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**Working Paper**

# Are lone mothers responsive to policy changes? The effects of a Norwegian workfare reform on earnings, education and poverty

ISER Working Paper Series, No. 2008-15

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*Suggested Citation:* Pronzato, Chiara; Mogstad, Magne (2008) : Are lone mothers responsive to policy changes? The effects of a Norwegian workfare reform on earnings, education and poverty, ISER Working Paper Series, No. 2008-15, University of Essex, Institute for Social and Economic Research (ISER), Colchester

This Version is available at:
https://hdl.handle.net/10419/92214

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ISER Working Paper Series

# Are Lone Mothers Responsive to Policy Changes?

## The Effects of a Norwegian Workfare Reform on Earnings, Education and Poverty

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No. 2008-15
April 2008

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**Summary**

The generous Nordic model of welfare is commonly viewed as an exceptional success, in terms of both equality and economic growth. However, it recently became evident that subgroups of the population with weak labour market attachment and high welfare dependency, such as lone mothers, were vastly overrepresented among the poor.

This prompted a workfare reform of the Norwegian welfare system for lone mothers. First, work and educational requirements were imposed, though only for lone mothers whose youngest child was at least three years old. Second, the upper age limit for the youngest child receiving benefit was reduced and time limits on welfare participation were introduced. Third, the maximum benefit amount was increased by 19 per cent. To evaluate the reform we introduce an estimator that accounts for the fact that policy changes are typically phased in gradually rather than coming into full effect immediately. In the case of transitional benefit reform, in fact, phase-in provisions were introduced so that lone mothers who had applied for and were entitled to benefits before 1998 could continue to receive them under the pre-reform rules for up to three years. The existence of such a phase-in period is not a feature specific to the policy evaluation carried out in this paper; indeed, a gradual phase-in of policy changes appears to be the rule rather than the exception in many OECD countries.

The results were striking: the workfare reform has not only led to increased earnings and educational attainment – in the process lowering welfare caseloads and therefore easing the government's financial burden – but also reduced poverty.

# Are Lone Mothers Responsive to Policy Changes?
# The Effects of a Norwegian Workfare Reform on Earnings, Education and Poverty

Magne Mogstad and Chiara Pronzato

**ABSTRACT**

High welfare dependency and poverty rate among lone mothers prompted a workfare reform of the Norwegian welfare system for lone parents: activity requirements were brought in, time limits imposed and benefit levels raised. To evaluate the reform we introduce an estimator that, unlike the much used difference-in-difference approach, accounts for the fact that policy changes are typically phased in gradually rather than coming into full effect immediately. We find that the reform has not only led to increased earnings and educational attainment – in the process lowering welfare caseloads and therefore easing the government's financial burden – but also reduced poverty.

**JEL classification:** C23, I32, I38, J00

**Keywords:** Welfare, lone mothers, workfare reform, difference-in-difference, activity requirements, time limits, earnings, education, poverty

**Acknowledgement:**
The Norwegian Research Council has provided financial support for this project. We are grateful for comments from Rolf Aaberge, Tony Atkinson, Andrea Brandolini, Ugo Colombino, John Ermisch, Terje Skjerpen, and Mark Taylor, as well as participants at the Conference on Economic Analysis and Policy Evaluation using Panel Data, the EEA conference, the Spring Meeting of Young Economists and research seminars at the London School of Economics, the Frisch Centre, ISER, the University of Gothenburg, the University of Oslo, Statistics Norway and the University of Stavanger.

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## 1. Introduction

A stylised fact of the Nordic countries is their relatively high employment rates among women in comparison with other OECD-countries. Although this holds true for married (and cohabiting) mothers, it is not the case for lone mothers.[1] Discrepancies in the relative labour market participation of married and lone mothers across countries may simply reflect compositional differences across the two groups. However, it seems likely that differences in the design and generosity of welfare schemes tailored to lone mothers will also provide an explanation.

When it comes to lone-parent benefits, Norway stands out even among the Nordic countries, being the only one with a generous welfare scheme directed exclusively at lone mothers: namely, transitional benefit. There used to be no work requirement for receipt of transitional benefit. Furthermore, transitional benefit carried with it strong work disincentives, since benefit declined rapidly as earnings increased. Note also that the terminology 'transitional benefit' was highly misleading, as lone mothers were free to choose to participate in the scheme for up to ten years. The poor work incentives inherent in transitional benefit may help explain why the employment rate of lone mothers in Norway in the mid-1990s was nearly 10 percentage points lower than that of its neighbours Sweden and Denmark.

In 1998 a major workfare reform of transitional benefit was undertaken. The aim was to improve the labour market attachment and educational attainment of lone mothers, and in this way increase their ability to be self-sufficient and escape poverty. A number of new conditions for welfare eligibility were introduced. To begin with, the upper age limit of the youngest child was reduced and time limits on participation were imposed. In addition, transitional benefit was for the first time linked to activity requirements, including employment and education; these requirements were enforced by withdrawing benefit for non-compliance. The maximum benefit level was also increased.

This paper examines various socio-economic effects of the transitional benefit reform on lone mothers in order to build up a fairly comprehensive picture of the impact of these policy changes. To this end, we make use of a unique household panel data set based on

[1] Throughout this paper, we have included mothers who are cohabiting in the 'married' category.
In Norway, the employment rate of lone mothers is significantly lower than that of married mothers. By contrast, in many OECD countries lone mothers are more likely to work than married mothers. Norway also stands out as a country where it traditionally has not paid to work for lone mothers, due to generous benefits and high effective tax rates. See Bradshaw et al. (1996) for cross-country descriptive statistics of lone mothers' employment and Kjelstad and Rønsen (2004) for an in-depth discussion of the labour market attachment of Norwegian lone mothers.

administrative registers covering the entire resident population of Norway in the period 1993–2001. First, we study the impact of reform on the earnings of lone mothers. However, evaluation of welfare reform can seldom be restricted to an analysis of responses to changes in work incentives; other considerations also come into play. Indeed, the impact on the living standards of those treated by the reform is of primary concern to policymakers. Unlike most past programme evaluations, we examine the effects of the reform on poverty among lone mothers (Hotz et al., 2002). In addition, we consider the impact of the policy changes on human capital investment by estimating the reform effects on the participation rates of lone mothers in education. The effects of welfare programmes on education are rarely studied in programme evaluations (Moffitt, 2001). Our policy evaluation also includes an assessment of the reform effects on welfare caseloads and government expenditure. As most of what we know about the impact of welfare reform comes from programme evaluations carried out in the US and the UK, evidence drawn from the responses of lone mothers to policy changes within the institutional context of a generous welfare state should be of particular interest.[2]

Programme evaluations frequently rely on a difference-in-difference (DD) approach, which compares the average outcome of interest before and after the reform for the treated with the before and after picture for a comparison group assumed to be unaffected by the reform. A problem ignored in the DD approach is that welfare reforms are seldom retroactive, so temporary provisions are often introduced during the phase-in period, from when the reform was first enacted to when it has been fully implemented. During this phase-in period, welfare recipients – or a subgroup of welfare recipients – may continue to receive benefits according to pre-reform rules, which blurs the before and after distinction that forms the basis of the DD approach.

In the case of transitional benefit reform, phase-in provisions were introduced so that lone mothers who had applied for and were entitled to benefits before 1998 could continue to receive them under the pre-reform rules for up to three years. The existence of such a phase-in period is not a feature specific to the policy evaluation carried out in this paper; indeed, a gradual phase-in of policy changes appears to be the rule rather than the exception in many

[2] Lone-parent benefits in the US underwent a major reform in 1996, when time limits and work requirements were imposed, the funding for childcare increased and, in many states, the benefit reduction rates lowered. Moffitt (2007) summarizes the evidence on this much studied reform, which appears to have increased employment as well as reduced poverty rates, programme caseloads and government expenditure. In addition, there are several programme evaluations of in-work benefit reforms, including Eissa and Liebman (1996) and Meyer and Rosenbaum (2001) of the Earned Income Tax Credit reform in the US, as well as Brewer and Gregg (2001), Blundell et al. (2005) and Francesconi and Klaauw (2007) of the UK counterpart, the Working Families' Tax Credit reform. The main finding is that these in-work benefit reforms have a significant and empirically large and positive effect on employment.

OECD countries.[3] While most past programme evaluations employing the DD approach have simply ignored the potentially confounding effects of a gradual phase-in of reforms, Blundell et al. (2005) decided to discount observations from a six-month phase-in period in their evaluation of the Working Families' Tax Credit reform in the UK. However, relying on observations once the reform has been fully implemented can make it more likely that reform effects will be confused with other factors. In our case, this problem might be particularly acute given that the phase-in period is as long as three years. But perhaps more importantly, if we were to discount observations from the phase-in period, we would be able to use the DD approach to evaluate reform effects on only a very selective subgroup of women who had been lone mothers for at least five years and whose youngest child was between four and eight years of age. If there is heterogeneity in the responses to the reform among lone mothers, focusing exclusively on this particular subgroup may result in a misleading picture of the impact of policy changes.

