

# **Poverty Measures that Take Account of Changing Living Arrangements and Childcare Expenses**

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### **Introduction**

In 2007 the official poverty rate for the U.S. was 12.5 percent. This measure is often criticized by researchers and policy makers for a large variety of reasons. The deficiencies in the official measure of poverty in the U.S. are described in detail in the 1995 report of the National Academy of Sciences (Citro and Michael, 1995). Among those deficiencies is the unit of analysis that is used to compile this statistic. This issue is the main subject of this paper.

Besides listing the problems with the current measure, this report recommended a new measure of poverty. This new measure would include the value of in-kind benefits as income and subtract necessary expenses. Among the necessary expenses are work-related expenses, such as commuting costs and child care expenses, taxes, and medical expenses. This paper examines the effect of changing the unit of analysis on a poverty measure that incorporates not just before-tax money income, as in the official measure, but other elements recommended by the National Academy of Sciences (NAS). This paper examines child care expenses as an example of this relationship.

One perspective on the deficiency of the current unit of analysis of the official measure is encountered in the attempt to account for child care expenditures as a work-related expense, as the NAS recommended. In the Annual Social and Economic Supplement to the Current Population Survey (ASEC), a question asks if anyone in the household paid for child care while they worked<sup>1</sup>. A preliminary examination of

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<sup>1</sup> The data in this paper are from the Annual Social and Economic Supplement to the March 2008 Current Population Survey, and the estimates in it are based on responses from a sample population and may differ from actual values because of sampling variability or other factors. Further information about the

responses to this question yields some problems. A household may consist of two young people who are unmarried partners with a child. The reference person is the father, while the mother and young child are a separate unrelated family. The father, therefore, has no child for whom expenses for child care could be deducted from income. On the other hand, the mother, whose income may already fall below the poverty line, will have child care expenses subtracted. Therefore, while child care expenses cause additional stress on the finances of these three individuals, it is not represented in NAS poverty statistics, based on the family unit of analysis.

Further examination of the ASEC finds several households that indicate that someone paid for child care, while these parents are not assigned expenses because no children are in the family for whom child care expenses may have been paid. How would this happen? Consider some examples. A household might consist of two adults living together with two children. One child, age 12 years, is related to the householder. The second adult and the second child, age 3 years, are listed as secondary individuals. Even though this household paid for child care, the youngest child, for whom expenses are paid, is eliminated from the universe. Or consider a family who cares for a foster child. In this case, the household may have indicated paying for child care and receiving foster child payments, yet the foster child has been eliminated from the universe as an unrelated individual under age 15. No child care expenses are assigned even though the foster child payments are included in income.

This paper examines two aspects of the recommended NAS poverty measure that are closely associated. First, I examine the unit of analysis, employing new questions in

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source and accuracy of the estimates is available at  
<http://www.census.gov/apsd/techdoc/cps/cpsmar08.pdf>

the ASEC to discern relationships between household members. I also investigate the effect on poverty statistics of excluding unrelated individuals under age 15 as members of economic units.

The second goal is to update and improve assignment of child care expenses to these new groups. I review current methods used to value these expenses and present an updated method for these imputations. In the final sections of the paper, I compare a measure that changes both the unit of analysis and improved valuation methods for child care expenses relative to current estimates.

Other aspects of the NAS recommended measure are closely tied to the chosen unit of analysis. One example is the recommendation to deduct child care expenses from income, but estimates of taxes, medical expenses, and receipt of in-kind benefits would also change along with the unit of analysis. This paper shows the difference for only one of these elements, child care, as an illustration of the effect of changing from family to a new poverty group. Changes in other elements will be addressed in future work.

