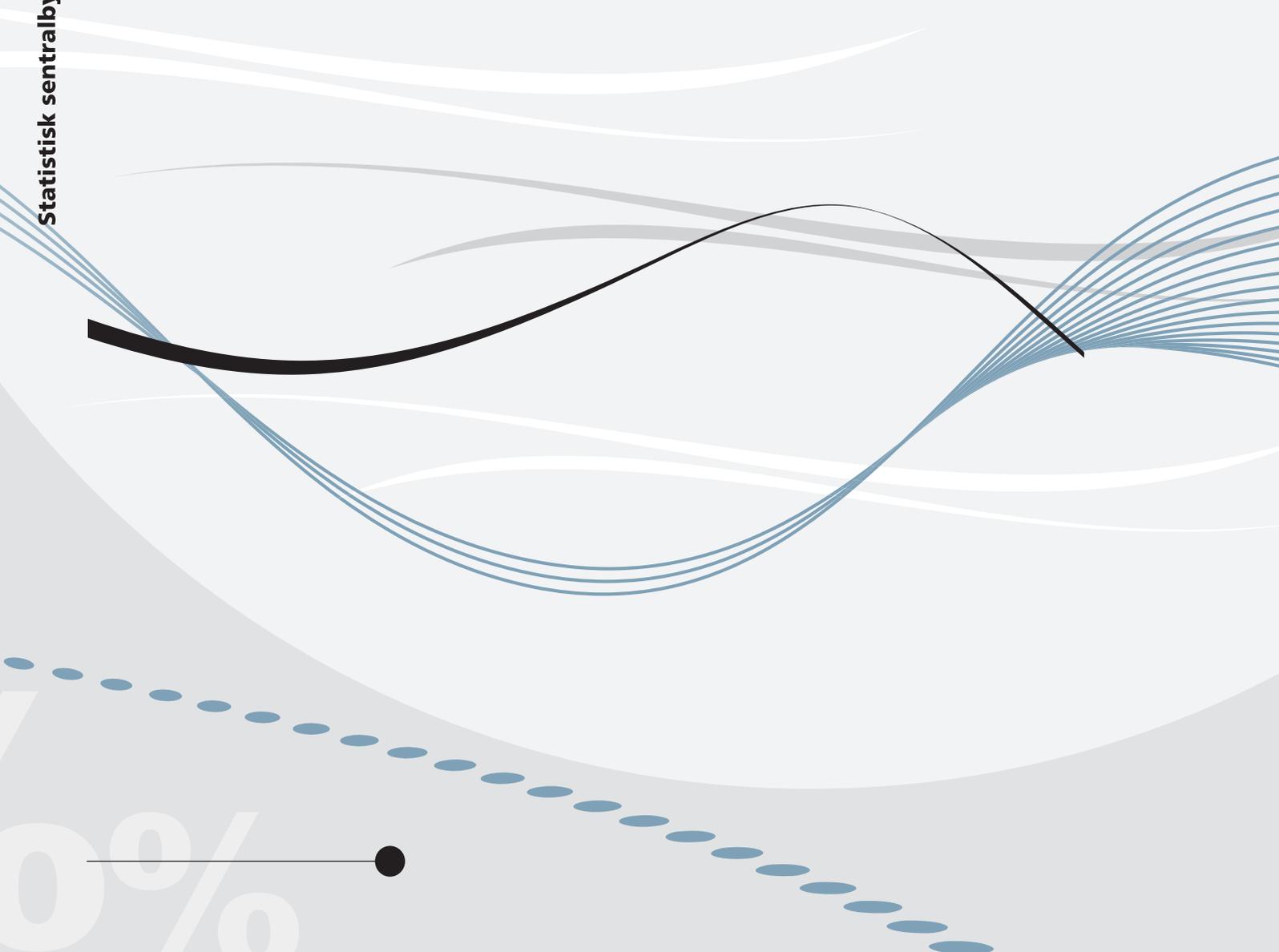


*Morten Henningsen and Tom Kornstad*

## **Variation in the quality of regional child welfare services**



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**Abstract:**

While child welfare services of high quality are very important for many children, measuring quality is not a simple task. This paper presents a method for estimating differences in the quality of local child welfare services. We identify the contributions of municipalities to high school completion and employment of youth who have used child welfare services. By controlling for family background and by introducing non-users to eliminate common regional effects, we hope to eliminate effects that cannot be attributed to child welfare services. Our findings may then be interpreted as mainly quality differences between the child welfare services of different municipalities. According to our results there are substantial differences in the quality of local child welfare services in Norway, and large municipalities performed systematically better than smaller ones when the outcome is high school completion.

**Keywords:** Child welfare; public services; high school graduation; labour market participation.

**JEL classification:** H75; I38; J13

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## **Sammendrag**

Mens vi alle er enige om at det er viktig med god kvalitet i tjenestene til barnevernet, så er det ikke så lett å måle hvorvidt dette faktisk er tilfelle. En viktig grunn er at en vanskelig kan tenke seg at barnevernet kan utlikne alle forskjeller som går i disfavør av barnevernsbarn uansett hvor god kvaliteten er i barnevernstjenesten. I dette arbeidet har vi derfor en mindre ambisiøs problemstilling ved at vi begrenser oss til å studere forskjeller i kvaliteten i arbeidet til barnevernstjenesten i ulike kommuner. Dette gjør vi ved å identifisere kommunenes bidrag til fullføring av videregående skole og sysselsetting for personer som har vært i kontakt med barnevernet. Ved å kontrollere for familiebakgrunn og for hvor godt andre personer som ikke har vært i kontakt med barnevernet gjør det med hensyn til skolefullføring og sysselsetting i de ulike kommunene, håper vi å eliminere effekter som ikke skyldes barnevernets innsats. Gitt at dette er tilfelle, kan resultatene våre tolkes som forskjeller i kvaliteten i barnevernets arbeid i ulike kommuner. Vi finner at det er betydelige kvalitetsforskjeller i barnevernets arbeid i ulike kommuner, og at store kommuner gjør det bedre enn små kommuner når kvaliteten relateres til fullføring av videregående skole.

# 1. Introduction

Studies show that children who receive assistance from child welfare services fare worse than other children in terms of mortality, education, employment and use of government transfers as adults, see Dworsky and Courtney (2000), Clausen and Kristoffersen (2008), Vinnerljung et al. (2005). Other studies show that mental health of child welfare users are worse than of non-users (Claussen et al. 1998), and that they are more frequently involved in crime. Burt et al. (1999) find that 20 percent of imprisoned US youth have previously lived in foster homes. These findings indicate that children who come into the need of assistance, are severely disadvantaged in many ways, and are likely to have much worse life prospects (health, employment, etc.) as adults than other children. Even the most well-funded and successful child welfare programs could not hope to eliminate the differences between users and non-users, and the fact that former users of child welfare services have worse outcomes than others only reflects latent differences in opportunities and choices, rather than failure of the services provided.

The strong selection into child welfare services, i.e., the underlying and mostly unobserved differences between those who receive assistance and those who do not, suggests that it is complicated to measure the causal impact of assistance on children's outcomes. Doyle (2007) exploits randomness in assignment of children to case workers to estimate the impact of foster care on various long term outcomes. However, such sources of exogenous variation are scarce, and it is important to explore alternative ways to study whether and how child welfare services contribute to improving the childhood of the children, and how they may contribute to improving the potential for some form of success in adult life.

In this paper we suggest an approach for comparison of regional child welfare units within the overall child welfare services. By studying how different practises across local child welfare services co-vary with outcomes of the children, we can, in principle, extract information on how the organization of local child welfare services affects the quality of services, defined as the contribution to child outcomes. As an application of the approach we study whether there are differences in high school graduation (upper secondary school) and employment at age 23 of former child welfare services recipients (users) across municipalities in Norway. Hence, we do not answer the question of whether and how the child welfare services contribute to more employment and education, but we estimate the relative effects of local child welfare authorities. We do not have information on the internal

organization of work in local units, but the central child welfare authorities do, and will use this in their continuing efforts to improve services.<sup>1</sup>

The empirical analysis is based on a register data set covering all users of child welfare services during the period 1993–2003. These data are linked with other national wide register data sets in order to get information about family background, incomes, education etc. Thus, the data are rather unique by providing detailed information about all types of assistance from the child welfare services as well as a wide array of background variables for the total Norwegian population. Since the register data sets also include information about non-users of child welfare services, we can introduce a control group of non-users in the estimation of the models. As we will see this is of great importance to uncover the “true” effects of the contribution of the child welfare services.

What we find is that there are substantial differences in the quality of local child welfare services in Norway. When we consider high school graduation as measure of success - in the 8 largest municipalities (cities) of Norway - the probability of graduating from high school is about 10 percentage points lower in the worst performing municipality compared to the most successful one. The ranking of the municipalities is relatively independent of measure of success, i.e., it does not matter very much whether we consider high school graduation or labor market participation. Finally we find - in a separate analysis of all municipalities - that larger municipalities systematically perform better than smaller ones.

The paper is organized as follows. Section 2 gives a brief overview of the organization of the child welfare services in Norway. In Section 3 approach and model specifications are presented, while Section 4 describes data. The estimation results are presented in Section 5. There we first look at a number of specifications covering child welfare users in the 8 largest municipalities in Norway only. At the end of the section we also present some analyses covering users in all municipalities. Finally, Section 6 concludes the paper.

