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The Effect of Welfare Reforms on Benefit Substitution

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The Effect of Welfare Reforms on Benefit Substitution^{*}

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Abstract

Policy-makers have confronted welfare dependence and poverty among single mothers by imposing work requirements and time limits on the receipt of welfare benefits. Reforms with such features have generally reduced programme case-loads and increased the employment and earnings of single mothers. There is little evidence, however, on the amount of benefit substitution associated with such reforms. In this paper, we test whether reductions in welfare dependence may be offset by increased participation in other benefit programmes. Evaluating the restrictive reforms of the welfare programme for single mothers in Norway, we find evidence of considerable benefit substitution. Hence, decreases in programme case-loads do not reflect equal reductions in welfare dependence.

JEL Codes: *H55, I38.*

Key words: Welfare reform, welfare dependence, benefit substitution, single mothers.

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1. Introduction

Welfare dependence among single mothers has been a concern of policy-makers for decades. In an attempt to reduce dependence and stimulate single mothers to work, the US implemented a major nationwide reform of the welfare programme targeted at this group in 1996. The most important features of this reform were the introduction of time limits on the receipt of welfare and stringent work requirements. Overall, this reform increased the employment rates, earnings and family income of single mothers. The rate of poverty among single mothers also fell, as did the programme case-load and expenditures. Moffitt (2007, p. 31) reviews the research on this reform and declares: “That the 1996 welfare reform was a success, in overall terms and on average, is almost universally accepted by policy analysts and researchers”.¹

However, as noted by Moffitt, there is evidence of an uneven distribution of gains across different groups of single mothers, and suggestions that some were actually worse off because of the reform. According to Blank (2007), a growing share of former welfare recipients were not working, with estimates showing that 20–25 per cent of all low-income single mothers in 2004 fit into this particular category. Thus, even though the reform may be perceived as a great success *on average*, some single mothers apparently did not successfully manage the transition from welfare to work. Important information may be lost if the reform is not also evaluated with respect to the alternatives for these single mothers.

The aim of this paper is to investigate whether such restrictive reforms of welfare programmes for single mothers lead them to switch to alternative benefit programmes, so-called “benefit substitution”. As most developed countries have comprehensive income security systems for their residents, single mothers may have the option to participate in one

¹ In addition to Moffitt (2007), see Blank (2002) for an overview of this literature. There is also related literature on in-work tax benefits for low-income families in both the US and the UK, showing that employment among single mothers has increased in response to the expansion of these tax benefits. See, for instance, Meyer and Rosenbaum (2001) and Eissa and Liebman (1996) for the US, and Francesconi and van der Klaauw (2007) and Blundell *et al.* (2005) for the UK.

or more of several benefit programmes. Benefit substitution implies that decreases in the case-load or expenditure of a single welfare programme may not reflect equal reductions in welfare dependence.

To investigate this possibility, we exploit two nationwide reforms that reduced access to the welfare programme for single mothers in Norway in the late 1990s. The more important of the two Norwegian reforms has many similarities with the US reform in this area. As in the US, the aim in Norway was to stimulate mothers to work and thereby reduce their welfare dependence and improve their income, by introducing time limits on the receipt of benefits, lowering the maximum eligible age of the youngest child and implementing work requirements. Mogstad and Pronzato (2012) have already investigated the effects of this reform, finding that it increased average labour market participation and the earnings of single mothers. However, the reform also led to a reduction in disposable income and increased poverty among a sizable subgroup of single mothers. Notably, Mogstad and Pronzato (2012) do not evaluate the associated benefit substitution effects.

Two US studies in this area suggest that single mothers are able to switch between the welfare programme targeted specifically at them and the Supplementary Security Income (SSI) programme, which provides benefits to disabled individuals. Work by Schmidt and Sevak (2004) lies closest to the analysis presented here. Using data from the Current Population Survey, Schmidt and Sevak, exploit variation in state-level reforms of the welfare programme for single mothers (occurring prior to the nationwide reform in 1996) for identification. Their results showed that female-headed households in states with less attractive welfare programmes were about 20 per cent more likely to receive SSI compared with households with married mothers. In the second study, Garrett and Glied (2000) examine substitution of the SSI programme for single parent benefits in response to relaxed eligibility

criteria for children and found that child SSI participation increased more in those states with lower welfare payments to single mothers.

To our knowledge, our study is the first to analyse benefit substitution by single mothers that investigates an exhaustive list of all possible alternative benefit programmes, and it is thus the first to analyse total benefit substitution in response to such restrictive reforms. As the dataset used covers the entire resident population of Norway, it is highly representative and provides a large number of observations. Further, as this individual-level dataset is drawn from administrative registers, it does not suffer from the under-reporting of welfare participation, which is a major concern with survey data used elsewhere.

For identification, we use a difference-in-difference approach whereby we compare single mothers, the target group of the welfare programme, with married mothers, who are ineligible, in the periods before and after the reforms. We find evidence of considerable benefit substitution by single mothers in the form of switching to the alternative benefit programmes, namely, sickness insurance (SI), medical- and work-related rehabilitation, disability insurance (DI) and social assistance (SA). We find that while the reforms decreased the participation rate in the welfare programme for single mothers by 32 percentage points, this was offset by an estimated total benefit substitution effect of about 10 percentage points. Thus, the decrease in the case-load of the welfare programme for single mothers does not reflect an equal reduction in the number of single mothers who are welfare dependent. A substantial proportion of single mothers did not become self-sufficient, despite the reform's intent, and continued to depend on welfare received through these alternative programmes. The use of multiple comparison groups and a series of alternative specifications confirm these findings. This evidence of benefit substitution is in line with both the findings of the two US studies and the related literature on benefit substitution in general (i.e. *without* a particular focus on single mothers or single mother welfare programmes). See, for instance, Inderbitzin

et al. (2013), Bloemen *et al.* (2013), Karlström *et al.* (2008) and Henningsen (2008) for studies of benefit substitution in regard to reforms of unemployment or disability insurance programmes.

The remainder of the paper is organized as follows. Section 2 provides details of the reforms of the welfare programme for single mothers in Norway, offers a short description of the alternative benefit programmes for single mothers and discusses why the reforms could result in benefit substitution. Section 3 describes the data and presents descriptive evidence relating to the outcomes. Section 4 outlines the identification strategy and describes the characteristics of the sample. Section 5 presents the results and robustness tests. Section 6 concludes.

2. Background

2.1 The welfare programme for single mothers and the reforms

The welfare programme for single mothers in Norway, called the transitional benefit programme, secures income for mothers who are temporarily unable to support themselves by working because they are the sole caregiver for their children.² In 1998 and 1999, the Norwegian government introduced two reforms. Table 1 details the most important features of these reforms.

[Table 1 “Features of the 1998 and 1999 reforms of the transitional benefit programme” about here]

Before the reforms, there were no work requirements and a mother could technically receive benefits continuously until her youngest child finished third grade at primary school, i.e. when the child was 9–10 years old. In addition, mothers who were cohabiting could

² Single fathers in Norway may also receive transitional benefits. The reason we did not include them in this study is that few single parents in Norway are men (only about 14 per cent of single parents in the 1990s were men, according to the income statistics for households) and they have significantly higher labour market attachment and earnings than single mothers (Andersen *et al.*, 2002).

receive benefits as long as they were not married and had no children in common with their current partner.

The main reform in 1998 imposed several new restrictions, namely a three-year time limit on the receipt of benefits, a reduction in the maximum eligible age of the youngest child and work requirements. The work requirements were for single mothers with children aged three years or older and included working for at least half of the hours of a standard working week in Norway (37.5 hours), studying for at least half of the hours of a full-time study or registering as unemployed. However, the same reform also increased the benefit levels to improve the incomes of those single mothers remaining eligible. The implementation of the reform was over a three-year period from 1 January 1998 to 1 January 2001. During this period, new applicants received benefits according to the new rules, while mothers who had applied for benefits before 1 January 1998 could continue to receive benefits according to the pre-reform rules. From 1 January 2001 onwards, all single mothers were subject to the new rules. An additional restriction introduced in the 1999 reform rendered cohabiting mothers in a stable relationship with a man other than the father of their children ineligible for the programme.³

Two other family-related welfare reforms took place in Norway at about the same time. The years 1998 and 1999 saw the introduction of cash subsidies for families with children aged one and two years that did not make full use of Norway's publicly subsidized day-care centres. By focusing in our analysis on single mothers of children aged 4–10 years, that is, those with the highest risk of losing their eligibility for transitional benefits, we ensured that these cash subsidies did not influence the estimated effects.⁴ Likewise, in 1997,

³ Implemented for all single mothers on 1 July 1999.

⁴ The cash subsidies were not limited to single mothers. However, to obtain consistent estimates of the benefit substitution effects of the reforms of the transitional benefit programme on single mothers with children younger than three years, it must hold that the cash subsidies had the same impact on single and married mothers. This assumption is doubtful. The cash subsidies reduced mothers' labour market participation (Drange and Rege,

the mandatory school starting age in Norway fell from seven to six years. Fortunately, this reform affected all mothers with children aged six in both the year before (1997) and the year after (2001) the implementation period for the transitional benefit reforms (see Section 4.1 for the identification strategy). Thus, there is no concern that these related reforms contaminated our results.

