

# Incentives to Work: Labour Supply Effects of a Cash-for-Care Subsidy for Non-Western Female Immigrants

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## Abstract

Non-western female immigrants are characterised by having very low labour force participation. In this paper we are especially concerned with factors on the supply side of the labour market and we ask to what extent the labour supply of this group is sensitive to economic incentives. We answer the question of economic responsiveness by evaluating labour supply effects of a Norwegian family policy programme that clearly has affected the incentives to participate in the labour market. From January 1999, all parents with one and two-year-old children who did not use publicly subsidised day care became entitled to a “cash-for-care” subsidy (“CFC”). The CFC reform has increased the relative price of publicly subsidised day care and decreased the relative price of own care. Standard economic theory of labour supply will postulate that the CFC reform will have a negative effect on labour supply for the person most involved in child care. The results show that the CFC reform *has* affected non-western immigrant mothers’ labour supply. Furthermore, the magnitude of the effect is rather large. The results support the hypothesis that non-western immigrant mothers react to changes in the relative prices of child care. This suggests that this group of individuals is quite responsive to changes in economic incentives.

**JEL classification:** J13, J18, J22

**Keywords:** Labour supply, child care, female non-western immigrants, difference-in-differences-in-differences

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## 1. Introduction

In Norway, as in most other modern economies, non-western immigrants are found to have much lower labour supply compared to natives. Furthermore, the low labour supply is especially prevalent for female non-western immigrants. In 2005 the average labour force participation rate among all women in Norway was 66.5 per cent, and almost on par with men. The comparable percentage for non-western female immigrants was 53. The low participation rates suggest a large potential for increase. Even so, the majority of empirical studies analysing determinants of labour force participation among non-western immigrants have tended to focus on male immigrants (Chiswick 1978, Borjas 1987). However, to meet future challenges related to ageing population it should be of interest to increase the understanding of what affects the labour force participation for groups that initially have very low participation rates, since the potential for boosting labour supply may be substantial for these groups.

To explain the low labour force participation rate of this group one can look at both supply and demand side explanations. Lack of transferable skills from the country of birth and employer discrimination may be examples of explanations from the demand side. In this paper we are especially concerned with factors on the supply side of the labour market and we ask to what extent the labour supply of non-western immigrant women is sensitive to economic incentives. One of the major issues in the discussion of making work pay in low paid jobs compared to being in an unemployment or social assistance situation. Low potential wages in the labour market combined rather generous and means tested benefits when not working can create disincentives for seeking ordinary employment for groups at the outskirts of the labour markets (OECD 2003).

We answer the question of economic responsiveness by evaluating labour supply effects of a Norwegian family policy programme that clearly has affected the incentives to participate in the labour market. From January 1999, all parents with one and two-year-old children who did not use publicly subsidised day care became entitled to a “cash-for-care” subsidy (from now on referred to as “CFC”). The CFC-subsidy is paid out monthly from the time the child is one until it is three years old. The CFC reform has increased the relative price of publicly subsidised day care and decreased the relative price of own care. Standard economic theory of labour supply will postulate that the CFC reform will have a negative effect on labour supply for the person most involved in child care. This is what we test for non-western female mothers in this paper. Results from this study could shed light on the

more general question on whether supply side considerations are important for explaining changes in labour force participation for groups that are very marginalised at the labour market

The effect of the CFC-reform on labour supply is studied by utilising potentially exogenous variations in the eligibility of the CFC-subsidy. This is a natural experiment approach. The basic idea is to compare two groups, one which has experienced a specific policy change, and another with similar characteristics which has been unaffected by the policy change. Our approach is to compare the change in labour supply for mothers eligible for the CFC-subsidy with mothers of children not eligible for the CFC-subsidy. The CFC-reform is equally and nation-wide accessible for all mothers with children the same age. Therefore, there is no natural comparison group. In this article, this problem is approached by putting forward a framework in which the treatment group differs from the control group along three dimensions. This implies that we employ a triple difference approach, i.e. a difference-in-differences-in-differences (DDD) approach.

There is large empirical literature analysing the effects of different measures of child care costs on mothers' labour supply (see e.g., Ribar 1992; Blau and Robbins 1988, Connelly 1992, Averett et al. 1997, Connelly and Kimmel 2000). The majority of these studies report results that support the hypothesis that incentives matter; reduced child care costs increase labour supply of mothers. Some of these studies have also put special attention on potential marginal groups, like single mothers. The argument for separately analysing single and married mothers separately is that the external child care costs on average will represent a higher percentage of the total income for single mothers than for married and cohabitant mothers. As a consequence, single mothers face higher financial barriers to work compared to both married and cohabitant mothers. Therefore, it is reasonable to assume that single mothers – on the margin – will be more responsive to changes in child care costs. Although the empirical results are not conclusive, the majority of studies seem to report that the labour supply of single mothers is more sensitive to changes in child care costs than of married mothers. However, one shortcoming of this literature is the scant representation of studies of immigrant mothers.

Another strand of the empirical labour supply literature has focussed on incentive effects of taxes and tax changes. There is especially a large US literature on this topic (Eissa 1995, 1996; Eissa and Liebman 1996; Graversen 1996; Eissa and Hoynes 1998; Blundell et al. 1998; and Meyer and Rosenbaum 2000). Some of these studies have carried out separate studies for different groups of mothers, for example Meyer and Rosenbaum (200) analyse

effects on labour supply for single mothers in the US from different tax reforms carried on in the 1990's. The results reveal that tax reforms that have been carried out to encourage single mothers to work have the desired effect. However, this literature has so far put little attention on female immigrants.

A third relevant strand of the labour supply literature is analyses that have analysed labour supply effects of different workfare programmes. These programmes are especially targeted at marginalised groups at the outskirts of the labour market. Even if there is no standard definition of workfare, most programmes include an obligation for the social recipient to work in order to still receive benefits. Again, there is especially a large US literature on this matter, but as for the two former type of studies, evidence for immigrants are scant. One exception is Kaestner and kaushal (2001). They analyse native and immigrant responses to the Personal Responsibility and Work Opportunity act (PRWORA), a US welfare reform. The objective of the reform was to reduce dependency on public assistance by encouraging women to work. The results suggest that the welfare reform induced natives and foreign-born to increase their employment. The effects for immigrants are found to be quite large in magnitude.