## **2 The organization of child welfare services in Norway**

The Norwegian Child Welfare Authorities offer an array of services for children under the age of 18. The services span financial aid for day care, family support and counselling, leisure activities, medical aid, child protection and both short-term and long-term out-of-home placements, such as foster family

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<sup>1</sup> The Norwegian Child and Youth Directorate and other authorities participated in a reference group for this project.

homes, group homes, and independent living for youth. The child welfare services act upon reports from the public, including police, day care centers, schools, family, neighbours, or from the children or parents themselves, and a case worker assesses whether the authorities should intervene with assistance of some form. The causes of need for assistance can be grouped in four categories: circumstances in the home, deficit of parental care, attributes of the child, and child abuse. Most children receive services for a limited period. The most common forms of assistance are respite care (planned short-term out-of-home placements), and financial aid like subsidies for vacations, school trips and holidays, with 29 and 25 percent of cases, respectively. However, many cases involve stronger measures such as out-of-home placements in foster homes, child and youth group homes, and drug rehabilitation centres. In 2007, 42,600 children received some form of assistance, and 11,700 children received assistance for the first time.

For the period for which we have individual level data on assistance (1993-2003), the responsibility of Norwegian child welfare services was split between municipalities and a national wide authority. There are 430 municipalities in Norway, the smallest having less than 1,000 inhabitants, the largest with more than 500,000. Municipalities are free to decide the amount of money spent on the child welfare services, subject to providing a certain minimum level of services. Children enter the system at the municipality level, where the need for services is evaluated. In some cases, the case worker decides that the child needs services that are in excess of the services provided by the local (municipal) child welfare services, typically out-of-home placements in institutions. The children will then also be part of the national child welfare services (the Capital area, Oslo, is an exception). This two-tier system implies that it is difficult to measure the separate effects of services provided by the municipal and national welfare services. Municipalities may have different thresholds for passing on children to the national level, depending on politics, fiscal and human resources, and on local variation in the type of problems children have. Thus, there are different degrees of selection (in terms of the scope of the children's problems) in children transferred to the national level. In addition, the quality of services may vary across municipalities, such that children who enter the national services are systematically different, depending on the effects of prior measures for the child within the municipality. Finally, we do not have individual specific information from the national child welfare services, we only know when the child is transferred to the national level. For these reasons we do not distinguish between the provider of services, and record the municipality or residence on January 1 the year of the person's 18<sup>th</sup> birthday. Note that we cannot evaluate the relative quality of child welfare services as of today, because we need a follow-up period after the children have been in contact with

the services, until we measure the outcome. Because the Norwegian child welfare services were reformed 2004, we only include its users before 2004 in our analysis.

### **3. Method**

We are interested in measuring how child welfare services affect the opportunities for children to perform well in adult life, measured by some well-defined outcomes. Because outcomes in life depend on the choices made by individuals themselves, it is not evident that more and better opportunities translate into better outcomes. However, by using outcome measures related to education and employment it is reasonable to assume that limited opportunities do constrain the choices of disadvantaged children, and that child welfare services therefore can improve outcomes through improving opportunities for children to later make better decisions. We focus on outcomes in early adult life, but late enough that the outcome is indicative of permanent effects. We choose two outcomes: Education and employment. Education is measured as whether or not the person has completed high school by November of the year when he turns 23. Employment is measured as an indicator variable that equals one if the person has a certain level of earnings the year he turns 23 (see data section). Students are very unlikely to complete high school after the age of 23, and can be assumed ready for work life, if not pursuing further education. However, a very low share of child welfare users takes further education.

Ideally, the estimated effects should only reflect conditions that the child welfare authorities can affect directly. An important confounding factor that authorities cannot control perfectly is the composition of the local population in terms of age, income, employment, education level, degree of social problems, etc. Systematic regional variation in the attributes of parents will translate into regional differences in the outcomes of children. Even though we measure a number of variables relating to parents' education and income, we cannot hope to measure all relevant background variables. Second, differences in local labor market conditions are important for explaining regional variation in youth unemployment. This may relate to the share of youth who take further education, the supply of jobs, and the sectoral structure of work places. Similarly, the quality and density of schools will affect the share of children who complete high school. Many municipalities do not have a high school, and students must commute long distances.

Because of these regional variations in parental background and opportunities, differences in outcomes between (former) child welfare recipients living in different municipalities will reflect many other factors than variation in the quality of child welfare services, even after we condition on observable

variables. In order to control for such regional differences, we introduce a control group of children who did not receive assistance from the child welfare services. These children have been exposed to the same labor market conditions and education system, the same physical and cultural environment as welfare users, and can therefore be used for purging all such common effects that are unrelated to the efforts of child welfare authorities.

We will now formulate a framework for identifying differences in the outcomes of child welfare users between municipalities, after having controlled for observable differences in children's family background and for differences between municipalities in outcomes of all children. Assume that there is an underlying response variable  $Y_{ij}^*$  that can be interpreted as person  $i$ 's ability and motivation for completing high school, or alternatively, participating in the labour market. Subscript  $j$  signifies that the person is living in municipality  $j$ . In what follows it will be assumed that  $Y_{ij}^*$  is determined by

$$(1) \quad Y_{ij}^* = \alpha + \beta X_i + \gamma_j Z_j + \eta B_i + \delta_j Z_{ij} B_i + u_{ij},$$

where  $u_{ij}$  is a stochastic residual and  $X_i$  is a vector of characteristics of person  $i$  including family background variables that is included to account for geographic variation in the composition of population.  $Z_j$  is an indicator variable for municipality  $j$  and the parameters  $\gamma_j$  measure municipality effects that are common to all children in municipality  $j$ .  $B_i$  is an indicator that equals 1 if person  $i$  received assistance from the child welfare services between the age of 15 and 18 (we discuss this limitation below) and zero otherwise, and  $\eta$  captures differences in outcomes between these children and other children. We are primarily interested in the parameters  $\delta_j$ .  $\delta_j$  measures effects that are common to all child welfare users in municipality  $j$ , and may be interpreted as the contribution of the municipality to the outcomes of child welfare users. Thus, we associate these parameters with variations in the quality of child welfare services across municipalities.

Eq. (1) cannot be used directly for practical purposes since  $Y_{ij}^*$  is latent. What we observe in our data is a binary variable  $Y_{ij}$ , which equals 1 if the person has sufficiently high motivation and ability to complete high school and 0 otherwise. That is,

$$(2) \quad Y_{ij} = \begin{cases} 1 & \text{if } Y_{ij}^* > 0 \\ 0 & \text{otherwise.} \end{cases}$$

Given that the cumulative distribution of  $u_{ij}$  is the logistic, we get the standard logit model, cf. Maddala (1983). Thus, we have a framework that can be used for empirical studies of variation in the quality of child welfare services. While the explanation so far primarily has been related to completing high school, in what follows it will be assumed that this model can also be applied to the person's decision of participating in the labour market.

Above, it was argued that  $\delta_j$  may be interpreted as the contribution of the municipality to the outcomes of child welfare users. One particular concern with this interpretation is that certain aspects of municipalities may affect child welfare users and other children differently. For instance, it might be the case that poor school quality has a stronger negative effect on the probability of continuing to high school for children with problems at home than for other children.  $\delta_j$  would also pick up such effects, and this obscures the interpretation of  $\delta_j$ , which then includes more than the relative quality of child welfare services.

Another source of concern is that the threshold for receiving assistance varies across municipalities, because we only include children who receive assistance of some form. Differences in resources and practise at local offices imply that children with very similar problems would be offered assistance in one municipality but not in another. Such systematic variation between municipalities affects our estimates. However, part of the effect will be captured by  $\gamma_j$  and part by  $\eta$ , because the problems of the average recipient of assistance and non-recipient are more severe in municipalities with a high threshold for offering assistance. In one specification we control for the share of assessments that lead to assistance. Of course, there is also a degree of randomness in assistance, even the same case worker may come to different conclusions on identical cases on different days. Such genuine randomness is not a problem to us, because it is uncorrelated with the variables in (1).

When estimating model (1) we can only obtain precise estimates of  $\delta_j$  for municipalities with a relatively large number of child welfare cases. In addition, estimating (1) identifies the existence and size of quality differences, but is "silent" about what drives these differences. In an alternative specification we use selected attributes of the municipalities and omit the municipality indicators, in order to see whether differences in quality are related to resources available to the municipality, resources allocated to the child welfare services, or municipality size. The model in this alternative specification is

$$(3) \quad Y_{ij}^* = \alpha + \beta X_i + \rho Q_j + \eta B_i + \lambda Q_j B_i + e_{ij},$$

where  $Q_j$  is the set of municipality attributes and  $e_{ij}$  is the error term.

## 4. Data

The analysis combines four data sources: The FD-Trygd database with socio-economic and demographic information on all Norwegian inhabitants, the National Education Database, the Child Welfare Services Registry and the KOSTRA database with information about municipalities. All databases are maintained by Statistics Norway and the data are linked by unique personal identification numbers and municipality numbers.

The FD-Trygd database is a collection of data from various administrative registers. We use data on family structure, gender and immigrant background for the entire population, income every year since 1967<sup>2</sup>, municipality of residence and earnings and transfers received since 1992. We add data on high school completion and parents' education level from the National Education Database.

