



Closing the gap. A method for (re)capturing income data lost after administrative changes. Experiences from the Norwegian Household Income Statistics

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Abstract

The aim of this paper is to describe a model for calculating and imputing the amount non-custodial parents transfer to custodial parents, when they choose a private agreement for child support. This income component could previously be collected directly from tax registers, but due to recent changes in legislation (from taxable to non-taxable income), it is no longer available from administrative registers. By combining data from surveys, geographical databases and administrative registers, we develop a model that includes the same inputs that is used and recommended by the Norwegian Welfare Service when estimating the amount of child support to be paid by non-custodial parents. The main conclusion is that the inclusion of this “missing” income component is of little importance to the income distribution in general, but restricted to single parent households, we see a reduction in inequality and at-risk-of poverty.

¹ Thanks are extended to Magnar Lillegård for developing the model and to Gjermund Nygårdseter for using GIS-data to calculate geographic distances between the parents’ residential addresses.

Introduction

As household income is the most important determinant of economic well-being for most people, the coverage and accuracy of income statistics is always under scrutiny. As is noted in the Canberra-report (UNECE 2011), there will always be a gap between a wider conceptual definition of income and an operational or “practical” definition used in official household income statistics. The income definitions used in official statistics are generally more limited in scope, as some income items are difficult to collect on a regular basis. Even when restricted to the operational income definition it is sometimes difficult to maintain comparability over time, due to changes in definitions or data collection practises. This is particularly relevant for countries relying on register data, where changes in legislation in the worst-case scenario may lead to a complete loss of data. In this paper, we describe one example where such legal changes led to missing data on child support, but where we suggest a method of recapturing missing data from registers by supplementing it with data from other sources by combining both external administrative data and survey data.

Along with the other Nordic countries, and increasingly more European countries, the Norwegian household income statistics collects its data from administrative registers (Jäntti et al., 2013). According to Nordbotten (2010), this take place in an environment where *“official object identification numbers (are) used in administrative applications, laws (are) providing an NSI with access to administrative data for statistical purposes, (and) technical possibilities for fast transfer of large data files”*. In the case of Norwegian household income statistics, we rely heavily on data from administrative registers, primarily data from national Tax-authorities. The quality and coverage of these registers are vital for the quality of statistics, and the strength of Norwegian income statistics lies primarily in the access to data covering the whole population of resident persons and private households, and in the level of detail for components of income and wealth. Though seen as an undisputable advantage for the quality of statistics, relying on these administrative sources also imply important challenges.

One challenge is that observable income elements possible to collect from surveys may be missing from registers. This is especially true for inter-household transfers, i.e. income transfers from one household to another. Closing gaps created by these missing data from administrative sources demand different methods and solutions, depending on the missing income components. In this paper, we will describe how one particular income component, private transfers of child support, can be estimated and imputed by utilizing external data and regulations used by welfare authorities.

Private child support, as will be seen from the description of changes in the legislation from 2003, also serve to highlight two other challenges we face by using administrative data for statistical purposes. As the purpose of collecting data for administrative use differs from the purposes for statistical use, data and definitions will not always comply with the needs set out for statistics. This might pose challenges to the validity of statistical indicators. Relying on data from administrative registers also imply a vulnerability in the face of changes in rules, regulations and laws. Such changes may cause break in time-series, or as we shall see even worse, lapse of data. In the UNECE guidelines for use of administrative data in censuses, NSI/NSOs are warned about this *“[...] the NSO becomes heavily dependent on the public authorities holding the administrative records being used. NSOs have to realise that, for such authorities, the production of statistics is not a core activity to which they would normally give priority. For the NSO, any failure or shortcomings in the administrative registers will affect the quality of the derived official statistics, for which it must take responsibility (UNECE, 2018).*

Having said that, it should also be pointed out that increasingly more administrative data are available for statistical purposes due to computerisation of public administration. This may both

increase the data availability and improve the ability to specify income components in greater detail. Two recent examples from Norway are new register data on local wealth taxes and data on credit and consumer debt.

The rest of the paper is structured as follows. We give an outline of the legal changes that took place in 2003, which led to a sharp decline in the number of households receiving child support according to administrative registers. We then describe the inputs to the model the Norwegian Labour and Welfare Service use to calculate child support to be paid by non-custodial parents. This is the same method we then apply to the census-like household income statistics to calculate missing data on privately organised child support. In the final section we present some results from the imputation.