The article proceeds as follows: Section 2 presents information on immigrants in Norway as well as the Norwegian immigration policy. Section 3 presents the CFC-reform; Section 4 discusses the CFC-reform in relation to standard labour supply theory; Section 5 presents the identification strategy, i.e. our strategy to find the causal effect of the CFC-subsidy on labour supply; Section 6 presents the data, the variables and some statistics; Section 7 presents the results; and Section 8 contains a summary and a discussion.

## **2. Immigrants and immigration policy in Norway**

Historically, Norway has always had considerable restrictions on labour immigration from non-western countries. The only historic exception is a period of liberalisation between 1957 and 1975. In this period and especially in the beginning of the 1970's there was a considerable influx of low skilled labour immigrants from countries like Pakistan, Turkey and Morocco. From 1975 there was in practice implemented an immigration stop from countries outside the Nordic countries. Exceptions were made for some specialists, after considerations whether their skills were needed in the Norwegian labour market. Before such exceptions were made, it had to be argued that their qualifications could not be met by the skills of natives.

. The immigrants' share of the Norwegian population has increased considerably since the immigration stop of 1975, from approximately 2 per cent of the population in 1980 to approximately 8 per cent in 2005. The increase is mainly due to the influx of refugees and asylum seekers, and because of family reunifications. During the same period the composition of the immigrant population has changed, from being dominated by Nordic and western immigrants to at present being dominated by immigrants from non-western countries. By 2004, almost 75 per cent of the immigrants in Norway were non-western immigrants compared to 25 per cent in 1980 (Statistics Norway 2004).

There has been a free movement of labour between the Nordic countries (Norway, Sweden, Denmark, Finland, and Iceland) since 1954. This liberalisation has led to rather large flows of workers across the Nordic borders, especially in periods when the countries have experienced differences in business cycles. Within the European Economic Area (EEA) there has been free movement of labour since 1994, but this expansion has not resulted in any large movement of labour between European countries. Labour migration from Eastern Europe started to increase during the turn of last century. At first working permits were given to seasonal workers, many of whom worked in the agriculture sector. Thereafter a yearly immigration quota for immigrants from outside the EEC-area was introduced. To be considered the immigrants had to fulfil skill requirements of secondary school, or college or university degree. The yearly quota, of 5000 at the most, has never been effective.<sup>1</sup>

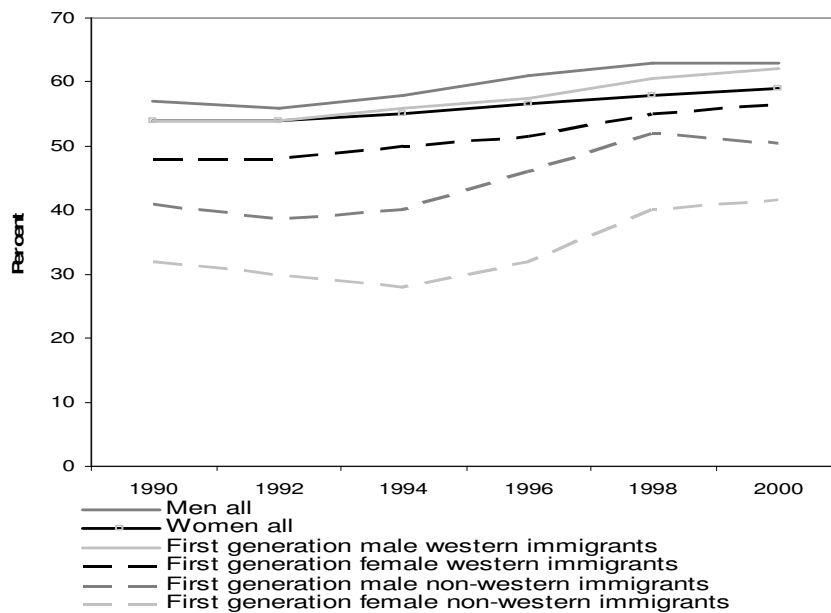
In general, male and female non-western immigrants differ in their reasons for coming to Norway. To seek refugee is the most important reason for men, while family reunification is the most important reason for women (Statistics Norway 2006). In the period from 1990 to 2005, 65 per cent of the non-Nordic immigrants that came for reasons of family reunification came as non-western immigrant women. The main reason for this gender difference is that among refugees it is most common that the men migrate first. Later, the family enters on family reunification. Furthermore, it is more common that native men marry women that at the time of marriage live outside Norway, than the other way around.

Figure 2.1 presents the share of workers employed among natives and immigrants, measured as a share of total number of individuals 16-74 years for the period we study.

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<sup>1</sup> The latest expansion of the labour market by including the new EU members in 2004 does not affect our study since our observation year is 2003.

Figure 2.1. Employment rates for men and women. Natives and immigrants



In 2000 the employment rate for male non-western immigrants were 12.6 percentage points lower than for all men. The comparable difference for western men was only -1.7 percentage points. Among women the difference is even larger. Non-western female immigrants have 17.2 percentage points lower employment rates compared to all women. For western immigrants the difference is only -2.8 percentage points. These differences were even larger up till 1994. In 1994, non-western immigrants had an employment rate equal to 28.5 compared to 53.5 for women in total. After 1994, the business cycles changed in Norway with increasing employment and decreasing unemployment rates. Figure 2.1 shows that non-western immigrants experienced a rapid growth in their employment rates in this period.

### 3. The cash-for-care reform

The CFC-reform contributes to a long list of family policy programmes in Norway. The two most important programmes in this respect have been parental leaves and subsidised daycare. From 1993, all working parents in Norway have been entitled to 52 weeks' leave with 80 per cent wage compensation (alternatively 42 weeks with full compensation). To increase the involvement of fathers, an amendment in 1993 reserved four weeks of the leave for the fathers. These weeks are not transferable to the mother, and are lost if the father does not use them.

There are no eligibility criteria for subsidised day-care in Norway. But, subsidised day-care centres have always been rationed, mainly due to economic shortfalls in the local municipalities. However, the coverage rate has increased during the last two decades. In the year 2000, it was 62 per cent among children aged one to five. In general, the coverage rate increases with the age of the child. The day-care centres are publicly or privately owned. As long as they are publicly approved, however, both types receive public subsidies. Roughly 50 per cent of the market consists of private day-care centres. The costs of a publicly approved day-care centre are shared between the state, the municipality and the parents. In 1998, the average parental payment was approximately 3500 Norwegian kroner (NOK - approximately 430 Euros) per month in private centres and slightly less in public centres.