2.2 The alternative benefit programmes

The Norwegian income security system provides a variety of benefits to residents who are unable to support themselves by working. Hence, single mothers may have the option to participate in several benefit programmes, in addition to the transitional benefit programme, or to substitute one programme for another. Relevant alternative benefit programmes may include SI, medical- and work-related rehabilitation, DI and SA.⁵ To be eligible for SI, medical- and work-related rehabilitation and DI benefits, the individual must have an illness, certified by a physician, which has led to a reduced ability to work. The eligible age range for medical- and work-related rehabilitation and DI benefits is 18–67 years (i.e. until the usual retirement age).

SI benefits are intended to compensate for 100 per cent of the loss of income for workers with a short-term illness lasting less than one year. To be entitled, the worker must have worked for at least two weeks prior to the injury or illness, and his/her work capacity must have been reduced by at least 20 per cent.⁶ The employer pays SI benefits for the first 16 sick days.⁷ If the worker has not recovered within one year and is unable to work more than 50 per cent because of the illness, he/she is then eligible for medical- or work-related

2013; Naz (2004); Schøne (2004). However, the responses were heterogeneous in regard to mothers' education and earnings levels, and thus likely to differ across single and married mothers.

⁵ Unemployment insurance (UI) is not included. The reason is that being unemployed counts as one of the work requirements in the 1998 reform. After the reforms, single mothers could register as unemployed in order to receive transitional benefits and not necessarily UI benefits. Our data do not allow us to separate the single mothers among the registered unemployed who received UI benefits from those who did not.

⁶ In 2004, the minimum number of weeks increased from two to four.

⁷ Until 1998, the number of days was 14.

rehabilitation benefits. Non-working residents who can document that they have been ill for at least one year are also entitled. These benefits are provided while the individual undergoes treatment to improve his/her ability to work, and may be received for several years.⁸

The DI benefit programme provides income to all individuals (including those with no employment record) who are unable to work more than 50 per cent because of enduring health-related reasons.⁹ The process of applying for and receiving DI benefits is time consuming: the mean duration of the receipt of other benefits prior to being granted DI is approximately 2.5 years, and it is longer for younger age groups.¹⁰ Unlike welfare recipients in other benefit programmes, individuals on DI benefits usually never fully return to work and are likely to depend on welfare for the rest of their lives.¹¹ In 2004, time-limited DI benefits were introduced to secure income for individuals for a maximum of four years in cases where (further) medical- or work-related rehabilitation was not considered beneficial but where it was likely that the individual's ability to perform work-related activities would improve within some years. Relatively young applicants were more frequently awarded time-limited DI benefits compared to older applicants (Bragstad, 2009).

SA payments are not health related and do not require documentation of an illness for eligibility. The purpose of SA payments is to ensure that everyone has a reasonable standard of living. They are means tested against income and assets, and the level of payments is set according to the applicant's needs. These payments are considered a last resort. To be eligible, the applicant must have exhausted all other opportunities to support him/herself economically,

⁸ The compensation rate is about two-thirds of the recipient's previous earnings from work, and the minimum payment was about 6,000 NOK per month in 1998. Earnings exceeding 272,000 NOK per year in 1998 went uncompensated by SI benefits and were not included in the calculation of medical- and work-related rehabilitation benefits. 100 NOK = approx. 14 EUR or 18 USD.

⁹ The compensation rate is determined based on the workers' earning histories, and the minimum payment was about 6,800 NOK per month in 1998. Earnings exceeding 544,000 NOK per year in 1998 were not included in the calculation of DI benefits.

¹⁰ Ministry of Labour, Report to the Storting No. 9 (2006–2007): *Work, Welfare and Inclusion*, p. 45.

¹¹ Of those who left the DI program in 2003, 74 per cent entered the old-age pension programme, 19 per cent died and only 7 per cent no longer meet the eligibility criteria and may have returned to work (Kostøl and Mogstad, 2014).

including eligibility for other benefit programmes. However, there are no restrictions on receiving SA payments on top of earnings or other benefits, as long as the given level of income is considered insufficient.

2.3 Why reforms of the transitional benefit programme may cause benefit substitution

Prior to the reforms, fewer single mothers were working, and consequently fewer single mothers were eligible for SI benefits. In general, the costs of participating in the transitional benefit programme were lower than the costs of actively engaging in medical- or work-related rehabilitation programmes or going through the process of applying for DI benefits. Hence, the relatively high participation and/or application costs of the latter programmes may have outweighed any potential gain from increased benefit levels or relaxed time limits on receipt of payments by switching programmes.

After the reforms, an increasing number of working single mothers may have gained access to SI benefits, and single mothers facing the new transitional benefits rules may have found the medical- and work-related rehabilitation programmes and DI programme relatively attractive. Reports show that single mothers generally have poorer health than the rest of the population below the retirement age (Andersen *et al.*, 2002) and that single mothers have poorer mental health and worse self-reported health than married or cohabiting mothers (Ugreninov, 2005). This implies that many single mothers may be eligible for health-related benefits. The remaining single mothers who (as a consequence of the reforms) were no longer eligible for transitional benefits, and were neither able to fully support themselves by working nor able to document having an illness, may have had to rely on SA payments.

3. Data and descriptive evidence

3.1 Data

Statistics Norway produced our data based on administrative registers. The data cover all Norwegian residents and include income security system registers from 1992 to 2008.

The sample consisted of single and married mothers whose youngest child was aged 4–10 years at the end of each calendar year. Mothers were defined as single in the data if they were neither married nor cohabiting with a partner with whom they had children. This implies that a cohabiting unmarried mother was considered single if her partner was not the father of any of her children.¹² The data did not allow us to separate mothers living *without* a partner from mothers living *with* a partner as long as they remained unmarried and did not have children in common. Mothers were defined as married if they were either actually married or cohabiting with a partner with whom they had children.¹³ We focused on mothers aged 19 to 55 years at the end of each calendar year who were either single or married both at the beginning and at the end of the calendar year. We selected this age range so that the sample of mothers satisfied the age eligibility criteria for all the alternative benefits, and so that the old-age pension was not an option for these mothers in the near future. As we measured outcomes annually, we also wished to ensure that there were no overlaps between the groups within a given year. If we were to take a snap-shot of the data and compare single with married mothers based on their family status, say on 1 January each year, there could be mothers in the married group who later in the same year became single mothers, and vice versa.

We defined a mother as participating in transitional, SI, medical- or work-related or DI programmes in a given year if she was recorded in the relevant register in that year. This is regardless of the number of days she received benefits or the amount she was paid.¹⁴ The register for medical- or work-related rehabilitation benefits we used was limited to the period 1992 to 2001. The register for DI benefits we used did not include the time-limited DI benefits introduced in 2004. If a mother is married, either she or her husband may be

¹² These cohabiting single mothers had access to transitional benefits before, but not after, the 1999 reform that made mothers in stable relationships ineligible.

¹³ Some 0.2 per cent of the observations for married mothers indicate the receipt of transitional benefits. As this is inconsistent with the fact that married mothers are strictly ineligible for transitional benefits, we exclude the observations for these mothers.

¹⁴ To be in the SI register, the mother must have been ill for longer than the number of employer-paid sick days.

registered as the recipient of SA payments, depending on who applies on behalf of the family. Thus, a mother was defined as participating in SA payments in a given year if either she, her husband (if married) or both were recorded in the register in that year.

To control for local labour market conditions, we constructed yearly unemployment rates for 46 regional labour markets in Norway according to the commuting statistics (Bhuller, 2009).¹⁵ We calculated the unemployment rates separately for females because the labour market in Norway is highly gender segregated. In addition, we included the following set of control variables based on the mother's characteristics: age, years of education, non-Norwegian country of birth, number of children and age of the youngest child. Instead of excluding mothers with missing data for the control variables, we constructed a missing value dummy variable and included this in the regressions.¹⁶

3.2 Descriptive evidence of the outcomes

[Figure 1 “Participation in the transitional benefit programme” about here]

Figure 1 depicts the rate of participation in the transitional benefit programme. In each year, from 1992 to 2008, the sample consisted of all single mothers whose youngest child was aged 4–10 years. As expected, there was a decrease in participation over the years from 1997 to 2001, leading up to the beginning of the blanket implementation of the reforms, with a large drop in 2001 when the phase-in period ended. In that year, many single mothers may have exhausted the three-year time limit on the receipt of benefits.

[Figure 2 “Participation in the sickness insurance (SI) programme” about here]

[Figure 3 “Participation in medical- and work-related rehabilitation benefits programmes” about here]

¹⁵ For this purpose, we use data from the Norwegian Social Science Data Services (NSD). NSD is not responsible for the analysis of the data or the interpretations drawn in this paper.

¹⁶ Excluding the mothers with missing data (5 per cent of the sample) does not alter the results (results not shown).