**Table 1. The distribution of child welfare users by type of assistance<sup>1</sup>**

	Number	Percent
Unknown, including parental guidance	2,877	13.1
1. Financial aid	2,011	9.1
3. Guidance	2,231	10.1
4. Supervision	649	2.9
5. Respite care	1,054	4.8
6. Home consultant/respite care in home	506	2.3
7. After-school activities/respite institution	44	0.2
8. Leisure activities	1,804	8.2
9. Education/employment	463	2.1
10. Medical examination/treatment	164	0.7
11. Treatment of children with special needs	163	0.7
12. Parent-child institutions, incl. womens homes	54	0.2
13. Independent living	708	3.2
14. Short notice foster home/institution	536	2.4
15. Foster home	1,867	8.5
16. Placement with relatives	989	4.5
17. Re-inforced foster home	1,036	4.7
18. Child and youth home	3,088	14.0
19. Youth group home	513	2.3
20. Drug rehabilitation centre	587	2.7
21. Psychiatric institution/treatment	589	2.7
22. Polyclinical psychiatric treatment	144	0.7
Total	22,077	100

<sup>1</sup> Cases over the years 1993-2003 for children born 1978-1985. We record only the highest numbered form of assistance received during the age 15-18 for each child.

<sup>2</sup> This is 'pensjonsgivende inntekt', which is the definition of income used in the national social security pension system. The variable includes wages, unemployment benefits and a measure of stipulated labor incomes for self-employed. Before 1993 this is the only income measure we have access to, whereas from 1993 we have detailed information on the sources of income.

The Child Welfare Services Registry includes information about all children who have been registered with the child welfare services. They consist of one dataset for each year. When linked over time, we have one record for every child every year the child received services, for the years 1993-2003. The database includes information on who contacted the welfare services about the child, on what grounds the child was offered assistance, and the type of assistance received.

The KOSTRA database contains information on an array of aspects of organization and expenditure in all Norwegian municipalities (KOSTRA is a Norwegian acronym for Municipality-State-Reporting). We include data on population, working income per inhabitant, gross expenditure on child welfare services per child assessed, gross expenditure per child with assistance types that do not involve out-of-home placement (respite care included here), gross expenditure per child with out-of-home placement, share of the child population who are assessed for assistance, and the share of assessments that lead to assistance.

During the period we study the number of municipalities in Norway was reduced from 435 to 430. We have excluded municipalities for which we do not have information, and have 381 municipalities in our final sample. The excluded municipalities are predominantly very small municipalities, all with less than 3,000 inhabitants. KOSTRA is a relatively new database, and we only have data on all relevant variables since 2002. We therefore use the values of these variables in 2002. Although resources may change over time, the level in 2002 may still be a good proxy of the overall level over time.

In order to ensure both a sufficiently large sample size and a minimum follow-up period, we limit the analysis to children who were born 1978 to 1985, and who were between 15 and 18 years of age in 1993 to 2003. We might have included data on use at ages below 15, as this usage is also relevant for future development, and because interventions below age 15 (which may prevent the need for later assistance) is part of the quality of child welfare services. However, conditional on assistance received from age 15, the additional information in earlier interventions may be limited. And, for every further year below 15 we lose one cohort of children, which would reduce the precision of our estimates.

In the selection of the sample we have excluded children who received assistance on the grounds of 'parents' death' and 'physically disadvantaged'. We define a control group of children who were also 15 to 18 years old 1993-2003, but who were not in the child services database in any years between 15 and 18 years of age.

Table 1 provides an overview of the distribution of children by type of assistance received, for the children included in our sample. Because a child may receive more than one type of assistance within a given year, and different types in different years between the age of 15 and 18, we have assigned to each child the most “severe” assistance type received over the period. The ”severity” of assistance is as numbered in Table 1 (the numbering is not used in the analysis). Table 1 shows that 22,077 children received assistance from the child welfare services, and that 8,616 (39 %) received assistance that involved some form of placement outside the home, other than independent living and psychiatric treatment.

As described above, we use two different variables as our dependent variable *Y*. The indicator for whether the person works is an indicator for whether earnings (the sum of wage earnings and business income) exceed a given threshold, which can be interpreted as whether or not the person has worked a certain amount. We define this threshold as NKR 88,181 measured in 2002-prices. This number equals the product of 20 hours of work per week for 47 weeks at an hourly wage of NKR 93.81, which is the lowest wage allowed within workers’ union for trade and office workers. Because we only have information on earnings until 2005, some persons are omitted from the sample when the dependent variable is employment.

**Table 2. Means of individual characteristics for child welfare services users and controls**

	Users	Controls
Completed high school by age 23	0.26	0.75
Employed at age 23 <sup>1</sup>	0.41	0.56
Female	0.47	0.49
1st generation immigrant	0.12	0.04
2nd generation immigrant	0.02	0.01
Father: average income when child aged 10-18	3.48	6.53
Mother: average income when child aged 10-18	1.74	3.30
Father: transfer<1.5G, earnings<3G	0.27	0.10
Father: transfer>1.5G, earnings>3G	0.03	0.02
Father: transfer>1.5G, earnings<3G	0.25	0.07
Mother: transfer<1.5G, earnings<3G	0.24	0.28
Mother: transfer>1.5G, earnings>3G	0.08	0.05
Mother: transfer>1.5G, earnings<3G	0.47	0.13
Father: high school level education	0.37	0.49
Father: university degree	0.09	0.27
Father: education unknown	0.14	0.04
Mother: Completed high school level	0.13	0.19
Mother: university degree	0.04	0.11
Mother: education unknown	0.13	0.04
Number of observations	22,077	391,015

<sup>1</sup> N=12902 for users and N=259851 for controls, because we only observe earnings until 2005.

Parent's income is measured as average income over the years when the child was aged 10-18, where the income measure includes labor earnings and unemployment benefits. We also include categorical variables based on earnings (the sum of earnings and business income) and transfers received by the parents. Transfers include all transfers from social security, including disability pension, rehabilitation benefits and sickness benefits. To facilitate comparison of incomes and transfers over time, they are divided by the base amount of the social security system (G), an amount that is set every year and that forms the basis for calculating transfers. As of 1. May 2003 the base amount was NKR 56,861 . The categorical variables related to earnings and transfers are introduced to control for the socioeconomic status of the parents.

Table 2 shows a large difference in the share of persons who have completed high school, only 26% among persons who have received child welfare services assistance and 75% among other persons. The difference in employment is much smaller, with 41% of users being employed, and 56% among non-users. However, this is due to a larger share of non-users taking further education and entering the labor market later. There is no gender difference, but immigrants are over-represented among users, especially first generation immigrants. The parents' socio-economic status is an important indicator of use of child welfare services, and sizeable differences in earnings and transfers are also visible here. The average incomes of users' mothers and fathers are only half of those of the parents of non-users. Among users, 52% of fathers had earnings below 3G, compared to 17% among non-users. 28% of fathers of users received more than 1.5G in transfers, compared to 9% among non-users. For mothers, the difference is most visible to the group with high transfers and low earnings, which accounts for 47% of mothers among child welfare recipients and 13% among non-recipients. In contrast, the share of mother with low earnings and low transfers is almost the same for the two groups.

Users and non-users also differ substantially in terms of parents' education level. Among users, 46% of the parents have at least high school education while only 9% have higher education, whereas the shares among control persons are 76% and 27% respectively. For mothers, the corresponding numbers are 17% and 4% for users and 30% and 11% for controls. Parents' education is missing for a much larger share of parents of child welfare users, and part of this follows from a larger share of immigrants.

In Table 3 we consider aspects of municipalities and their child welfare services. Both size and income per inhabitant vary considerably. This provides exogenous variation in resources available for allocation of all the municipalities' services. Expenditure on child welfare services also varies

considerably. Seven municipalities have zero expenditure. These are very small municipalities with few cases (one or two). For reasons of anonymity we do not identify the names of the 8 largest municipalities/cities, neither in Table 3 nor in the other Tables in this report. However, to facilitate comparison of parameter estimates and marginal effects across tables, the ordering of the municipalities/cities is the same in all the tables.<sup>3</sup>

**Table 3. Summary statistics for municipality attributes<sup>1</sup>**

	All municipalities (N=381)				Large municipalities <sup>b</sup> ('cities') (N=8)			
	Mean	S.d.	Min.	Max.	Mean	S.d.	Min.	Max.
Population	11,583	11,523	778	508,726	162,668	150,578	60,086	508,726
Gross working income per inhabitant	45,076	12,653	28,243	166,053	40,331	4,196	37,180	50,040
Gross expenditure per child in child welfare services	23,526	13,614	0	92,889	37,589	9,475	27,711	53,006
Gross expenditure per child with assistance in own home <sup>c</sup>	24,716	15,730	0	113,000	29,512	7,520	20,273	41,153
Gross expenditure per child with out-of-home placement	200,416	258,964	0	439,000	218,112	43,898	179,142	319,540
Assessed children per inhabitant aged 0-17 (%)	2.5	1.3	0.2	8.8	1.8	0.3	1.4	2.2
Assessments that lead to assistance (% for the year 2002)	55.2	21.4	0	100	55.3	9.8	3.8	67.0

<sup>1</sup> All amounts in real NKR All variables measured 2002, except population 2001. <sup>b</sup> The municipalities of Bergen, Bærum, Fredrikstad, Kristiansand, Oslo, Stavanger, Tromsø, Trondheim. <sup>c</sup> Includes respite care.

