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

Abstract:

The generous Nordic model of welfare is commonly viewed as an exceptional success both in terms of equality and economic growth. However, it has recently become 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 motivated a workfare reform of the Norwegian welfare system for lone mothers; activity requirements were introduced, time limits imposed, and benefit levels raised. To evaluate the welfare 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 at once. We find that the workfare reform did not only increase earnings and education as well as lower welfare caseloads and by this route ease the financial burden of the government, but also reduced poverty.

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

JEL classification: C23, I32, I38, J00

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1. Introduction

A stylized fact of the Nordic countries is their relatively high employment rates among women compared to other OECD-countries. Although this is true for married (and cohabiting) mothers, it is not the case for lone mothers.¹ Discrepancies in the relative labour market participation of married mothers and lone mothers across countries may simply reflect compositional differences. However, it seems plausible that differences in design and generosity of the welfare schemes tailored at lone mothers also have explanatory power.

When it comes to lone parent benefits, Norway is distinctive even among the Nordic countries; it is the only country with a generous welfare scheme directed exclusively at lone parents, the transitional benefit. There used to be no working requirements to receive transitional benefit. Furthermore, the transitional benefit implied strong work disincentives, since benefits rapidly declined as earnings increased. Note also that the terminology 'transitional benefit' was highly misleading, as lone parents were free to choose to participate in this scheme for up to 10 years. The poor work incentives inherent in the transitional benefit may be one of the reasons for the close to 10 percent lower employment rate of lone mothers in the mid-1990s in Norway compared to its neighbours Sweden and Denmark.

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

This paper examines the effects of the transitional benefit reform on lone mothers in terms of several socioeconomic outcomes, forming quite a comprehensive picture of the impact of the policy changes. To this end, we utilise a unique household panel data set based on administrative registers covering the entire resident population of Norway in the period 1993-2001. First of all, we examine the impacts of

¹ Throughout this paper, we include mothers who are cohabitating in the married category. In Norway, the employment rate of lone mothers is substantially lower than that of married mothers. By contrast, in many OECD countries lone mothers are more likely to work than married mothers. 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.

the reform on the earnings of lone mothers. However, the evaluation of a welfare reform can seldom be exclusively restricted to a matter of responses to changes in the work incentives; other considerations must come to play. Indeed, the impacts on the living standard of those treated by the reform are a primary concern of policymakers. Unlike most past program evaluations, we examine the reform effects on poverty of lone mothers (Hotz et al., 2002). In addition, this paper studies 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 programs on education are rarely studied in program 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 reforms on lone mothers comes from program evaluations carried out in the US and the UK, evidence on the responses of lone mothers to policy changes in the institutional context of a generous welfare state should be of interest.²

Program 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 contrast for a comparison group, which is assumed to be unaffected by the reform. A problem ignored in the DD approach is that welfare reforms are seldom allowed to have retroactive effects on current recipients. Consequently, temporary provisions are often introduced during a phase-in period, from the reform is enacted until it is fully implemented. During the phase-in period, welfare recipients – or a subgroup thereof – may continue to receive benefits according to pre-reform rules, which makes the before and after reform picture blurry.

In the case of the 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 benefits under the pre-reform rules for up to 3 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

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 were lowered. Moffitt (2007) summarises the evidence on this much studied reform, which appears to have increased employment as well as reduced poverty rates, program caseloads and government expenditure. In addition, there are several program 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.

to be the rule rather than the exception in many OECD countries.³ Whilst most past program 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 drop observations from a 6 months phase-in period in their evaluation of the Working Families' Tax Credit reform in the UK. However, relying on observations from after the reform is fully implemented can make it more likely to confound reform effects with other factors. In our case, the bias might be particularly strong given that the phase-in period is as long as 3 years. But perhaps more important, if we were to drop the observations from the phase-in period we would only be able to use the DD approach to evaluate the reform effects on a very selective subgroup of women who had been lone mother for at least 5 years. If there is heterogeneity in the responses to the reform across lone mothers, focusing exclusively on this particular subgroup may lead to a misleading picture of the overall impact of the policy changes.

As an alternative, we propose to identify the 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 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 transitional benefit reform. Section 3 outlines the proposed evaluation approach. Section 4 discusses definitional issues and presents the data. Section 5 assesses the estimated reform effects. Section 6 concerns policy implications.