[Figure 4 “Participation in the disability insurance (DI) programme” about here]

[Figure 5 “Participation in the social assistance (SA) programme” about here]

Figures 2–5 plot the yearly rates of participation in the SI, medical- and work-related rehabilitation, DI and SA programmes for both single and married mothers whose youngest child was aged 4–10 years. The two groups display similar pre-reform time trends. Note, however, with regard to participation in the SI and SA programmes (Figures 2 and 5), that the pre-trends are steeper for single mothers compared with married mothers. This may reflect an increasing labour market participation of single mothers in the period before the reforms, a time when the economy was recovering from a recession that took place in Norway in the early 1990s. Consistent with the benefit substitution hypothesis, we see a larger increase in the participation of single mothers compared with married mothers in all the alternative benefit programmes during the reform period. In addition, the figures show that the levels of participation in the various programmes differ between the two groups, with single mothers being generally more dependent on benefits than married mothers.

4. Identification strategy and descriptive characteristics

4.1 Identification strategy

For identification, we use a difference-in-difference strategy. We compare the outcomes for single and married mothers whose youngest child was aged 4–10 years in 1997, the year prior to the reforms, with those for single and married mothers whose youngest child was aged 4–10 years in 2001, the year the phase-in period ended and the new rules of the 1998 reform were implemented for all. The use of a comparison group of married mothers removes any time-specific confounding factors common to both single and married mothers. The assumption required for such a traditional difference-in-difference set-up (with one difference across time and another across groups) to produce consistent estimates is that single and

married mothers follow the same underlying time trend. However, the steeper time trends we observed in Figures 2 and 5 for participation in the SI and SA programmes for single mothers in the pre-reform period indicate that we may not satisfy the common trend assumption for these outcomes. To control for this single mother-specific time trend, we add a comparison over time of single and married mothers whose youngest child was aged 4–10 years in the years 1992 and 1996, i.e. in the pre-reform period.

We implement our trend-adjusted difference-in-difference estimator by estimating the following regression:

$$\begin{aligned}
y_{itq} = & \alpha_1 + \alpha_2 Reform_q + \alpha_3 Last_t + \alpha_4 Single_i + \alpha_5 (Reform_q \times Last_t) \\
& + \alpha_6 (Reform_q \times Single_i) + \alpha_7 (Last_t \times Single_i) \\
& + \mu (Reform_q \times Last_t \times Single_i) + X'_{itq} \theta + \varepsilon_{itq}, \tag{1}
\end{aligned}$$

where the subscript i denotes the individual, subscript t denotes the year and subscript q denotes the reform period. y_{itq} is the outcome variable and takes a value of one if the mother is registered to receive the benefit of interest and zero otherwise. *Reform* is a binary variable taking a value of one if the year is within the reform period (1997 or 2001) and zero if the year is within the pre-reform period (1992 or 1996). *Last* is a binary variable taking a value of one if the year is the last year within either the pre-reform or reform period (1996 or 2001) and zero if the year is 1992 or 1997. *Single* is a binary variable taking a value of one if the mother was a single mother and zero if she was married. X_{itq} is a vector of observed characteristics comprising the mother's age, years of education, non-Norwegian country of birth, number of children, age of the youngest child and the local labour market unemployment rate for females. ε_{itq} is the error term. The coefficient of interest is μ . This coefficient measures the effect of the reforms, i.e. the change in the mean outcome over time

in the reform period relative to the pre-reform period for single mothers relative to married mothers.

For this trend-adjusted difference-in-difference estimator to produce consistent estimates, we assume that in the absence of the reforms, the average outcome of single mothers would have changed in the same way in the reform period (1997 and 2001) as in the pre-reform period (1992 and 1996) relative to the average outcome of married mothers with children in the same age range.

4.2 Descriptive characteristics of the sample

[Table 2 “Characteristics of mothers in the pre-reform (1992 and 1996) and reform (1997 and 2001) periods” about here]

Table 2 details the characteristics of single and married mothers whose youngest child was aged 4–10 years in the pre-reform period (1992 or 1996) and the reform period (1997 or 2001). As shown, on average single mothers were younger, were less educated and had fewer children compared with married mothers. However, these differences are not of concern given that we control for these differences by allowing for different intercepts in the estimations. However, a potential concern is whether there are any different trends in the characteristics of single and married mothers. Unless controlled for, any such differences in trends could bias the estimated effects of the reforms. For example, over time, the sample of mothers is becoming older, more educated and more likely to be non-Norwegian. It is, however, encouraging to find that these time trends are similar across single and married mothers. Consistent with this, a balancing test where these characteristics served as dependent variables in equation (1) produced rather small estimates. However, given that the majority of these

estimates were statistically significant, we still included these characteristics as controls in our main specification.¹⁷

5. Results

5.1 Main results

To investigate the benefit substitution effects of the reforms on single mothers, we estimated expression (1) using a linear probability model.¹⁸ All standard errors were robust with respect to heteroscedasticity.

[Table 3 “Benefit substitution effects of the reforms on single mothers” about here]

Table 3 provides the estimated results. Every estimate is from a separate estimation of expression (1) for the relevant outcome. Overall, the estimates indicate strong evidence of benefit substitution by single mothers in response to the reforms. That is, the estimated effect of the reforms on the participation of single mothers in the transitional benefit programme is negative and statistically significant, while the estimates for participation in all the alternative benefit programmes (SI, medical- and work-related rehabilitation, DI and SA) are positive and statistically significant.

With regard to benefit substitution by switching to health-related benefit programmes, the results suggest that the reforms led to a 2.66 percentage points increase in the participation rate in the SI programme, 2.86 percentage points in the medical- and work-related rehabilitation programme and 0.97 percentage points in the DI programme for single mothers compared with married mothers. These estimates are large in relative terms: compared with

¹⁷ Excluding the controls does not significantly alter the results (see column (2) in Table 6).

¹⁸ We could have applied non-linear logit or probit models. Another alternative, given that there are many outcomes (benefit programmes) to choose from, is the multinomial logit model. However, the estimates from these non-linear models do not facilitate straightforward interpretation. In addition, the multinomial logit model relies on a strict assumption (the independence of irrelevant alternatives) implying that removing or changing the characteristics of a third outcome does not affect the relative odds of the two outcomes considered. In this context, given that some of the benefit programmes are more similar than others (e.g. health-related benefits vs. SA payments), this assumption is not realistic.

the mean participation rates of single mothers in these programmes in 1997, the estimated effects correspond to about 14 per cent, 50 per cent and 35 per cent increases, respectively. This suggests that many single mothers are eligible for benefits designed to secure income for individuals who have either a temporary or a long-term illness. This is in line with the reports showing that single mothers have poorer health than the general population (see Section 2.3) and may suggest that the welfare state is in fact able to support those who need it. In the absence of the reforms, these single mothers may simply have delayed their participation in health-related benefit programmes until their transitional benefits eventually expired. The increased participation in SI benefits (2.66 percentage points) is also consistent with the scenario of more single mothers earning their right to receive this benefit by working.

Conversely, this benefit substitution may also indicate a worsening of the health of single mothers in response to the reforms, possibly caused by stress or difficulties combining work with caring for their children. Further, we cannot rule out the possibility that some single mothers in a difficult economic situation may have gained access to benefits for which they were not eligible. In this regard, the increased participation in the DI programme (0.97 percentage points) is of particular concern, in that single mothers on DI benefits are likely to depend on welfare for the rest of their lives.

Of course, it would have been interesting to follow the mothers in the sample until their youngest child had reached the age of 10 years, when all single mothers would have lost access to transitional benefits in the absence of the reforms, and see whether the reforms still had effects on participation in the DI programme. If so, this would indicate that the reforms have indeed caused some single mothers to enter the DI programme who would not otherwise have done so (even when their transitional benefits eventually expired). Unfortunately, this exercise is unlikely to produce reliable results given that we do not have data on time-limited DI benefits. The introduction of this benefit is likely to have affected single and married

mothers differently: single mothers are generally younger than are their married counterparts and are thus more likely to be in the target group for the time-limited DI programme.¹⁹

These findings of benefit substitution by single mothers by switching to health-related benefit programmes support the studies on substitution between the welfare programme for single mothers in the US and the SSI programme. Interestingly, our estimate of benefit substitution by switching to the DI programme (0.97 percentage points) is very close to Schmidt and Sevak's (2004) finding that female-headed households in states with less attractive welfare programmes were 0.6 percentage points (in relative terms 20 per cent) more likely to receive SSI than were households with married mothers.

Turning to SA payments, we estimate that the participation rate increased by 8.15 percentage points for single mothers relative to married mothers in response to the reforms. This corresponds to a 49 per cent increase compared with the level for single mothers in 1997. Thus, SA payments prove to be the main safety net for single mothers when access to transitional benefits declines. This is as expected, in that SA payments are the only alternative for single mothers who cannot document having an illness. In addition, mothers receiving their main income elsewhere may receive SA payments as a supplementary or intermediate source of income.²⁰ Following the mothers in the sample six years ahead (when their children were 10–16 years old and both pre- and post-reform single mothers lost access to transitional benefits regardless of the reforms), the estimated reform effect on the participation rate in SA (at that time) is –0.8 percentage points and statistically significant (results not shown). Thus,

¹⁹ What we can do is to follow the mothers a couple of years ahead (to 2002 and 2003) and see whether the single mothers unaffected by the reforms were catching up with the post-reform single mothers as their children aged. This does not seem to be the case. The estimated effects on DI participation one and two years ahead are stable at 1.04 percentage points and 1.00 percentage points, respectively (results not shown). Keep in mind, however, that qualifying for DI benefits is a time-consuming process, so time lags may contaminate these estimates.