As an alternative, we propose to identify reform effects by comparing pre-reform and post-reform differences in the average growth rate of the outcome of interest between married mothers who stay married (stayers) and those who split up and become lone mothers (splitters). The reform effects are therefore given as the difference between pre-reform and post-reform DD estimators of the effects of becoming a lone mother on the outcomes. By sampling from the flow of new lone mothers, who will not be entitled to the phase-in provisions if they split up in the post-reform period, the proposed evaluation approach circumvents the problem of the phase-in period. The availability of comprehensive administrative data sources allows us to pay close attention to the issue of selection bias.

Section 2 describes the welfare system for lone mothers, emphasising on the transitional benefit reform. Section 3 outlines the proposed evaluation approach. Section 4 addresses questions of definition and presents the data. Section 5 assesses the responses of lone mothers to the reform. Section 6 concludes with a discussion of policy implications

[3] For instance, many OECD countries have enacted legislation that gradually will phase out some of the existing openings for early retirement (see Gruber and Wise, 1998). Another example is the Temporary Assistance to Needy Families reform in the US (see Moffitt, 2007). Under the new federal law, recipients have to work after two years on assistance and states are allowed to impose work requirements earlier if they wish. Recognizing, however, that many states lacked the administrative capacity to impose work requirements on everyone immediately, a phase-in period was devised.

## 2. The welfare system for lone mothers

Below, we describe the welfare system for lone mothers, comment on the theoretical effects of the policy changes over the period of study on work incentives and provide some basic facts on welfare participation rates among lone mothers.

### *2.1 Policy changes*

Historically, the transitional benefit scheme has been a generous out-of-work welfare programme targeted exclusively at lone mothers. A workfare reform of transitional benefit was undertaken on 1 January 1998. There were four changes. First, work and educational requirements were imposed, though only for lone mothers whose youngest child was at least three years old. Second, the upper age limit for the youngest child receiving benefit was reduced and time limits on welfare participation were introduced. Third, the maximum benefit amount was increased by 19 per cent. Fourth, lone mothers with children less than three years of age became eligible for a supplement to the general family allowance if they received maximum transitional benefit. Table 1 provides more details on the transitional benefit scheme and the changes made in the 1998 reform.

Another key feature of the transitional benefit reform is that phase-in provisions were introduced so that a subgroup of lone mothers who were entitled to and had applied for benefits by 1 January 1998 could continue to receive transitional benefit under the pre-reform rules. The phase-in provisions were gradually phased out and from 1 January 2001 benefits were paid exclusively according to the post-reform rules.

In August 1998 the cash-for-care reform was introduced, which is a cash transfer to married and lone mothers with children aged one or two who did not make or only partly made use of government-subsidized day-care centres. From August to December 1998 the scheme included only one-year-old children, but it was subsequently extended to cover two-year-olds as well. In 1998 the maximum monthly benefit rate was about €360 per child. The benefits are reduced according to the number of hours the child spends in a government-subsidized day-care centre.

**Table 1. Key features of the transitional benefit reform (€ – 1998)**

| Characteristic | Before the reform | After the reform |
|---|---|---|
| Maximum benefit level | € 695 per month | € 855 per month |
| Benefit reduction rate | 40 per cent of earnings exceeding a threshold of € 215 per month | 40 per cent of earnings exceeding a threshold of € 230 per month |
| Activity requirements | None | If youngest child is at least 3 years old, the lone parent has to work half time or participate in education/labour market training/active job search |
| Time limit | None | Maximum 3 years of welfare receipt |
| Age limit | Youngest child less than 9–10 years old (4th grade of primary school) | Youngest child less than 8 years old |
| Family allowance supplement | None | € 72 per month to lone parents receiving maximum transitional benefit whose youngest child is less than 3 years of age |
| Means-testing of benefits depending on assets | None | None |

### *2.2 Work incentives and welfare participation rates*

Figures 1 and 2 give a static perspective of the work incentives stemming from the tax-benefit system before and after the welfare reform in 1998. They show how disposable income on the vertical axis varies with working hours per week on the horizontal axis; the earnings and welfare components (after tax) are above the 0 line, while the taxes and childcare costs are below. For brevity and with minimal loss of generality, we present only the work incentives for a lone mother with one child who has an hourly wage equal to 75 per cent of the average wage in the labour force.[4]

[4] The figures are based on an exact representation of the Norwegian tax-benefit system. Childcare expenses are assumed to increase linearly with working hours. Social assistance and housing benefits, which in Norway are granted at the discretion of social security office staff supplementary to other social policies as last resorts of assistance, are excluded from the incentive structures. The reason is that there are no clear-cut rules for eligibility. Figures 1 and 2 may thus overestimate the work incentives. In Figure 1, the upper limit of the age of the youngest child is set equal to six rather than nine years of age, to reflect the differences in childcare costs for pre-school and school children.

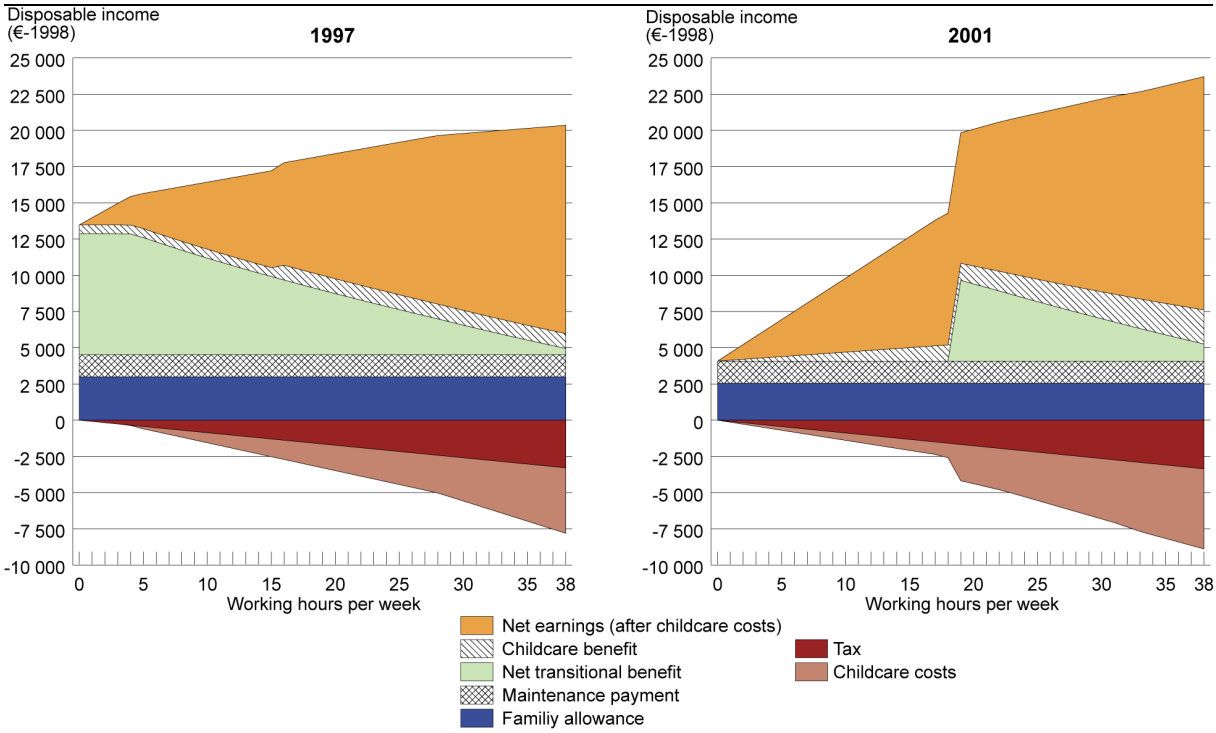
Figure 1 illustrates that making lone mothers with a child at least three years old work at least half time before receiving transitional benefit implies that those working less have incentives to increase labour supply. A counteracting effect on the average labour supply is the increase in the maximum benefit level, which unambiguously discourages labour supply among those working half time or more before the reform, provided that leisure is a normal good.[5] Altogether, the reform subsidizes part-time work; the average change in labour supply will depend on the size of the different responses, as well as the relative numbers of lone mothers at different points along the budget constraint.

As is clear from Figure 2, the static effect of the policy changes on the labour supply of a lone mother with a child under three years of age is unambiguously negative, provided that leisure is a normal good. There are three reasons for this. First, lone mothers with small children are affected by the increase in the maximum benefit level but are not faced with work requirements. The increase in the benefit levels is expected to reduce labour supply. Second, introducing the supplement to the family allowance should reduce labour market participation among lone mothers with small children, since the substitution effect and the income effect work in the same direction. Third, the introduction of the cash-for-care scheme should decrease labour supply among lone and married mothers with small children. The cash-for-care reform makes use of day-care centres more expensive in comparison with staying at home to look after the children and thus diminishes work incentives. In addition to this negative substitution effect, there is also a negative income effect.[6]

[5] Using structural approaches, Ermisch and Wright (1991) and Meyer and Rosenbaum (2001) find that changes in the benefit levels have significant but rather small effects on employment of lone mothers.