The CFC-reform was introduced in August 1998. First, only one-year-old children were eligible for the benefit, but from January 1999, all children between 12 and 36 months became eligible. All parents with children in this age group who do not use publicly subsidised daycare are entitled to the subsidy. To receive the full subsidy, the child must not attend a publicly funded day-care centre at all. Parents of children that attend publicly funded daycare on a part-time basis may receive a share of the full benefit (80, 60, 40, or 20 per cent) depending on weekly attendance. The right to the CFC-subsidy also for part-time users was important to ensure flexibility in the parents' work and child care arrangements. In addition, for eligible parents, there is no obligation for parents who claim the benefit to stay at home and care for the children themselves. They may hire external daycare, as long as it is not publicly subsidised.

The subsidy is a flat, tax-free payment, paid out monthly from the month after the child is one year old (from month 13), until the month the child is maximum three years old (36 months). Therefore, parents may receive CFC-subsidy for one child for a maximum period of two years. Originally, the subsidy was set to 3000 NOK per month (approximately 370 Euros). In 1999 the subsidy was reduced to 2250 NOK per year. The subsidy is approximately equivalent to the state subsidy for a place in a day-care centre.

The purpose of the CFC-reform was threefold: First, to distribute public transfers more equally between parents that use and parents that do not use public daycare; second, to motivate the parents to spend more time with their children; and third, to give the parents more flexibility in their choice between work and care of children.

The CFC-subsidy has so far been a popular reform and especially for children of non-western immigrants. Table 3.1 shows the percentage of children eligible for CFC-subsidy that receives the benefit in 1999, 2000, and 2001.

*Table 3.1. Children with CFC-subsidy. Per cent of all eligible children. Non-western immigrant children and all children. Per September each year*

	Non-western immigrants	All
1999	75.5	73.5
2000	80.5	73.0
2001	80.3	71.7

Source: Daugstad (2006)

The share of all eligible children of non-western immigrants that receives the CFC-subsidy is high and stable in this period. In 2001, approximately 4 out of 5 children of non-western parents receive the benefit. The last column shows the share for all children. We see that the share of non-western immigrant children that receive the benefit is higher than the share for all children.

#### **4. The CFC-reform and labour supply**

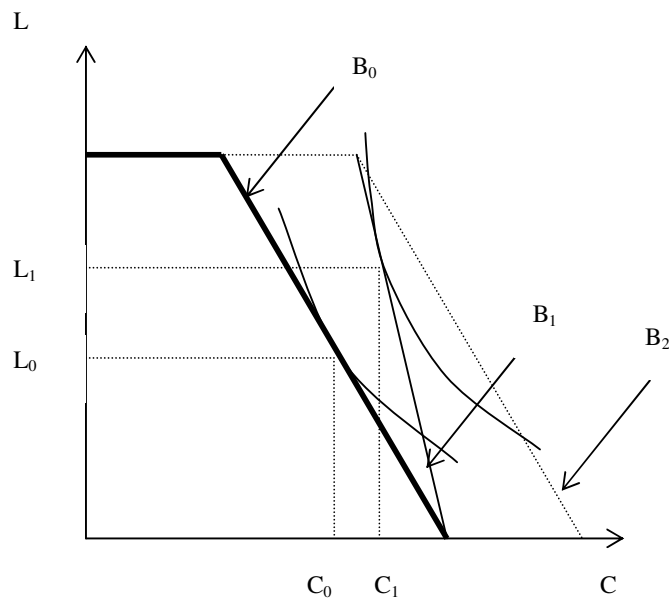
To motivate the empirical analyses, the CFC-reform will be discussed somewhat more formally within a simple labour supply framework. Let us assume that we have a family consisting of a mother, a father, and a child eligible for CFC-subsidy. The child requires constant care. For the sake of simplicity, we shall assume that only the mother is involved in this time-use choice. According to standard theories of labour supply, the mother will adjust her labour supply such that she maximises the value of consumption (C) and leisure (L), subject to a budget constraint. Since we have assumed that the family has a child eligible for the CFC-subsidy, the budget constraint will be positively affected by the subsidy, *conditional* on the child not attending a publicly subsidised kindergarten on a full-time basis.

Within a simple leisure-consumption framework, figure 3.1 presents an illustration of the labour supply effect of the CFC-reform on working mothers initially using publicly subsidised *kindergarten services*. The bold line illustrates the budget set facing the mother before the CFC-reform.

Figure 3.1 illustrates that the effect of the CFC-subsidy will depend on the degree of kindergarten utilisation (whether the child attends on a full-time or part-time basis).



Figure 3.1. Labour supply before and after the CFC-reform. For working mothers using kindergarten services



We are assuming that the mother is working, and while she works the child attends a publicly subsidised kindergarten. Therefore, one hour of work implies one hour of external child care in the kindergarten. If the mother initially works full-time, the child attends kindergarten full-time. Consequently, the mother receives no CFC-subsidy.

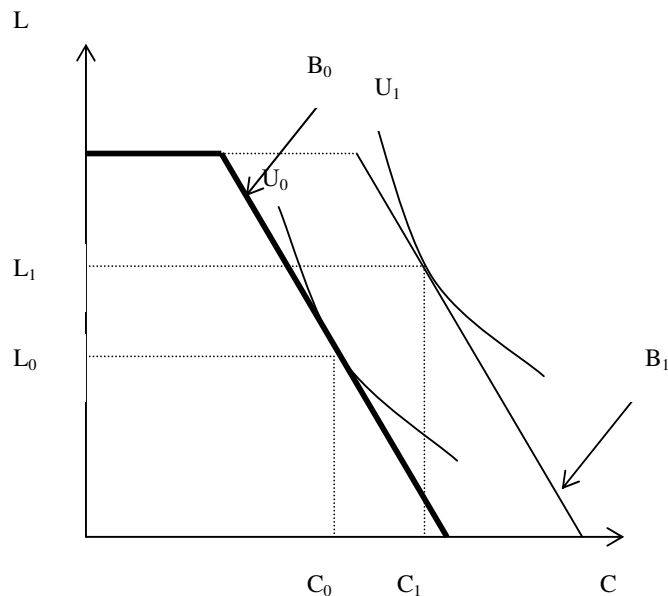
As mentioned earlier, mothers of children that attend publicly subsidised kindergartens on a part-time basis may receive a share of the full benefit depending on weekly attendance. For mothers initially using kindergarten on a part-time basis, the CFC-reform shifts the budget set from  $B_0$  to  $B_1$ . For this group, the CFC-subsidy creates both a substitution effect and an income effect. If leisure is a normal good, they both work in the same direction, i.e. towards more leisure and less work. This is illustrated by the change in the leisure-consumption combination from  $(L_0, C_0)$  to  $(L_1, C_1)$ . The size of the reduction in market work will depend on the size of the subsidy, as well as the mother's preferences for leisure and consumption.

