	0.015	0.016	0.002	0.001	
<i>East Anglia</i>	0.019	0.012	0.008	0.024	0.031	***
	0.008	0.007	0.006	0.001	0.000	
<i>London</i>						
Inner London	0.034	0.033	0.042	0.057	0.056	
	0.011	0.012	0.013	0.001	0.001	
Outer London	0.072	0.075	0.096	0.062	0.068	***
	0.016	0.017	0.019	0.002	0.001	
<i>Rest of South East</i>	0.091	0.116	0.134	0.110	0.158	
	0.018	0.021	0.022	0.002	0.001	
<i>South West</i>	0.049	0.058	0.054	0.047	0.072	
	0.013	0.015	0.015	0.001	0.001	
<i>West Midlands</i>						
West Midlands (Met County)	0.057	0.066	0.042	0.062	0.048	***
	0.014	0.016	0.013	0.002	0.001	
Rest of West Midlands	0.049	0.041	0.046	0.041	0.041	
	0.013	0.013	0.014	0.001	0.000	
<i>North West</i>						
Greater Manchester	0.057	0.054	0.050	0.060	0.052	***
	0.014	0.015	0.014	0.001	0.001	
Merseyside	0.038	0.037	0.025	0.038	0.031	***
	0.012	0.012	0.010	0.001	0.000	
Rest of North West	0.034	0.046	0.046	0.041	0.042	
	0.011	0.013	0.014	0.001	0.001	

Variables	Age Of Youngest Child			Lone Mothers		Sign
	15.75	16	16.25	No Qual	All	
Wales	0.072	0.066	0.054	0.068	0.055	***
	0.016	0.016	0.015	0.002	0.001	
<i>Scotland</i>						
Strathclyde	0.072	0.066	0.054	0.065	0.045	***
	0.016	0.016	0.015	0.002	0.001	
Rest of scotland	0.049	0.037	0.059	0.046	0.048	*
	0.013	0.012	0.015	0.001	0.001	
Northern Ireland	0.072	0.062	0.050	0.047	0.032	***
	0.016	0.016	0.014	0.001	0.000	
4. Labour Force Status						
Employed	0.452	0.452	0.431	0.314	0.503	***
	0.031	0.032	0.032	0.003	0.001	
Unemployed	0.080	0.071	0.109	0.067	0.069	***
	0.017	0.016	0.020	0.002	0.001	
Inactive	0.468	0.477	0.460	0.619	0.429	***
	0.031	0.032	0.032	0.003	0.001	
5. Hours Worked						
Zero	0.593	0.581	0.598	0.721	0.557	***
	0.030	0.032	0.032	0.003	0.001	
Between 0 and 16	0.091	0.066	0.050	0.064	0.080	***
	0.018	0.016	0.014	0.002	0.001	
Greater than 16	0.316	0.353	0.351	0.215	0.362	***
	0.029	0.031	0.031	0.003	0.001	
6. Number of Hours Worked	9.9	11	12	7	12	***
	13.9	15.0	16.0	12.9	16.7	
7. Gross Weekly Pay (£)	118	126	131	114	194	***
	95.7	70.2	84.6	86.0	100.0	
8. Any Benefit Claim	0.989	0.954	0.902	0.948	0.703	***
	0.007	0.013	0.019	0.001	0.001	
9. Benefits						
Income Support	0.424	0.315	0.234	0.504	0.255	***
	0.030	0.030	0.027	0.003	0.001	
Unemployment-Related Benefits	0.008	0.046	0.109	0.017	0.011	***
	0.005	0.013	0.020	0.001	0.000	
Other						
Child Benefit	0.928	0.884	0.799	0.888	0.654	***
	0.016	0.021	0.026	0.002	0.001	
Housing Benefit	0.420	0.415	0.427	0.516	0.253	***
	0.030	0.032	0.032	0.003	0.001	
Council Tax Benefit	0.462	0.448	0.439	0.524	0.261	***
	0.031	0.032	0.032	0.003	0.001	
Tax Credits	0.186	0.154	0.192	0.168	0.145	***
	0.024	0.023	0.026	0.002	0.001	
Observations	263	241	239	25428	159353	

Notes: The Table reports summary statistics on all single mothers and single mothers with no qualifications, observed to be single in the first period when they enter the survey. Tax credits include Working Families' Tax Credits and Family Credits prior to 1999. Summary Statistics for uneducated single mothers irrespective of the period of observation are similar as those pertaining to single mothers observed in the first period they appear in the data. ***, ** and * indicate that single mothers and single mothers with no qualifications are statistically different from one another at 1%, 5% and 10% level of significance respectively. Eligible mothers to the left and ineligible mothers to the right of the age-16 threshold are not statistically different from each other in terms of characteristics. Source: Quarterly Labour Force Surveys, Winter 1994 - Autumn 2002 (excluding Winter 1996 - Winter 1997).