²⁰ We should note that the reforms also led to a statistically significant increase in the yearly SA payments for single mothers compared with married mothers. In the full sample, the estimated reform effect on yearly SA payments is about 3,900 NOK (all money values are given at 1998 prices), while in a sample restricted to SA payment receivers, the estimated reform effect is about 12,600 NOK in 1998 (results not shown). Thus, in addition to being more dependent on SA payments in terms of participation, single mothers are also in need of, or at least apply for, larger payments after the reforms.

post-reform single mothers appear to substitute SA benefits for transitional benefits when their children are relatively young, but they do not seem to be more dependent on SA payments in the long run compared with pre-reform single mothers.

The estimated effect of the reforms on total benefit substitution, as measured by participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA), was 10.05 percentage points. By contrast, the estimated reduction in welfare dependence, as measured by participation in *any benefit programme* (all the alternative benefit programmes in addition to the transitional benefit programme), was 14.81 percentage points. Thus, despite the substantial amount of benefit substitution, the reforms on average reduced welfare dependence among single mothers. Note, however, that the estimated decrease in the participation rate in the transitional benefit programme for single mothers was 31.88 percentage points. This implies that the reduction in welfare dependence because of the reforms was far less than the reduction in the transitional benefit programme case-load.

We cannot extract similar information on welfare dependence from existing studies evaluating welfare reforms with respect to programme case-loads and/or labour market participation. For instance, Mogstad and Pronzato (2012) estimate that labour market participation among single mothers increased by about 4 percentage points because of the 1998 reform in Norway. They also show that the transitional benefit programme case-load fell from 65 per cent to 36 per cent within the same period. The corresponding decrease in welfare dependence would be overestimated if we interpret the decrease in the transitional benefit programme case-load as a pure dependence reduction, and correspondingly underestimated if we interpret the increase in labour market participation as the true dependence reduction.

To see this, we used Mogstad and Pronzato's (2012) definition of labour market participation and estimated single mothers' labour market participation in our sample to

increase by 4.71 percentage points due to the reforms (results not shown).²¹ Note that this increase is smaller than not only the decrease in the transitional benefit programme case-load (31.88 percentage points) but also the decrease in overall welfare dependence (14.81 percentage points). Some single mothers may already be working while receiving welfare, and they may increase their (existing) participation rather than starting afresh in the labour force when they lose access to transitional benefits. Thus, more single mothers than those who actually start to work may become self-sufficient. On the other hand, not all single mothers who lose access to transitional benefits become self-sufficient. As this study shows, many obtain access to benefits elsewhere, and these buffer the potential reduction in welfare dependence. Note that the estimated decrease in the participation rate in the transitional benefit program and the estimated increase in benefit substitution do not add up to the estimated reduction in welfare dependence ($-31.88+10.05 \neq -14.81$). The reason is that some single mothers were receiving alternative benefits in addition to transitional benefits. When losing access to the latter, these mothers continued to be welfare dependent on the alternative benefits without making a distinct switch between benefit programs. Alternative reform responses of single mothers could be to rely on other household members, family or friends to maintain some income. These alternatives are less relevant in this context, as less than 2 per cent of the single mothers in the sample were neither working nor receiving benefits of any kind.

To investigate the characteristics of single mothers who are prone to enter the specific alternative benefit programmes in response to the reforms, we split the sample according to the local labour market unemployment rates where the single mothers lived, their number of

²¹ We defined a mother as participating in the labour force if her measure of earnings, which included labour earnings in addition to welfare payments such as unemployment benefits, SI and parental leave benefits, exceeded one “basic amount” (a measure used by the Norwegian Social Insurance Scheme to determine a person’s eligibility for a number of benefits and the magnitude of the payments he/she can receive). In 1998, one basic amount was 45,000 NOK (at 1998 prices).

years of education, their age and the age of their youngest child.²² Table 4 displays the results. Table A1 in Appendix A details the subsample characteristics of single mothers in the pre-reform year of 1997.

[Table 4 “Benefit substitution effects of the reforms on single mothers by selected characteristics” about here]

We found that single mothers living in local labour markets with relatively high unemployment were considerably less likely to substitute SI benefits for transitional benefits in response to the reforms compared with single mothers in local labour markets with relatively low levels of unemployment (1.88 vs. 3.54 percentage points). The same holds for single mothers with fewer years of education relative to those with more years of education (2.31 vs. 3.38 percentage points). This is as expected, given that high local unemployment and low levels of education reduce the probability of finding employment and hence reduce the likelihood of becoming eligible for SI benefits. Note that the opposite holds true for all of the other alternative benefits. In particular, the statistically insignificant estimate for participation in medical- and work-related rehabilitation programmes for the sample of more-educated mothers (0.62 percentage points) is consistent with these mothers being eligible for SI benefits instead. Better-educated single mothers were also far less likely to be in need of SA payments compared with less-educated single mothers (3.97 vs. 7.33 percentage points).

Turning to older versus younger mothers, we see that older single mothers were less likely to receive SI benefits (1.72 vs. 4.57 percentage points) and were less dependent on SA payments (5.27 vs. 9.78 percentage points). By contrast, older mothers and those whose youngest child was aged 8–10 years were most likely to participate in the DI programme in

²² We split the sample according to whether the observation was above or below/equal to the median for single mothers in each year of the analysis (1992, 1996, 1997 and 2001). The median ranges for the years are 2.5–5.0 per cent for the local labour market unemployment rate, 32–35 years for the mothers’ age and 10–12 years for their years of education.

response to the reforms (1.50 and 1.59 percentage points, respectively). This may of course be related to maternal age, but it may also be the case that these single mothers had relied on welfare for a longer period and hence experienced greater difficulty (re-)entering the labour market compared with younger single mothers with children aged 4–7 years.

5.2 Robustness

Married mothers constitute our preferred comparison group. Along with their ineligibility for transitional benefits, married mothers may face similar barriers to employment and challenges in the labour market resulting from having children to those of single mothers. Nevertheless, robustness tests using specifications with a range of other comparison groups increase the level of confidence in our results. We therefore supplemented the analysis by using single women without children and single mothers whose youngest child was aged 11–18 years as comparison groups.²³ In addition, we undertook a triple-difference analysis where *both* married mothers and single mothers whose youngest child was aged 11–18 years served as the comparison groups. This enabled us to simultaneously control for possible changes over time affecting mothers with children in the same age range *and* changes over time that affect single mothers differently from married mothers. Table 5 provides the results.

[Table 5 “Benefit substitution effects of the reforms on single mothers for alternative comparison groups” about here]

When using single women without children as the comparison group, we find that the estimates are somewhat larger than for married mothers, and when using single mothers whose youngest child was aged 11–18 years as the comparison group, the estimates are

²³ As for the definition of single mothers whose youngest child was aged 4–10 years in Section 3.1, single women without children and single mothers whose youngest child was aged 11–18 years were defined as single if they were neither married nor cohabiting with a partner with whom they had children. These women were aged 19–55 years at the end of each calendar year, and were single either with or without children, both at the beginning and at the end of the calendar year.

smaller and less precise (except for SA payments). The estimates from the triple-difference test tend to be quite similar to the results when single mothers whose youngest child was aged 11–18 years are the comparison group. In the two latter specifications, the estimates for the SI and DI benefits are not statistically significant. However, the validity of the use of single mothers whose youngest child was aged 11–18 years as a comparison group is questionable. For instance, the reforms affect single mothers with children older than 10 years who experience a family dissolution, and cohabiting single mothers in stable relationships who have children in need of intensive supervision (see Table 1). Note also that some of the children who were older than 10 years after the reforms were 10 years or younger during the phase-in period of the reforms, and thus their mothers may have been affected. Nevertheless, we expect that single mothers whose youngest child was aged 11–18 years were less affected by the reforms than were single mothers whose youngest child was aged 4–10 years. Finding evidence of the reforms' effects with these alternative specifications, though of smaller magnitude and less precise in a statistical sense, is reassuring.

In addition, we constructed a series of alternative specifications for the main analyses using married mothers as the comparison group. We checked whether the results were sensitive to the exclusion of the control variables. Then we tested how the results changed if we did not include a comparison group, i.e. did not control for potential time-specific confounding factors common to both single and married mothers. This exercise elucidated whether the reforms changed the behaviour of single mothers independently of the relative behaviour of married mothers. Then we did not control for the pre-reform trends, i.e. we dropped the observations in the pre-reform period (1992 and 1996). In this specification, we ignored the fact that single mothers may respond somewhat differently to changes in the economic environment from married mothers. Further, we limited the sample to mothers whose youngest child was aged 6–10 years. Even though we constructed the sample so that

the mothers were ineligible for the cash subsidies for children aged one and two years at the time the outcomes were measured (see Section 2.1), some mothers in the sample with children aged 4 or 5 years in 2001 may have taken up these cash subsidies prior to 2001, in 1998 and 1999. We thus excluded these mothers. To investigate whether the increasing share of foreign (non-Norwegian) mothers may drive the results of the analysis over time, we limited the sample to Norwegian-born mothers only. Finally, we conducted a placebo test using only observations from the pre-reform years. In this specification, the pre-reform period consisted of the years 1992 and 1995, and the artificial reform period consisted of the years 1993 and 1996. Because there were no reforms within this period, we expected to identify no effects. Table 6 presents the results from these alternative specifications.