## 5. Estimation results

This section presents the estimation results. We primarily consider models estimated on a sample of persons living in the 8 largest municipalities in Norway. First we estimate (1) for all types of assistance, as well as for out-of-home placements in a separate model. To consider the robustness of the ranking of the municipalities/cities with respect to the choice of response variable ( $Y$ -variable), we also estimate this equation using an indicator for employment at age 23 as the dependent variable. Finally, we proceed to estimating (3) using all municipalities.

We present estimation results both for the unknown parameters of the models as well as for the marginal effects. Generally, the marginal effects measure the effects on the probability of completing high school of changes in one of the independent variables. Given that Eq. (1) in vector notation can be written  $y_i^* = \beta'x_i + u_i$ , then the marginal effect of a partial change in variable  $x_{ik}$  is given by

$$(4) \quad \frac{\partial P}{\partial x_{ik}} = \frac{\exp(x_i'\beta)}{[1 + \exp(x_i'\beta)]^2} \beta_k,$$

<sup>3</sup> The ordering is based on the size of the estimates of  $\delta_j$ -parameters associated with  $Z_jB$  in the lower part of Table 4.

where  $P$  is the probability of completing high school. Thus, a particular feature of the logit model is that the marginal effects depend on the characteristics of the unit of analysis, i.e., the person. To describe the distribution of the marginal effects we present figures both for selected deciles using the characteristics of the persons in the sample as well as the marginal effects for a reference person with the following characteristics: The reference person is a man that received child welfare services in municipality 1 when 15-18 years old. He is a Norwegian citizen born in 1995 (non-immigrant). Both his father and his mother have only a little education (not completed high school), and their average labor income when the child was between 10-18 years was 3.2 G and 1.6 G, respectively. These income levels correspond to the average incomes in the sample used in the estimation of the first model (left part of table/all types of assistance) of Table 4. Both parents belong to the category “income transfer < 1.5 G and earnings > 3G” when the child was 15 years old.

## 5.1 Large municipalities

Table 4 displays the estimation results of (1) for inhabitants of the 8 large municipalities, and in Table 5 we show the corresponding marginal effects for the reference person described in the previous section. In column 2 and 3 of the tables we consider all child welfare services users, whereas we in the two last columns of the tables look at only child welfare services users who were placed outside the home, in addition to all controls.

We are primarily interested in the estimates of the parameters of  $Z_jB$ , the municipality effects, but we should also check that the other estimates conform to our a priori expectations. Considering first the estimation results for the sample including all types of assistance, we see from Table 4 that most of the parameters are significantly different from zero, in particular when one ignores the dummies for year of birth. According to the results for the marginal effects in Table 5, the partial effect of being a woman is a 7.2 percentage points higher probability of completing high school, given the characteristics of the reference person. We also find that 1<sup>st</sup> generation immigrants are less likely to complete high school than natives. For 2<sup>nd</sup> generation immigrants the effect is not significantly different from zero. Research has shown that parental background is important for school grades, see Hægeland et al. (2005).

Another frequently reported result in the literature is that socio-economic status is positively correlated between parents and their children. To account for this, we include parents' income, transfers and education in the model specifications. According to our results, the probability of graduating from high school increases with parents' income, and is lower for persons whose parents have low earnings or high transfer incomes. The father's education level is important for predicting high school graduation, and more important than the mother's education level, again given the characteristics of the reference person. Children whose father has a high school degree, have 7.8 percentage points higher probability of graduating from high school, and this effect increases to 17.5% if the father has a university degree. The coefficient on "former child welfare services user" shows that users who live in the reference municipality have 29.8 percentage points lower probability of high school graduation, holding other variables constant. This is only about half of the difference in raw high school graduation rates, showing that a substantial part of the reason that these children do not complete high school can be found in their social background.

The coefficients  $\gamma_j$  associated with the municipality indicators  $Z_j$  capture two effects. First, a causal effect of living in a given municipality, e.g. due to high school coverage, quality of the schooling system, crime rates, and all other attributes of municipalities that may influence the education opportunities and decisions of youth. Second, the coefficients measure composition effects, seeing that the propensity to graduate from high school depends on other individual aspects than those included in  $X_i$ , and that the distribution of these aspects may vary across municipalities. However, the composition of the local population and municipality policies are to some extent jointly determined over time, such that it would be difficult to separate the two.

As pointed out above, the main results of this analysis are the estimates of the contribution (marginal effects) of child welfare services to completion of high school among former users of these services. We find large differences, see Table 5. Municipalities 1-3 have the largest contributions (normalized to zero for municipality 1), municipalities 4-6 have between 3.6 and 6.0 percentage points lower effects, and 7 and 8 stand out with 8.5 and 11.4 percentage points "penalty", relative to municipality 1. To put things in perspective, we notice that among former users of child welfare services only 26 percent have graduated from high school by the age of 23, according to our results in Table 2.

**Table 4. Logit model for completed high school.<sup>1</sup> The eight large municipalities.<sup>2</sup> Including control children**

	All types of assistance		Out-of-home placements	
	Coeff.	t-value	Coeff.	t-value
Constant	0.033	0.8	0.053	1.3
Female	0.352	23.5	0.343	22.5
Born 1978	0.113	3.8	0.107	3.5
Born 1979	-0.007	-0.2	-0.016	-0.5
Born 1980	-0.004	-0.1	-0.014	-0.5
Born 1981	-0.007	-0.2	-0.011	-0.4
Born 1982	0.156	5.3	0.150	5.0
Born 1983	0.114	3.8	0.108	3.5
Born 1984	0.030	1.0	0.033	1.1
Born 1985				
1st generation immigrant	-0.210	-6.9	-0.236	-7.6
2nd generation immigrant	-0.009	-0.2	-0.028	-0.7
Father: average income when child aged 10-18 <sup>c</sup>	0.023	12.1	0.024	12.3
Mother: average income when child aged 10-18 <sup>c</sup>	0.065	13.2	0.066	13.0
Father: transfer<1.5G, earnings>3G				
Father: transfer<1.5G, earnings<3G	-0.314	-12.0	-0.327	-12.2
Father: transfer>1.5G, earnings>3G	-0.262	-4.6	-0.266	-4.5
Father: transfer>1.5G, earnings<3G	-0.255	-9.5	-0.255	-9.2
Mother: transfer<1.5G, earnings>3G				
Mother: transfer<1.5G, earnings<3G	0.009	0.4	0.012	0.5
Mother: transfer>1.5G, earnings>3G	-0.201	-6.6	-0.205	-6.6
Mother: transfer>1.5G, earnings<3G	-0.209	-7.7	-0.225	-8.1
Father: not completed high school level				
Father: high school level education	0.379	18.9	0.383	18.7
Father: university degree	0.788	33.7	0.785	32.9
Father: education unknown	0.158	4.5	0.145	4.0
Mother: not completed high school level				
Mother: Completed high school level	0.058	2.9	0.050	2.4
Mother: university degree	0.215	8.6	0.209	8.2
Mother: education unknown	-0.924	-30.1	-0.950	-30.2
Municipality 1 ( $Z_1$ )				
Municipality 2 ( $Z_2$ )	-0.218	-6.3	-0.229	-6.6
Municipality 3 ( $Z_3$ )	0.108	3.5	0.097	3.1
Municipality 4 ( $Z_4$ )	0.045	1.6	0.034	1.2
Municipality 5 ( $Z_5$ )	0.356	13.1	0.346	12.7
Municipality 6 ( $Z_6$ )	0.146	6.4	0.135	5.9
Municipality 7 ( $Z_7$ )	0.349	9.7	0.338	9.4
Municipality 8 ( $Z_8$ )	0.576	16.6	0.568	16.4
Former child welfare services user ( $B$ )	-1.283	-25.6	-1.250	-17.1
Former child welfare user *municipality 1 ( $Z_1B$ )				
Former child welfare user *municipality 2 ( $Z_2B$ )	0.023	0.1	-0.274	-1.2
Former child welfare user *municipality 3 ( $Z_3B$ )	0.000	0.0	-0.076	-0.4
Former child welfare user *municipality 4 ( $Z_4B$ )	-0.197	-1.8	-0.192	-1.2
Former child welfare user *municipality 5 ( $Z_5B$ )	-0.334	-3.3	-0.186	-1.3
Former child welfare user *municipality 6 ( $Z_6B$ )	-0.347	-4.1	-0.207	-1.7
Former child welfare user *municipality 7 ( $Z_7B$ )	-0.515	-3.6	-0.555	-2.4
Former child welfare user *municipality 8 ( $Z_8B$ )	-0.738	-5.9	-0.742	-4.0
McFadden's pseudo-R2	0.13		0.11	
Log likelihood	-54693.4		-52534.8	
N	102905		99142	

<sup>1</sup> Estimation of Eq. (1). The dependent variable equals one if person completed high school by October the year of the 23rd birthday, zero otherwise. <sup>b</sup>  $Z_1$ -  $Z_8$  are dummy variables for the 8 municipalities Bergen, Bærum, Fredrikstad, Kristiansand, Oslo, Stavanger, Tromsø, Trondheim in random order.