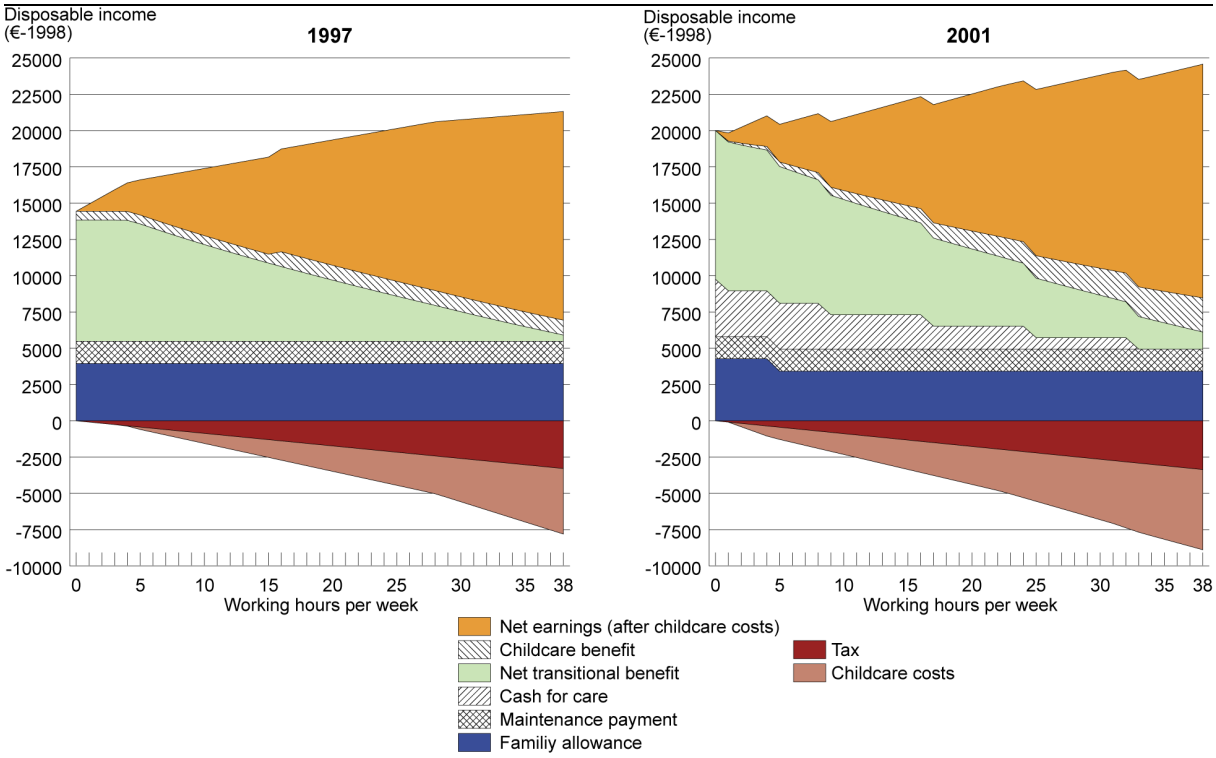
[6] Schøne (2003) and Naz (2004) find that the reform reduced employment among married and cohabiting mothers, in particular among those with higher education.

**Figure 1. Work incentives before and after the reform for a lone mother with one child 3–6 years of age**




Note: Hourly wage rate is set equal to 75 per cent of the average wage rate in the labour force

**Figure 2. Work incentives before and after the reform for a lone mother with one child 1–3 years of age**




Note: Hourly wage rate is set equal to 75 per cent of the average wage rate in the labour force

Figures 1 and 2 do not capture the introduction of welfare time limits and the reduction of the upper age limit for the youngest child to the welfare eligibility criteria. The long-term static effect of these measures is to eliminate welfare completely for certain lone mothers, which should increase labour supply for the same reasons that welfare decreases labour supply in the first place. In addition, there are some dynamic effects that unambiguously go in the same direction. First, one may expect lone mothers on welfare to anticipate the date when benefit will run out and begin to intensify their job search or even to accept job offers at an increasing rate when approaching this date.[7] This implies that the time limits and the upper age limits do not have to be binding to affect the labour supply of welfare recipients. An explanation is that if there is uncertainty in terms of job opportunities or randomness in wage offers, one may want to accept an offer that is, in the short run, less attractive than staying on welfare even if it arrives in advance of the date when benefit will run out. Furthermore, reduced time limits should provide incentives for recipients who might need welfare in the future to delay the use of welfare benefits, or to leave welfare as rapidly as possible, in order to preserve future eligibility.[8]

In contrast to human capital programmes inherent in many welfare schemes in the US, which are aimed at getting recipients into a job as soon as possible and thereby focusing on narrow job preparation skills and job search assistance (see Blank, 2002), the intention of the transitional benefit reform was primarily to stimulate long-term training.[9] In fact, lone mothers who are not working because they are taking part in human capital programmes can apply for two more years of transitional benefit. The possibility of receiving an extra two years of benefit if participating in a human capital programme should increase the transition rates to education.

The welfare participation rates and the benefit amounts presented in Table 2 clearly mirror the fact that reform was gradually phased in. Table 2 also reflects the fact that the work incentives stemming from the welfare reform are much stronger for lone mothers with the youngest child at least three years of age than for lone mothers with small children. While the participation rates for lone mothers with older children declined gradually after the reform in 1998, with a

[7] Moffitt (1985) and Røed and Zhang (2005) find this behaviour for unemployment insurance recipients approaching the time their benefits will run out.

[8] Grogger (2002), Grogger and Michalopoulos (2003) and Swann (2005) find that the introduction of time limits reduces welfare receipt substantially and that a significant part of this reduction occurs because recipients are forward-looking.

[9] The empirical evidence on how to design human capital programmes is mixed. In a review of the literature, Barnow and Gubits (2002) argue that, long-term, more intensive human capital programmes appear to have a considerably greater effect than short-term programmes intended to help welfare recipients into jobs quickly. However, Bloom and Michalopoulos (2001) present a survey of studies based on experimental evidence suggesting that the most effective human capital programmes used a mix of short-term education and training while maintaining the strong focus on the goal of immediate employment.

substantial drop in 2001 when the reform was fully implemented, this was less the case for lone mothers with small children. As expected, the average monthly transitional benefit amount of lone mothers with small children increased after the reform. In comparison, the average benefit amount for lone mothers with older children declined in 2001; this conforms to intuition, as they were faced with work requirements and benefits are reduced when earnings increase.[10]

**Table 2. Participation rates and average benefit amount for the transitional benefit scheme, 1993–2001**

| | Lone mothers with the youngest child 3–9 years old | | Lone mothers with the youngest child 1–3 years old | |
|---|---|---|---|---|
| Year | Welfare participation rate (%) | Average monthly benefit amount per recipient (€ – 1998) | Welfare participation rate (%) | Average monthly benefit amount per recipient (€ – 1998) |
| 1993 | 66 | 477 | 63 | 561 |
| 1994 | 65 | 469 | 66 | 563 |
| 1995 | 65 | 460 | 67 | 565 |
| 1996 | 65 | 465 | 66 | 578 |
| 1997 | 65 | 470 | 68 | 594 |
| 1998 | 66 | 524 | 70 | 691 |
| 1999 | 64 | 496 | 70 | 709 |
| 2000 | 61 | 492 | 69 | 721 |
| 2001 | 36 | 449 | 63 | 734 |

## 3. Evaluation approach

Access to a panel data set that is exceptionally rich allows us to exploit the fact that an outcome measured for a lone mother in the pre-reform period can be a good proxy for her counterfactual outcome after the reform. Moreover, it provides us with the opportunity to carefully select a comparison group that minimizes the risk of confounding the policy changes with time-specific factors that coincide. So, at first sight, it appears to provide strong reasons for evaluating the transitional benefit reform by employing the much used DD estimator,

[10] The results of Table 2 suggest that the phase-in period provides limited information about the incentive effects of the transitional benefit reform. Thus the programme evaluation by Kjelstad and Rønsen (2004) based on data for lone mothers only until the end of 1998 is likely to have seriously underestimated the reform effects, which may have led them to conclude that the reform had a minor impact on employment. In addition, Kjelstad and Rønsen ignore the issue of selection bias. To our knowledge, Kjeldstad and Rønsen (2004) is the only published evaluation of the transitional benefit reform.

which assumes that the reform effects can be identified by comparing the difference in the average outcome before and after the reform for the treated and a comparison group.