The budget sets  $B_0$  and  $B_1$  are drawn for a given mode of child care (kindergarten). However, since the CFC-subsidy increases the relative price of kindergarten services, the mother may - due to the relative price increase of kindergarten services - switch from using kindergarten to using a childminder. If so, the new budget set will be given by  $B_2$ . For a given

level of market work, the consumption possibilities increase. Again, if leisure is a normal good, this will reduce the labour supply further.

Figure 3.2 illustrates the choice between leisure and consumption before and after the introduction of the CFC-reform for non-working mothers and working mothers using a child minder. The bold line illustrates the budget set facing the mother before the CFC-reform. We assume that the mother, even if she is not working, has some minimum level of not-working related income. The introduction of the CFC-reform shifts the budget curve outwards from  $B_0$  to  $B_1$ . We see that, for not-working mothers and working mothers using a child minder, the CFC-reform has only an income effect.

*Figure 3.2. Labour supply before and after the CFC-reform. For not-working mothers and working mothers using a childminder*



For mothers who were not working before the CFC-reform, the subsidy will have a negative impact on their incentives to participate in market work. For working mothers using a child minder, we assume that preferences between leisure and consumption initially are represented by  $U_0$ . She consumes  $L_0$  units of leisure and  $C_0$  units of consumption. If  $U_1$  represents the mother's preferences after the introduction of the CFC-reform, she chooses to take out more leisure, and consequently work less. If leisure is a normal good, she will always choose to reduce her working hours. The size of the reduction will depend on the size of the CFC-subsidy, and the mother's preferences for leisure and consumption. In the extreme case,

the mother will choose to consume maximum amount of leisure and withdraw completely from the labour market.

So far, we have assumed that the mother only has preferences for consumption and leisure; however, she will probably also have preferences with regard to the quality of the various modes of care (see e.g., Connelly 1992, Ribar 1992). One additional working hour does not only imply one hour less leisure. It will usually also imply one hour with external child care.

If the mother uses a kindergarten or a childminder prior to the reform, but considers own care as superior to both kindergarten and childminder, the CFC-reform may enable her to do more of the caretaking herself, and consequently spend less time in the labour market. Conversely, if users of kindergarten services consider this mode of care to be superior to both childminder and own care, they may be willing to pay a “premium” for these types of services. If so, fewer mothers will withdraw from the labour market as a response to the CFC-reform. Moreover, if users of kindergarten services consider the use of childminders to be a satisfactory substitute for kindergarten, they will switch to this type of care as a response to the CFC-reform. As illustrated in figure 1, this will lead to a larger decrease in market work compared to a situation in which the mother chooses to keep the child in kindergarten, but compared to a situation where the mother considers own care to be superior, this will have a less negative impact on the time the mother spends on market work.

In summary, standard theories on labour supply predict that the CFC-reform will have a negative impact on labour supply. However, whether this change in the economic implications of the various child care modes will lead to a large reduction in labour supply, will depend on the mothers’ preferences for the different child care arrangements. In the end it is an empirical question.

#### *CFC, labour supply and non-western immigrants*

The reduction in labour supply from the CFC reform can come from two groups: First, from those that prior to the reform were not working, and from those that prior to the reform were working. A larger fraction of non-western immigrant women are not participating in the labour market compared to natives, and as we shall see in the result section; this is also true for non-western immigrant mothers. This implies that non-western immigrant mothers to a larger extent are on the extensive margin in Figure 3.1 and 3.2. Their decision is to a larger extent a binary decision, i.e., whether to participate on the labour market or not. The prediction from economic theory is that CFC will affect the decision to enter the labour

market negatively. The decision to enter the labour market will be decided by the difference between the wage she can receive in the labour market and what she must have (the reservation wage). It is reasonable to assume that non-working non-western immigrant mothers on average have lower potential labour market earnings compared to native mothers. Less than perfect transferable skills from country of birth and language deficiencies are two candidates to back up this assertion. By choosing to stay home and receive the benefit non-western immigrant mothers give up less labour market earnings. In addition, by not working they do not incur costs related to child-care and transport. These costs will on average represent a higher share of the total income for non-western immigrant mothers than for natives. Therefore, it is reasonable to assume that non-western immigrant mothers that were not working prior to the reform – on the margin – will be more responsive to the reform than natives, meaning that they will to larger extent choose to keep staying at home as a consequence of the CFC reform. In addition, non-western immigrant mothers have on average more children compared to native mothers (Daugstad 2006). More children in the CFC-eligible age will increase the incentive to not enter the labour market.

Against these arguments one can argue that there will be other mechanisms besides the economic ones that play a role, and that these might be more important. Differences in family structures, gender roles, cultures and religion may be also be important determinants of females' labour supply from many of these non-western countries. The distribution of work in the household between the husband and wife are much more unequally distributed in some non-western countries compared to native Norwegian households. If these barriers for labour supply are strong they may outweigh the importance of economic mechanisms. If a large fraction of the non-western immigrant mothers are home for other reasons than economic, the effect of the CFC benefit on behaviour will be small. In this case the benefit will act more as an income distribution without any behavioural component.

However, a sizeable fraction of non-western immigrant women participate in the labour market. Using the same reasoning as above; since non-western immigrant women that participate on the labour market have relatively low wages, and lower compared to natives mothers, one should expect the effect of the CFC reform on labour supply to be more negative for non-western immigrants. In our data material the average pre-birth yearly wage for CFC-eligible non-western immigrant mothers was 111.000 NOK (approximately 14.000 EURO). The comparable mean yearly wage for native mothers was 155.000 NOK (approximately 19.000 EURO). If non-western immigrant mothers decide to reduce working hours or withdraw completely, they must on average give up less labour income. In addition, costs

related to child care and transport will be reduced, and since these costs take up a larger share of labour earnings for non-western immigrants, it should matter more.

In sum, we should expect the CFC reform to increase the disincentives to participate on the labour market for non-western immigrant women, but the strength of the effect is ambiguous. If the large share of non-participants from this group is generally insensitive to economic incentives from the labour market the CFC benefit should not matter much. In this case they are in some sense “unreachable”. However, how “unreachable” they are, or out in other words; how far they really are from the labour market is uncertain. In the end it is an empirical question, for which we turn to in section 6.