The reform of 2003 and its consequences

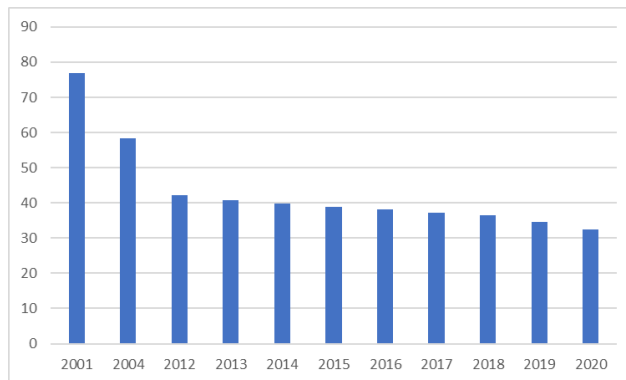
Prior to 2003 child support was taxable income for the recipient and tax deductible for the provider. Thus, information on these income items could readily be collected from tax registers. This all changed in 2003. This year a new law regarding the financial relationship between custodial and non-custodial parents was introduced. In brief, this law acknowledged that substantial changes had taken place within the Norwegian society in recent years. An increase in female labour force participation had reduced the income gap between many former spouses and this ought to be reflected in the calculation of child support. More importantly, many non-custodial parents had in fact close to shared custody of their children, without this being considered when calculating the amount of child support to be paid. According to the White Book proposing the bill, non-custodial parents should be encouraged to spend more time with their children and be rewarded by paying less in child support.² Yet another change had implication for the data availability of this income item from registers. To simplify the transfer of income from one household to the other, it was suggested that received child support should be tax-free income while child support paid should no longer be tax deductible. The best, and from the government's point-of-view, cheapest way of dealing with this was that former spouses should reach a private agreement on how much child support should be paid without any involvement from the Welfare Service.

However, some data on child support are still available from administrative registers. If former couples are not able to reach a private arrangement by themselves, this task is handed over to the Welfare Service, i.e. an administrative data source. Obviously, this is not the case for those reaching a private arrangement, and there is reason to believe that an increasing number of parents living apart opt for the private solution. Figure 1 show the number of children under 18 that receive child support administered by the Welfare Service, as a proportion of all children eligible for such support. In 2001, i.e. two years before the reform came into effect, as many as 77 per cent of all children eligible for child support was registered with this income.³ Already one year after the reform (2004) this number was reduced to 58 per cent. Our most recent data from 2020, suggest that register data on child support are only available for roughly one-third of all children eligible for such support.

²<https://www.regjeringen.no/contentassets/1a6f8ef448504dcdbf174304f933583f/no/pdfs/otp200020010043000dddpdfs.pdf>

³ Children 0-17 years not living with (both) mother and father.

Figure 1. Children 0-17 year of age receiving child support collected from registers, as a proportion of all children eligible for such support. 2001-2020



Source: Statistics Norway and The Labour and Welfare Service

While the number of children in receipt of child support has declined according to our register data, one cannot assume that this decline is fully compensated by an increase in privately organised child support. One of the main reasons for the 2003-reform, was to encourage non-custodial parents to spend more time with their children. Based on survey data, Lyngstad et al. (2014) conclude that is exactly what happened. The proportion of parents living apart reporting shared residence for their child increased from 8 per cent in 2002 to 25 per cent in 2012. Consequently, the number of non-custodial parents paying child support has been substantially reduced in the same period. In fact, shared custody has become so common in recent years that the National Population Register in Norway today offers the possibility for children to be registered with two addresses, an administrative change that may help us identify children with shared custody in the future.

Nevertheless, most children that do not live with both of their parents *do not* have a shared residence. For these children, and where parents have agreed upon a private arrangement, little is known about the amount and distribution of child support. In order to encourage parents to go for a privately agreed child maintenance scheme after a break-up, the Labour and Welfare Service offers a 'child support calculator' from their website. In this calculator various aspects of the life-situation of both the custodial and non-custodial parent are taken into account when deciding on how much child support is to be paid. Many of the inputs to this calculator can be found in data also available in the register-based household income statistics (e.g. income, household composition), while other inputs will have to be imputed from other sources (e.g. time spent with children).

Following a suggestion made by Statistics Sweden (Lindberg, 2013), this calculator can be used to estimate privately paid child maintenance. By assuming that most parents that choose a private agreement after a break-up will make use of this calculator, we develop a model that can be applied to our household income statistics to calculate and impute missing data on child support.

Methodology

In this section we give a brief outline of the method used to calculate privately agreed child maintenance between former partners. A more detailed description of the method is provided in Appendix 1.

The child support calculator

As already stated, we use the child support calculator developed by the Welfare Service to estimate the amount paid in child support. This calculator uses the following main inputs:

- Estimated cost of supporting a child
- The incomes of the custodial and non-custodial parent
- The amount of time the non-custodial parent spends with their child

The estimated cost of children relies heavily on data from a 'Reference Budget for Consumer Expenditures' developed by Consumption Research Norway (SIFO). According to SIFO, the reference budget presents the costs of maintaining a reasonable standard of living for the household of interest, i.e. a reasonable, or acceptable, standard of living generally accepted in Norwegian society. The cost of children varies with the age of the child, where older children are more "expensive" than younger ones. To estimate the cost of children, further adjustments are made, for instance considering expenses related to child care (kinder garden etc.) and whether the child receives child care support from the Government or not.

Next, the financial situation of both parents is considered. Income include employment income and net income from capital. In addition, several social benefits targeted to single parents are included.

The final input is the amount of time the non-custodial parent spends with the child. The number of nights per month the child spends in the household of the non-custodial parent is collapsed into five different classes, the lowest being 2 nights or less, the highest being 14-15 nights. In addition, the age of the child is once more taken into consideration, where older children are more "expensive" than younger. The more nights the child spends in the home of their non-custodial parent and the older the child is, the less child support is to be paid according to the calculator.