[Table 6 “Benefit substitution effects of the reforms on single mothers for alternative specifications” about here]

The estimates from the specification without controls are virtually identical to the main results. The relatively large estimates from the specification without a comparison group imply that single mothers do alter their behaviour in response to the reforms, and that we tend to overestimate the benefit substitution effects if we ignore time-specific factors. Not adjusting for the pre-trends causes the estimate of participation in the SA programme to decrease considerably (1.06 percentage points). This corresponds well with the descriptive evidence on SA payments: the pre-reform trend is steeper for single mothers than married mothers (see Figure 5). Thus, controlling for time-specific factors both common to single and married mothers *and* specific to single mothers is crucial for obtaining consistent estimates of benefit substitution. The estimates for the specifications for mothers whose youngest child was aged 6–10 years and Norwegian-born mothers only are essentially identical to the main results. It is reassuring to find that the placebo test produces rather small and, for the most part, statistically insignificant estimates.

Finally, we implemented an alternative difference-in-difference estimator whereby we utilized the fact that we have data for every year from 1992 to 2008. Here, we compared the outcomes for single and married mothers whose youngest child was aged 4–10 years over the period prior to the reforms (1992–1997) against those for single and married mothers whose youngest child was aged 4–10 years in the phase-in reform period (1998–2000) and the post-reform period (2001–2008). In addition to year dummies, we included a single mother-specific time trend.²⁴ The advantage of this difference-in-difference set-up is that it allows us to control for both linear and quadratic differences in single mother-specific trends. Table 7 displays the results.

[Table 7 “Benefit substitution effects of the reforms on single mothers using an alternative difference-in-difference specification” about here]

Columns (1) and (2) in Table 7 show the estimated effects when a linear trend is controlled for, while columns (3) and (4) show the estimated effects when both linear and quadratic trends are controlled for. In both specifications, the estimates for the phase-in period (columns (1) and (3)) are rather small compared with the estimates for the post-reform period (columns (2) and (4)). This is as expected: the reforms affect fewer single mothers in the phase-in period, so evidence of benefit substitution effects in this period is limited. The estimates for the post-reform period (columns (2) and (4)) are similar to those for the main specification (see Table 3). One notable exception is that the substitution of medical- and work-related rehabilitation benefits for transitional benefits is somewhat sensitive to how we control for the trend. In the specification with a quadratic trend, this estimate is insignificant

²⁴ Formally: $y_{itq} = \beta_1 + \beta_2 Single_i + \gamma_1 (Phasein_q \times Single_i) + \gamma_2 (Post_q \times Single_i) + \beta_3 (t \times Single_i) + \lambda_t + X'_{itq} \theta + \varepsilon_{itq}$, where the notation is similar to expression (1). *Phasein* takes a value of one if the year is within the phase-in period of the reforms (1998–2000) and zero otherwise. *Post* takes a value of one if the year is within the post-reform period (2001–2008) and zero otherwise. *t* is a trend variable numbering 1 (1992) to 17 (2008) and λ_t is a vector of yearly fixed effects. The reform effects are the coefficients γ_1 and γ_2 ; these are the changes in the mean outcome over time in the phase-in period relative to the pre-reform period, and the post-reform period relative to the pre-reform period, respectively, for single mothers relative to married mothers.

(−0.02 percentage points). Note also that the estimates for the substitution of SI benefits for transitional benefits are larger (4.12 and 3.07 percentage points) and the estimates for the substitution of SA payments are smaller (4.04 and 6.09 percentage points) than for the main specification. Thus, in the longer run, more single mothers with children aged 4–10 years may have entered the SI programme because of the reforms, and correspondingly fewer may have joined the SA programme. These results should, however, be interpreted with some caution. In the years following 2001, there have been further reforms to both the DI programme (the introduction of time-limited DI benefits) and the SI programme that may have affected single and married mothers differently.²⁵ In addition, we have no data on medical- and work-related rehabilitation benefits after 2001, and both the the cash subsidies for children aged one and two years and the lowering of the school starting age (see Section 2.1) could potentially influence the results. Thus, our main specification, although more restricted, is preferred. Overall, the robustness specifications support our main results.

5.3 Threats to validity

One potential concern may be that the mother’s marital status could be endogenous with respect to the reforms. That is, if the reforms make it more costly to be a single mother, the likelihood that single mothers become married mothers may increase. If so, the estimated results are inconsistent. To investigate this, we examined the yearly transition rates from single to married motherhood, and vice versa, for mothers whose youngest child was aged 4–10 years (or those most affected by the reforms) and mothers whose youngest child was aged 11–18 years (or those less affected by the reforms). It is reassuring to find that the two groups of mothers follow the same trends, and that there are no changes in the relative probabilities of becoming a single or married mother within the reform period (results not shown).

²⁵ Reforms to the SI programme in 2004 increased the number of weeks persons had to work to be entitled to benefits from two to four weeks, and required recipients who had been ill for more than eight weeks to engage in some work-related activity in order to qualify (unless they were unable to do so for medical reasons).

The reforms could also potentially influence the choice of mothers to have another child. The 1998 reform introduced both a three-year time limit on the receipt of benefits and a three-year implementation period from 1998 to 2001. Thus, single mothers receiving transitional benefits continuously since 1997 would have needed to have another child in 2000 to remain eligible for benefits. Investigating the yearly probabilities of having another child for single and married mothers whose youngest child was aged 4–10 years, we do in fact find a small (but statistically significant) relative increase in the probability of having another child among single mothers in 2000 (results not shown). Given that single mothers who speculate about having another child in order to stay on transitional benefits may also be more prone to take up alternative benefits, the exclusion of these mothers from the sample could bias the estimates of benefit substitution downwards. However, the probability of becoming a single mother through having one's first child also increased somewhat in 2000. We believe it is unlikely that the reforms influenced these first-time mothers, so there would appear to be some factor unrelated to the reforms that influenced births among single mothers in 2000. Whatever the cause, there was only an increase of about 200 births among single mothers whose youngest child was aged 4–10 years in 2000. Relative to the approximately 40,000 single mothers in the sample each year, this is a rather small amount, so any resulting bias is likely to be small. This corresponds well with what Moffitt (2007) and Blank (2002) find in reviewing the US literature, namely that the effects of welfare reform on marriage and fertility are very small, if they exist at all.

6. Conclusion

Policy-makers in developed countries have confronted welfare dependence and poverty among single mothers by imposing reforms on welfare programmes targeted at this group. Such reforms have included work requirements and time limits on the receipt of welfare, and thus they have operated to restrict single mothers' access to these benefits. These reforms

have served to reduce programme case-loads and generally increased the employment and earnings of single mothers. However, it is unlikely that all single mothers have successfully managed the transition from welfare to work. Given that most developed countries have comprehensive income security systems for their residents, single mothers may have the option to switch to other income security programmes when access to their own specific welfare programme is reduced, i.e. so-called benefit substitution.

We investigated whether reforms that decreased access to the transitional benefit programme targeted at single mothers in Norway encouraged single mothers to substitute alternative benefits for their prior welfare payments. Using a difference-in-difference approach, we found evidence of considerable benefit substitution by single mothers by switching to alternative benefit programmes. While the reforms decreased the participation rate in the transitional benefit programme by 32 percentage points, the estimated effect of the reforms on total benefit substitution was 10 percentage points. Overall, we found that welfare dependence among single mothers decreased by 15 percentage points because of the reforms. A series of robustness checks confirmed these findings.

These results imply that single mothers who left the transitional benefit programme did not necessarily become self-sufficient, and many continued to depend on welfare. Thus, decreases in programme case-loads do not reflect equal reductions in welfare dependence. From a policy perspective, this paper stresses the importance of taking into account the entire income security system when designing welfare reforms aimed at getting individuals off welfare and into work.

More specifically, the phenomenon of single mothers switching to health-related benefits should be of concern for policy-makers. The increased uptake of disability insurance (DI) benefits is especially worrying in that these mothers are likely to remain dependent on DI benefits for the rest of their work-aged lives. It is an open question as to whether, in the

absence of these reforms, single mothers would have delayed their participation in health-related benefit programmes until their transitional benefits eventually expired, or whether the reforms made them sick or influenced them to access benefits they were not entitled to. Although this question is yet to be answered, this study may justify increased scrutiny by general physicians and stricter screening processes for health-related benefits.

Some single mothers may also need extra time or support to manage the transition from welfare to work. The increased take-up of social assistance (SA) payments, generally considered a benefit of last resort, may also indicate that the three-year time limit on the receipt of benefits is too short or perhaps that the work requirements are too hard to fulfil, at least for some single mothers. A final interesting question for future research is how the reforms affect the welfare dependence of single mothers over the longer run, i.e. among single mothers who have never been part of the pre-reform programme. Single mothers who enter motherhood in the post-reform period may view welfare as less attractive and consequently alter their behaviour in order to be less welfare dependent.