Although the transitional benefit reform was undertaken on 1 January 1998, it was three years before the policy changes were fully implemented. In this phase-in period, lone mothers who were entitled to and had applied for transitional benefit before the reform could continue to receive benefits according to the pre-reform rules. As suggested by Table 2, the phase-in period provides limited information about the incentive effects of the reform. To capture the reform effects with a DD estimator, it would be necessary to discount the observations from 1998, 1999 and 2000. However, if we were to identify the reform effect by comparing lone mothers' outcomes in 1997 with their outcomes in 2001, the risk of confounding the reform effects with other factors is likely to increase. But perhaps more importantly, we would be able to evaluate the reform effects on only a subgroup of women who in 2001 had been lone mothers for (at least) the last five years and whose youngest child was between four and eight years of age. If there is heterogeneity in the responses to the reform across lone mothers, focusing exclusively on this particular subgroup may result in a misleading picture of the impact of the policy changes. As an alternative, we introduce an estimator that accounts for the fact that policy changes are typically phased in gradually rather than coming into full effect immediately.

To define the estimator proposed in this paper, it is necessary to introduce some notation. For simplicity we have suppressed the individual subscript. Consider a population of married and lone mothers over the years $t$ = 1993, 1994…2001 and let:

$L_t$ be a binary assignment indicator equal to 1 if the mother is married in year $t–1$ and splits up and becomes a lone mother (a splitter) in year $t$, and 0 if she stays married (a stayer);

$R_t$ be a binary assignment indicator equal to 1 if a lone mother is treated by post-reform rules in year $t$ and $t$+1, and 0 if she is treated by pre-reform rules;

$s$ denote pre-reform years, $s$ = 1993, 1994, 1995, 1996, 1997;

$v$ denote post-reform years, $v$ = 1998, 1999, 2000, 2001;

$Y_s$ be the outcome of a mother in $s$;

$Y_v$ be the outcome of a mother in $v$;

$X$ be a set of time-varying observed characteristics;

$E$ is the expectation operator

The true reform effect on a given lone mother is defined as the difference between her actual and her counterfactual outcome in a post-reform year, given by $(Y_{v+1} \mid \mathrm{L_v} = 1, R_v = 1) - (Y_{v+1} \mid \mathrm{L_v} = 1, R_v = 0)$ for $v$ = 1998, 1999, 2000. The reasons for considering the year immediately after the married mother splits up and becomes a lone mother, and not the year of change itself, are that we have annual data only on the outcomes and that we want to allow the splitters some time to readjust to their new situation. The fundamental evaluation problem arises because we do not observe the counterfactual outcome $(Y_{v+1} \mid \mathrm{L_v} = 1, R_v = 0)$. In order to estimate the average effect of the reform on lone mothers $E(Y_{v+1} \mid L_v = 1, R_v = 1) - E(Y_{v+1} \mid L_v = 1, R_v = 0)$, it is therefore necessary to construct an estimate of the expectation of the counterfactual outcome $E(Y_{v+1} \mid L_v = 1, R_v = 0)$, which captures the hypothetical situation where women becoming lone mothers in the post-reform period were treated by pre-reform rules.

This paper evaluates the reform by comparing pre-reform and post-reform DD estimators of the effects of becoming a lone mother on the outcomes of interest. The DD estimator $\zeta^1$ of the effect of becoming a lone mother in the post-reform period is defined as

(1) $$\zeta^1 = E(Y_{v+1} - Y_{v-1} \mid X, L_v = 1, R_v = 1) - E(Y_{v+1} - Y_{v-1} \mid X, L_v = 0, R_v = 1),\ v = 1998, 1999, 2000,$$

which gives the difference in the expected growth rate of the outcomes of the splitters and the stayers in the post-reform period under post-reform rules. Similarly, the DD estimator $\zeta^0$ of the effect of becoming a lone mother in the pre-reform period is defined as

(2) $$\zeta^0 = E(Y_{s+1} - V_{s-1} \mid X, L_s = 1, R_s = 0) - E(Y_{s+1} - V_{s-1} \mid X, L_s = 0, R_s = 0),\ s = 1994, 1995, 1996,,$$

which gives the difference in the expected growth rate of the outcomes of the splitters and the stayers under pre-reform rules. The estimator of the reform effects proposed in this paper is defined as $\Delta = \zeta^1 - \zeta^0$. In the terminology of programme evaluation, $\Delta$ gives the treatment effect on the treated since it focuses on the expected difference between the actual and counterfactual outcome of lone mothers treated by the welfare reform.

The identifying assumption is that the effects of becoming a lone mother before and after the reform would have been equal in the absence of the reform. This requires the same pre-reform and post-reform differences between the splitters and the stayers in the average growth rate in

the outcome of interest if it were not for the reform. Formally, the identifying assumption is that

$$(3)\qquad \begin{aligned} &E(Y_{v+1}-Y_{v-1}\mid X, L_v=1, R_v=0)-E(Y_{v+1}-Y_{v-1}\mid X, L_v=0, R_v=0)= \\ &E(Y_{s+1}-Y_{s-1}\mid X, L_s=1, R_s=0)-E(Y_{s+1}-Y_{s-1}\mid X, L_s=0, R_s=0) \end{aligned}$$

for $v$ = 1998, 1999, 2000 and $s$ = 1994, 1995, 1996. If this assumption is satisfied, we obtain consistent estimates for the effects of the policy changes that are unaffected by the existence of the phase-in period.

At first glance, our estimator $\Delta$ resembles the difference-in-difference-in-difference (DDD) estimator; indeed, both are based on the difference between two DD estimators. However, the DDD estimator takes the difference between a DD estimator that compares pre-reform and post-reform outcomes and a pre-reform DD estimator; the purpose is to adjust for differential trends of the treated and the comparison group. In contrast, our evaluation approach takes the difference between a pre-reform and a post-reform DD estimator in order to circumvent the issue of the phase-in period. Unlike the standard DDD estimator, our evaluation approach will therefore – by definition – never use observations about the same lone mothers before and after the reform.[11]

The econometric counterpart of the DD estimators of becoming a lone mother before and after the reform, defined by equations (2) and (1), is a panel data model with fixed individual-specific effects. In order to account for time-specific change coinciding with the reform, such as economic fluctuations, we include time-specific effects. To account for differences in local labour market conditions, we use data on local unemployment rates.[12] For the continuous dependent variable, the panel data model can be expressed as

$$(4)\qquad Y_{t+1}-Y_{t-1}=\beta(X_{t+1}-X_{t-1})+\zeta^{j}L_t+\theta_{t+1}-\theta_{t-1}+\varepsilon_{t+1}-\varepsilon_{t-1},\ j=0,\ 1,$$

[11] To see the distinction, consider a population of women that comprises either lone mothers or married mothers before and after the reform. Define a binary assignment indicator $D$ that is equal to 1 if the woman is a lone mother and 0 if she is a married mother. Let $r$ be the point in time in which the reform occurs. A DDD estimator of the reform on outcome $Y$ can then be defined as

$$[E(Y_{r+1}-Y_{r-1}\mid X, D=1)-E(Y_{r+1}-Y_{r-1}\mid X, D=0)]-[E(Y_{r-1}-Y_{r-2}\mid X, D=1)-E(Y_{r-1}-Y_{r-2}\mid X, D=0)]$$

where $X$ is a set of time-varying characteristics. Unless the temporary provisions are fully phased out before period $r+1$, the DDD estimator will not capture the reform effects. See, for example, Francesconi and Klaauw (2007) for a discussion and an application of the DDD estimator to programme evaluation.

[12] Heckman et al. (1998) demonstrate the importance in policy evaluations of controlling for variation in the local labour market conditions of those treated by the reform and the comparison group.

where $t$ = 1994, 1995, 1996 for $j$ = 0 and $t$ = 1998, 1999, 2000 for $j$ = 1, $\beta$ is the effect of local unemployment rates $X_t$, $\theta_t$ is the fixed time-specific effect and $\varepsilon_t$ is the error term assumed to be white noise.[13] The model is estimated on a sample of married mothers in year $t–1$ who may or may not split up and become lone mothers in year $t$. To take into account the fact that the reform is likely to affect lone mothers differently according to the age of their youngest child, we estimate the model separately for mothers with the youngest child between one and three years of age and mothers with the youngest child between three and nine years of age. For simplicity of interpretation, we employ a linear probability model (adjusting for heteroskedasticity in the standard errors) to the case of the dichotomous outcomes; Chamberlain fixed-effects logit models produce similar marginal effects estimates.

## 4. Data and definitions

The empirical analysis is based on a administrative registers covering the entire resident population of Norway in the period 1993–2001. The register panel data set with household and demographic information is merged with detailed income data from the Tax Assessment Files through unique individual identifiers. The income data are collected from tax records and other administrative registers rather than interviews and self-assessment methods. The coverage and reliability of Norwegian register data are considered to be exceptional, as is documented by the fact that the quality of such national data sets received the highest rating in a data quality survey in the Luxembourg Income Study database (Atkinson et al., 1995).[14]

The population of study comprises married, cohabiting and lone mothers who in each year were at least 18 years old and not more than 55. The self-employed, as well as individuals receiving permanent disability benefits, are excluded. Students are also omitted from the population, with the exception of when we evaluate the reform effects on education.[15]

This paper focuses exclusively on the effects of the reform on lone mothers. There are two reasons for this. First, as many as nine lone parents in ten are women. Thus the policy discussion concerning the consequences of the disincentives inherent in the design of lone-parent benefits prior to 1998 primarily relates to lone mothers. But more importantly, the

[13] A largely neglected issue with DD regressions is that standard errors may be misstated in the presence of serial correlation within individual units; if the residuals are correlated, and the correlation changes over time, the fixed effects no longer capture the within cluster dependence (Bertrand et al., 2004). However, we sample from the flow of new lone mothers and thus use only two repeated observations of those treated, which reduces the problem of serial correlation.