There are also additional factors taken into consideration in the model, for instance household composition. When calculating the amount of child support to be paid, there is a distinction between a non-custodial parent living alone and one that is established with a new family, where the latter pays less in child support than the former. There is, furthermore, a cap on the amount of child support to be paid, where the sum of child maintenance shall not exceed 25 per cent of the size of income of the non-custodial parent.

Combining survey data with register data

Once the inputs to the "child support calculator" have been identified, the next step is to use the same inputs in our household income statistics to estimate child support for those favouring a private arrangement. Most of the data needed as inputs are available from the household income statistics except for one crucial factor, - the time non-custodial parents spend with their children. There is, for obvious reasons, no register data available on how much time children spend with their parents.⁴ Instead, this information must be collected from survey data and then combined with data from registers.

⁴ Recent administrative changes in the National Population Register may, however, in the future help us identify children with shared custody, i.e. children registered with two addresses.

Statistics Norway conducts, on a semi-regular basis, a survey on the living arrangements of parents no longer living together. The most recent survey was conducted in 2020, but here we use data collected in 2012 (Lyngstad et. al. 2014). In this survey both custodial and non-custodial parents report the amount of time the child spends with the non-custodial parent. In our calculation we mainly use the time that non-custodial fathers have reported spent with their child as an input to the model, since this is still the most common living arrangement for children experiencing a divorce or break-up or where parents have been living together.

However, not all children have the same probability of spending time with their non-custodial parent. This is something that needs to be taken into consideration when calculating child support. Again, using data from the survey, there are at least three variables that stand out as being particularly correlated with the probability of spending time with own children after a break-up. The most important factor is the distance between the custodial and non-custodial parent. According to the survey, 55 per cent of non-custodial fathers living in “walking distance” from the custodial mother reported that the child spent 13 days or more per month in their home, i.e. very close to shared custody. In contrast, 47 per cent of those who reported living at least 2 ½ hours away from their child reported 0 days per month of custody for their child. Other factors that also seem to influence the amount of time spent with children, are level of education (more educated fathers tend to spend more time with own children compared to less educated fathers) and the number of siblings (fathers with just one child less frequently spend time with their child, compared to fathers with 2+ children).

Information on the distance between the custodial and non-custodial parent (travel time and geographic distance), as well as level of highest completed education and the number of children in the household, are all data available from registers and used as input to a regression model that estimate the time non-custodial parents spend with their children.

Identifying children receiving a privately organised child support

In 2014 roughly 272 000 children under 18 years in Norway lived in a household where mother and father were not living together. This is about 24 per cent of all children in that age group. However, not all these children will receive a privately organised child support, one reason being that we are not able to find all parents in our registers. This will happen in cases where one of the parents either lives abroad, is diseased, is unknown or has moved to an institution. Roughly a fifth of all children eligible for child support have a parent that we cannot link to any private household in 2014. These children are, of course, included in our household income statistics, but we are unable to calculate any child support.

We also assume that parents who leave it to the Welfare Service to organise their child support, do not in addition have a privately organised scheme. This may not be entirely true. There are probably both fathers and mothers who have experienced more than one family break-up and thus should provide child maintenance to more than one household, but we consider the number to be small. In 2014 almost a third of all children eligible for child support received this income administered by the Welfare Service.

The remaining number of children we then assume have a privately organised arrangement when it comes to child support, and they make up about 47 per cent of all children eligible to child support. However, even among these there are children whom we assume do not receive child support. We estimate that 7 per cent of all children eligible for child support spend so much time with the non-custodial parent that they have shared custody, i.e. no transfer will take place between households. The actual number of children receiving a privately distributed child support is thus reduced to 108 000 children, or 40 per cent of all children not living together with both parents.

Table 1. Identifying the number of children with privately organised child support

	Number of children	Per cent
Children not living with mother and father:	272 000	100 %
Children with parent missing in register data:	57 000	21 %
Child support adm. by Welfare Service:	87 000	32 %
Assumed privately organised child support:	128 000	47 %
hereof with assumed shared custody:	20 000	7 %
Receiving privately org. child support:	108 000	40 %

Source: Statistics Norway

Some results from estimating private child support

By using the method described, we estimate that approximately 5 per cent of all households are either paying or receiving private child support, while this is case for 12 per cent among all households with children. Contributors are found across almost all types of households, most commonly among single men, while receivers are more often found among single mothers. More than 34 per cent of single mothers are assumed to receive this private transfer (Table 2). In sum for all households, the total effect on disposable income is of course zero, since the amount paid equals the amount received. But since more than half of the contributors are living in households without children, there is a net increase of NOK 1,4 billion both in total and disposable income for households with children.

Before including private child support, the 637 000 households with children (0-17 years) had a total income of 659 billion NOK in 2014, of which 532 billion was income from employment and 31 billion from property income. In addition, taxable and non-taxable cash transfers like for instance parental benefits, family allowance and cash-for-care also make up a considerable part of the total income for households with children, more than 14 per cent of the total income before including private child support.