## 5. Identification strategy

The aim of the empirical analysis is to measure the effect of the CFC-reform by identifying changes in labour supply for mothers affected by the reform, and to compare the change in labour supply with the change in labour supply of mothers not affected by the reform. However, the CFC-subsidy is accessible nation-wide to all parents with children of the same age. Therefore, we do not have a natural comparison group. Our strategy in this article is the following: We start by comparing the change in labour supply from 1997 to 2000 for mothers whose youngest child was born in 1998 (CFC-eligible mothers) with the change in labour supply from 1994 to 1997 for mothers whose youngest child was born in 1995 (mothers not eligible for CFC). This implies that we are comparing the change in labour supply from a before to an after-period for similar mothers (mothers with children of the same age) in different time periods (1994-1997 versus 1997-2000). This is a version of the standard difference-in-differences (DD) approach.<sup>2</sup>

However, if some contemporaneous macroeconomic shocks occurred during the period 1997-2000 - independent of the introduction of the CFC-reform - the DD-estimate will yield biased results for the effects of the CFC-reform on labour supply. To approach this problem we will compare the change in labour supply for the mothers presented above with the change in labour supply for the same two periods (1994-1997 and 1997-2000) for mothers with *older* children not eligible for CFC-subsidy. This latter group consists of mothers giving birth in 1992 and 1995. The children of these mothers will be between two and five years old in the periods of the labour supply evaluation.<sup>3</sup> If some macroeconomic shock occurred at the

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<sup>2</sup> See Meyer (1995) or Hamermesh (2000) for an overview of pros and cons by using quasi-experiments in economics.

<sup>3</sup> Children born in 1992 will be two years old in 1994 and five years old in 1997, whereas children born in 1995

same time as the introduction of the CFC-reform, we expect this to affect mothers with older children as well. We will use the change in labour supply for mothers with older children to adjust the first estimate received for mothers with younger children.<sup>4</sup>

This approach takes into account that the CFC-reform (as we evaluate it) creates variation along three dimensions, (1) between mothers with children of different ages, (2) between pre- and post-periods, and (3) between periods with CFC-subsidies and periods without CFC-subsidies (1997-2000 versus 1994-1997).<sup>5</sup> The identification assumption of this DDD-estimator is that there is no contemporaneous shock that affects the relative outcome of the treatment group (mothers with young children relative to mothers with older children) in the same treatment period as the introduction the CFC-subsidy.

The DDD approach may be illustrated as follows:

$$DDD - estimate = \underbrace{\{(Y^T_a - Y^T_b)^{97-00} - (Y^T_a - Y^T_b)^{94-97}\}}_{DD} - \underbrace{\{(Y^C_a - Y^C_b)^{97-00} - (Y^C_a - Y^C_b)^{94-97}\}}_{DD} \quad (1)$$

The first bracket shows DD-estimates for mothers with young children, called the *treatment group*. First,  $(Y^T_a - Y^T_b)^{97-00}$  measures the change in labour supply of CFC-eligible mothers with young children from 1997 to 2000.  $Y^T$  is a measure of labour supply for the treatment group *after* birth, and  $Y^T_b$  is the labour supply for the treatment group *before* birth. Similarly,  $(Y^T_a - Y^T_b)^{94-97}$  measures the change in labour supply of mothers *not* eligible for CFC, having had young children in the period from 1994 to 1997. The difference between these two components is the DD-estimate.

The second bracket presents DD-estimates for mothers with older children, called the *control group*. First,  $(Y^C_a - Y^C_b)^{97-00}$  measures the change in labour supply of mothers with older children from 1997 to 2000. Similarly,  $(Y^C_a - Y^C_b)^{94-97}$  measures the change in labour supply of mothers with older children from 1994 to 1997. The difference between these two components is the DD-estimate. Finally, the difference between the two DD-estimates gives us the DDD-estimate. The hypothesis that the CFC-reform has reduced labour supply is a test of whether the DDD-estimate in equation (1) is negative. In our context, running a familiar

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will be two years old in 1997 and five years old in 2000.

<sup>4</sup> Note that we do not have - and do not need - information on whether the CFC-eligible mothers from 1998 actually receive the subsidy.

<sup>5</sup> As mentioned earlier, the CFC-reform was introduced in August 1998. We still refer to 1997-2000 as a period with CFC-subsidies. The year 1997 is included as a “before” period.

DD-estimation would mean leaving out the effect of contemporaneous macroeconomic shocks, i.e. leaving out the contribution from the second bracket in (1).<sup>6</sup>

However, treatment and control groups may differ systematically with respect to important labour supply determinants such as education, age, place of residence, the presence of other children in the household, and marital status. Observed differences in outcomes may therefore reflect differences between the treatment and control group rather than a treatment effect. To deal with this problem, a multivariate regression analysis will also be employed. We have:

$$\begin{aligned}
 Y_{ijkt} &= \alpha_1 + \alpha_2 Z_{ijkt} + \alpha_3 CFC_{ijk} + \alpha_4 POST_{itk} + \alpha_5 TREAT_{ik} \\
 &+ \alpha_6 (CFC_{ijk} \times POST_{itk}) \\
 &+ \alpha_7 (CFC_{ijk} \times TREAT_{ik}) \\
 &+ \alpha_8 (POST_{itk} \times TREAT_{ik}) \\
 &+ \alpha_9 (CFC_{ijk} \times TREAT_{ik} \times POST_{itk}) + \varepsilon_{ijkt}
 \end{aligned} \tag{2}$$

where  $i$  indexes individuals,  $t$  indexes time (1 = after, and 0 = before),  $k$  indexes group of mothers (1 if mother of young children, and 0 if mother of older children), and  $j$  indexes CFC-status (1 if the period is 1997-2000, 0 if the period is 1994-1997),  $Z$  is a vector with variables affecting labour supply. CFC is a dummy variable with value 1 if the period is 1997-2000 (CFC-period), and 0 if the period is 1994-1997 (not a CFC-period). POST is a dummy variable with value 1 if the year is 2000 (for the CFC-group) or 1997 (for the non-CFC-group), and 0 if the year is 1997 (for the CFC-group) or 1994 (for the non-CFC-group). TREAT is a dummy variable with value 1 if the mother's youngest child is two years old, and 0 if the mother's youngest child is five years old.