2. The transitional benefit reform

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

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

2.1 Policy changes

Historically, the transitional benefit scheme has been a generous out-of-work welfare program targeted exclusively at lone mothers. A workfare reform of the transitional benefit was undertaken on the 1st of January 1998. There were four changes. First of all, work and educational requirements were imposed, though only for lone mothers with the youngest child at least 3 years old. Secondly, the upper age limit of the youngest child for receiving benefits was reduced and time limits on welfare participation were introduced. Thirdly, the maximum benefit amount was increased by about 20 percent. Fourthly, lone mothers with toddlers less than 3 years of age were made entitled to a supplement to the general family allowances if they received maximum transitional benefit. Table 1 provides more details on the transitional benefit scheme, and the changes made in the 1998 reform.

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 percent of earnings exceeding a threshold of € 215 per month	40 percent 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 be at least 50 percent of full-time employed or in education
Time limit	None	Maximum 3 years of welfare receipt
Age limit	Youngest child less than 9-10 years old (4 th grade of primary school)	Youngest child less than 8 years old
Family allowance supplement	None	€ 72 per month to lone parents with children less than 3 years of age receiving maximum transitional benefit
Means-testing of benefits depending on assets	None	None

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 the 1st of January 1998, could continue to receive transitional benefit under the pre-reform rules. The phase-in

provisions were gradually phased out, and from the 1st of January 2001 benefits were exclusively granted 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 toddlers of one or two years of age who did not or only partly made use of government subsidised day-care centres. From August to December 1998 the scheme only included one-year-old children, but was subsequently extended to also include two-year-old children as well. In 1998, the maximum monthly benefit rate was about Euro 360 per child. The benefits are reduced according to the number of hours the child spends in a government subsidised day-care centre.

2.2. Work incentives and welfare participation rates

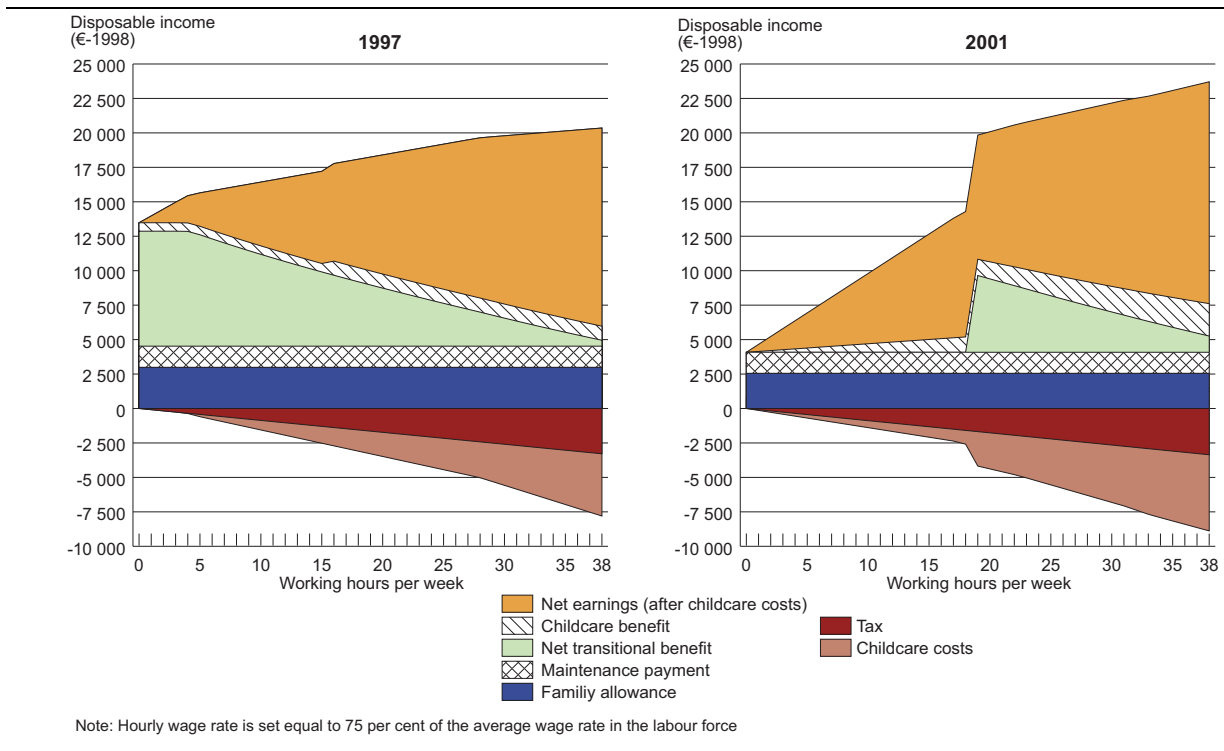
Figures 1 and 2 give a static perspective of the work incentives stemming from the tax-benefit system before and after the welfare reform in 1998. The figures depict how disposable income on the vertical axis varies with working hours per week on the horizontal axis; the earnings and welfare components (after tax) are above the 0 line, whilst the taxes and childcare costs are below. For brevity and without much loss of generality, we only present the work incentives of a lone mother with one child who has an hourly wage rate equal to 75 percent of the average wage rate in the labour force.⁴