[14] See Røed and Raaum (2003) for a discussion of administrative registers as a valuable, yet largely unexplored, reservoir for microeconometric research.

[15] Eissa and Liebman (1996) and Francesconi and Klaauw (2007) use similar sample selection criteria in their reform evaluation of lone-parent benefits.

human capital levels and socio-economic status of lone fathers in Norway can be demonstrated to differ substantially from those of lone mothers, presumably because of the stringent selection criteria for lone fathers to actually get daily custody of their children (Kjeldstad and Rønsen, 2004). Thus pooling lone fathers and lone mothers in an evaluation of the welfare reform is likely to add to the extent of heterogeneity in responses to the reform as well as to the problem of selection bias. The scope of this paper is also limited to evaluating the reform effects on lone mothers who were formerly married or cohabiting, which is the great majority of Norwegian lone mothers.

To account for variations in local labour market conditions in the population we make use of data on local unemployment rates for 90 economic regions. Specifically, the economic regions constitute a regional level between country and municipality. The main criteria used for defining the economic regions are labour market, trade and service patterns, as well as commuting and internal migration patterns. Letting economic regions rather than municipalities form the basis for measuring unemployment rates may provide a better predictor of local labour market conditions.

Our dependent variables are defined as follows. Education is defined as a dichotomous variable, which is equal to 1 if the individual is undergoing education and 0 otherwise. To evaluate the effects of the reform on annual gross earnings, we use the consumer price index to make incomes from different periods comparable; throughout this paper the reference year is 1998, and €1 is set equal to NOK 8.4. The fixed time-specific effects account for general earnings growth among married mothers. The reason for focusing on earnings to evaluate the effects of the reform on labour market participation is that we do not have credible data on working hours. Poverty is defined by a dichotomous variable taking the value of 1 if the individual has annual equivalent disposable income below the annual poverty line and 0 otherwise. Disposable income is defined in close agreement with international recommendations (see Expert Group on Household Income Statistics, 2001) and incorporates earnings, self-employed income, capital income, all public cash transfers and taxes.[16] To enable comparison of disposable income between individuals belonging to households of varying size and composition, the OECD equivalence scale is applied; the weight of the first

[16] By contrast, Hotz et al. (2002) and other evaluations of the effects of welfare reforms on disposable income measures based on the frequently used Unemployment Insurance records fail to include sources of non-employment income and income from partners. Another advantage of our data source is that disposable income, as well as gross earnings, is measured in a consistent way for the entire population in the whole period. In comparison, the commonly cited LaLonde (1986) study suffers from using comparison groups with earnings measured in different ways from the treated group. Heckman et al. (1998) demonstrate the potential bias in the estimated effects when faced with such measurement errors, which are likely to occur when multiple non-harmonized data sources form the basis of the empirical analysis.

adult in the household is set to 1, each additional adult gets a weight of 0.7 and each child gets a weight equal to 0.5. We follow common practice and define the annual poverty thresholds as 50 per cent of the median annual equivalent disposable income. The choices of poverty threshold and equivalence scale correspond to what is done in Norwegian official poverty statistics, as well as in the 2002 Poverty White Paper (Ministry of Social Affairs, 2002). To evaluate the robustness of our results, we have also used poverty thresholds determined as 60 and 40 per cent of the median equivalent disposable income.

### *4.1 Descriptive statistics*

This paper identifies the effects of the reform by comparing the differences before and after the reform in the average growth rate of the outcomes of married mothers who stay married and those who split up and become lone mothers. Substantial changes over time in the differences in the characteristics of the splitters and the stayers may call our estimation results into question. This requires an examination of the characteristics of splitters and stayers before and after the reform.

The descriptive statistics presented in Tables 3 and 4 demonstrate that splitters and stayers have, by and large, fairly similar individual characteristics. Specifically, women who stay married are, on average, older with a better education and more labour market experience than women who become lone mothers. However, we are not concerned with differences in the characteristics of splitters and stayers per se, rather with changes in the differences between these groups before and after the reform. Tables 3 and 4 show very small differences over time in the characteristics of stayers and splitters. So, the selection of women becoming lone mothers does not seem to have changed much over time; moreover, the share of women who become lone mothers has been fairly stable over time.[17]

[17] The descriptive statistics conform well with a vast amount of evidence from programme evaluations carried out in the US which show the insignificant effects of reforms on marriage, divorce and fertility (Moffitt, 2007).

**Table 3. Pre-reform and post-reform descriptive statistics of married mothers who stay married and those who become lone mothers whose youngest child is 3–9 years of age**

| | Before the reform | | After the reform | |
|---|---|---|---|---|
| | Married mothers | Lone mothers | Married mothers | Lone mothers |
| Average: | | | | |
| Earnings (€ – 1998) | 16,878 | 15,597 | 20,548 | 19,138 |
| In education % | 6.1 | 12.4 | 7.4 | 13.4 |
| Poverty % | 2.2 | 6.1 | 2.2 | 5.0 |
| | | | | |
| Average: | | | | |
| Age | 36.2 | 33.6 | 36.9 | 34.3 |
| Years of schooling | 12.4 | 12.0 | 12.8 | 12.3 |
| Labour market experience points | 32 | 27 | 38 | 31 |
| Non-western immigrant % | 3.7 | 3.3 | 4.4 | 3.8 |
| Number of children | 2.3 | 2.0 | 2.3 | 2.0 |
| Age of the youngest child | 6.1 | 5.8 | 6.2 | 5.9 |
| Unemployment rate % | 2.1 | 2.1 | 2.1 | 2.1 |
| | | | | |
| Observations | 354,241 | 11,659 | 379,306 | 13,111 |
| Composition % | 46.7 | 1.5 | 50.0 | 1.7 |

Note: Labour market experience points is defined as years of pension points (depending on years in employment) interacted with average number of pension points (depending on level of previous earnings).

**Table 4. Pre-reform and post-reform descriptive statistics of married mothers who stay married and those who become lone mothers whose youngest child is 1–3 years of age**

| | Before the reform | | After the reform | |
|---|---|---|---|---|
| | Married mothers | Lone mothers | Married mothers | Lone mothers |
| Average: | | | | |
| Earnings (€ – 1998) | 14,774 | 9,418 | 16,870 | 10,775 |
| In education % | 5.5 | 16.5 | 7.0 | 22.1 |
| Poverty % | 3.2 | 17.4 | 2.8 | 11.2 |
| | | | | |
| Average: | | | | |
| Age | 31.9 | 27.3 | 32.5 | 28.0 |
| Years of schooling | 12.7 | 11.8 | 13.2 | 12.2 |
| Labour market experience points | 26 | 13 | 28 | 15 |
| Non-western immigrant % | 4.5 | 4.1 | 5.6 | 5.3 |
| Number of children | 2.3 | 1.6 | 2.3 | 1.7 |
| Age of the youngest child | 2.1 | 2.0 | 2.1 | 2.1 |
| Unemployment rate % | 2.1 | 2.2 | 2.1 | 2.2 |
| | | | | |
| Observations | 251,705 | 9,550 | 253,619 | 9,046 |
| Composition % | 48.0 | 1.8 | 48.4 | 1.7 |

Note: Labour market experience points is defined as years of pension points (depending on years in employment) interacted with average number of pension points (depending on level of previous earnings).

Tables 3 and 4 also show the average outcomes of the women who stay married and those who split up and become lone mothers before and after the reform. As expected, the earnings are higher and the poverty rates are lower for stayers than for splitters. On the other hand, the participation rate in education is higher for splitters than for stayers; one explanation is that

lone mothers, unlike married mothers, are eligible for educational benefits to cover tuition fees and study materials. It is also clear that the earnings and the participation rate in education of the splitters have increased over time, while their poverty rates have decreased. The same has happened with the stayers, although the reduction in, for instance, poverty rates has been smaller. The splitters and the stayers have also experienced comparable changes in the outcomes within the pre-reform period. For instance, from the first (1994) to the last (1996) observation of women splitting up in the pre-reform period, earnings increase by 9 per cent when their youngest child is between three and nine years of age and by 7 per cent when the child is younger. Over the same time period, the earnings of the stayers increase by 11 per cent when the youngest child is between three and nine years of age and by 7 per cent when the child is younger.