The interpretation of the coefficients are as follows;  $\alpha_3$  controls for effects of the CFC-period,  $\alpha_4$  controls for changes in labour supply between the before and after period,  $\alpha_5$  controls for effects of the treatment group (mothers with young children),  $\alpha_6$  controls for changes from the before to the after period in the CFC-period,  $\alpha_7$  controls for characteristics of the treatment group in the CFC-period, and  $\alpha_8$  controls for changes between the before and after period for the treatment group. Finally,  $\alpha_9$  - the *DDD estimator* - measures the impact of the interaction term between CFC, POST, and TREAT. This coefficient measures all variation in labour supply for the CFC-group (1997-2000) relative to the non-CFC-group (1994-1997)

<sup>6</sup> Examples of studies that use DDD-estimates to analyse labour supply effects of policy reforms include Gruber (1994), Klerman and Leibowitz (1997) and Waldfogel (1999). However, none of these studies analyse nationwide and equally accessible reforms.

for mothers with young children, relative to mothers with older children, between the before and after period.

When testing for the presence of second-order interactions, it is important to also include first-order interactions. If this is not done, the second-order interaction effect will be confounded with the omitted first-order interactions, and this will most likely lead to biased estimates. The key identifying assumption is that  $\alpha_0 = 0$  in the absence of treatment, or  $E[\varepsilon_{ijk} | \text{CFC} \times \text{TREAT} \times \text{POST}] = 0$ . This means that there is no correlation between the error term measuring unobservable individual-transitory shocks and the variables measuring the effect of the CFC-reform.

Controlled for observable differences between treatments and controls, the identifying assumption is as mentioned earlier, i.e. that there is no contemporaneous shock that affects the relative outcome of the treatment group (mothers with young children relative to mothers with older children) in the same treatment period as the introduction of the CFC-subsidy. The identifying assumption will be violated if the change in labour supply between treatments and controls evolve differently between periods with and without CFC-subsidy – independent of the introduction of the CFC-reform. There are various approaches to this problem. We include explanatory variables that are supposed to control for such biases. The kindergarten coverage in the mothers' municipality is one such variable. If reduced supply of kindergarten services for young children is one consequence of the CFC-reform, this will have a negative effect on the mothers' labour supply. Moreover, if not controlled for, it will wrongly be assigned as an effect of the CFC-reform

## 6. Data and variables

The data set used is gathered from several different registers, collected by Statistics Norway. The starting point is a public demographic register with information on all births during each year. This data set contains information on the child, as well as information on the mother and father. To this data set Statistics Norway has linked individual information on the mother and father. The data sample contains information on spells of employment, wages, non-labour income, the partner's income, age, educational attainment, place of residence, the presence of older children in the family, marital status, and kindergarten coverage in the municipality.

Our measure of labour supply is labour market participation. *Labour market participation* is a dummy variable, measuring whether the mother was registered as an employee during the period of observation (12 months). The variable is taken from The



Register for Employers and Employees, administered by the National Insurance Administration. Our group of mothers under study is non-western immigrants. We include mothers from: Asia (including Turkey), Africa, South and Central America and Eastern Europe.

Our three cohorts of mothers are those with children born in 1992, 1995 and 1998. The analyses are restricted to mothers who were between 20 and 45 years of age in the year they became mothers. For all three cohorts of mothers, we have panel information for the whole period of observation. This is taken advantage of in the analyses by requiring that, to be included in the analyses, all mothers must be present in both the pre- and post-year periods. In the analyses of annual working hours, we additionally require that all mothers included must be present with positive working hours in both the pre- and post-year periods. By utilising the repeated observation structure of the panel data, we reduce problems related to composition effects, potentially present in repeated cross-sections samples.

Table A1 in Appendix presents descriptive statistics for our two groups: the *treatment group*, consisting of mothers with young children (two years old in the post-year period), and the *control group*, consisting of mothers with older children (five years old in the post-year period). For both groups, the mean values are taken from the “before” years, i.e. from 1994 and 1997.

## 7. Results

This section presents the empirical results. First, the basic DD- and DDD-estimates are presented, followed by a presentation of the regression-adjusted estimates.

### 7.1. Basic DD- and DDD-estimates

Table 7.1 presents DD- and DDD-estimates of the effects of CFC-subsidy on labour supply. Labour supply is measured by participation rates. Each cell contains the mean level for the group specified, along with standard errors. The upper half of the Table shows results for non-western immigrant mothers. For comparisons we also include an analysis for native mothers. This is shown in the bottom half of the Table.

First, we look at the DDD-estimate for non-western immigrant women. We start by looking at the change in labour supply for the treatment group (mothers with young children). For CFC-eligible non-western immigrant mothers (mothers from 1998) the average participation rate one year before birth is 39 per cent. The participation rate increases from 39

per cent to 42 per cent from the pre- to the post-birth period. This is an increase of 3 percentage points. For mothers not eligible for CFC (mothers from 1995), the comparable increase is from 0.35 to 0.50, an increase of 15 percentage points. The DD-estimate equals -0.12, and is statistically significant.

However, as mentioned earlier, if there was a contemporaneous labour market shock in the 1997-2000 period that generally affected labour market opportunities for all mothers, this would bias the DD-estimate and lead us to overstate the negative labour supply effect of CFC. Therefore, for the same periods, we run through the same exercise for *mothers with older children* (the control group). The DD-estimate for this group is equal to -0.06. Taking the difference between the two DD-estimates, we find that the reduction in labour supply is equal to 0.06, or 6 percentage points. This is the DDD-estimate. Measured as a percentage of the share of employed mothers in 1997 (0.39), this is a reduction of approximately 15 per cent. The results of the participation variable show that not controlling for macroeconomic effect by running a triple difference approach would lead us to overstate the effect of the CFC-reform on labour supply.