Figure 1 illustrates that mandating lone mothers with a child at least 3 years of age to work at least part time to receive transitional benefit implies that those working less than this threshold have incentives to increase labour supply. A counteracting effect on the average labour supply is the increase in the maximum benefit levels, which unambiguously discourages labour supply among those working at least 50 percent before the reform provided that leisure is a normal good.⁵ Altogether, the reform subsidises part time work; the average change in labour supply will depend on the sizes of the different responses as well as the relative numbers of lone mothers at different points along the budget constraint.

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 by the discretion of a 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 bound of the age of the youngest child is set equal to 6 rather than 9 years, to reflect the differences in childcare cost for pre-school and school children.

⁵ Using structural approaches, Ermisch and Wright (1991) and Meyer and Rosenbaum (2001) find that changes in the benefits levels directed at single parents have significant but rather small effects on employment.

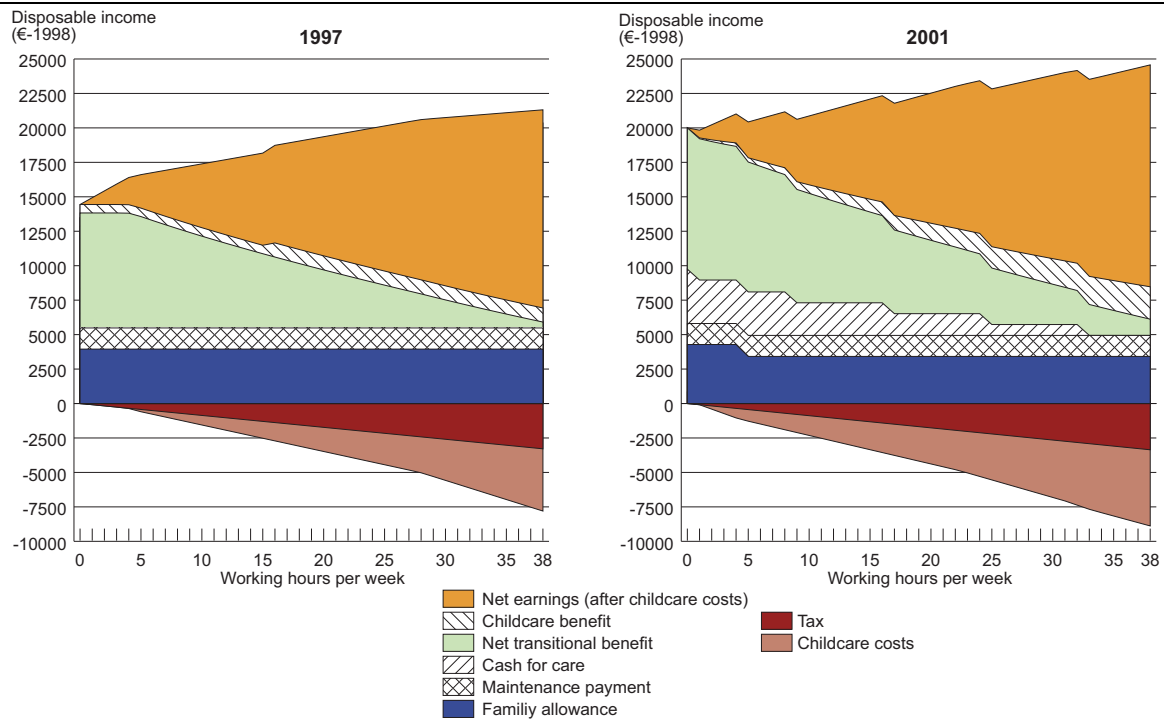
Figure 1. Work incentive structure before and after the reform for a lone mother with one child 3-6 years of age