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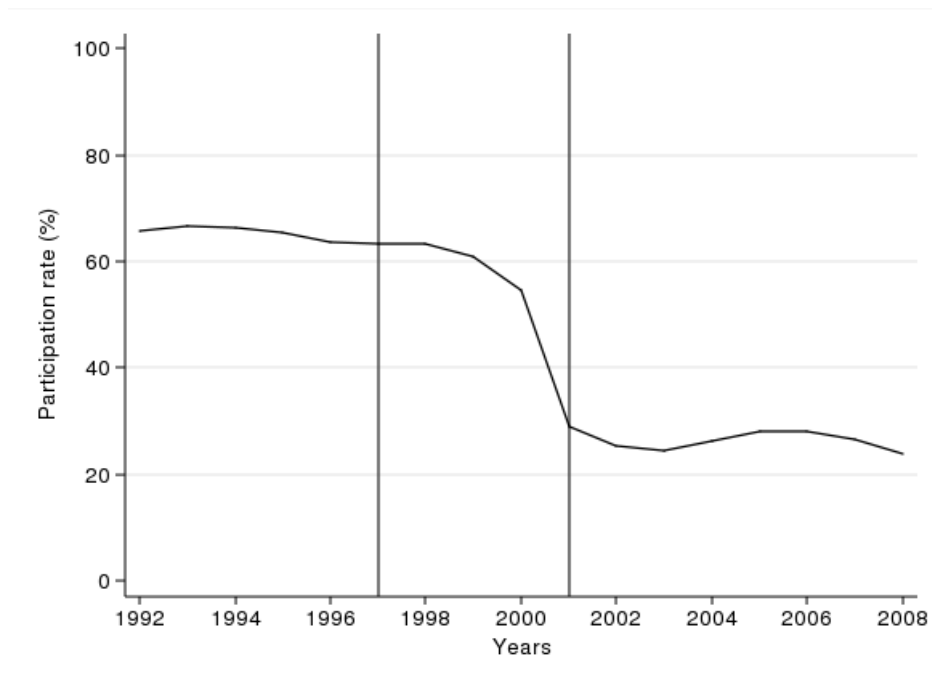


Figure 1: Participation in the transitional benefit programme

Notes: In each year, the sample comprises single mothers whose youngest child was aged 4–10 years. The vertical lines indicate the years before (1997) and after (2001) the phase-in period of the reforms.

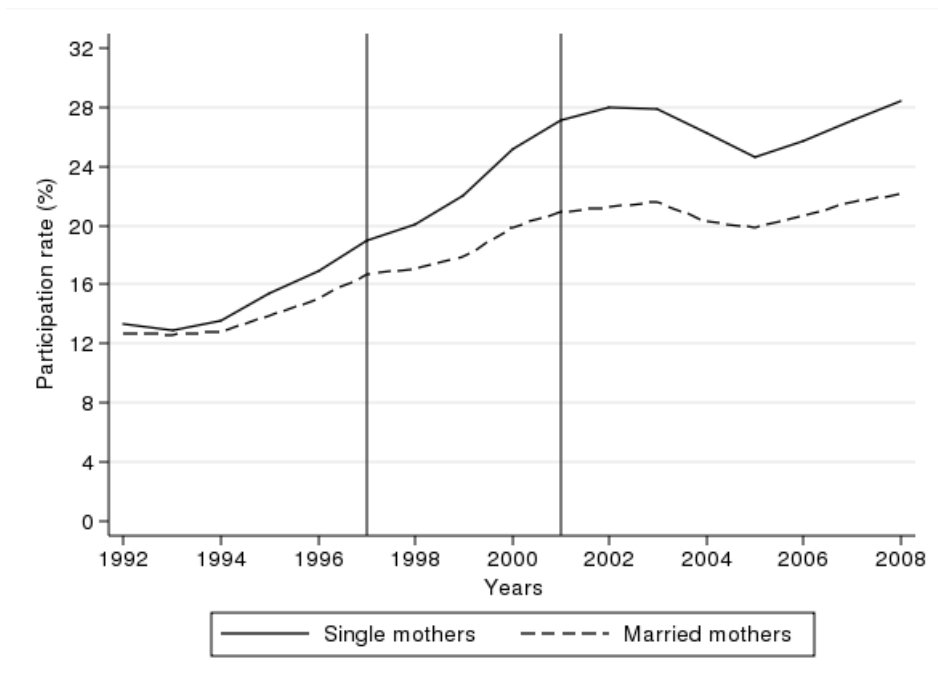


Figure 2: Participation in the sickness insurance (SI) programme

Notes: In each year, the sample comprises single and married mothers whose youngest child was aged 4–10 years. The vertical lines indicate the years before (1997) and after (2001) the phase-in period of the reforms.

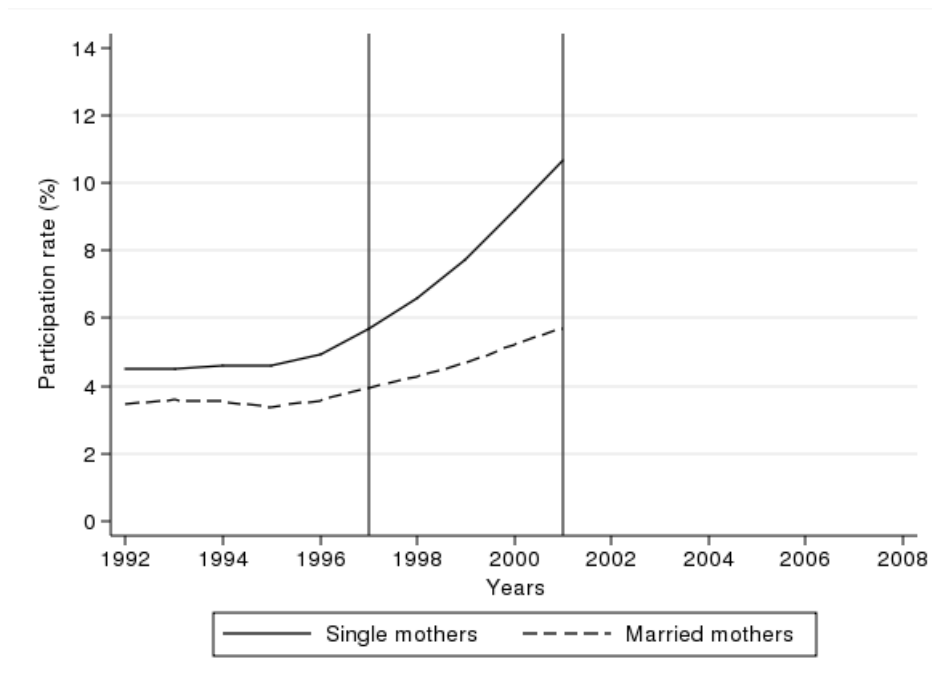


Figure 3: Participation in medical- and work-related rehabilitation benefits programmes

Notes: In each year, the sample comprises single and married mothers whose youngest child was aged 4–10 years. The vertical lines indicate the years before (1997) and after (2001) the phase-in period of the reforms. The data on medical- and work-related rehabilitation benefits are limited to the years 1992 to 2001.

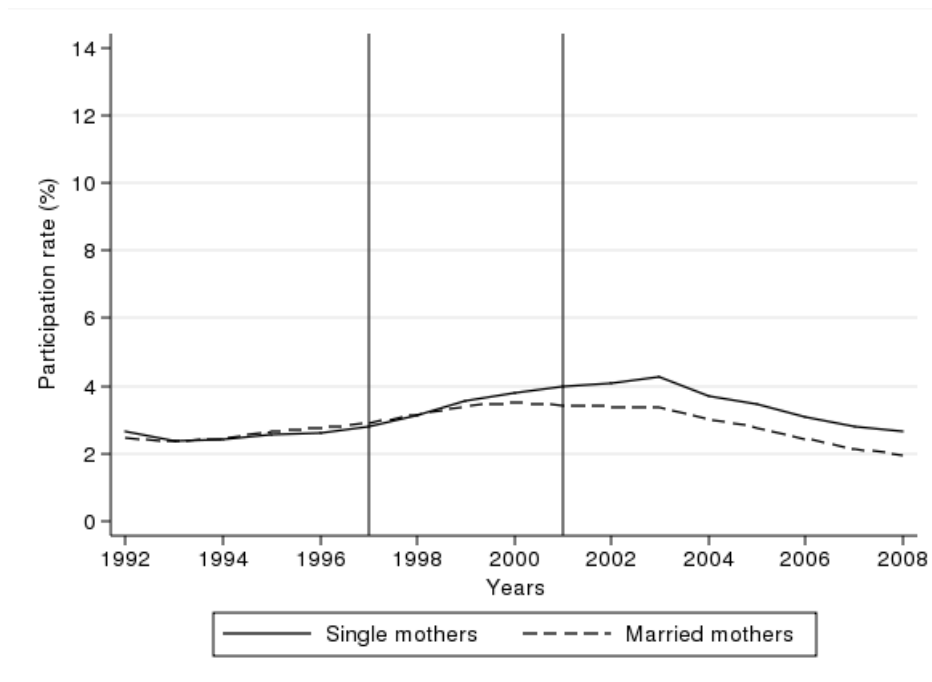


Figure 4: Participation in the disability insurance (DI) programme

Notes: In each year, the sample comprises single and married mothers whose youngest child was aged 4–10 years. The vertical lines indicate the years before (1997) and after (2001) the phase-in period of the reforms.