<sup>2</sup> Income is measured in terms of the base amount of the social security (G), see text.

Not all children who are registered as users of child welfare services, have problems that would suggest serious disadvantages in terms of education. It is also interesting in itself to examine how successful municipalities are in “rescuing” children with serious problems.<sup>4</sup> Therefore we also estimate the model on a sample that includes only out-of-home placements (assistance types 14-20 in Table 1), and controls. The interpretation of the results from this estimation may be problematic because the child welfare services influence (or decide) whether the child should be removed from the home. If the threshold for out-of-home placement varies across municipalities, this would entail composition effects in the estimates. However, the parameter estimates and the marginal effects are remarkably similar to the ones in the estimation for all types of assistance, but the parameters are now less precisely determined, cf. Table 4 and Table 5. Note that reduction in precision might be due to a relatively large reduction in the number of children in welfare services.

Due to the non-linearity of the logit model, the marginal effects vary across the population. To get a better understanding of the variation, Table 6 shows selected percentiles of the marginal effects for high school graduation in the sample used in the estimation of the two models. The percentiles are determined by sorting the marginal effects within a particular municipality in increasing order, before we select the actual percentile.<sup>5</sup> To save space, we only present figures for the marginal effects that can be associated with quality of child welfare services. From the table we notice that there is considerable variation in the estimates across persons within a municipality, for both out-of-home placements and for all types of assistance. By comparing the marginal effects in the various percentiles, we notice that the marginal effects of percentile 1 and 10 are almost identical while there is larger differences in the marginal effects of percentile 90 and 99. In Table 6, including all types of assistance, in particular the municipalities 7 and 8 perform systematically worse than the other municipalities.

Hence, there are large and statistically significant differences between the 8 largest municipalities in terms of high school completion among users of child welfare services, both users with serious and less serious problems. Given that we have corrected for individual heterogeneity and for common municipality effects, these results are likely to be related to differences in the quality of local child welfare services.

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<sup>4</sup> Previous research on the impact of foster care has found small or no effects (Doyle, 2007).

<sup>5</sup> The sorting is done separately for each sample.

**Table 5. Marginal effects for completed high school. The eight large municipalities. Including control children. Based on model reported in Table 4<sup>1</sup>**

	All types of assistance		Out-of-home placements	
	Marg. eff. <sup>b</sup>	t-value	Marg. eff. <sup>b</sup>	t-value
Female	0.072	20.5	0.072	18.5
1st generation immigrant	-0.038	-7.0	-0.044	-7.6
2nd generation immigrant	-0.002	-0.2	-0.005	-0.7
Father: average income when child aged 10-18	0.004	11.8	0.005	11.5
Mother: average income when child aged 10-18	0.012	13.4	0.013	12.6
Father: transfer<1.5G, earnings>3G				
Father: transfer<1.5G, earnings<3G	-0.055	-11.7	-0.059	-11.2
Father: transfer>1.5G, earnings>3G	-0.047	-4.8	-0.049	-4.7
Father: transfer>1.5G, earnings<3G	-0.045	-9.3	-0.047	-8.8
Mother: transfer<1.5G, earnings>3G				
Mother: transfer<1.5G, earnings<3G	0.002	0.4	0.002	0.5
Mother: transfer>1.5G, earnings>3G	-0.036	-6.7	-0.038	-6.6
Mother: transfer>1.5G, earnings<3G	-0.038	-7.4	-0.042	-7.6
Father: not completed high school level				
Father: high school level education	0.078	17.5	0.081	16.4
Father: university degree	0.175	28.5	0.177	26.1
Father: education unknown	0.031	4.4	0.029	3.9
Mother: not completed high school level				
Mother: high school level education	0.011	2.9	0.010	2.4
Mother: university degree	0.043	8.0	0.043	7.6
Mother: education unknown	-0.136	-23.0	-0.143	-18.6
Municipality 1				
Municipality 2	-0.039	-6.5	-0.042	-6.7
Municipality 3	0.021	3.4	0.019	3.1
Municipality 4	0.009	1.6	0.007	1.2
Municipality 5	0.073	11.9	0.073	11.3
Municipality 6	0.029	6.2	0.027	5.7
Municipality 7	0.072	8.9	0.071	8.6
Municipality 8	0.123	14.6	0.124	14.0
Former child welfare services user ( <i>B</i> )	-0.298	-29.8	-0.293	-20.1
Former child welfare user *municipality 1 ( <i>Z<sub>1B</sub></i> )				
Former child welfare user *municipality 2 ( <i>Z<sub>2B</sub></i> )	0.004	0.1	-0.050	-1.2
Former child welfare user *municipality 3 ( <i>Z<sub>3B</sub></i> )	0.000	0.0	-0.015	-0.4
Former child welfare user *municipality 4 ( <i>Z<sub>4B</sub></i> )	-0.036	-1.9	-0.036	-1.2
Former child welfare user *municipality 5 ( <i>Z<sub>5B</sub></i> )	-0.058	-3.4	-0.035	-1.3
Former child welfare user *municipality 6 ( <i>Z<sub>6B</sub></i> )	-0.060	-4.2	-0.038	-1.8
Former child welfare user *municipality 7 ( <i>Z<sub>7B</sub></i> )	-0.085	-4.0	-0.094	-2.7
Former child welfare user *municipality 8 ( <i>Z<sub>8B</sub></i> )	-0.114	-6.8	-0.119	-4.6

<sup>1</sup> Marginal effects of cohort dummies are omitted to save space. <sup>b</sup> Marginal effects are calculated for a reference person, see text.

**Table 6. Distribution of marginal effects for completed high school. The eight large municipalities. Including control children. Based on model reported in Table 4**

	Percentile (within municipality)				
	1	10	50	90	99
<i>All types of assistance</i>					
$Z_2B$	0.002	0.003	0.004	0.006	0.006
$Z_3B$	0.000	0.000	0.000	0.000	0.000
$Z_4B$	-0.049	-0.048	-0.035	-0.022	-0.014
$Z_5B$	-0.083	-0.081	-0.059	-0.036	-0.023
$Z_6B$	-0.087	-0.084	-0.062	-0.038	-0.024
$Z_7B$	-0.129	-0.125	-0.092	-0.056	-0.036
$Z_8B$	-0.184	-0.178	-0.131	-0.081	-0.051
<i>Out-of-home placements</i>					
$Z_2B$	-0.068	-0.066	-0.048	-0.030	-0.019
$Z_3B$	-0.019	-0.018	-0.013	-0.008	-0.005
$Z_4B$	-0.048	-0.046	-0.034	-0.021	-0.014
$Z_5B$	-0.046	-0.045	-0.033	-0.020	-0.013
$Z_6B$	-0.052	-0.050	-0.037	-0.023	-0.015
$Z_7B$	-0.139	-0.134	-0.098	-0.060	-0.039
$Z_8B$	-0.185	-0.179	-0.131	-0.081	-0.052

A shortcoming of our data is that we do not observe the practice of child welfare services within a specific municipality. Thus, there might be other institutions or public arrangements that affect the probability of completing high school among former child welfare services users in addition to the security system we are analysing. One way of dealing with this problem might be to study whether the results are robust with respect to the chosen outcome variable. As an alternative measure to high school completion, we study how the child welfare services contribute to employment of their previous users. Employment is an alternative measure of success as adult, although for those who take further education, employment is usually precluded. Table 7 shows the key estimates when being employed (as defined above) is the dependent variable in estimation of Eq. (1). We have included the results for education for comparison, and also included the estimates when controls are omitted. For a complete list of parameter estimates, marginal effects and t-values for the employment estimations and for the estimations without controls, see Table A1 and Table A2, respectively, in the Appendix. The marginal effects are calculated for the same reference person that is used in the calculations in Table 5.

The estimation results for the model without controls reveal the importance of controlling for common effects in municipalities. Without controls, child welfare users in municipality 3 have significantly higher high school completion chances than users in other municipalities. When one introduces control persons, the composition effects and common effects of municipalities are eradicated, and we obtain

similar results to the ones presented above. This suggests that municipalities 4-8 have a composition of the population and other municipality contributions to education that are relatively good, but that these hide a low quality of child welfare services. If we consider contributions to employment at age 23 (right hand side of Table 7), we find large differences across municipalities in the model without controls, to a large extent reflecting variation in labor market conditions. When using controls, we obtain a ranking of municipalities quite similar to the one we found with education as the outcome. Excluding non-out-of-home placements does not change the overall pattern. These estimations substantiate the impression that that the child welfare services in municipalities 4-8, and especially 7 and 8, provide low quality support for children.