We estimate the total sum of privately organised child support to be 1.9 billion NOK in 2014. Compared to other income components this represent a rather insignificant share of total income for all households with children. Because 2.8 per cent of all households with children also pay private child support, the net contribution of received private child support only increases the disposable income by a meagre 0.3 per cent for all households with children.

Tabell 2. Income components, households with children (0-17 years) by type of household. Bill. NOK.

	All households with children 0-17 years	Couples with children, youngest child 0-6 years	Couples with children, youngest child 7-17 years	Single mother, youngest child 0-17 years	Single father, youngest child 0-17 years	Multi-family household with children 0-17 years
Income from employment	532,0	215,8	245,4	29,6	13,4	27,8
Income from property	30,6	10,3	16,7	1,1	0,8	1,7
Current transfers received, private child support excluded	96,4	41,6	26,4	15,6	2,3	10,4
Child support adm. by Welfare Service	2,4	0,4	0,4	1,3	0,1	0,2
Private child support (net)	1,4	0,1	0,1	1,1	0,0	0,1
Private child support received	1,9	0,3	0,3	1,1	0,1	0,1
Private child support paid	-0,5	-0,3	-0,1	-0,0	-0,1	-0,0
Total income, private child support excluded	659,0	267,7	288,6	46,3	16,5	39,9
Total income, private child support included	660,4	267,8	288,7	47,4	16,5	40,0
Disp. income, private child support excluded	485,9	198,1	207,0	37,9	12,3	30,6
Disp. income, private child support included	487,3	198,1	207,1	39,0	12,3	30,7
Median equivalent income, private child support excluded	341 200	344 000	380 400	251 000	313 800	343 000
Median equivalent income, private child support included	342 100	344 100	380 700	258 500	314 000	344 600
Share of households paying private child support	2,8	3,2	2,2	0,9	9,9	3,7
Share of households receiving private child support	9,5	3,6	4,2	34,4	18,4	13,3

Source: Income and wealth statistics for households, Statistics Norway

From Table 2 we observe that child maintenance administered by the Welfare Service, where data can be collected from administrative registers, is a more important source of income compared to what the imputed private support is, both in total and to all types of households with children. It should, however, be noted that for single mothers the median equivalent income increases by 3 per cent when private child support is included in the income definition.⁵

From the above, we may conclude that privately organised child support in general has little impact on income aggregates, even among households with children. But more important than aggregates are the distributional effects and possible impact on income inequality and poverty. Especially single parent households, but also families with many children, are often pointed out as households in a precarious economic situation. Statistics on at-risk-of poverty rates among children also find overrepresentation of children from these kinds of households. Since the legal change in 2003, we have been aware of the danger of underestimating income for custodial parents, but also overestimating income for non-custodial parents, in cases where a private arrangement of child support is preferred.⁶ Will a correction of this have an effect on distribution and inequality?

⁵ Throughout the paper the “modified OECD-scale” is used when calculating equivalent income.

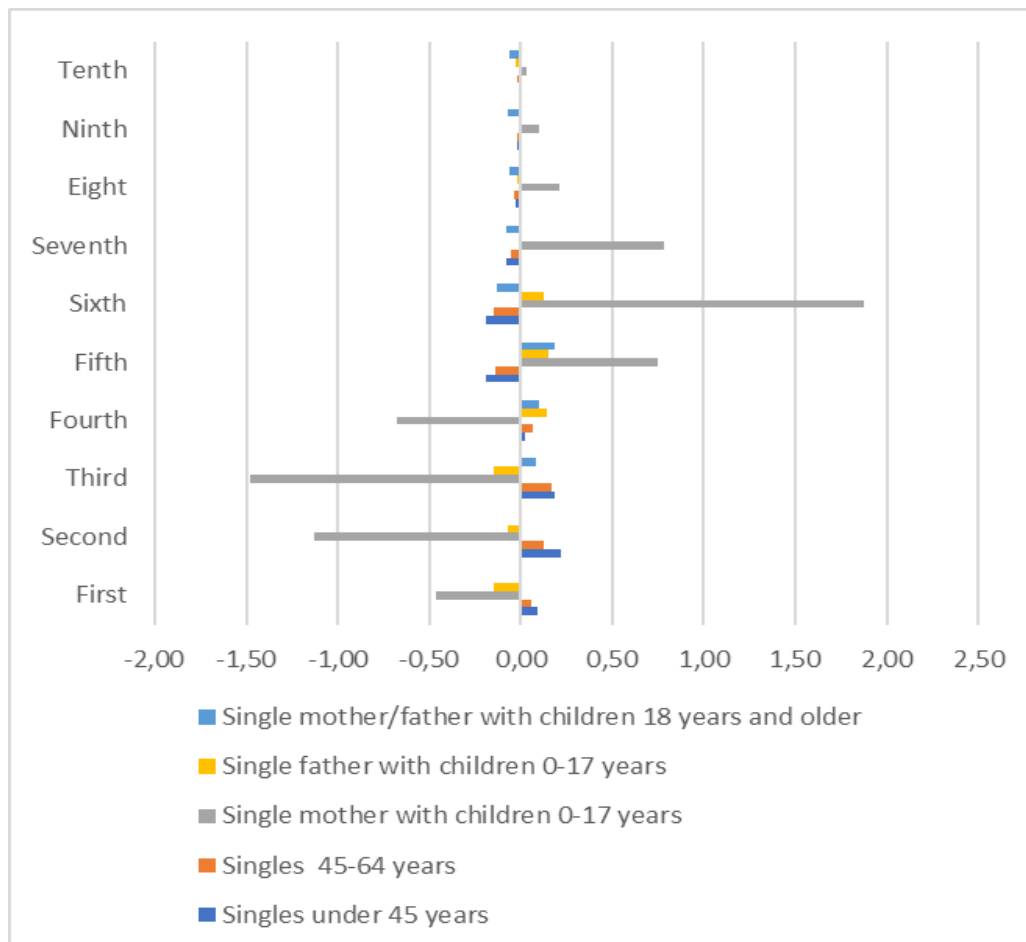
⁶ The household definition in the Household Income Statistics is based on a dwelling concept. Households consists (with some minor exceptions) of persons registered in the same dwelling, and because a person can only be registered in one dwelling, the statistics does not allow for one person belonging to more than one household. This is also the basis for the calculation of equivalent household income. By introducing a method for imputation of child support based on the assumption that children of non-custodial parents are part of their household part of the time, we implicitly introduce a deviation from the “one person – one household” assumption. This should in practice also lead to an adjustment of equivalence scales, both for the custodial (reduction in the burden of providing for children) and the non-custodial households (increase in the burden of providing for children). In this preliminary work, scales have not been adjusted and we use the traditional “modified OECD-scale” in all calculations. But Lindberg et al. (2021) have taken this a step further. They analyse how these kinds of adjustments of scales have distributional impact on Swedish income data by estimating that