As is clear from Figure 2, the static effect of the policy changes on the labour supply of lone mothers with a toddler less than 3 years of age is unambiguously negative, provided that leisure is a normal good. The reason is threefold. First, lone mothers with toddlers are affected by the increase in the maximum benefit levels, but not faced with work requirements. The increase in the benefit amounts is expected to reduce labour supply. Secondly, 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. Thirdly, 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 the use of day-care centres more expensive compared to 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

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

Figure 2. Work incentive structure 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 of the youngest child to be eligible for welfare. The long run 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 of all, one may expect lone mothers on welfare to anticipate the benefit exhaustion date, and begin to intensify job search or even 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 benefit exhaustion date. Furthermore, shortened time limits should provide

⁷ Moffitt (1985) and Røed and Zhang (2005) find this behaviour for unemployment insurance recipients approaching the point in time when their benefits will be exhausted.

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

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

Year	Lone mothers with the youngest child 3-9 years old		Lone mothers with the youngest child 1-3 years old	
	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

In contrast to human capital programs 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 (Blank, 2002), the intention of the transitional benefit reform was primarily to stimulate long-term training.⁹ In fact, lone mothers who do not work due to participation in human capital programs can apply for an extra two years of transitional benefit. The possibility of receiving an extra two years of benefits if participating in a human capital program should increase the transition rates to education.

The welfare participation rates and the benefit amounts presented in Table 2 clearly mirror the fact that the reform was gradually phased in. Table 2 also reflects that the work incentives stemming from the welfare reform are much stronger for lone mothers with the youngest child at least 3 years of age than for lone mother with toddlers. Whilst the participation rates of lone mothers with older children declined gradually after the reform in 1998 with a substantial drop in 2001 when the reform was fully

⁸ Grogger (2002), Grogger and Michalopoulos (2003), and Swann (2005) find that 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 programs is mixed. In a review of the literature, Barnow and Gubits (2002) argue that long-term, more intensive human capital programs appear to be considerably more effective than short-term programs 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 programs used a mix of short-term education and training while maintaining the strong focus on the goal of immediate employment.

implemented, this was less the case for lone mother with toddlers. As expected, the average monthly transitional benefit amount of lone mothers with toddlers increased after the reform. In comparison, the average benefit amount of 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

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 minimises the risk of confounding the policy changes with time-specific factors that coincide. At first sight, it thus appears to be strong reasons for evaluating the transitional benefit reform by employing the much used DD estimator, which assumes that the reform effects can be identified by comparing the difference in the average outcome before and after the reform for a group of treated and a comparison group.

Although the transitional benefit reform was undertaken at the 1st of January 1998, it took 3 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 of the incentive effects of the reform. To capture the reform effects with a DD estimator, it would thus be necessary to drop 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 important, we would only be able to evaluate the reform effects on a subgroup of women who in 2001 (i) had been lone mothers for (at least) the last 5 years and (ii) their youngest child was between 4 and 8 years of age. If there is heterogeneity in the responses to the reform across lone mothers, focusing exclusively on this particular subgroup may lead to a misleading picture of the overall 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 at once.

¹⁰ The results of Table 2 suggest that the phase-in period provides limited information of the incentive effects of the transitional benefit reform. Thus, the policy 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 minor impact on employment. To our knowledge, Kjelstad and Rønsen (2004) is the only published evaluation of the transitional benefit reform.

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

L_t be a binary assignment indicator equal to one if the mother is married in year $t-1$ and splits up and becomes lone mother (a splitter) in year t , and zero if mother stays married (a stayer).

R_t be a binary assignment indicator equal to one if lone mothers are treated by post-reform rules in year t and $t+1$, and zero if they are 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 pre-reform year s .

Y_v be the outcome of a mother in post-reform year v .

X be a set of time-varying observed characteristics.

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

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

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 ζ^0 of the effect of becoming lone mother in the pre-reform period is defined as

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

which gives the difference in the expected growth rate of the outcomes of the splitters and the stayers in the pre-reform period 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 program evaluation, Δ 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 effect of becoming 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 was not for the reform. Formally, the identifying assumption is that

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

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

At first glance, our estimator Δ 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 treatment 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 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

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

where $t = 1994, 1995, 1996$ for $j = 0$ and $t = 1998, 1999, 2000$ for $j = 1$, β is the effect of local unemployment rates X_t , θ_t is the fixed time-specific effect, and ε_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 mother in year t . To take into account that the reform is likely to affect lone mothers differently according to the age of the youngest child, we estimate the model separately for mothers with the youngest child between 1 and 3 years of age and mothers with the youngest child between 3 and 9 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.