**Table 7. Indicators of child welfare services quality for the eight large municipalities, alternative measures<sup>1</sup>**

Controls	Completed high school <sup>2</sup>			Employment <sup>3</sup>		
	No	Yes	Yes	No	Yes	Yes
Child welfare services users	All	All	Out-of-home placements only	All	All	Out-of-home placements only
	Marg. eff.	Marg. eff.	Marg. eff.	Marg. eff.	Marg. eff.	Marg. eff.
$Z_1B$						
$Z_2B$	-0.005	0.004	-0.050	0.013	-0.048	-0.083
$Z_3B$	0.044***	0.000	-0.015	0.044	0.088***	-0.001
$Z_4B$	-0.008	-0.036*	-0.036	-0.065**	-0.048*	-0.011
$Z_5B$	0.018	-0.058***	-0.035	-0.111*	-0.109***	-0.079*
$Z_6B$	-0.002	-0.060***	-0.038*	-0.064*	-0.085***	-0.022
$Z_7B$	0.000	-0.085***	-0.094***	-0.051	-0.097**	-0.158**
$Z_8B$	-0.007	-0.114***	-0.119***	-0.164*	-0.174***	-0.137**
McFadden's pseudo-R <sup>2</sup>	0.03	0.13	0.11	0.02	0.05	0.05
Log likelihood	-3792.8	-54693.4	-52534.8	-2623.2	-42083.9	-40599.3
N	6805	102905	99142	3958	63993	61798

<sup>1</sup> Estimation of Eq. (1). Only marginal effects of  $Z_iB$  reported. \*\*\* Indicates that marginal effect is statistically significant at 1 % level (\*\*: 5 % level, \*: 10 % level).

<sup>2</sup> Completed high school by October the year of the 23rd birthday.

<sup>3</sup> Earnings exceed certain threshold in year of 23rd birthday (see text).

## 5.2 Sources of quality differences

In the previous section we analyzed differences between the largest municipalities only, because the dummy variable approach requires many child welfare services users for each municipality. However, this method does not provide information about why the quality of services differs. In what follows we proceed with an analysis of the sources of these differences, using all municipalities and all types of assistance. We estimate Eq. (3) and focus on the estimates of interest, the parameters  $\lambda$  and the

marginal effects of  $Q_j B_i$  that are presented in Table 8. See Table A3 in the Appendix for a full overview of the estimation results.

**Table 8. Marginal effects for completed high school and labor market participation.<sup>1</sup> All municipalities, and all types of assistance. Including control children**

	Completed high school <sup>2</sup>		Employment <sup>3</sup>	
	Marg. eff.	t-value	Marg. eff.	t-value
Municipality level variables interacted with $B$ :				
2000-4999 inhabitants	0.032	1.8	0.107	3.3
5000-9999 inhabitants	0.030	1.6	0.073	2.2
10000-19999 inhabitants	0.050	2.6	0.091	2.7
20000-39999 inhabitants	0.063	3.3	0.114	3.3
40000-99999 inhabitants	0.055	2.8	0.066	1.9
100000+ inhabitants	0.080	4.2	0.129	4.0
Gross working income per inhabitant/10000	0.019	6.2	0.024	4.2
Gross exp. per child in child welfare services/10000	0.000	0.0	0.002	0.5
Gross exp. per child with assistance in own home**/10000	-0.004	-2.0	0.002	0.6
Gross exp. per child with out-of-home placement/10000	0.000	0.2	0.001	2.1
Assessed children per inhabitant aged 0-17 (%)	0.221	0.8	-0.217	-0.4
Assessments that lead to assistance (% for the year 2002)	-0.003	-0.2	0.064	2.4
McFadden's pseudo-R2	0.11		0.05	
Log likelihood	-218943.9		-169438.3	
Number of observations	413092		259251	

<sup>1</sup> Estimates of Eqs. (1) and (3), respectively. Only marginal effects of  $Q_j B_i$ -variables reported. The full set of estimates can be found in Table A4 in the Appendix.

<sup>2</sup> Completed high school by October the year of the 23rd birthday.

<sup>3</sup> Earnings exceed certain threshold in year of 23rd birthday (see text).

One would expect that the quality of child welfare services increases with the resources allocated to them, and we therefore include in  $Q$  the total expenditure on child welfare services measured per child assessed for assistance, and the expenditure per child who receive assistance within and outside the home, respectively. Income per inhabitant is also included, because other municipality services may be important for the degree of success of combined efforts to help children and youth.

Table 8 shows that more affluent municipalities have higher rates of high school completion for child welfare users, after correcting for fixed municipality effects. The effect is small, though, one standard deviation higher gross working income per capita implies an increase in high school completion probability of 0.24 percentage points. There is no effect of resources allocated to child welfare on users' high school completion probabilities. Of course, if high expenditure levels only mirror inefficient organization of child welfare services, we would see no, or even a negative, effect. The negative coefficient on Gross expenditure per child with assistance in own home might reflect that

priority to assistance within the home comes at the expense of long-run outcomes, such as educational attainment.

The expenditure per child outside the home may be more relevant to improving the education opportunities of children who are actually placed outside the home, and we have therefore estimated the model again with only those with out-of-home placement (and controls). However, the results are similar, and expenditure variables are not significant. Because the expenditure variables are measured only in 2002, we miss all within-municipality variation in expenditure over time, and this may explain the lack of significant results. Furthermore, if expenditure depends on past performance, the estimation will not reflect the contemporaneous relationship between resources and outcomes that we are interested in.

One might think that quality increases with experience and scale. Local child welfare services with many case workers and many cases can accumulate and maintain expertise, and case workers can support each other in their daily work. Large units are likely to be more professional, with formal best-practise procedures and better explicit and implicit training of staff. Large units could also have better physical facilities for out-of-home placements and for organizing activities for children.

The results reveal a relatively strong and systematic increase with municipality size in the contribution to high school completion. This suggests that larger units with more cases provide better assistance for children with problems. The difference between the smallest and largest municipalities is 8 percentage points given the characteristics of our reference person, which is a bit less than the difference between the best and the worst among the eight largest municipalities, as discussed in the previous section. A child welfare recipient who lives in a municipality with less than 2000 inhabitants faces a 6.3 percentage point lower chance of high school completion than an identical child who lives in a municipality with 20,000-39,999 inhabitants, after controlling for common municipality-size effects (coefficients  $\rho$  in Eq. (3)). This is a large difference, and calls for further studies of quality, unit size and organization of local child welfare services.

Finally, we include a variable that measures the share of assessments made by the local child welfare services per child in the population. This variable accounts for differences in composition of children in the population, or, the share who needs assistance, but it will also be influenced by local practise, and thus also reflect quality of local child welfare services. As shown in Table 9 the use of child

welfare services per child, and the share of assessments that result in assistance, have no significant effect on high school completion according to our estimation results.

Using the alternative outcome, employment, the size effect is less pronounced, and the difference is to some extent more of a level difference between the smallest municipalities and larger ones. The effect of municipality income is almost the same as with education. However, Gross expenditure per child in out-of-home placement is now statistically significant, but very small.

## **6. Conclusion**

Many children need and receive help from child welfare services every year, and it is relevant to ask whether the services they receive help them to better lives as adults, in addition to offering immediate help. We compare different geographical units within the child welfare services, and thus obtain a measure of relative performance of regional child welfare services. We compare children who received assistance from the local child welfare services in different municipalities in Norway when they were aged 15-18, between 1993 and 2003. To account for municipality effects that are common to all children and that cannot be affected by child welfare services, we use a comparison group of persons of the same age who were not in contact with child welfare. And by using administrative data that cover the entire population, we avoid problems related to small sample size and generalization from surveys to the population. The Norwegian child welfare services were re-organized in 2004, and our sample is restricted to the period until 2003. Therefore, we cannot evaluate the current system. However, there is reason to believe that the differences uncovered to some extent derive from factors that have not changed.

Two outcomes are studied, i) whether the person has completed high school by age 23, and ii) whether the person is employed at age 23. After controlling for gender, immigrant status, cohort, father's and mother's incomes and transfers and education levels, we find large differences in the quality of child welfare services. Among the eight largest municipalities in Norway, the relative effects (compared to zero for the reference municipality) are up to 11.4 percentage points on high school completion. That is, children who are registered with the child welfare services in the least successful municipality have 11.4 percentage points lower chance of completing high school than an identical child in the municipality with the best quality of child welfare services, if the common municipality effects were the same.

Unfortunately, we do not have detailed data about how the local child welfare services organize their work and practises. This means we are not able to identify the characteristics of best practice. As a first attempt of analysing the sources of variation in quality we relate the outcomes to municipality size (number of inhabitants), income and expenditure on child welfare services, using all municipalities. We find a strong size effect, with larger municipalities having larger effects. The difference between the smallest and largest municipalities is 8 percentage points, and municipalities with a polulation below 2,000 have a 6.3 percentage point 'penalty' compared to municipalities with 20,000-39,999 inhabitants, after controlling for common municipality-size effects. This is a large difference. It may derive from learning and scale effects, and the results call for further studies of the effects of unit size and organization of local child welfare services on the quality of services provided. The results are robust to whether we use employment or education as the dependent variable. The size effect is less clear when the outcome studies is employment, although living in one of the smallest municipalities under 2000 inhabitants) entails a statistically significantly penalty (6.6 to 12.9 percentage points) compared to all other size categories

As a general note of caution, we stress that we cannot be sure to what extent the estimates we have found reflect genuine differences in the quality of local child welfare services. In particular, the estimates may be affected by differences in cooperation between schools, police, social workers and child welfare services. Anything that affects children involved with the child welfare services differently than it affects other children is a candidate for pollution of our estimates. However, because child welfare services are necessarily part of a larger system and do work together with other public services, our estimates are still valuable as a starting point for analyzing in detail, using in-depth interviews and more detailed survey data, why some municipalities contribute more to the future success (as defined here) of children with problems, relative to other children.