Distributional effects of private child support

In Figure 2, we distribute all private households into deciles for an income definition that both includes and excludes private child support. We then compare the relative position of various household types, before and after the inclusion of private child support.

It is apparent that including private child support in the income concept, has only minor effect on the overall income distribution among households. There is a slight effect indicating an improvement of single mother households in the distribution, as shares in the lower deciles are reduced. Although there are traces of the same effect among single father households, the redistributive effect is far less visible. For singles aged under 65 the effect of introducing private child support has an opposite effect. Because they more often are on the contributing rather than the receiving side, these households' relative position in the distribution is weakened. A possible adjustment of equivalence scales due to more children having (close to) shared residence is assumed to strengthen the main findings from the figure, as the receiving households would see a reduction in weights while the opposite would be true for contributing households (see Lindberg et al., 2021).

Figure 2. Change in decile distribution by including private child support in disposable income. Selected household types, 2014. Percentage points



children with shared residence are in fact living in 172 000 household as opposed to the 92 000 registered households. The situation in Norway is expected to be quite similar to the Swedish one.

In Table 3, we study in greater detail the effect of including privately organised child support with respect to distribution. The table presents the decile distribution of equivalent income for various household types with children before and after the inclusion of private child support, as well as the Gini coefficient.

The table confirms, what was previously stated, that this income component has limited impact on income distribution. For all households with children, there is hardly any change in the distribution of equivalent income by deciles, while the Gini coefficient for households is reduced by just 0.001 points. Similar results are found for single persons under the age of 45 and for couples with children. Since a substantial proportion of single parent households receive the imputed private child support, the distributional effects are more visible for these households. The Gini is reduced from 0.218 to 0.210 after the inclusion of private child support, a noticeable change. Also, the distribution of equivalent household income is affected by a slight increase in the share of income received by the lower half of the distribution – and a reduction at the top.

Table 3. Distribution of equivalent household income, excluding and including privately organised child support, 2014. Household types. Decile shares and Gini coefficient

	All	Deciles										Gini
		1	2	3	4	5	6	7	8	9	10	
All households												
Disposable income excluding private child support	100,0	4,1	6,1	7,2	8,0	8,8	9,6	10,5	11,6	13,3	20,8	0,237
Disposable income including private child support	100,0	4,1	6,2	7,2	8,0	8,8	9,6	10,5	11,6	13,3	20,8	0,236
Single person, under 45 years												
Disposable income excluding private child support	100,0	0,8	4,6	6,5	7,7	8,9	10,2	11,5	13,0	14,9	22,1	0,315
Disposable income including private child support	100,0	0,8	4,6	6,5	7,7	8,9	10,2	11,5	12,9	14,9	22,0	0,314
Single parents												
Disposable income excluding private child support	100,0	4,1	6,6	7,5	8,3	9,0	9,7	10,6	11,6	13,1	19,5	0,218
Disposable income including private child support	100,0	4,3	6,7	7,6	8,4	9,1	9,8	10,6	11,5	13,0	19,1	0,210
Couples with children												
Disposable income excluding private child support	100,0	4,3	6,4	7,4	8,2	8,9	9,6	10,4	11,4	13,0	20,5	0,225
Disposable income including private child support	100,0	4,3	6,4	7,4	8,2	8,9	9,6	10,4	11,4	13,0	20,5	0,224

Source: Income and wealth statistics for households, Statistics Norway

As already stated, child support administered by the Welfare Service amounts to almost half a billion NOK more than what we estimate the amount of private child support to be. However, it may be of interest to learn whether these two types of child support target households in different or equal positions in the income distribution.