To obtain consistent estimates of the reform effects on lone mothers whose youngest child is less than three years old, the cash-for-care reform must have the same impact on splitters and stayers with young children. This is admittedly a questionable assumption, but we may take some comfort from Table 5, which shows that the participation rates and the average benefit amount for the cash-for-care scheme do not differ significantly between splitters and stayers. Note also that similar assumptions are often made to achieve identification in frequently cited programme evaluations.[18]

**Table 5. Participation rates and average benefit amounts in the cash-for-care scheme for married mothers who stay married and those who become lone mothers (1998–2001)**

| | Participation rate (%) | Average monthly benefit amount per recipient (€ – 1998) |
|---|---|---|
| Lone mothers | 70.0 | 293 |
| Married mothers | 71.9 | 285 |

## 5. The responses of lone mothers to the welfare reform

This section evaluates the transitional benefit reform. First, we assess the overall reform effects on earnings, education and poverty, before undertaking robustness analysis to examine if our results are affected by compositional changes. Then we account for heterogeneity by age and educational level of the lone mothers in their response to the policy changes to get a

[18] For instance, to identify the effects of time limits on welfare participation Grogger (2002) assumes that all other factors of the reform, as well as any changes in the macro economy, had the same impact on women with the youngest child less than seven years of age as on women with the oldest child at least 13 years old.

more complete picture of the consequences of the reform. Finally, we consider the reform effects on welfare caseloads and government expenditure.

### *5.1 Main reform effects*

Table 6 shows the estimated impact of the welfare reform on earnings, education and poverty of lone mothers whose youngest child is between three and nine years of age. The reform is expected to stimulate the labour market participation of this group as long as the positive effects from the time and the age limits, as well as the work requirements, override the negative effect of the increase in the maximum benefit level. Indeed, Table 6 shows a positive and significant reform effect on earnings, after adjusting for inflation and controlling for overall economic growth among women through the time-specific effects. Specifically, the reform led to a 2.4 per cent increase in the average earnings of lone mothers whose youngest child was between three and nine years of age. Put into perspective, the reform closes the earnings gap between married mothers and lone mothers by 55 per cent. Our results also show that the reform reduced poverty by almost 1 percentage point, but it did not have much of an impact on the participation rate in education.

Table 7 demonstrates that the welfare reform had no effect on average earnings of lone mothers with children between one and three years of age. This suggests that the positive dynamic effects from the anticipation of work requirements, as well as time and age limits, offset the negative effect on work incentives caused by the increase in the maximum benefit level. The reform increased the participation rate in education by as much as 3.6 percentage points, which may have been encouraged by the possibility of receiving an extra two years of benefits if participating in a human capital programme. But more striking, the welfare reform reduced the poverty rate of lone mothers with small children by 5.9 percentage points. It could be argued that the reduction in poverty rates is only because those with income just below more or less arbitrarily drawn poverty lines were the primary gainers. To evaluate the robustness of our results, we have therefore used various poverty thresholds; the findings are qualitatively the same.[19]

[19] When the poverty thresholds are set equal to 60 per cent of the median annual equivalent income, the pre-reform poverty rate of lone mothers with the youngest child between three and nine years old is 14.3 per cent and the reform reduces poverty by 2.6 percentage points; in comparison, the pre-reform poverty rate of lone mothers with small children is 33 per cent and the decline in poverty is 11.0 percentage points. If the poverty thresholds are defined as 40 per cent of the median annual equivalent disposable income, then 2.9 per cent of lone mothers with children between three and nine years old and 11 per cent for lone mothers with small children are poor in the pre-reform period; in this case, the reform reduces poverty by 1.2 percentage points and 4.8 percentage points respectively. All reform effects are significant. The results are available from the authors upon request.

Note also that the insignificant reform effect on earnings for lone mothers with young children does not imply that the reduction in their poverty rate is primarily driven by higher benefit levels. As pointed out in Section 2, lone mothers who worked substantially before the reform will only be affected by the increase in the maximum benefit level, which reduces work incentives. In comparison, lone mothers who work little or not at all – the poor or those at risk of poverty – are also affected by work requirements and time limits, which enhance work incentives. It would thus be consistent with theory that an increase in earnings among poor lone mothers is offset by a decrease in earnings of other lone mothers, which may give an insignificant average reform effect on earnings side by side with a large reduction in poverty.

Tables 6 and 7 also provide information about the socio-economic consequences of becoming a lone mother, which may be interesting in their own right. The results are as expected: poverty increases and earnings fall; the effects on education of becoming a lone mother are mixed.[20]

**Table 6. Reform effects on earnings, education and poverty for lone mothers with the youngest child 3–9 years of age**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| Reform | 400*** | 92 | 0.007 | 0.005 | – 0.009** | 0.004 |
| Becoming a lone mother | – 723*** | 67 | 0.026*** | 0.004 | 0.032*** | 0.003 |
| Observations | 1,411,008 | | 1,130,543 | | 1,411,008 | |
| Lone mothers' average outcome before the reform | 16,701 | | 14.0% | | 5.9% | |
| Reform effect | + 2.4% | | + 0.7 perc. points | | - 0.9 perc. points | |

Notes: *** significant at 1% level, ** significant at 5% level, *significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

[20] There is considerable cross-country evidence suggesting a significant economic penalty from marital disruption, especially for women. See, for example, Burkhauser et al. (1991), Jarvis and Jenkins (1999), Smock et al. (1999) and Aassve et al. (2006).

**Table 7. Reform effects on earnings, education and poverty for lone mothers with the youngest child 1–3 years of age**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Error |
| Reform | – 217 | 134 | 0.036*** | 0.004 | – 0.059*** | 0.003 |
| Becoming a lone mother | – 419*** | 92 | – 0.020*** | 0.003 | 0.110*** | 0.002 |
| Observations | 980,308 | | 739,313 | | 980,308 | |
| Lone mothers' average outcome before the reform | 10,445 | | 16.8% | | 17.2% | |
| Reform effect | – 2.1% | | + 3.6 perc. points | | – 5.9 perc. points | |

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

### *5.2 Robustness analysis: accounting for compositional changes*

Although the descriptive statistics presented in Section 4 suggest minor changes in the characteristics and the number of splitters and stayers before and after the reform, we cannot rule out that compositional changes may affect our estimates of the responses of lone mothers to the reform. To the extent that compositional changes are a product of the reform itself, and therefore may be viewed as reform effects, they may be of little concern. However, if the characteristics of splitters and stayers change over time for other reasons than the reform, we may get biased estimates of the impact of the policy changes: for instance, it may have become more socially acceptable to be a lone mother over time, which may change the characteristics of splitters relative to stayers. To account for changes in the compositional differences between splitters and stayers before and after the reform, we weight the sample and re-estimate our model. The estimation results based on the weighted sample aim to answer the question: What would the reform effects have been if the characteristics of the women becoming lone mothers had been the same after the reform as they were before the reform?

This paper employs a standard survey weighting procedure, which is typically used to adjust for unequal probabilities of sample selection of the units in household surveys. Specifically, we construct a system of weights adjusting the distribution of observable characteristics of splitters and stayers before and after the reform. To this end, it is necessary to decide on a population of reference, which in our case is splitters before the reform. Next, the sample of women is partitioned into 64 subgroups according to their age, education, work experience and immigration status, as well as number of children and age of the youngest child. Within each subgroup of women, sampling weights are constructed. In a given subgroup, the sampling weight of, say, splitters after the reform is defined as the reciprocal of their

population share relative to the share of the splitters before the reform.[21] Tables 8 and 9 show the average characteristics in the weighed sample of married mothers who stay married and those who split up and become lone mothers. As expected, there is no significant change before and after the reform in the differences in the characteristics of the splitters and the stayers.

**Table 8. Pre-reform and post-reform descriptive statistics from the weighted sample of married mothers who stay married and those who become lone mothers whose youngest child is 3–9 years of age**

| | Before the reform | | After the reform | |
|---|---|---|---|---|
| | Married mothers | Lone mothers | Married mothers | Lone mothers |
| Average: | | | | |
| Earnings (€ – 1998) | 16,177 | 15,835 | 18,429 | 18,378 |
| In education % | 6.2 | 12.5 | 7.0 | 13.4 |
| Poverty % | 1.7 | 5.7 | 1.9 | 5.1 |
| | | | | |
| Average: | | | | |
| Age | 34.3 | 33.5 | 34.4 | 33.7 |
| Years of schooling | 12.1 | 12.0 | 12.3 | 12.1 |
| Labour market experience points | 29 | 28 | 30 | 28 |
| Non-western immigrant % | 2.1 | 2.1 | 2.1 | 2.1 |
| Number of children | 2.1 | 2.0 | 2.1 | 2.0 |
| Age of the youngest child | 5.8 | 5.8 | 5.8 | 5.8 |
| Unemployment rate % | 2.1 | 2.1 | 2.1 | 2.1 |
| | | | | |
| Observations | 344,966 | 11,347 | 368,707 | 12,779 |
| Composition % | 46.8 | 1.5 | 50.0 | 1.7 |

Note: Labour market experience points is defined as years of pension points (depending on years in employment) interacted with average number of pension points (depending on level of previous earnings).