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## Appendix A: Estimation results

**Table A1. Logit model for employment.<sup>1</sup> The eight large municipalities.<sup>2</sup> Including control children**

	All types of assistance				Out-of-home placements			
	Coeff.	t-value	Marg. eff.	t-value	Coeff.	t-value	Marg. eff.	t-value
Constant	1.155	26.0	-	-	1.184	26.2	-	-
Female	-0.300	-18.3	-0.072	-17.9	-0.306	-18.3	-0.075	-18.0
Born 1979	0.112	4.3	0.026	4.3	0.112	4.3	0.027	4.2
Born 1980	0.073	2.8	0.017	2.8	0.080	3.0	0.019	3.0
Born 1981	-0.056	-2.2	-0.013	-2.2	-0.052	-2.0	-0.013	-2.0
Born 1982	-0.026	-1.0	-0.006	-1.0	-0.023	-0.9	-0.005	-0.9
Born 1983/1984/1985								
1st generation immigrant	-0.192	-5.1	-0.046	-5.1	-0.216	-5.6	-0.053	-5.5
2nd generation immigrant	-0.052	-1.1	-0.012	-1.1	-0.072	-1.5	-0.017	-1.5
Father: average income when child aged 10-18*	-0.032	-14.9	-0.008	-14.9	-0.032	-14.8	-0.008	-14.8
Mother: average income when child aged 10-18*	-0.047	-9.1	-0.011	-9.1	-0.048	-9.1	-0.012	-9.1
Father: transfer<1.5G, earnings>3G								
Father: transfer<1.5G, earnings<3G	-0.294	-9.4	-0.071	-9.3	-0.300	-9.4	-0.074	-9.3
Father: transfer>1.5G, earnings>3G	0.003	0.0	0.001	0.0	0.008	0.1	0.002	0.1
Father: transfer>1.5G, earnings<3G	-0.158	-5.0	-0.038	-5.0	-0.151	-4.6	-0.037	-4.6
Mother: transfer<1.5G, earnings>3G								
Mother: transfer<1.5G, earnings<3G	-0.145	-5.4	-0.035	-5.4	-0.150	-5.5	-0.037	-5.5
Mother: transfer>1.5G, earnings>3G	0.102	3.0	0.024	3.0	0.102	2.9	0.024	3.0
Mother: transfer>1.5G, earnings<3G	-0.088	-2.9	-0.021	-2.9	-0.082	-2.6	-0.020	-2.6
Father: not completed high school level								
Father: high school level education	-0.130	-5.4	-0.031	-5.4	-0.146	-5.9	-0.035	-5.9
Father: university degree	-0.816	-30.4	-0.201	-31.1	-0.838	-30.6	-0.207	-31.6
Father: education unknown	-0.394	-9.3	-0.096	-9.2	-0.428	-9.7	-0.105	-9.6
Mother: not completed high school level								
Mother: Completed high school level	-0.007	-0.3	-0.002	-0.3	-0.011	-0.5	-0.003	-0.5
Mother: university degree	-0.381	-14.6	-0.093	-14.1	-0.382	-14.5	-0.094	-14.2
Mother: education unknown	-0.510	-14.1	-0.125	-13.8	-0.514	-13.7	-0.127	-13.6
Municipality 1 ( $Z_1$ )								
Municipality 2 ( $Z_2$ )	0.189	4.5	0.043	4.7	0.182	4.4	0.043	4.4
Municipality 3 ( $Z_3$ )	-0.207	-6.2	-0.050	-6.1	-0.208	-6.2	-0.051	-6.1
Municipality 4 ( $Z_4$ )	-0.164	-5.2	-0.039	-5.1	-0.168	-5.3	-0.041	-5.3
Municipality 5 ( $Z_5$ )	-0.176	-6.1	-0.042	-6.0	-0.182	-6.3	-0.044	-6.2
Municipality 6 ( $Z_6$ )	-0.058	-2.3	-0.014	-2.3	-0.064	-2.5	-0.015	-2.5
Municipality 7 ( $Z_7$ )	-0.032	-0.8	-0.007	-0.8	-0.039	-1.0	-0.009	-1.0
Municipality 8 ( $Z_8$ )	-0.136	-3.8	-0.032	-3.8	-0.142	-4.0	-0.034	-3.9
Former child welfare services user ( $B$ )	-0.467	-8.2	-0.102	-7.7	-0.587	-7.2	-0.129	-6.6
Former child welfare user *municipality 1 ( $Z_1B$ )								
Former child welfare user *municipality 2 ( $Z_2B$ )	-0.199	-1.1	-0.048	-1.1	-0.338	-1.3	-0.083	-1.3
Former child welfare user *municipality 3 ( $Z_3B_3$ )	0.399	2.9	0.088	3.1	-0.004	0.0	-0.001	0.0
Former child welfare user *municipality 4 ( $Z_4B$ )	-0.201	-1.7	-0.048	-1.7	-0.045	-0.3	-0.011	-0.3
Former child welfare user *municipality 5 ( $Z_5B$ )	-0.446	-3.6	-0.109	-3.6	-0.284	-1.6	-0.070	-1.6
Former child welfare user *municipality 6 ( $Z_6B$ )	-0.349	-3.6	-0.085	-3.6	-0.091	-0.7	-0.022	-0.7
Former child welfare user *municipality 7 ( $Z_7B$ )	-0.400	-2.4	-0.097	-2.4	-0.639	-2.4	-0.158	-2.4
Former child welfare user *municipality 8 ( $Z_8B$ )	-0.709	-4.8	-0.174	-4.8	-0.553	-2.5	-0.137	-2.5
McFadden's pseudo-R2	0.05				0.05			
Log likelihood	-42083.9				-40599.3			
Number of observations	63993				61798			

<sup>1</sup> Estimation of Eq. (1). The dependent variable equals 1 if earnings of the person exceed certain threshold in year of 23rd birthday (see text), zero otherwise.

<sup>2</sup>  $Z_1$ -  $Z_8$  are dummy variables for the 8 municipalities Bergen, Bærum, Fredrikstad, Kristiansand, Oslo, Stavanger, Tromsø, Trondheim in the same order as in Table 4.

**Table A2. Logit model for completed high school<sup>1</sup> and labor market participation<sup>2</sup>. The eight large municipalities.<sup>3</sup> Without control children. All types of assistance**

	Completed high school				Employment			
	Coeff.	t-value	Marg. eff.	t-value	Coeff.	t-value	Marg. eff.	t-value
Constant	-1.702	-10.7	-	-	-0.141	-0.77	-	-
Female	0.596	10.5	0.095	8.2	-0.072	-1.09	-0.018	-1.09
Born 1978	0.182	1.6	0.025	1.6	0.254	2.43	0.063	2.44
Born 1979	0.257	2.3	0.037	2.3	0.054	0.52	0.013	0.52
Born 1980	0.276	2.5	0.040	2.5	-0.029	-0.28	-0.007	-0.28
Born 1981	0.088	0.8	0.012	0.8	0.020	0.2	0.005	0.2
Born 1982	0.100	0.9	0.014	0.9				
Born 1983	0.142	1.3	0.019	1.3				
Born 1984	-0.022	-0.2	-0.003	-0.2				
Born 1985								
1st generation immigrant	0.081	0.9	0.011	0.8	0.029	0.26	0.007	0.26
2nd generation immigrant	0.241	1.7	0.034	1.5	0.210	1.18	0.052	1.18
Father: average income when child aged 10-18	0.006	1.2	0.001	1.2	-0.004	-0.55	-0.001	-0.55
Mother: average income when child aged 10-18	-0.009	-0.4	-0.001	-0.4	-0.018	-0.65	-0.004	-0.65
Father: transfer<1.5G, earnings>3G								
Father: transfer<1.5G, earnings<3G	0.092	1.1	0.012	1.1	0.081	0.8	0.020	0.79
Father: transfer>1.5G, earnings>3G	0.108	0.6	0.015	0.6	0.180	0.86	0.045	0.86
Father: transfer>1.5G, earnings<3G	-0.023	-0.3	-0.003	-0.3	0.018	0.19	0.004	0.19
Mother: transfer<1.5G, earnings>3G								
Mother: transfer<1.5G, earnings<3G	0.018	0.2	0.002	0.2	0.048	0.34	0.012	0.34
Mother: transfer>1.5G, earnings>3G	0.006	0.1	0.001	0.1	-0.003	-0.02	-0.001	-0.02
Mother: transfer>1.5G, earnings<3G	0.026	0.2	0.003	0.2	-0.175	-1.33	-0.043	-1.32
Father: not completed high school level								
Father: high school level education	0.188	2.6	0.026	2.6	0.103	1.26	0.026	1.26
Father: university degree	0.641	6.6	0.103	5.5	-0.144	-1.18	-0.035	-1.18
Father: education unknown	0.115	1.2	0.016	1.1	0.001	0	0.000	0
Mother: not completed high school level								
Mother: Completed high school level	0.208	2.5	0.029	2.4	0.118	1.18	0.029	1.18
Mother: university degree	0.395	3.3	0.059	2.9	-0.222	-1.38	-0.054	-1.41
Mother: education unknown	-0.331	-3.5	-0.039	-3.6	-0.392	-3.78	-0.094	-3.88
Municipality 1 ( $Z_1$ )								
Municipality 2 ( $Z_2$ )	-0.040	-0.3	-0.005	-0.3	0.054	0.31	0.013	0.31
Municipality 3 ( $Z_3$ )	0.301	2.8	0.044	2.5	0.177	1.34	0.044	1.34
Municipality 4 ( $Z_4$ )	-0.063	-0.6	-0.008	-0.6	-0.265	-2.28	-0.065	-2.31
Municipality 5 ( $Z_5$ )	0.133	1.4	0.018	1.3	-0.467	-3.89	-0.111	-3.98
Municipality 6 ( $Z_6$ )	-0.019	-0.2	-0.002	-0.2	-0.263	-2.76	-0.064	-2.77
Municipality 7 ( $Z_7$ )	0.002	0.0	0.000	0.0	-0.208	-1.28	-0.051	-1.3
Municipality 8 ( $Z_8$ )	-0.058	-0.5	-0.007	-0.5	-0.711	-4.91	-0.164	-5.23
McFadden's pseudo-R2	0.03				0.02			
Log likelihood	-3792.8				-2623.2			
Number of observations	6805				3958			

<sup>1</sup> Estimation of Eq. (1). The dependent variable equals 1 if person completed high school by October the year of the 23rd birthday, zero otherwise.