¹¹ To see the distinction, consider a population of women that are either lone mothers or married mothers before and after the reform. Define a binary assignment indicator D that is equal to one if the woman is a lone mother, and zero 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

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

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 e.g. Francesconi and Klaauw (2007) for a discussion and an application of the DDD estimator to program evaluation.

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

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 the treated, which reduces the problem of serial correlation.

4. Data

The empirical analysis is based on a register household panel data set covering the entire resident population of Norway in the period 1993-2001. The register panel data set with household and demographic information is supplemented with detailed income data from the Tax Assessment Files, which are collected from tax records and other administrative registers rather than interviews and self-reporting methods. The coverage and reliability of Norwegian register data are considered to be very high, as is documented by the fact that the quality of such national datasets 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 aged at least 18 years and not more than 55 years. Throughout this paper, we include mothers who are cohabiting in the married category. Self-employed as well as individuals receiving permanent disability benefits are excluded. Students are also dropped from the population, with the exception of the case where we evaluate the reform effects on education.¹⁵

This paper focuses exclusively on the effects of the reform on lone mothers. The reasons are twofold. First of all, as much as 9 lone parents in 10 are women. Thus, the policy discussion concerning the consequences of the disincentives inherent in the design of the lone parent benefits prior to 1998 primarily relates to lone mothers. But more importantly, the human capital levels and socio-economic status of lone fathers in Norway are demonstrated to differ substantially from those of lone mothers, presumably due to a strong selection process for single fathers to actually get daily custody of their children (Kjeldstad and Rønsen, 2004). Thus, pooling single fathers and lone mothers in the evaluation of the welfare reform is likely to add to the extent of heterogeneity in the responses to the reform as well as 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.

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

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

To account for variation in local labour market conditions in the population we utilise 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. Thus, letting economic regions rather than municipalities form the basis for measuring unemployment rates may provide a better predictor of local labour market tightness.

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 Euro 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 (Expert Group on Household Income Statistics, 2001), and incorporates earnings, self-employment income, capital income, all public cash transfers, and taxes.¹⁶ To enable comparison of disposable incomes across individuals belonging to households of varying size and composition the OECD equivalence scale is applied; the weight of the first adult in the household is set to 1, each additional adult is given 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 percent 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 percent of the median equivalent disposable income.

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 incomes as well as gross earnings are measured in a consistent way for the entire population in the whole period. In comparison, the heavily cited LaLonde (1986) study suffers from using comparison groups with earnings measured in different ways than the treated. Heckman et al. (1998) demonstrate the potential bias in the estimated treatment effects when faced with such measurement errors, which are likely to occur when multiple non-harmonised data sources form the basis of the empirical analysis.

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, quite similar individual characteristics. Specifically, women who stay married are, on average, older and have more education and labour market experience than women who become lone mother. However, we are not concerned with differences in the characteristics of splitters and stayers per se, rather changes in the differences of these groups before and after the reform. Tables 3 and 4 show very small differences over time in the characteristics of stayers and splitters. Hence, the selection of women becoming lone mother does not seem to have changed much over time. Moreover, the share of women who become lone mother has been fairly stable over time.¹⁷

Table 3. Pre-reform and post-reform descriptive statistics of married mothers who stay married and those who become lone mother. The youngest child is 3-9 years

	Before the reform		After the reform	
	Married mothers	Lone mothers	Married mothers	Lone mothers
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
Age	36.2	33.6	36.9	34.3
Years of schooling	12.4	12.0	12.8	12.3
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

Notes: Labour market experience 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).

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

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

	Before the reform		After the reform	
	Married mothers	Lone mothers	Married mothers	Lone mothers
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
Age	31.9	27.3	32.5	28.0
Years of schooling	12.7	11.8	13.2	12.2
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

Notes: Labour market experience 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 mother 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; an 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, whilst their poverty rates have decreased. The same has happened to the stayers, although the reduction in, for instance, poverty rates has been smaller. The splitters and 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, the earnings increase by 9 percent when their youngest child is between 3 and 9 years of age and 7 percent when they have a toddler. Over the same time period, the earnings of the stayers have increased by 11 when the youngest child is between 3 and 9 years of age and 7 percent when they have a toddler.