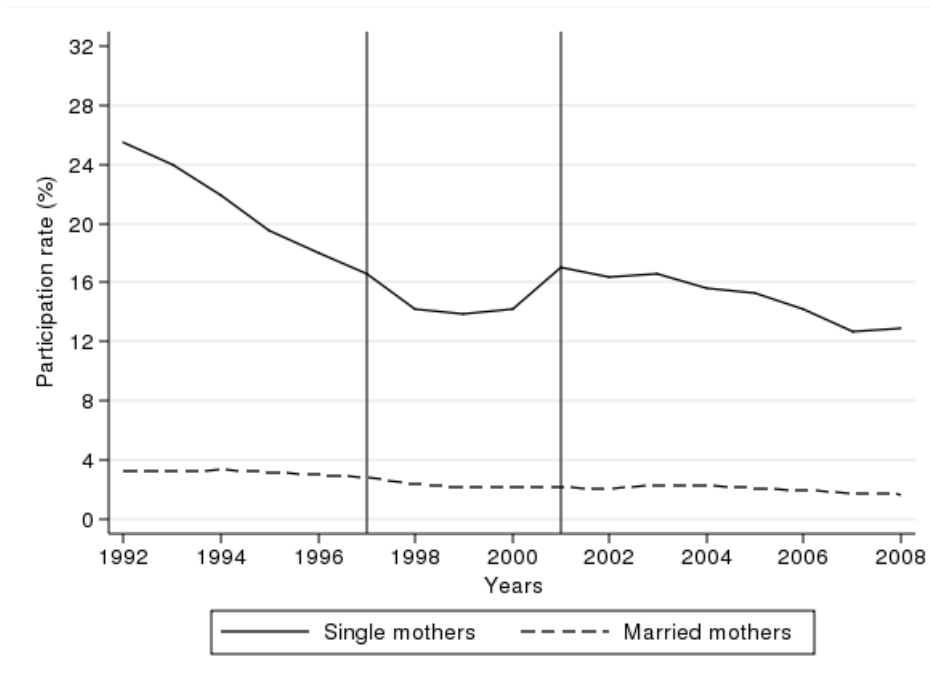


Figure 5: Participation in the social assistance (SA) programme

Notes: In each year, the sample comprises single and married mothers whose youngest child was aged 4–10 years. The vertical lines indicate the years before (1997) and after (2001) the phase-in period of the reforms. A woman was also defined as participating in the SA programme if her husband participated.

Table 1. Features of the 1998 and 1999 reforms of the transitional benefit programme

Characteristics	Pre-reform	Post-reform
1998 reform		
Time limit ^{a)}	None	3 years
Age limit	Youngest child has finished third grade of primary school (9–10 years old)	Youngest child is less than 8 years old
Work requirement ^{b)}	None	Youngest child is aged 3 years or older
Max. benefit level ^{c)}	6,171 NOK (1998 prices) per month in 1998	6,995 NOK (1998 prices) per month in 1998
Short-term (1–2 years) eligibility after family dissolution (child > age limit)	Youngest child between 10 and 18 years of age	Youngest child between 8 and 10 years of age
Child requires intensive supervision because of disability, illness or severe social issues	Child less than 18 years of age	Child less than 18 years of age
Asset means-tested	No	No
1999 reform		
Cohabitation status	Not eligible if the couple have children in common or are married	Not eligible if the relationship has lasted for at least 12 of the past 18 months

Notes: a) The time limit relates to the mother's youngest child and resets to three years for every newborn child. Benefits may be awarded in non-consecutive periods. b) Work requirements include working for at least half of the hours of a standard working week in Norway (37.5 hours), studying for at least half of the hours of a full-time study or registering as unemployed at the government agency of the Labour and Welfare Service. c) The maximum benefit level was obtained if the mother had earnings from work, or received SI benefits, below a threshold of 1,891 NOK (1998 prices) per month in 1998, and did not receive medical- or work-related rehabilitation or DI benefits. 100 NOK = approx. 14 EUR and 18 USD.

Table 2. Characteristics of mothers in the pre-reform (1992 and 1996) and reform (1997 and 2001) periods

	Single mothers				Married mothers				DD estimate (no controls) ^{c)}
	Pre-reform		Reform		Pre-reform		Reform		
	1992	1996	1997	2001	1992	1996	1997	2001	
Characteristics (mean)^{a)}									
Age	32.88	33.57	33.88	34.94	36.73	37.17	37.35	37.98	0.17** (0.07)
<i>No. of obs.</i>	32,919	42,477	43,705	45,629	13,5437	143,516	146,131	153,893	743,707
Years of education	10.87	11.27	11.36	11.71	11.28	11.73	11.83	12.23	-0.01 (0.02)
<i>No. of obs.</i>	31,732	40,810	41,939	44,299	12,9928	136,579	138,886	148,305	712,478
Non-Norwegian (%)	4.84	6.46	6.77	7.91	5.49	7.67	8.00	9.70	-0.64*** (0.24)
<i>No. of obs.</i>	32,207	42,477	43,705	45,629	13,1408	143,516	146,131	153,893	738,966
No. of children	1.68	1.71	1.73	1.83	2.32	2.34	2.35	2.39	0.05*** (0.01)
<i>No. of obs.</i>	32,919	42,477	43,705	45,629	13,5437	143,516	146,131	153,893	743,707
Age of youngest child	6.74	6.78	6.86	7.02	6.80	6.64	6.66	6.74	-0.11*** (0.02)
<i>No. of obs.</i>	32,919	42,477	43,705	45,629	13,5437	143,516	146,131	153,893	743,707
Unemployment rate (%)	5.18	4.50	3.69	2.50	5.18	4.47	3.66	2.49	-0.05*** (0.01)
<i>No. of obs.</i>	32,919	42,477	43,705	45,629	13,5437	143,516	146,131	153,893	743,707

Proportion of single mothers ^{b)}	0.196	0.228	0.230	0.229	0.222
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Notes: In each year, the sample comprises single and married mothers whose youngest child was aged 4–10 years. a) Mothers with missing information for specific characteristics were excluded from the calculation of the relevant means. b) The proportion of single mothers among all mothers (including mothers with missing information). c) Difference-in-difference (DD) estimates obtained after specifying each characteristic separately as the dependent variable in OLS estimations of expression (1).

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Table 3. Benefit substitution effects of the reforms on single mothers

Dependent variable	Estimate	Single mothers' outcome (%) 1997 ^{c)}
Transitional benefits	-31.88*** (0.45)	63.20
SI benefits	2.66*** (0.43)	18.99
Medical- and work-related rehab. benefits	2.86*** (0.26)	5.68
DI benefits	0.97*** (0.19)	2.80
SA payments	8.15*** (0.39)	16.60
Total benefit substitution^{a)}	10.05*** (0.53)	37.91
Welfare dependence^{b)}	-14.81*** (0.47)	77.15
<i>No. of obs.</i>	743,707	43,705

Notes: Each estimate is from a separate OLS estimation of expression (1) for the respective outcome. Controls were included. a) The outcome of total benefit substitution is defined as participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA). b) The outcome of welfare dependence is defined as participation in *any benefit programme*, i.e. any of the alternative benefit programmes in addition to the transitional benefit programme. c) Single mothers' outcome (%) 1997 refers to the mean outcome of single mothers in the pre-reform year of 1997.

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Table 4. Benefit substitution effects of the reforms on single mothers by selected characteristics

Dependent variable	(1) High local unemp.	(2) Low local unemp.	(3) Highly educated	(4) Less educated	(5) Older mother	(6) Younger mother	(7) Youngest child 8–10	(8) Youngest child 4–7
Transitional benefits	–34.12*** (0.63)	–30.27*** (0.65)	–27.66*** (0.76)	–37.75*** (0.56)	–29.81*** (0.67)	–35.66*** (0.57)	–42.38*** (0.73)	–23.11*** (0.58)
SI benefits	1.88*** (0.61)	3.54*** (0.61)	3.38*** (0.74)	2.31*** (0.56)	1.72*** (0.62)	4.57*** (0.65)	2.02*** (0.71)	2.77*** (0.54)
Medical- and work- related rehab. benefits	3.06*** (0.37)	2.64*** (0.36)	0.62 (0.38)	3.19*** (0.36)	3.14*** (0.38)	3.34*** (0.39)	3.00*** (0.43)	2.67*** (0.33)
DI benefits	1.27*** (0.28)	0.63** (0.26)	0.97*** (0.23)	1.02*** (0.28)	1.50*** (0.33)	0.69*** (0.20)	1.59*** (0.35)	0.47** (0.21)
SA payments	8.85*** (0.57)	7.39*** (0.55)	3.97*** (0.47)	7.33*** (0.56)	5.27*** (0.52)	9.78*** (0.60)	7.51*** (0.59)	8.69*** (0.52)
Total benefit substitution^{a)}	10.39*** (0.76)	9.70*** (0.74)	7.67*** (0.85)	9.21*** (0.71)	7.36*** (0.74)	13.41*** (0.81)	9.29*** (0.85)	10.24*** (0.68)
Welfare dependence^{b)}	–15.59*** (0.65)	–14.49*** (0.68)	–16.57*** (0.87)	–17.59*** (0.57)	–13.49*** (0.71)	–16.28*** (0.68)	–20.68*** (0.80)	–10.04*** (0.58)
<i>No. of obs.</i>	366,064	377,643	299,847	412,631	509,215	234,492	279,210	464,497

Notes: Each estimate is from a separate OLS estimation of expression (1) for the respective outcome for the relevant subsample of mothers. Controls were included. The sample was split according to whether the observation was above or below/equal the median for single mothers in each year of the analysis (1992, 1996, 1997 and 2001). a) The outcome of total benefit substitution is defined as participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA). b) The outcome of welfare dependence is defined as participation in *any benefit programme*, i.e. any of the alternative benefit programmes in addition to the transitional benefit programme.