### **Unit of analysis**

The unit of analysis is important to the poverty measure for two reasons. First, if individuals are sharing resources then, even if one of the individuals has no income at all, they may not be in financial need if their partner is sharing with them. The official measure of poverty only assumes sharing among individuals who are related to one another by birth, marriage, or adoption. Cohabiting couples are assumed only to have access to their own income and, therefore, one or the other of the pair may be designated as poor. The second reason that choice of unit of analysis is relevant is that poverty thresholds include assumptions about scale efficiencies, so that the thresholds do not

increase as a linear function of the number of people in the unit of analysis, but they increase at a decreasing rate, assuming economies of scale. In general, this suggests that the more inclusive the unit of analysis, the lower the overall poverty rate will be.

In their report the NAS panel of experts recommended that individuals who were not married, but were otherwise sharing expenses, should be considered together as an economic unit in the computation of poverty statistics. They encouraged further research into the extent of sharing of resources among unrelated individuals sharing the same household. There has been research on this general topic area including U.S. Department of Health, Education, and Welfare (1976), Korbin (1976), Michael, Fuchs, and Scott (1980), Pampel (1983), Lampman and Smeeding (1983), Thomas (1990), Townsend (1995), Whittington and Peters (1996), Lundberg et al. (1997), Bauman (1999), Carlson and Danziger (1999), Iceland (2000), Iceland (2007), Englehardt et al. (2002), Brown and Lichter, (2004), Carlson et al. (2004), Smock et al. (2004), DeLeire and Kalil (2005), Haider and McGarry (2005), Kenney (2006), Manning and Brown (2006), Snyder and McLaughlin (2006). While, in general, there is not clear evidence of similar resource-sharing activity between cohabiting couples and family members, this paper assumes equal sharing behavior by both groups for purposes of illustration.

Following the release of the NAS recommendations, the Census Bureau released a report that varied the unit of analysis (Short et al., 1999) based on work by Hernandez (1998). The report looked at various combinations of individuals in a household, whether related or not. This work combined people in different ways, implicitly assuming that these individuals shared resources.

Short and Smeeding (2005) continued this work. They used questions in the Survey of Income and Program Participation (SIPP) that asked all members in the household about other members with whom they shared expenses. These questions were based on those used in the Consumer Expenditure Survey (CE) to ascertain membership in a consumer unit. For the purpose of collecting information about shared expenditures, the CE considers a consumer unit to be a better representation of an 'economic unit' than a family. Using these questions to put individuals together, the authors found that the units were similar to those that paired cohabiting couples together, rather than restricting units to related individuals and families. This work, and others, lent support to the notion that an improved unit of analysis for poverty measurement would treat cohabiting couples as families are treated in a poverty measure.

#### **Improvements to Relationship Data in the Current Population Survey ASEC: 2007**

As documented by Kreider (2008) there have been recent improvements in the ASEC in the information collected to document changing family structure. Since 1996 the ASEC has collected information about unmarried partners of the householder. Respondents were asked to identify the relationship of each household member to the householder – the individual who owns or rents the property. One of the response categories for this question is “unmarried partner.” In 2007 a new direct question was added to further identify couples in the household in which neither partner is the householder. A new question was asked of adults who were not living with a spouse, and were living with an adult non-relative–“Does [respondent] have a boyfriend/girlfriend or partner in the household?” The new questions are aimed at capturing the relationship of couples that do not include the householder, in addition to those who identified

themselves as the unmarried partner of the householder. The direct question may further capture some partners of the householder who may have reported a relationship other than “unmarried partner” in the *relationship to householder* item, for example, “roommate” or “nonrelative,” (Kreider ,2008).

In addition, unmarried couples are increasingly likely to have children present in the household. The ability to identify children living with two unmarried parents is important to group together people who share resources. Currently in the ASEC, children with two unmarried parents were assumed to share only the resources of the single parent, so the addition of a second parent pointer adds accuracy to the measurement of co-residence of children and their parents and allows improved measures of economic resources potentially available for children.