[21] As an illustration, consider married and lone mothers with the youngest child between three and nine years of age. This sample is partitioned into 64 subgroups according to the following dummy variables: younger than 36 years, less than 12 years of education, less than 32 labour market experience points, non-western immigrant, two or fewer children and with the youngest child below six years of age. The most typical subgroup consists of mothers who are young, poorly educated, ethnic Norwegians with little work experience, have two or fewer children, where the youngest child is above six years of age. In fact, this subgroup represents 24 per cent of splitters before the reform, but only 19 per cent after the reform. In comparison, it represents 13 per cent of stayers before the reform and 9 per cent after the reform. To adjust for the compositional changes within this subgroup, the system of weights is constructed as follows: the weight of the reference category of splitters before the reform is set to 1, splitters after the reform are given the weight of 24/19, and stayers before and after the reform get weights equal to 24/13 and 24/9 respectively. See Yansaneh (2005) for an in-depth discussion of the weighting procedure.

**Table 9. Pre-reform and post-reform descriptive statistics from the weighted sample of married mothers who stay married and those who become lone mothers whose youngest child is 1–3 years of age**

| | Before the reform | | After the reform | |
|---|---|---|---|---|
| | Married mothers | Lone mothers | Married mothers | Lone mothers |
| Average: | | | | |
| Earnings (€ – 1998) | 13,207 | 11,459 | 14,450 | 12,344 |
| In education % | 4.9 | 13.3 | 5.4 | 17.5 |
| Poverty % | 2.7 | 12.0 | 2.4 | 6.0 |
| | | | | |
| Average: | | | | |
| Age | 30.3 | 29.5 | 30.5 | 29.7 |
| Years of schooling | 12.0 | 11.7 | 12.2 | 11.8 |
| Labour market experience points | 21 | 19 | 21 | 19 |
| Non-western immigrant % | 2.8 | 2.8 | 2.8 | 2.8 |
| Number of children | 2.1 | 2.0 | 2.1 | 2.0 |
| Age of the youngest child | 2.2 | 2.5 | 2.2 | 2.6 |
| Unemployment rate % | 2.2 | 2.2 | 2.2 | 2.2 |
| | | | | |
| Observations | 231,296 | 5,586 | 234,910 | 5,710 |
| Composition % | 48.4 | 1.2 | 49.2 | 1.2 |

Note: Labour market experience points is defined as years of pension points (depending on years in employment) interacted with average number of pension points (depending on level of previous earnings).

Tables 10 and 11 show the estimation results based on the weighted sample. In general, the reform effects are remarkably robust, suggesting that compositional changes over time play a minor role in understanding the impact of the policy changes on lone mothers. When the youngest child of the lone mother is between three and nine years of age, the estimated reform effects based on the weighted sample are slightly larger on education and somewhat smaller on poverty and earnings. Whether the reform effects are estimated based on the weighted sample or not has little or no consequences for lone mothers with small children; if anything, the insignificant reform effect on earnings goes from having a negative to having a positive sign.

**Table 10. Reform effects based on the weighted sample on earnings, education and poverty of lone mothers with the youngest child 3–9 years of age**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| | | | | | | |
| Reform | 343*** | 74 | 0.010** | 0.004 | – 0.004 | 0.003 |
| Becoming a lone mother | – 707*** | 48 | 0.029*** | 0.003 | 0.031*** | 0.002 |
| Observations | 1,301,008 | | 1,091,588 | | 1,301,008 | |
| | | | | | | |
| Lone mothers' average outcome before the reform | 16,965 | | 13.8% | | 5.5% | |
| Reform effect | + 2.0% | | + 1 perc. points | | – 0.4 perc. points | |

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

**Table 11. Reform effects based on the weighted sample on earnings, education and poverty of lone mothers with the youngest child 1–3 years of age**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| Reform | 72 | 118 | 0.034*** | 0.006 | – 0.059*** | 0.005 |
| Becoming a lone mother | – 84 | 72 | 0.055*** | 0.004 | 0.079*** | 0.004 |
| Observations | 865,674 | | 674,562 | | 865,674 | |
| Lone mothers' average outcome before the reform | 12,387 | | 13.8% | | 12.5% | |
| Reform effect | + 0.6% | | + 3.4 perc. points | | – 5.9 perc. points | |

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

### *5.3 Reform effects by age and education of the lone mother*

Estimating the average responses of the population of lone mothers as a whole may conceal important differences in the consequences of the reform across subgroups. Tables 12 and 13 show estimation results where we have accounted explicitly for heterogeneity of different types of lone mothers in the responses to the reform.

**Table 12. Reform effects with weights on earnings, education and poverty of lone mothers with the youngest child 3–9 years old by age and educational level**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| **Young – poorly educated** | | | | | | |
| Reform | 515*** | 123 | 0.009* | 0.005 | – 0.008** | 0.004 |
| Becoming a lone mother | – 1090*** | 87 | 0.021*** | 0.003 | 0.038*** | 0.002 |
| Observations | 461,122 | | 495,320 | | 461,122 | |
| **Older – poorly educated** | | | | | | |
| Reform | 556*** | 187 | 0.007 | 0.006 | – 0.009* | 0.005 |
| Becoming a lone mother | – 859*** | 139 | 0.007 | 0.004 | 0.040*** | 0.004 |
| Observations | 374,126 | | 389,684 | | 374,126 | |
| **Young – highly educated** | | | | | | |
| Reform | 367 | 256 | 0.003 | 0.015 | 0.000 | 0.004 |
| Becoming a lone mother | 16 | 189 | 0.083*** | 0.011 | 0.011*** | 0.003 |
| Observations | 186,348 | | 117,710 | | 186,348 | |
| **Older – highly educated** | | | | | | |
| Reform | – 234 | 304 | 0.000 | 0.023 | 0.001 | 0.004 |
| Becoming a lone mother | 296 | 230 | 0.024 | 0.018 | 0.007** | 0.003 |
| Observations | 279,412 | | 88,874 | | 279,412 | |

Notes: Young is defined as less than or equal to 35 years of age and poorly educated is defined as length of education less than or equal to 12 years (they correspond to the median age and education). *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

It turns out that even when we run the regressions separately by the age and educational level of the lone mothers, we cannot find a significant adverse reform effect on any of the outcomes for any of the subgroups. Furthermore, it is clear that the positive effect of the welfare reform on earnings relates to poorly educated lone mothers with older children. The welfare reform is also demonstrated to have a relatively strong impact on the education of young lone mothers with the youngest child between one and three years of age.

Another interesting result from Tables 12 and 13 is that the earnings of highly educated married mothers increase when they split up and become lone mothers; in comparison, becoming a lone mother leads to a substantial decrease in the earnings of women with poor education. This indicates that education, directly or as a proxy for innate ability, is a key determinant of whether lone mothers are able to offset the loss of income from their spouse by working more, while using day-care facilities to look after their children.

**Table 13. Reform effects with weights on earnings, education and poverty of lone mothers with the youngest child 1–3 years old by age and educational level**

| | Earnings (€ – 1998) | | In education | | Poverty | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| **Young – poorly educated** | | | | | | |
| Reform | 109 | 191 | 0.034*** | 0.006 | – 0.074*** | 0.006 |
| Becoming a lone mother | – 312*** | 127 | 0.051*** | 0.004 | 0.095*** | 0.004 |
| Observations | 289,724 | | 307,430 | | 289,724 | |
| **Older – poorly educated** | | | | | | |
| Reform | – 87 | 348 | 0.018** | 0.008 | – 0.039*** | 0.009 |
| Becoming a lone mother | – 425* | 253 | 0.021*** | 0.006 | 0.055*** | 0.007 |
| Observations | 208,666 | | 215,134 | | 208,666 | |
| **Young – highly educated** | | | | | | |
| Reform | 405 | 416 | 0.046** | 0.019 | – 0.041*** | 0.007 |
| Becoming a lone mother | 1145*** | 310 | 0.113*** | 0.014 | 0.055*** | 0.005 |
| Observations | 157,516 | | 91,496 | | 157,516 | |
| **Older – highly educated** | | | | | | |
| Reform | – 359 | 598 | 0.032 | 0.028 | – 0.025*** | 0.007 |
| Becoming a lone mother | 1412*** | 449 | 0.071*** | 0.021 | 0.030*** | 0.006 |
| Observations | 209,768 | | 60,502 | | 209,768 | |

Notes: Young is defined as less than or equal to 31 years of age and poorly educated is defined as length of education less than or equal to 12 years (they correspond to the median age and education). *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Year dummies and local unemployment rates are included in the model, but coefficients are not reported.

### *5.4 Reform effects on government expenditure*

The substantial rise in welfare expenditure over the last decade has created considerable concern among Norwegian policymakers, especially in view of the ageing population. The impact on government expenditure is therefore an important aspect of the reform.