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Table 5. Benefit substitution effects of the reforms on single mothers for alternative comparison groups

Dependent variable	(1) Baseline (married mothers)	(2) Single women, no child	(3) Single mothers, child 11–18	(4) Married and single mothers, child 11–18
Transitional benefits	−31.88*** (0.45)	−31.61*** (0.46)	−29.49*** (0.48)	−30.34*** (0.49)
SI benefits	2.66*** (0.43)	2.55*** (0.43)	1.15* (0.60)	0.94 (0.66)
Medical- and work-related rehab. benefits	2.86*** (0.26)	3.75*** (0.27)	1.23*** (0.38)	1.75*** (0.41)
DI benefits	0.97*** (0.19)	0.77*** (0.22)	−0.44 (0.34)	0.59 (0.38)
SA payments	8.15*** (0.39)	9.54*** (0.41)	9.62*** (0.52)	9.13*** (0.54)
Total benefit substitution^{a)}	10.05*** (0.53)	11.80*** (0.54)	8.55*** (0.71)	8.87*** (0.78)
Welfare dependence^{b)}	−14.81*** (0.47)	−12.94*** (0.49)	−15.01*** (0.67)	−15.23*** (0.75)
<i>No. of obs.</i>	743,707	699,327	305,020	1,402,904

Notes: Each estimate in columns (1–3) is from a separate OLS estimation of expression (1) for the respective outcome for the relevant subsample of women. Column (4) uses a trend-adjusted triple-difference specification, whereby both married mothers whose youngest child was aged 4–10 years and single mothers whose youngest child was aged 11–18 years (relative to married mothers whose youngest child was aged 11–18 years) were the comparison groups. Controls were included. a) The outcome of total benefit substitution is defined as participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA). b) The outcome of welfare dependence is defined as participation in *any benefit programme*, i.e. any of the alternative benefit programmes in addition to the transitional benefit programme.

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Table 6. Benefit substitution effects of the reforms on single mothers for alternative specifications

Dependent variable	(1) Baseline	(2) No controls	(3) No comparison group	(4) No control of pre-reform trend	(5) Youngest child 6–10	(6) Norwegians only	(7) Placebo
Transitional benefits	−31.88*** (0.45)	−31.84*** (0.47)	−28.19*** (0.44)	−33.95*** (0.30)	−37.93*** (0.55)	−31.35*** (0.47)	−2.62*** (0.48)
SI benefits	2.66*** (0.43)	2.67*** (0.43)	4.02*** (0.39)	3.88*** (0.31)	2.53*** (0.53)	2.86*** (0.45)	0.60 (0.41)
Medical- and work-related rehab. benefits	2.86*** (0.26)	2.90*** (0.26)	4.65*** (0.24)	3.18*** (0.18)	3.20*** (0.32)	2.83*** (0.27)	0.32 (0.24)
DI benefits	0.97*** (0.19)	1.02*** (0.19)	1.31*** (0.17)	0.47*** (0.13)	1.13*** (0.25)	0.85*** (0.19)	−0.02 (0.18)
SA payments	8.15*** (0.39)	8.29*** (0.40)	8.82*** (0.38)	1.06*** (0.25)	8.10*** (0.46)	7.42*** (0.40)	0.15 (0.43)
Total benefit substitution^{a)}	10.05*** (0.53)	10.21*** (0.53)	13.61*** (0.48)	4.53*** (0.36)	10.08*** (0.64)	9.68*** (0.55)	0.70 (0.54)
Welfare dependence^{b)}	−14.81*** (0.47)	−14.68*** (0.48)	−9.08*** (0.41)	−18.15*** (0.33)	−18.26*** (0.59)	−15.08*** (0.49)	−1.96*** (0.47)
<i>No. of obs.</i>	743,707	743,707	164,730	389,358	492,893	683,250	703,892

Notes: Each estimate is from a separate OLS estimation of expression (1) for the respective outcome for the relevant sample of mothers. Married mothers were the comparison group. Controls were included. a) The outcome of total benefit substitution is defined as participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA). b) The outcome of welfare dependence is defined as participation in *any benefit programme*, i.e. any of the alternative benefit programmes in addition to the transitional benefit programme.

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Table 7. Benefit substitution effects of the reforms on single mothers using alternative difference-in-difference specifications

Dependent variable	Linear trend		Linear + quadratic trend		(3) <i>No. of obs.</i>
	(1) Phase-in period (1998–2000)	(2) Post-reform period (2001–2008)	(3) Phase-in period (1998–2000)	(4) Post-reform period (2001–2008)	
Transitional benefits	–3.25*** (0.20)	–33.78*** (0.29)	–2.04*** (0.25)	–32.68*** (0.33)	3,255,978
SI benefits	2.68*** (0.20)	4.12*** (0.31)	1.52*** (0.23)	3.07*** (0.32)	3,255,978
Medical- and work-related rehab. benefits ^{a)}	0.90*** (0.15)	2.26*** (0.24)	–0.03 (0.21)	–0.02 (0.42)	1,857,099
DI benefits	0.21** (0.09)	0.81*** (0.13)	0.28*** (0.10)	0.87*** (0.14)	3,255,978
SA payments	–1.77*** (0.16)	4.04*** (0.24)	0.49** (0.20)	6.09*** (0.28)	3,255,978
Total benefit substitution^{b)}	0.76*** (0.23)	6.37*** (0.36)	2.15*** (0.29)	7.64*** (0.38)	3,255,978
Welfare dependence^{c)}	–2.10*** (0.21)	–16.87*** (0.34)	–0.88*** (0.25)	–15.77*** (0.35)	3,255,978

Notes: The estimates in each row of columns (1) + (2) [and columns (3) and (4)] are from separate OLS estimations of the expressions $y_{itq} = \beta_1 + \beta_2 Single_i + \gamma_1 (Phasein_q \times Single_i) + \gamma_2 (Post_q \times Single_i) + \beta_3 (t_t \times Single_i) + [\beta_4 (t_t \times Single_i)^2] + \lambda_t + X'_{itq} \theta + \varepsilon_{itq}$ for the respective outcomes. Columns (1) + (3) and columns (2) + (4) display estimates of γ_1 and γ_2 , respectively. Controls were included. a) The register for medical- or work-related rehabilitation benefits was limited to the years 1992 to 2001. b) The outcome of total benefit substitution is defined as participation in *any alternative benefit programme* (SI, medical- and work-related rehabilitation, DI or SA). c) The outcome of welfare dependence is defined as participation in *any benefit programme*, i.e. any of the alternative benefit programmes in addition to the transitional benefit programme.

***, ** and * indicate significance at the 1%, 5% and 10% level, respectively (robust standard errors).

Appendix A

Table A1. Description of single mothers in the pre-reform year 1997 by selected characteristics

	(1) High local unemp.	(2) Low local unemp.	(3) Highly educated	(4) Less educated	(5) Older mother	(6) Younger mother	(7) Youngest child 8–10	(8) Youngest child 4–7
Outcomes (%)								
Transitional benefits	68.06	58.73	49.67	72.51	49.10	76.91	55.18	68.35
SI benefits	18.75	19.21	18.33	19.87	20.97	17.06	21.44	17.41
Medical- and work- related rehab. benefits	5.89	5.49	4.83	6.46	6.28	5.10	6.23	5.33
DI benefits	2.88	2.73	1.27	3.90	4.62	1.03	3.72	2.21
SA payments	17.12	16.12	7.16	21.88	13.93	19.19	13.44	18.63
<i>No. of obs.</i>	<i>20,934</i>	<i>22,771</i>	<i>17,516</i>	<i>24,423</i>	<i>21,542</i>	<i>22,163</i>	<i>17,101</i>	<i>26,604</i>
Characteristics (mean)								
Age	33.50	34.23	34.34	33.42	38.79	29.11	36.43	32.24
Years of education	11.30	11.42	13.32	9.96	11.63	11.11	11.45	11.31
Non-Norwegian (%)	4.44	8.91	4.05	3.68	8.00	5.56	6.53	6.92
No. of children	1.76	1.71	1.59	1.81	2.08	1.39	1.81	1.68
Age of youngest child	6.85	6.87	6.88	6.85	7.49	6.24	8.94	5.52
Unemployment rate (%)	4.40	3.03	3.67	3.72	3.64	3.73	3.67	3.70

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