To obtain consistent estimates of the reform effects on lone mothers with the youngest child less than 3 years of age, the cash for care reform must have the same impact on splitters and stayers with toddlers. Admittedly a strong assumption, we may take some comfort in Table 5 showing 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 frequently imposed to achieve identification in much cited program evaluations.¹⁸

Table 5. Participation rates and average benefit amounts for the cash for care scheme of married mothers who stay married and those who become lone mother, 1998-2001

	Participation rate (%)	Average monthly benefit amount per recipient (€ -1198)
Lone mothers	70.0	293
Married mothers	71.9	285

5. The responses of the 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, which is followed by 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 the responses to the policy changes to get a 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 with the youngest child between 3 and 9 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 dominate the negative effect induced by 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 percent increase in the average earnings of lone mothers with youngest child between 3 and 9 years of age. Put into perspective, the reform closes the earnings gap between married mothers and lone mothers by 55 percent. 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.

¹⁸ For instance, to identify the effects of time limits on welfare participation Grogger (2002) assume 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 7 years of age as on women with the oldest child at least 13 years old.

Table 7 demonstrates that the welfare reform had no effect on average earnings of lone mothers with toddlers between 1 and 3 years of age. This suggests that the positive dynamic effects due to 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 induced by the possibility of receiving an extra two years of benefits if participating in a human capital program. But more striking, the welfare reform reduced the poverty rate of lone mothers with toddlers by 5.9 percentage points. It may be argued that the reduction in poverty rates is only because those with income just below more or less arbitrary 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

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 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 of 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 socioeconomic consequences of becoming lone mother, which may be interesting in their own right. The results are as expected; poverty increases and earnings fall; the effects of becoming single mother on education are mixed.²⁰

¹⁹ When the poverty thresholds are set equal to 60 percent of the median annual equivalent income, the pre-reform poverty rate of lone mothers with the youngest child between 3 and 9 years is 14.3 percent and the reform reduces poverty by 2.6 percentage points; in comparison, the pre-reform poverty rate of lone mothers with toddlers is 33 percent and the decline in poverty is 11.0 percentage points. If the poverty thresholds are defined as 40 percent of the median annual equivalent disposable income, then 2.9 percent of lone mothers with children between 3 and 9 years and 11 percent for lone mothers with toddlers 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.

²⁰ There is considerable cross-country evidence suggesting a significant economic penalty of 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 6. Reform effects on earnings, education, and poverty of lone mothers with the youngest child 3-9 years old

	Earnings (€ - 1998)		In education		Poverty	
	Coef	Std err	Coef	Std err	Coef	Std err
Reform	400***	92	0.007	0.005	-0.009**	0.004
Becoming 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.

Table 7. Reform effects on earnings, education, and poverty of lone mothers with the youngest child 1-3 years old

	Earnings (€ - 1998)		In education		Poverty	
	Coef	Std err	Coef	Std err	Coef	Std err
Reform	-217	134	0.036***	0.004	-0.059***	0.003
Becoming 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 accepted to be 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 have been the reform effects, if the characteristics of the women becoming lone mother had been the same after the reform as they were before the reform?

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

	Before the reform		After the reform	
	Married mothers	Lone mothers	Married mothers	Lone mothers
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
Age	34.3	33.5	34.4	33.7
Years of schooling	12.1	12.0	12.3	12.1
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

Notes: Labour market experience 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 9. Pre-reform and post-reform descriptive statistics from the weighted sample of married mothers who stay married and those who become lone mother. The youngest child is 1-3 years

	Before the reform		After the reform	
	Married mothers	Lone mothers	Married mothers	Lone mothers
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
Age	30.3	29.5	30.5	29.7
Years of schooling	12.0	11.7	12.2	11.8
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

Notes: Labour market experience 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).

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 according to the number of children, and the 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.

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 for understanding the impact of the policy changes on lone mothers. When the youngest child of the lone mother is between 3 and 9 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 toddlers; if anything, the insignificant reform effects on earnings goes from having a negative to a positive point estimate.

²¹ As an illustration, consider married and lone mothers with the youngest child between 3 and 9 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, 2 or fewer children, and with the youngest child below 6 years of age. The most typical subgroup consists of mothers who are young, poorly educated, ethnic Norwegians or western immigrants with little work experience, have 2 or fewer children, and where the youngest child is above 6 years of age. In fact, this subgroup represents 24 percent of splitters before the reform, but only 19 percent after the reform. In comparison, it represents 13 percent of stayers before the reform and 9 percent 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 10. Reform effects based on the weighted sample on earnings, education, and poverty of lone mothers with the youngest child 3-9 years old

	Earnings (€ - 1998)		In education		Poverty	
	Coef	Std err	Coef	Std err	Coef	Std err
Reform	343***	74	0.010**	0.004	-0.004	0.003
Becoming 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 old

	Earnings (€ - 1998)		In education		Poverty	
	Coef	Std err	Coef	Std err	Coef	Std err
Reform	72	118	0.034***	0.006	-0.059***	0.005
Becoming 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. It turns out that even when we run the regressions separately (based on the weighted sample) 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 low 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 1 and 3 years of age.