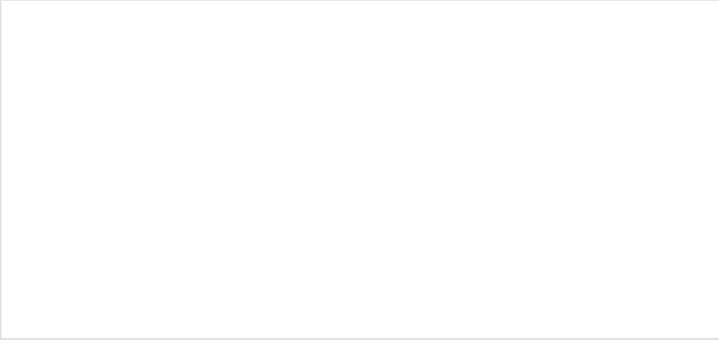
<sup>2</sup> Estimation of Eq. (1). The dependent variable equals 1 if earnings of the person exceed certain threshold in year of 23rd birthday (see text), zero otherwise.

<sup>3</sup>  $Z_1$ -  $Z_8$  are dummy variables for the 8 municipalities Bergen, Bærum, Fredrikstad, Kristiansand, Oslo, Stavanger, Tromsø, Trondheim in the same order as in Table 4.

**Table A3. Logit model for completed high school and labor market participation<sup>1</sup>. All municipalities and all types of assistance. Including control children**

	Completed high school <sup>2</sup>				Employment <sup>3</sup>			
	Coeff.	t-value	Marg. eff.	t-value	Coeff.	t-value	Marg. eff.	t-value
Constant	0.622	10.7	-	-	1.526	23.8	-	-
Female	0.387	51.7	0.058	6.8	-0.404	-49.3	-0.073	-7.1
Born 1978	0.104	7.1	0.014	4.8	0.092	7.1	0.019	5.5
Born 1979	0.081	5.5	0.011	4.2	0.083	6.4	0.017	5.2
Born 1980	0.058	3.9	0.008	3.4	-0.035	-2.7	-0.007	-2.6
Born 1981	0.091	6.2	0.012	4.4	-0.022	-1.7	-0.004	-1.7
Born 1982	0.208	14.0	0.030	6.0				
Born 1983	0.163	10.9	0.023	5.6				
Born 1984	0.031	2.1	0.004	2.0				
Born 1985								
1st generation immigrant	-0.128	-6.3	-0.016	-4.5	-0.274	-10.9	-0.052	-6.3
2nd generation immigrant	0.034	1.2	0.005	1.1	-0.082	-2.2	-0.016	-2.2
Father: average income when child aged 10-18	0.021	17.6	0.003	5.9	-0.029	-21.7	-0.006	-7.8
Mother: average income when child aged 10-18	0.057	20.2	0.008	6.0	-0.033	-11.0	-0.007	-6.7
Father: transfer<1.5G, earnings>3G								
Father: transfer<1.5G, earnings<3G	-0.262	-18.7	-0.032	-5.8	-0.310	-18.9	-0.058	-7.0
Father: transfer>1.5G, earnings>3G	-0.219	-7.7	-0.027	-4.9	0.000	0.0	0.000	0.0
Father: transfer>1.5G, earnings<3G	-0.301	-21.1	-0.036	-5.8	-0.178	-10.7	-0.034	-6.3
Mother: transfer<1.5G, earnings>3G								
Mother: transfer<1.5G, earnings<3G	-0.011	-0.9	-0.001	-0.9	-0.044	-3.4	-0.009	-3.1
Mother: transfer>1.5G, earnings>3G	-0.246	-15.2	-0.030	-5.7	0.112	6.1	0.023	5.0
Mother: transfer>1.5G, earnings<3G	-0.290	-21.4	-0.035	-5.8	-0.055	-3.6	-0.011	-3.3
Father: not completed high school level								
Father: high school level education	0.447	48.8	0.068	6.9	-0.197	-17.9	-0.038	-7.1
Father: university degree	0.898	73.2	0.156	8.1	-0.901	-67.2	-0.143	-6.3
Father: education unknown	0.137	6.3	0.019	4.4	-0.376	-14.4	-0.069	-6.6
Mother: not completed high school level								
Mother: Completed high school level	0.126	12.8	0.017	5.7	-0.002	-0.2	0.000	-0.2
Mother: university degree	0.299	20.2	0.044	6.3	-0.414	-28.2	-0.075	-7.0
Mother: education unknown	-0.972	-49.4	-0.091	-5.5	-0.618	-26.4	-0.106	-6.6
<2000 inhabitants								
2000-4999 inhabitants	-0.065	-2.1	-0.008	-2.0	-0.060	-1.7	-0.012	-1.7
5000-9999 inhabitants	-0.165	-5.1	-0.021	-4.2	-0.071	-2.0	-0.014	-2.0
10000-19999 inhabitants	-0.256	-7.6	-0.031	-5.0	-0.055	-1.5	-0.011	-1.5
20000-39999 inhabitants	-0.287	-8.5	-0.034	-5.2	-0.115	-3.1	-0.023	-3.0
40000-99999 inhabitants	-0.325	-9.4	-0.038	-5.3	-0.080	-2.1	-0.016	-2.1
100000+ inhabitants	-0.384	-11.9	-0.044	-5.5	-0.170	-4.7	-0.033	-4.2
Gross working income per inhabitant/10000	-0.075	-10.2	-0.010	-5.6	-0.025	-3.1	-0.005	-3.0
Gross exp. per child in child welfare services/10000	0.022	5.1	0.003	3.9	-0.011	-2.4	-0.002	-2.3
Gross exp. per child with assist. in own home**/10000	-0.001	-0.4	0.000	-0.4	0.004	1.0	0.001	1.0
Gross exp. per child with out-of-home placement/10000	-0.001	-2.7	0.000	-2.5	0.001	2.4	0.000	2.3
Assessed children per inhabitant aged 0-17 (%)	-1.551	-3.1	-0.205	-2.8	-1.346	-2.4	-0.270	-2.3
Assessments that lead to assistance (% , for the year 2002)	0.187	7.1	0.025	4.6	-0.204	-7.1	-0.041	-5.6
Former child welfare services user (B)	-2.464	-10.2	-0.529	-16.0	-1.987	-7.1	-0.459	-8.2
Municipality level variables interacted with B:								
<2000 inhabitants								
2000-4999 inhabitants	0.227	1.7	0.032	1.8	0.485	3.0	0.107	3.3
5000-9999 inhabitants	0.212	1.5	0.030	1.6	0.340	2.0	0.073	2.2
10000-19999 inhabitants	0.340	2.3	0.050	2.6	0.417	2.4	0.091	2.7
20000-39999 inhabitants	0.415	2.8	0.063	3.3	0.514	3.0	0.114	3.3
40000-99999 inhabitants	0.370	2.4	0.055	2.8	0.310	1.8	0.066	1.9
100000+ inhabitants	0.514	3.7	0.080	4.2	0.580	3.6	0.129	4.0
Gross working income per inhabitant/10000	0.141	4.5	0.019	6.2	0.118	3.3	0.024	4.2
Gross expenditure per child in child welfare services/10000	0.000	0.0	0.000	0.0	0.011	0.5	0.002	0.5
Gross expenditure per child with assistance in own home**/10000	-0.032	-2.3	-0.004	-2.0	0.009	0.6	0.002	0.6
Gross expenditure per child with out-of-home placement/10000	0.000	0.2	0.000	0.2	0.004	2.1	0.001	2.1
Assessed children per inhabitant aged 0-17 (%)	1.675	0.8	0.221	0.8	-1.082	-0.4	-0.217	-0.4
Assessments that lead to assistance (% , for the year 2002)	-0.021	-0.2	-0.003	-0.2	0.318	2.3	0.064	2.4
McFadden's pseudo-R2	0.11				0.05			
Log likelihood	-218943.9				-169438.3			
Number of observations	413092				259251			

<sup>1</sup> Estimates of Eq. (2). <sup>2</sup> Completed high school by October the year of the 23rd birthday. <sup>3</sup> Earnings exceed certain threshold in year of 23rd birthday (see text).



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