Table A5
Coefficients of Polynomials in Age of Youngest Child

	Income Support (without a disability premium)					Employed				
	+/- 4 years					+/- 4 years				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Age	-0.178 (0.163)	-0.133 (0.164)	-0.141 (0.168)	-0.194 (0.184)	-0.326 (0.233)	-0.013 (0.143)	-0.039 (0.144)	-0.003 (0.148)	-0.175 (0.161)	0.129 (0.204)
Age ²		0.008 (0.005)	0.006 (0.025)	-0.046 (0.081)	-0.250 (0.229)		-0.005 (0.005)	0.017 (0.022)	-0.163** (0.072)	0.284 (0.202)
Age ³			-0.000 (0.004)	-0.019 (0.029)	-0.144 (0.134)			0.003 (0.003)	-0.062** (0.025)	0.211* (0.118)
Age ⁴				-0.002 (0.003)	-0.035 (0.035)				-0.008*** (0.003)	0.064** (0.030)
Age ⁵					-0.003 (0.003)					0.007** (0.003)
Age ¹ *Treat	-0.054*** (0.016)	-0.179*** (0.035)	-0.265*** (0.061)	-0.286*** (0.103)	-0.214 (0.182)	0.028** (0.014)	0.096*** (0.030)	0.098* (0.053)	0.243*** (0.091)	-0.111 (0.160)
Age ² *Treat		0.016** (0.008)	0.087** (0.035)	0.239** (0.105)	0.583** (0.271)		-0.008 (0.007)	-0.059* (0.031)	0.158* (0.092)	-0.147 (0.239)
Age ³ *Treat			-0.012** (0.006)	-0.035 (0.038)	-0.014 (0.165)			0.002 (0.005)	0.052 (0.033)	-0.328** (0.145)
Age ⁴ *Treat				0.008 (0.005)	0.071 (0.045)				0.010** (0.004)	-0.030 (0.039)
Age ⁵ *Treat					-0.000 (0.004)					-0.010** (0.004)
F-test		14.463	8.077	2.448	2.068		5.690	2.239	2.209	2.023
	+/- 3 years					+/- 3 years				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Age	-0.219 (0.199)	-0.197 (0.200)	-0.225 (0.208)	-0.337 (0.244)	-0.259 (0.360)	0.007 (0.166)	0.009 (0.168)	-0.083 (0.175)	0.174 (0.204)	-0.092 (0.302)
Age ²		0.008 (0.009)	-0.010 (0.046)	-0.158 (0.169)	-0.008 (0.529)		0.000 (0.007)	-0.072* (0.039)	0.252* (0.142)	-0.250 (0.444)
Age ³			-0.004 (0.009)	-0.073 (0.077)	0.043 (0.396)			-0.015* (0.008)	0.139** (0.065)	-0.250 (0.332)
Age ⁴				-0.011 (0.012)	0.029 (0.132)				0.024** (0.010)	-0.108 (0.111)
Age ⁵					0.005 (0.016)					-0.016 (0.014)
Age ¹ *Treat	-0.078*** (0.019)	-0.212*** (0.043)	-0.276*** (0.082)	-0.262* (0.156)	-0.399 (0.319)	0.043*** (0.016)	0.094*** (0.036)	0.219*** (0.069)	-0.133 (0.131)	0.045 (0.268)
Age ² *Treat		0.030** (0.013)	0.136** (0.062)	0.467** (0.203)	0.487 (0.590)		-0.019* (0.011)	0.022 (0.052)	-0.104 (0.170)	0.667 (0.495)
Age ³ *Treat			-0.016 (0.013)	-0.049 (0.096)	-0.331 (0.460)			0.022** (0.011)	-0.243*** (0.080)	-0.115 (0.386)
Age ⁴ *Treat				0.028* (0.015)	0.053 (0.160)				-0.005 (0.013)	0.229* (0.134)
Age ⁵ *Treat					-0.014 (0.020)					0.003 (0.017)
F-test		14.183	4.169	4.129	0.361		3.826	3.766	2.899	2.255