In table 4 we once more distribute households by income deciles, but where child support (both private and administered by the Welfare Service) is not included in the income concept. The table seems to indicate that these two ways of organising child support have different social profiles. Overall, a larger share of households with children receive the publicly administered support compared to the private one, but this difference is most visible in the lower part of the income distribution. This is particularly true in respect to single parents. Roughly half of all single parents in the two bottom deciles receive child support administered by the Welfare Service, while less than a third receive the privately organised one. On the other hand, privately organised child support seems to be more common among single parents in the upper part of the income distribution.

An obvious interpretation of these findings is that parents that opt for a private agreement for child support in general are better-off compared to those that receive child support administered by the Welfare Service. It should be noted, however, that included in the child support administered by the Welfare Service is also the Advance payment of child support. This payment is financed by the government and is paid out to single parents where the other parent either cannot or will not pay child support, or where the father is diseased or unknown. This group of single parents is particularly overrepresented at the bottom of the distribution.

Tabell 4. The proportion of household receiving private child support and child support administered by the Welfare Service, by income deciles. 2014

	Deciles, disposable equivalent income excluding child support										n
	1	2	3	4	5	6	7	8	9	10	
All households with children											
private child support	13,7	16,7	16,7	13,9	10,7	7,8	6,3	5,5	4,6	3,6	634 211
child support adm. by Welfare Service	26,1	32,0	24,9	17,2	12,0	8,4	6,3	5,1	3,8	2,7	634 211
Single parents											
private child support	26,4	30,6	34,1	36,0	35,0	31,7	27,8	25,6	21,7	14,6	119 102
child support adm. by Welfare Service	47,0	54,1	45,1	34,9	26,5	20,1	15,2	12,3	8,7	6,4	119 102
Couples with children											
private child support	2,5	3,8	4,9	5,0	4,7	4,1	3,8	3,7	3,2	2,7	483 076
child support adm. by Welfare Service	7,5	11,4	11,1	9,7	7,9	6,0	4,9	4,1	3,1	2,2	483 076
Other households with children											
private child support	11,1	13,9	16,3	15,7	14,5	12,5	13,9	12,9	10,7	8,9	32 033
child support adm. by Welfare Service	25,4	28,3	25,6	23,7	20,9	18,4	15,2	14,4	11,9	9,6	32 033

Source: Income and wealth statistics for households, Statistics Norway

Changes in at-risk-of poverty rates

Finally, we look at impact private child support has on the incidence of low-income among households. From previous tables we have seen that the inclusion of this income component has a marginal effect on the overall income distribution, but a more pronounced impact when restricted to single parent households.

In table 5 we study changes in the share of low-income household before and after including privately organised child support. The incidence of low-income is defined as the cumulative proportion with equivalent income below 50, 60 and 70 per cent of the median.

As would be expected, the inclusion of private child support is of little importance when it comes to "poverty alleviation" for all households. The inclusion of private child support in disposable income only reduces the proportion below 50 per cent of the median with 0.1 percentage points, and below

60 and 70 per cent of the median with just 0.2 points. Focusing on groups more directly relevant for both receiving and paying private child support, results are more noticeable. At-risk-of poverty rates are reduced especially among children living with single parents. In social policy debate, childhood poverty is important, and by calculating and imputing private alimonies, we might add further knowledge and nuance to this debate. According to our data, the proportion of children living with a single parent with income below 60 per cent of median equivalent income is reduced by almost 4 percentage points, when private child support is included in the income concept.

As was the case for income distribution, there are gainers and losers when private child support is taken into the calculation. While single parents may be among the gainers, single persons below 45 – the household type most frequently paying child support - may be among the losers. However, the at-risk-of poverty rate only increases between 0.2 percentage points (below 60 per cent of the median) and 0.3 points (below 70 per cent of the median), when private child support is included.

Tabell 5. The cumulative proportion below various percentiles of median equivalent income. Before and after the inclusion of privately organised child support. 2014

	Equivalent income	Equivalent income, including private child support	Change
Percent of median income			
All households			
below 50%	5,5	5,3	-0,1
below 60%	10,8	10,6	-0,2
below 70%	18,1	17,9	-0,2
All children 0-17 years			
below 50%	6,3	5,9	-0,4
below 60%	11,8	11,2	-0,6
below 70%	19,3	18,6	-0,7
Children in single parent household			
below 50%	13,5	11,2	-2,3
below 60%	28,2	24,4	-3,8
below 70%	46,0	41,8	-4,2
Children in couple households			
below 50%	4,6	4,5	0,0
below 60%	8,5	8,4	-0,1
below 70%	14,1	14,0	-0,1
Singel persons below 45 years			
below 50%	21,5	21,6	0,1
below 60%	30,8	31,0	0,2
below 70%	41,2	41,5	0,3

Source: Income and wealth statistics for households, Statistics Norway

Conclusion and the way forward

In this paper, we have presented how reliance on administrative data in income statistics may pose a challenge in collecting certain income items, even when restricted to the 'operational' income definition as described in the Canberra Group Handbook (UNECE 2011). A legal change in 2003, making child support a tax-free income for receivers and non-deductible for the contributor, at the same time encouraging parents to come to a private settlement on child support, has led to a gradual loss of data for this specific income component.