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	
	Coef	Std err	Coef	Std err	Coef	Std err
Young – low educated						
Reform	515***	123	0.009*	0.005	-0.008**	0.004
Becoming lone mother	-1090***	87	0.021***	0.003	0.038***	0.002
Observations	461 122		495 320		461 122	
Older – low educated						
Reform	556***	187	0.007	0.006	-0.009*	0.005
Becoming lone mother	-859***	139	0.007	0.004	0.040***	0.004
Observations	374 126		389 684		374 126	
Young – high educated						
Reform	367	256	0.003	0.015	0.000	0.004
Becoming lone mother	16	189	0.083***	0.011	0.011***	0.003
Observations	186 348		117 710		186 348	
Older – high educated						
Reform	-234	304	0.000	0.023	0.001	0.004
Becoming lone mother	296	230	0.024	0.018	0.007**	0.003
Observations	279 412		88 874		279 412	

Notes: Young is defined as age less than or equal to 35 and low educated is defined as education less 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.

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	
	Coef	Std err	Coef	Std err	Coef	Std err
Young – low educated						
Reform	109	191	0.034***	0.006	-0.074***	0.006
Becoming lone mother	-312***	127	0.051***	0.004	0.095***	0.004
Observations	289 724		307 430		289 724	
Older – low educated						
Reform	-87	348	0.018**	0.008	-0.039***	0.009
Becoming lone mother	-425*	253	0.021***	0.006	0.055***	0.007
Observations	208 666		215 134		208 666	
Young – high educated						
Reform	405	416	0.046**	0.019	-0.041***	0.007
Becoming lone mother	1145***	310	0.113***	0.014	0.055***	0.005
Observations	157 516		91 496		157 516	
Older – high educated						
Reform	-359	598	0.032	0.028	-0.025***	0.007
Becoming lone mother	1412***	449	0.071***	0.021	0.030***	0.006
Observations	209 768		60 502		209 768	

Notes: Young is defined as age less than or equal to 31 and low educated is defined as length of education less 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.

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

5.4. Reform effects on government expenditure

The substantial rise in welfare expenditure over the last decade has created substantial concern among 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 are young and low educated. The table also describes the welfare participation rates and average monthly benefit amount 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 deceiving - 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

	New lone mothers in 1997	Before the reform 1995-1997		After the reform 1999-2001	
		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 old					
Older and high educated	144	32.3	5 035	43.5	5 719
Young and high educated	279	56.7	5 542	70.0	6 456
Older and low educated	283	56.1	5 724	68.6	6 392
Young and low educated	936	70.8	5 719	83.3	6 518
Youngest child 3-9 years old					
Older and high educated	465	18.5	4 822	22.4	4 678
Young and high educated	729	46.4	5 236	48.2	5 480
Older and low educated	634	50.7	5 052	45.4	4 503
Young and low 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 age less than or equal to 31/ 35 and low educated is defined as length of education less 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 spell of lone motherhood; this is done separately for 36 subgroups of lone mother by their age and educational level as well as each age of the child between 1 and 9 years. The spells range from 4 to 6 years. Next, we derive a measure for the number of years each subgroup, on average, receives welfare; before the reform, this is given as the minimum of the duration of the spell of lone motherhood and the upper age limit of the child of 9 years; after the reform, the number of years on welfare is defined as the minimum of the duration of the spell of lone motherhood, the upper age limit of the child of 8 years, and the time limit of 3 years. By combining the number of years on welfare with the welfare participation rates and benefit amounts, we get estimates of 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: 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