Table 14 shows the number of new lone mothers in 1997 by their age and education, as well as the age of their youngest child; as expected, most lone mothers were young and poorly educated. The table also describes the welfare participation rates and average monthly benefit amounts per recipient before and after the reform. These figures suggest that the expenditure on welfare benefits to the new lone mothers in 1997 would have been higher after the reform than it was before. However, this static perspective is deceptive because the reform introduced time limits and reduced the upper age limit of the youngest child.

**Table 14. A static perspective of the reform effect on government expenditure on transitional benefit to married mothers who split up and become lone mothers in 1997**

| | | Before the reform 1995–7 | | After the reform 1999–2001 | |
|---|---|---|---|---|---|
| | New lone mothers in 1997 | Welfare participation rate (%) | Average annual benefit amount per recipient (€ –1998) | Welfare participation rate (%) | Average annual benefit amount per recipient (€ –1998) |
| **Youngest child 1–3 years of age** | | | | | |
| Older and highly educated | 144 | 32.3 | 5,035 | 43.5 | 5,719 |
| Young and highly educated | 279 | 56.7 | 5,542 | 70.0 | 6,456 |
| Older and poorly educated | 283 | 56.1 | 5,724 | 68.6 | 6,392 |
| Young and poorly educated | 936 | 70.8 | 5,719 | 83.3 | 6,518 |
| **Youngest child 3–9 years of age** | | | | | |
| Older and highly educated | 465 | 18.5 | 4,822 | 22.4 | 4,678 |
| Young and highly educated | 729 | 46.4 | 5,236 | 48.2 | 5,480 |
| Older and poorly educated | 634 | 50.7 | 5,052 | 45.4 | 4,503 |
| Young and poorly educated | 1,845 | 62.6 | 5,036 | 63.9 | 4,928 |
| **Total** | 5,315 | | | | |
| **Expenditure** (thousands of € – 1998) | | 15,432 | | 17,467 | |

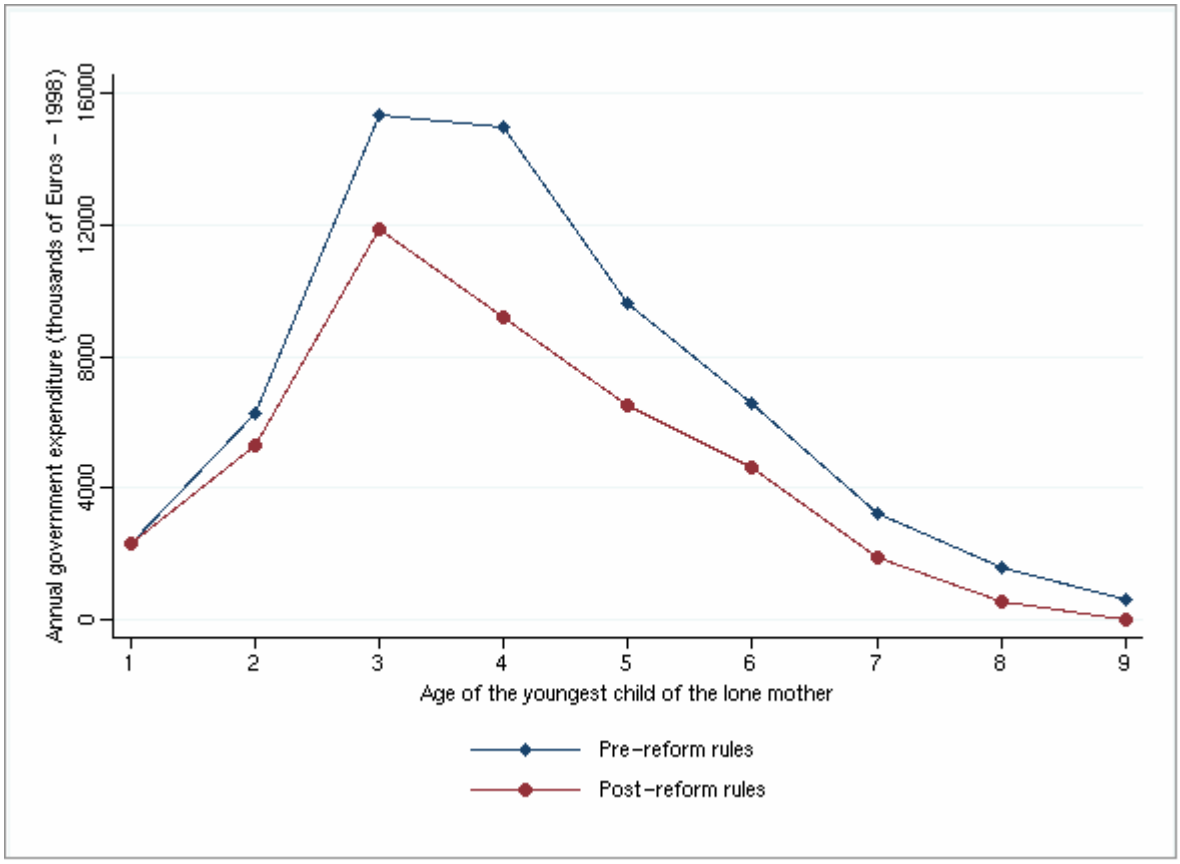
Notes: Young is defined as less than or equal to 31/ 35 years of age and poorly educated is defined as length of education less than or equal to 12 years (they correspond to the median age and education).

In an attempt to account for the dynamic features of the reform, we compute the median duration of the period of lone motherhood. This is done separately for 36 subgroups of lone mother by their age and educational level, as well as the age of the youngest child. The periods range in length from four to six years. Next, we derive a measure for the number of years each subgroup, on average, receives welfare: under pre-reform rules, this is given as the

minimum of median duration of the period of lone motherhood and the upper age limit of the child; after the reform, the number of years on welfare is defined as the minimum of the median duration of the period of lone motherhood, the upper age limit of the child, and the three-years time limit. By combining the estimated number of years on welfare with the welfare participation rates and benefit amounts, we may predict government expenditure on lone-parent benefits under pre-reform and post-reform rules, given the composition of new lone mothers we observe in 1997.

Figure 3 shows the predicted government expenditure on welfare for a cohort of new lone mothers by the age of the child, given their composition in 1997. It is clear that the reform decreases government expenditure on welfare for each of the subgroups; altogether, the reform cuts government expenditure by 30 per cent. The reduction is particularly large for lone mothers whose youngest child is at least three years of age, and therefore faced with activity requirements.

**Figure 3. A dynamic perspective of the reform effect on government expenditure on transitional benefit to married mothers who split up and become lone mothers in 1997**




One can argue that the drop in government expenditure is a lower-bound estimate of the true reform effects on welfare expenditure. First of all, we ignore the fact that the reform may

reduce the duration of the period of lone motherhood as lone mothers anticipate the time limits and work requirements and remarry at an increasing rate. Moreover, the reform may reduce the number of women becoming lone mothers, which we also close our eyes to. On the other hand, we pay no attention to the issue of benefit substitution. What we are really interested in is the overall rate of welfare dependency and expenditure, not its composition in terms of different programmes. It is, however, beyond the scope of this paper to evaluate the extent to which reforming lone-parent benefits passes government expenditure on to other parts of the welfare system.

## 6. Conclusion

Most of what we know about how lone mothers respond to policy changes comes from programme evaluations carried out in the US and the UK. To the extent that these studies tell us something about the deeper structural parameters of human behaviour, policymakers in other countries may learn directly from the success and failures of the US and the UK experience. However, caution must be applied. The reform effects may depend heavily on the broader institutional context and economic environment in which they are implemented.

Interestingly, the Norwegian lone-parent reform undertaken in 1998 mirrors the far-reaching welfare reform implemented in the US in 1996 (replacing the Aid to Families with Dependent Children programme with the Temporary Assistance to Needy Families programme). Both reforms imposed and enforced work requirements and time limits on welfare receipt; both appear to have been successful.[22] The results from our policy evaluation suggest that the Norwegian reform not only increased earnings and education – in the process lowering welfare caseloads and thus easing the financial burden on the government – but also reduced poverty considerably. The US experience is similar (see Moffitt, 2007). It is not clear, however, which roles the different elements of the reforms played. Nevertheless, the similarity in the responses of lone mothers to workfare reforms across two of Esping-Andersen's (1990) highly differentiated worlds of welfare capitalism is striking.

Even though both welfare reforms appear to have been an overall success, this does not imply that the gains were evenly spread out. Nor we can assume that all lone mothers have been made better off by the policy changes. Some studies indicate that the US reform had the strongest effect on highly skilled lone mothers; moreover, a fraction of the lone-mother

[22] There are some notable differences between the Norwegian and the US reforms. In the US, the funding for childcare was increased and many states lowered the benefit reduction rates. In Norway, the benefit levels were increased and education was included in the activity requirements.

population appears to have been made worse off by the reform (see Moffitt, 2007). In this respect, the contrast with the effects of the Norwegian welfare reform is most noticeable. Even when we estimate separately for subgroups of lone mothers by the age of their youngest child as well as their own age and educational level, we cannot find any adverse reform effects. In fact, the poorly educated lone mothers were those experiencing the largest gains.

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