By using different sources of input, from both surveys, geographical databases and register data on demography and income, we have presented possible solution to this specific problem of missing data on child support. In the paper, we describe a model for calculating and imputing the amount non-custodial parents transfer to custodial parents, when they choose a totally private agreement for child support. Merging register data to survey data for a limited sample is becoming more and more common in several countries. In a sense, what we have done in this paper is the opposite, by using input from survey to impute values into register data covering the total population.

Based on our data, the inclusion of private child support only had a marginal effect on income distribution between households. It is only restricted to single parent household that we see a substantial drop in inequality and poverty rates, when we include this income component in disposable income. The privately organised child support, furthermore, seems to be less targeted to low-income households, compared to child support administered by the Welfare Service.

Even though the estimated amount of child support only had marginal impact on household income and distribution, we should not neglect the fact that the inclusion of this income component may give a more realistic picture of the economic well-being of certain household types. This is especially true for single parent households, who more often than others are in a precarious economic situation. Providing more accurate information will be important for the public debate on inequality and poverty. The way forward will be to utilize the most recent survey on childcare from 2020 and update the model for imputation and include this income element in the annual production of household income statistics. This may even be facilitated by recent changes in administrative practices. The modernisation of the National Population Register in Norway now allows for a deviation from the one person-one address rule. There is now an opening for registering children on more than one formal address. This needs to be explored further but could, at best, give us register data on children with shared residence, which again would improve the input to our model.

The method used – collecting data from surveys and imputing it to register data – may also pave the way for similar exercises in collecting other, and probably more important, types of income that cannot be collected from registers. This will, for instance, be of interest if one wishes to approach the ‘conceptual’ income definition lined out in Canberra Group Handbook (UNECE 2011). One example is the value of unpaid domestic services, where utilizing data collected in a coming Time Use Survey (2023) might be of interest. An ongoing Household Budget Survey (2022) may also provide data useful for estimating data on indirect taxes and Social Transfers in Kind (STIK). Combining this data with ongoing work on STIK at Statistics Norway (Aaberge et al. 2019), may bring us closer to an estimation of adjusted disposable income.

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Appendix 1

In this appendix, we present a more detailed description of the method used to identify parents not living together where there is a probability of private child support, and how the sum of private transactions was estimated and imputed.

Identifying potential receivers of private child support

The starting point is all children aged 0-17 who are potential receivers of child support, identified as all children not living with both their parents. For 2014 (1 Jan 2015) 272 392 children were identified in the National Population Register. For these children, the following information is drawn from the register:

- The child's personal identification number and the corresponding household identification number
- The mother's personal identification number and the corresponding household identification number
- The father's personal identification number and the corresponding household identification number

Children where at least one of the parent's identification number is invalid or missing are then removed from the data, leaving 233 716 children.

Later in the process, income data for the parents in 2014 is needed. Therefore, children where at least one of the parents has a non-resident status (either dead or emigrated) per 1 Jan 2015 are also removed from the data, leaving 215 362 children.

Removing children with public child support

By using data from the Labour and Social Welfare Service (NAV) collected for and used in the income statistics, we identify mothers and fathers who are already paying child support specified by NAV, as they are to be excluded when estimating privately organised child support. Here, we find a total of 86 533 children whose father and/or mother is already paying child support. As these are to be kept aside when calculating private child support, we are left with 128 829 children for whom we calculate child support.

Identifying parents with shared custody

To identify parents with shared custody, we use information from the survey on living arrangements of parents not living together (Lyngstad et al. 2014). According to this survey, approximately 25 per cent of the children are living with shared custody. In our data, this should approximate 70 000 children. Using information on the non-custodial fathers, by far the largest group of potential contributors of private child support, we identify children with high probability of living with shared custody. Important parameters are:

- Travelling distance between the parents not living together. Short travelling distance increase the probability of shared custody. To estimate this, we pinpoint both parents at an exact address, and use GIS-data to estimate both total minutes and total meters of travelling between the two. When combining data on parents not living together and GIS-data, data on the Norwegian road network called ELVEG was used as input. ELVEG is a digital roadmap containing all Norwegian roads, public and private, longer than 50 meters and drivable for

passenger cars. It also includes speed-limits and possible obstacles. This roadmap is based on a database from The Norwegian Public Roads Administration. In the estimation of travelling distance using the roadmap, a few adaptations were added, mostly concerning ferries and ferry piers. To account for waiting at piers, an additional 5 minutes were added for each ferry route.