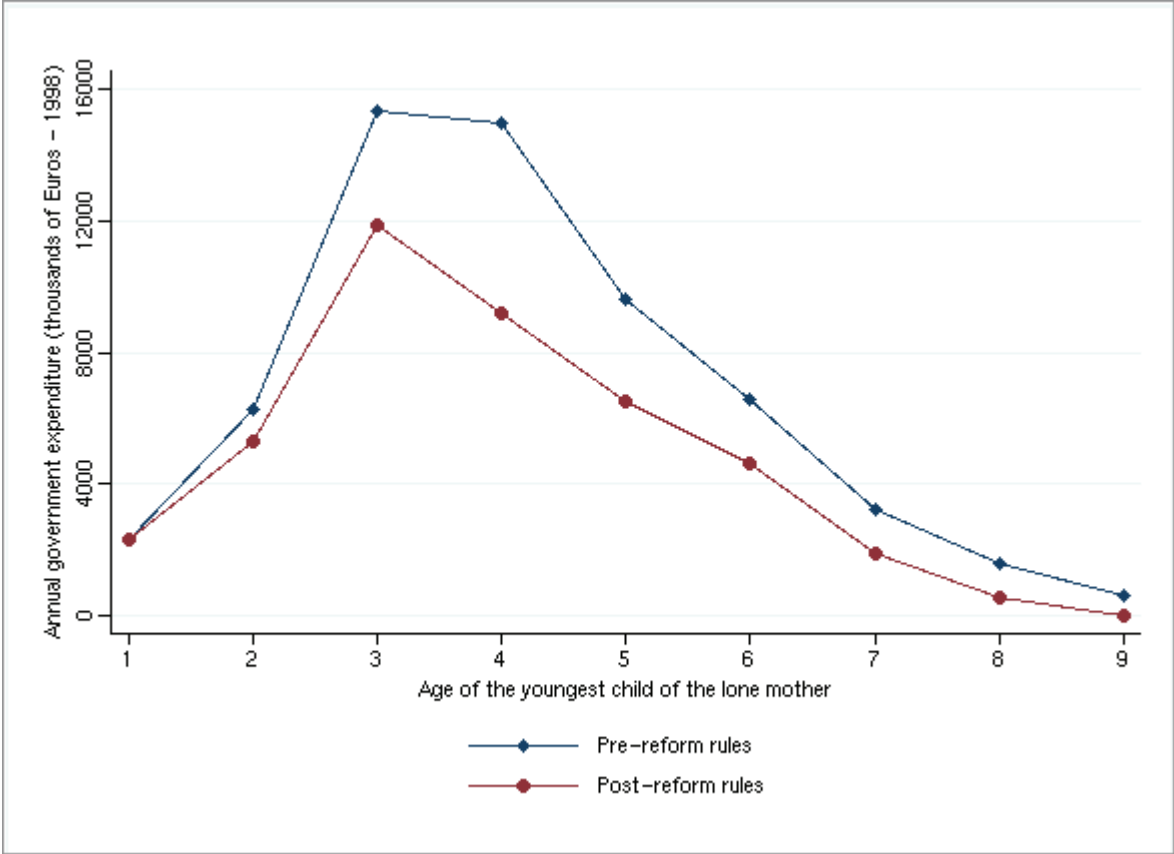


Figure 3 shows the predicted government expenditure on welfare for a cohort of new lone mothers by the age of the child, given their composition in 1997. It is clear that the reform decreases government expenditure on welfare for each of the subgroups; altogether, the reform cuts government expenditure

by 30 percent. The reduction is particularly large for lone mothers with the youngest child at least 3 years of age, who are facing work requirements.

One may 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 that the reform may reduce the duration of the spell of lone motherhood as the lone mothers anticipate the time limits and work requirements and re-marry at an increasing rate. Another reason is that the reform may reduce the number of women becoming lone mother, 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 programs. It is, however, beyond the scope of this paper to evaluate the extent to which reforming lone parent benefits pass 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 program 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 program with the Temporary Assistance to Needy Families program). Both reforms imposed and enforced work requirements and time limits on welfare receipt - both reforms appear to have been successful.²² The results from our policy evaluation suggest that the Norwegian reform did not only increase earnings and education as well as lower welfare caseloads and by this route ease the financial burden of the government, but also reduced poverty. The US experience is similar (Moffitt, 2007). It is not clear, however, which roles the different elements of the reforms played. Nevertheless, the

²² There are some notable differences between the Norwegian and the US reform. 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 the education was included in the activity requirements. See Moffitt (2007) for a review of the US welfare reform.

similarity in the responses of lone mothers to welfare 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, it 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 strongest effect on high skilled lone mothers; moreover, a fraction of the lone mother population appears to have been made worse off by the reform (Moffitt, 2007). In this aspect, the contrast with the effects from the Norwegian welfare reform is an apt one; 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 effect. In fact, the low educated lone mothers were those experiencing the largest gains.

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