Table 7.1. DD- and DDD-estimates. Labour market participation, 1994-1997 and 1997-2000. Non-western and native mothers

<b>Non-western immigrants</b>					
Treatment group					
Mothers with young children (2 years of age in the post-period)					
Birth year	Evaluation period	Pre	Post	Change	DD-estimate
1998	1997-2000	0.39 (0.002)	0.42 (0.002)	0.03 (0.003)	
1995	1994-1997	0.35 (0.002)	0.50 (0.002)	0.15 (0.003)	-0.12 (0.004)
Control group					
Mothers with older children (5 years of age in the post-period)					
Birth year	Evaluation period	Pre	Post	Change	DD-estimate
1995	1997-2000	0.28 (0.003)	0.35 (0.002)	+0.07 (0.003)	
1992	1994-1997	0.25 (0.003)	0.38 (0.003)	+0.13 (0.003)	-0.06 (0.004)
<b>DDD-estimate</b>					-0.06 (0.006)
<b>Natives</b>					
Treatment group					
Mothers with young children (2 years of age in the post-period)					
Birth year	Evaluation period	Pre	Post	Change	DD-estimate
1998	1997-2000	0.82 (0.002)	0.72 (0.002)	-0.10 (0.003)	
1995	1994-1997	0.78 (0.002)	0.72 (0.002)	-0.06 (0.003)	-0.04 (0.003)
Control group					
Mothers with older children (5 years of age in the post-period)					
Birth year	Evaluation period	Pre	Post	Change	DD-estimate
1995	1997-2000	0.72 (0.002)	0.76 (0.002)	0.04 (0.002)	
1992	1994-1997	0.68 (0.002)	0.73 (0.002)	0.05 (0.003)	-0.01 (0.004)
<b>DDD-estimate</b>					-0.03 (0.005)

Note: Mean values and standard errors in parentheses.

The bottom half of the table presents similar analyses for native mothers. Running through the same exercise as for non-western immigrant mothers, we find a DDD-estimate equal to -0.03, or 3 percentage points. Measured as a percentage of the share of employed native mothers in 1997 (0.82), this is a reduction of approximately 4 per cent.

### 7.2. *DD- and DDD-regression results*

This section presents the results from the regression analyses. We estimate maximum-likelihood versions of equation (2). In total, three models are presented. The first two models estimate labour supply for all non-western immigrant mothers. The first model includes the key explanatory variables only. The latter add control variables. The third and last model focuses especially on married non-western immigrant mothers. The participation equation is estimated by binary logistic regression. The results are presented in table 7.2.

Only including the key explanatory variables we find a negative and significant effect of CFC on labour supply, equal to -0.225. Taking the anti-log of the DDD-interaction coefficient, we find an odds ratio equal to 0.80. This means that for the CFC-group (1997-2000) of non-western immigrant mothers with young children (two years old), the difference in the chance of being employed between the before and after period is 0.8 times the difference in the chance for the non-CFC-group (1994-1997) of non-western immigrant mothers with older children (five years old), between the before and after period. Measured in percentage points at the mean level of labour supply, the effect is approximately equal to a reduction of 5 percentage points. This is one percentage point lower compared to the estimate in Table 7.1.

The second model adds control variables. The DDD-estimate increases somewhat, and is now equal to -0.374. Taking the anti-log of this we find we find an odds ratio equal to 0.70, i.e., somewhat lower compared to the odds ratio in the first model. Therefore, adding control variables, the negative effect of CFC on labour supply is increased somewhat. Finally, measured as a percentage point change, the effect is equal to a reduction of approximately 9 percentage points.

Table 7.2. The CFC-reform and labour market participation. Non-western female immigrants.

## Logit-coefficients

	All mothers				Married mothers	
	Without controls		With controls		With controls	
	Coefficient	Standard error			Coefficient	Standard error
Intercept	-1.113	0.036	-3.154	0.364	-3.462	0.429
CFC	0.474	0.047	0.223	0.056	0.243	0.061
POST	0.604	0.048	0.238	0.058	0.244	0.063
CFCxPOST	0.037	0.064	-0.130	0.075	-0.192	0.083
TREAT	0.172	0.048	0.583	0.057	0.484	0.065
POSTxTREAT	-0.302	0.065	-0.598	0.076	-0.486	0.085
CFCxTREAT	0.019	0.064	-0.016	0.076	-0.075	0.086
CFCxTREATxPOST	-0.225	0.088	-0.374	0.101	-0.312	0.113
Age			0.085	0.023	0.110	0.026
Age <sup>2</sup>			-0.001	0.000	-0.002	0.000
High school – I			0.623	0.042	0.664	0.048
High school – II			0.704	0.048	0.682	0.054
Higher education – I			1.715	0.104	1.824	0.121
Higher education – II			0.907	0.052	0.872	0.057
Higher education – III			1.205	0.086	1.145	0.093
Older children in the family			-0.363	0.028	-0.295	0.031
Married			-0.007	0.033		
Male income (in 10000 NOK)			0.021	0.001	0.019	0.001
Place of residence (Oslo)			-0.343	0.038	-0.328	0.042
Kindergarten coverage in Municipality			0.016	0.001	0.016	0.002
Control for ethnicity?			Yes			
Control for month of birth?			Yes			
DDD marginal effect	-0.048		-0.040		-0.040	
- 2 Log L	47041.3		37380.3		37380.3	
N	30952		30952		30952	

Note: “High school–I” is one or two years of education after compulsory school. “High school–II” is three years of education after compulsory school. “Higher education–I” is up to six years of education after compulsory school. “Higher education–II” is seven years of education after compulsory school. “Higher education–III” is more than seven years of education after compulsory school. The reference category is mothers with compulsory school. “Place of residence” is a dummy variable taking the value 1 if the mother lives in Oslo, and 0 otherwise. Level of significance: \*\*\* 1 per cent, \*\* 5 per cent, \* 10 per cent.

Results in the third model show that the negative labour supply is somewhat smaller for married mothers than for all mothers, but the difference is not statistically significant. The general result does also applies for this group: CFC has reduced the labour supply for non-western immigrant mothers. Therefore, also for this group we find that economic incentives matter.

Related to the impact of the control variables we find that older mothers are more likely to be working than younger mothers, and that mothers with a high education are more likely to be working than mothers with a low education. The presence of older children in the

family reduces participation. There are no differences in labour supply between married and non-married mothers. Mothers living in a municipality with high kindergarten coverage have higher labour supply compared to mothers living in a municipality with low kindergarten coverage. Regarding the variables for country of origin, we find that mothers from both Eastern Europe, South-America and Asia all have higher labour supply compared to the reference group; mothers from Africa. This result suggests that a family policy programme aimed at increasing the availability of public child care facilities has a positive impact also on non-western immigrant mothers' labour market participation.

One conclusion that can be drawn from the results in table 7.2 is that the CFC-reform *has* affected non-western immigrant mothers' labour supply. Furthermore, the magnitude of the effect is rather large. The results support the hypothesis that non-western immigrant mothers react to changes in the relative prices of child care. This suggests that this group of individuals is quite responsive to changes in economic incentives.