	Income Support (without a disability premium)					Employed				
	+/- 2 years					+/- 2 years				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Age	-0.118 (0.319)	-0.119 (0.321)	-0.150 (0.345)	-0.313 (0.453)	-0.566 (0.998)	0.052 (0.253)	0.037 (0.255)	0.100 (0.274)	-0.010 (0.361)	0.031 (0.797)
Age ²		-0.004 (0.021)	-0.034 (0.128)	-0.345 (0.565)	-0.951 (2.257)		-0.006 (0.017)	0.058 (0.102)	-0.150 (0.451)	-0.059 (1.803)
Age ³			-0.009 (0.038)	-0.216 (0.369)	-0.869 (2.375)			0.019 (0.030)	-0.119 (0.294)	-0.020 (1.897)
Age ⁴				-0.046 (0.082)	-0.362 (1.136)				-0.031 (0.065)	0.018 (0.907)
Age ⁵					-0.056 (0.202)					0.009 (0.161)
Age ¹ *Treat	-0.103*** (0.025)	-0.232*** (0.063)	-0.265* (0.142)	-0.281 (0.353)	-0.223 (0.964)	0.055*** (0.020)	0.130*** (0.050)	-0.020 (0.113)	-0.005 (0.281)	0.044 (0.770)
Age ² *Treat		0.077*** (0.028)	0.195 (0.155)	1.036* (0.621)	2.459 (2.350)		-0.027 (0.023)	0.044 (0.123)	0.536 (0.495)	0.069 (1.877)
Age ³ *Treat			-0.021 (0.047)	-0.252 (0.422)	-0.781 (2.546)			-0.065* (0.037)	-0.162 (0.337)	0.283 (2.034)
Age ⁴ *Treat				0.157 (0.096)	1.160 (1.248)				0.090 (0.077)	-0.275 (0.997)
Age ⁵ *Treat					-0.082 (0.227)					0.055 (0.181)
F-test		13.448	3.108	1.286	1.072		5.369	2.873	1.589	0.473
	+/- 1 year					+/- 1 year				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Age	-0.467 (0.579)	-0.610 (0.593)	-0.586 (0.885)	-0.808 (1.108)	-0.176 (0.735)	0.048 (0.484)	0.049 (0.496)	-0.174 (0.744)	0.371 (0.930)	-0.133 (0.616)
Age ²		-0.115 (0.115)	-0.083 (1.228)	-0.701 (2.331)	0.750 (0.767)		0.007 (0.097)	-0.411 (1.034)	1.077 (1.958)	-0.222 (0.644)
Age ³			0.016 (0.655)	-0.691 (2.553)	0.174 (0.303)			-0.224 (0.551)	1.475 (2.144)	0.268 (0.255)
Age ⁴				-0.283 (1.053)	-0.933 (1.440)				0.679 (0.885)	0.545 (1.209)
Age ⁵					-0.613 (0.899)					0.215 (0.755)
Age ¹ *Treat	-0.185*** (0.044)	-0.169 (0.160)	-0.485 (0.707)	-0.276 (0.721)	-0.871 (0.679)	0.096*** (0.037)	0.014 (0.134)	0.149 (0.596)	-0.202 (0.606)	0.250 (0.570)
Age ² *Treat		0.247* (0.134)	1.074 (1.281)	1.760 (3.871)	0.000 (0.000)		0.071 (0.113)	0.768 (1.078)	-1.730 (3.251)	0.000 (0.000)
Age ³ *Treat			-0.597 (0.701)	0.000 (0.000)	0.000 (0.000)			0.035 (0.590)	0.000 (0.000)	0.000 (0.000)
Age ⁴ *Treat				0.338 (2.307)	0.000 (0.000)				-1.513 (1.938)	0.000 (0.000)
Age ⁵ *Treat					1.008 (1.945)					-0.766 (1.633)
F-test		7.034	4.535	0.000	0.000		0.673	0.458	0.397	0.000

Notes: The Table displays the coefficients of the age and age*Treat variables in five different specifications with varied age windows for Income Support and Employment outcomes. Columns (1) to (5) refer to polynomials of degree 1 to 5 respectively. ***, **, * denote significance at 1%, 5% and 10% respectively. Source: Quarterly Labour Force Surveys, Winter 1994 - Autumn 2002 (excluding Winter 1996 - Winter 1997).

**This working paper has been produced by
the Department of Economics at
Queen Mary, University of London**

**Copyright © 2009 Zeenat Soobedar
All rights reserved**

**Department of Economics
Queen Mary, University of London
Mile End Road
London E1 4NS
Tel: +44 (0)20 7882 5096
Fax: +44 (0)20 8983 3580
Web: www.econ.qmul.ac.uk/papers/wp.htm**