- Educational attainment for the non-custodial parent by using data from the database Educational Attainment of the Population (NUDB), extracted from the Statistics Norway's National Education Database (NUDB). NUDB covers the following educational statistics: completed educations as of school-year 1970/1971; enrolment from the school-year 1974/1975; and data on the Educational Attainment of the Population from the 1970 census.
- The number of children in the relationship extracted from the National Population Register. The probability of shared custody increases by the number of children.

In addition, we also include the special deduction in taxes given to single parents to help identify couples with shared custody. In cases where both the mother and the father are given this deduction, we assume shared custody, and if the deduction is equally divided between parents, we assume equal custody and no need to organise child maintenance between the parents. The removal of children where this is the case, leave us with 108 494 children with potentially a privately organised child support arrangement.

Estimating private child support

To calculate the amount paid or received as private child support, we make the assumption that all parents who reach a private agreement follow the recommendations given in the public child support calculator provided by the Welfare Service (NAV). Several parameters are included in this calculator:

- Whether or not the custodial parent receive support for childcare.
- Whether or not the custodial parent receives special tax-deduction for single parents.
- Whether or not the custodial parent receives a supplement for small children in addition to the ordinary universal child benefit.
- Whether or not the custodial parent receives increased universal child benefit (this increased benefit is linked to the tax-deduction for single parents)
- The personal income, including positive net property income, for both the custodial and non-custodial parent.
- Expenses for childcare paid by the custodial parent
- The household composition of the non-custodial parent
- Time spent with the children in question by the non-custodial parent.

Estimating and imputing time spent with children

There are of course no data on time spent with children in administrative data. To estimate this, we use data on reported time spent with children from the mentioned survey on living arrangements of parents not living together (Lyngstad et al. 2014). This is reported as the number of days the child spent last month in the household of both the custodial and the non-custodial parent. In some cases, there are substantial discrepancies between the number of days reported by each of the parents for the same child. In these cases, we assume that the average number of days is close to the truth. Although the survey asks for time spent with all common children, we simplify the method by using only data concerning the youngest child.

On this basis, an analytical datafile containing children and their parents is constructed, and the estimated number of days spent with the child by the non-custodial parent is imputed. From this, a linear regression model explaining $y = \text{the number of days spent}$ is subtracted. The explanatory variables in this regression being

- x : a continuous variable showing the travelling distance between parents (the natural logarithm of the distance is used in the model)
- u : a categorical variable showing the educational attainment of the non-custodial parent. The educational attainment is categorized in three groups: low, middle and high education.
- v : a categorical variable showing the child's number of siblings, classified as zero, one, and two or more.

The regression model is then given by

$$y = \beta_0 + \beta_1 \ln(x) + \beta_2 u_{\text{low}} + \beta_3 u_{\text{middle}} + \beta_4 v_{\text{one}} + \beta_5 v_{\text{two}+} + \varepsilon,$$

where u_{low} , u_{middle} , v_{one} and $v_{\text{two}+}$ are dummy variables, and $u = \text{high}$ and $v = \text{zero}$ are reference categories.

In cases where explanatory variables are missing, the median value is imputed for x , and the most common category (the mode) is imputed for u and v .

The effect of the travelling distance is assumed to be dependent on whether the father or the mother is the non-custodial parent. Thus, two regression models are used, one to estimate time spent with the father and one to estimate time spent with the mother. From table A.1, we observe that time spent with the child decreases when travelling distance increase. We also see a positive effect of time spent by increasing educational attainment, while the number of siblings have a negative effect on time spent.

Table A.1 Two regression models for imputing

	Father is the non-custodial parent	Mother is the non-custodial parent
β_0 : Constant	19.42	23.87
β_1 : ln(travelling distance)	-1.06	-1.17
Educational attainment		
β_2 : Low	-1.20	-4.92
β_3 : Middle	-0.43	-0.30
Number of siblings		
β_4 : One	0.08	-0.47
β_5 : Two or more	-0.35	-1.30

Table A.2 Imputed values of time spent with the child, summary

	Minimum	First quartile	Median	Mean	Third quartile	Maximum
Father is the non-custodial parent	2,12	7,93	9,37	9,23	10,68	19,51
Mother is the non-custodial parent	0,54	8,97	12,36	11,58	14,19	23,87

Categories of time spent with children

The Welfare Service (NAV) classifies time spent with the child by non-custodial parents into six different categories based on the number of nights per month. In our model, we do not separate between the number of days and nights, but translate into number of days from the survey data into the following categories:

- a) 0–1,99
- b) 2–3,99
- c) 4–8,99
- d) 9–13,99
- e) 14–15
- f) Shared custody

Since the survey also included parents with shared custody and parents receiving child support administered by the Welfare Service (register data), we must assume that the distribution for those receiving private child support will be similar to the one for those receiving the public child support. Table A.3 will then provide a distribution for those with private child support, in addition to the ones with shared custody, to be used in the imputation of income. We also assume that parents with shared custody spend at least 14 days with the child per month.

Table A.3 Distribution of categories for time spent with child based on survey data, per cent

	0–1,99	2–3,99	4–8,99	9–13,99	14–15	15–31
Alle parents	19	7	31	19	22	2
Father is the non-custodial parent	21	7	32	21	18	2
Mother is the non-custodial parent	12	6	20	11	47	4