Table 7.3 presents results from separate analyses for each of the four countries of origin groups: Africa, Asia, Eastern Europe, and South America.

*Table 7.3. The CFC-reform and labour market participation. Non-western female immigrants. Africa, Asia, South-America and Eastern Europe. Logit-coefficients*

Variables	Africa		Asia		South America		Eastern Europe	
	Coeff	Std.err	Coeff	Std.err	Coeff	Std.err	Coeff	Std.err
CFCxTREATxPOST	-0.539	0.296	-0.304	0.128	-0.390	0.380	-0.559	0.223
Included controls?	Yes		Yes		Yes		Yes	
DDD marginal effect								
- 2 Log L	4598.4		22953.2		2414.8		7150.2	
N	4341		18865		1866		5880	

Level of significance: \*\*\* 1 per cent, \*\* 5 per cent, \* 10 per cent.

Except for South-America, we find significant negative impacts of CFC for all groups. The negative impacts appear to be strongest for mothers from Africa and Eastern Europa, but the differences between the groups are not statistically significant. African mothers have the lowest participation rates of all the groups. Even so, the results suggest that they are very responsive to the changes in incentives that the CFC reform creates. This result does not lend support to hypothesis saying that some non-western immigrant groups are so far away from the labour market that they are insensitive to labour market incentives.

## 8. Conclusions

The main purpose of this article has been to analyse to what extent non-western immigrant mothers are sensitive to changes in economic incentives regarding labour market participation. Non-western immigrants and non-western female immigrants have very low labour force participation rates. Therefore, research that increases the understanding of what explains the labour supply for this group should be of great value. To answer the question on the responsive to economic incentives we analyse labour supply effects of a Norwegian family policy programme that clearly has affected the incentives to participate in the labour market. From January 1999, all parents with one and two-year-old children who did not use publicly subsidised day care became entitled to a “cash-for-care” subsidy (from now on referred to as “CFC”). The CFC-subsidy is paid out monthly from the time the child is one until it is three years old. The CFC reform has increased the relative price of publicly subsidised day care and decreased the relative price of own care. Standard economic theory of labour supply will postulate that the CFC reform will have a negative effect on labour supply for the person most involved in child care. For the sake of simplicity, assume that parents, when choosing a child care arrangement, are confronted with three alternatives: 1) they may do the caretaking themselves, 2) they may let a childminder take care of their child, or 3) they may use a kindergarten with a public subsidy. After the introduction of the CFC-reform, parents choosing alternatives 1 and 2 will receive a subsidy. For those parents choosing alternative 3 there is no change. The CFC-reform increases the relative price of alternative 3. Therefore, it is reasonable to assume that after the reform more parents will choose alternatives 1 and 2 and fewer will choose alternative 3. Switching from 3 to 1 implies a reduction in labour supply.

We study the impact of the CFC-reform on mothers’ labour market participation. The basic idea is to compare the change in labour supply of CFC-eligible mothers with the change in labour supply of mothers not eligible for CFC. However, the CFC-reform is equally and nation-wide accessible for all mothers with children at the same age. Therefore, we have no natural comparison group. To approach this problem we have put forward a framework in which the treatment group differs from the control group along three dimensions. This means that we have employed a triple approach, i.e. a difference-in-differences-in-differences (DDD) approach.

The results show that the CFC-subsidy has reduced non-western immigrant mothers’ labour supply. The size of the reduction is in the range 5-10 per cent. We argue that this

reduction is rather large in magnitude. The result lends support to hypothesis saying that non-western immigrant mothers are responsive to economic incentives.

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## Appendix

*Table A1. Descriptive statistics. Treatment and control group. Mean values and standard deviations. Mean values are taken from the “before”- years (1994 for the not-CFC-period and 1997 for the CFC-period)*

Variables	Treatment group Mothers with young children (Youngest child 2 years old)				Control group Mothers with older children (Youngest child 5 years old)			
	Birth year (observation year)		Birth year (observation year)		Birth year (observation year)		Birth year (observation year)	
	1995 (1994)		1998 (1997)		1992 (1994)		1995 (1997)	
	Mean	Std.dv	Mean	Std.dv	Mean	Std.dv	Mean	Std.dv
Age (years)	29,04	5,26	29,49	5,43	31,79	5,24	32,04	5,26
Compulsory school (share)	0,08	0,27	0,13	0,34	0,11	0,31	0,15	0,36
High school–I (share)	0,14	0,35	0,19	0,39	0,14	0,35	0,20	0,40
High school–II (share)	0,07	0,25	0,13	0,34	0,08	0,28	0,12	0,33
Higher education–I (share)	0,02	0,13	0,02	0,14	0,02	0,12	0,02	0,14
Higher education–II (share)	0,06	0,24	0,10	0,30	0,08	0,27	0,09	0,29
Higher education–III (share)	0,02	0,13	0,03	0,16	0,03	0,16	0,03	0,17
Unknown education	0,61	0,49	0,41	0,49	0,54	0,50	0,39	0,49
Older children in the family (share)	0,61	0,49	0,59	0,49	0,61	0,49	0,61	0,49
Married (share)	0,60	0,49	0,69	0,46	0,69	0,46	0,76	0,43
Eastern Europe	0,14	0,35	0,15	0,36	0,13	0,33	0,14	0,35
Africa	0,21	0,41	0,20	0,40	0,24	0,43	0,21	0,41
Asia	0,59	0,49	0,60	0,49	0,57	0,49	0,59	0,49
South America	0,06	0,24	0,05	0,22	0,06	0,23	0,06	0,24
Male income (in 10000 NOK)	12,94	13,50	17,77	16,40	13,31	14,40	16,88	15,38
Place of residence, Oslo (share)	0,28	0,45	0,33	0,47	0,32	0,47	0,33	0,47
Kindergarten coverage in municipality (per cent)	39,34	14,62	43,69	12,19	38,99	14,68	43,08	12,43
N	9358		9412		9412		8336	

Note: Mean values and standard deviations in parentheses. “High school–I” is one or two years of education after compulsory school. “High school–II” is three years of education after compulsory school. “Higher education–I” is up to six years of education after compulsory school. “Higher education–II” is seven years of education after compulsory school. “Higher education–III” is more than seven years of education after compulsory school. “Place of residence” is a dummy variable taking the value 1 if the mother lives in Oslo, and 0 otherwise. “Kindergarten coverage in the municipality” measures the per cent of children 1-2 years of age that attend kindergarten.