Kreider (2008) shows that the additional questions on relationships increases the number of potential resource-sharing relationships measured in the ASEC. In 1996, there were an estimated 2.9 million opposite sex unmarried partner households, or 2.9 percent of all households, and in 2006, there were an estimated 5.0 million unmarried partner households, or 4.4 percent of all households.<sup>2</sup> The new direct question has increased identification of couples in the household in which neither partner is the householder. In 1996, an estimated 1.2 million of the unmarried partner households included children under 18, while in 2008, there were 6.8 million unmarried partner households of which 2.6 million contained children under 18.

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2 See historical table UC-1, which can be accessed on the U.S. Census Bureau website at: <http://www.census.gov/population/socdemo/hh-fam/uc1.xls> Unmarried partners of the opposite sex by Presence of Children, 1960 to Present. The estimates in this working paper (which may be shown in text, figures, and tables) are based on responses of a sample of the population and may differ from the actual values because of sampling variability or other factors. As a result, apparent differences between the estimates for two or more groups may not be statistically significant. All comparative statements have undergone statistical testing and are significant at the 90-percent confidence level unless otherwise noted.

## **Family definitions for poverty measurement**

The ASEC is a household survey. For survey purposes a household consists of all the people who occupy a housing unit at the time of interview. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live and eat with any other persons in the structure and there is direct access from the outside or through a common hall.

A household includes related family members and all unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household.

Each household has a householder. The householder is the person (or one of the people) in whose name the housing unit is owned or rented (maintained) or, if there is no such person, any adult member, excluding roomers, boarders, or paid employees. If the house is owned or rented jointly by a married couple, the householder may be either the husband or the wife. The person designated as the householder is the "reference person" to whom the relationship of all other household members, if any, is recorded.

The official measure of poverty is not based on households, but on families. Following the Office of Management and Budget's (OMB's) Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine poverty status. If a family's total income is less than that family's threshold, then that family, and every individual in it, is considered poor. Inherent in the official



poverty definition is the assumption that only family members share resources within a given household.

The Census Bureau defines a family as a group of two people or more (one of whom is the householder) related by birth, marriage, or adoption and residing together; all such people (including related subfamily members) are considered as members of one family. A subfamily is a married couple with or without children, or a single parent with one or more own never-married children under 18 years old. A subfamily does not maintain their own household, but lives in the home of someone else. A *related subfamily* is a married couple with or without children, or one parent with one or more own never married children under 18 years old, living in a household and related to, but not including, the person or couple who maintains the household. One example of a related subfamily is a young married couple sharing the home of the husband's or wife's parents. Members of related subfamilies are assumed to share resources with the householder.

An *unrelated subfamily* is a married couple with or without children, or a single parent with one or more own never-married children under 18 years old living in a household. Unrelated subfamily members are not related to the householder. An unrelated subfamily may include people such as guests, partners, roommates, or resident employees and their spouses and/or children. Unrelated subfamilies only include spouses if married and children under age 18 if never married – so the cousin of an unrelated subfamily reference person is treated as an unrelated individual – and as such is assumed to not share resources with other members.

Further, the Census Bureau restricts the determination of poverty status to a specific universe of individuals. For secondary individuals under age 15, poverty status is

not defined. Since Census Bureau surveys typically ask income questions of persons age 15 or older, if a child under age 15 is not related by birth, marriage, or adoption to a reference person within the household, there is no family income and we cannot determine his or her poverty status. People whose poverty status is undefined are excluded from Census Bureau poverty tabulations. Thus, the total population in poverty tables -- the poverty universe -- is slightly smaller than the overall population.

For our purposes, it is useful to understand who these secondary individuals are. There are 7,884 unweighted counts of secondary individuals in the 2008 ASEC sample. Of these, 325 are below age 15 and thus excluded from official poverty calculations. A majority of these, 277, are reported to be not related to anyone in the household. Of these, 154 are foster children and do not have a parent in the household. A smaller group of 48 are classified as being unrelated to the householder but living with relatives. Although they are identified as living with relatives, there is no indicator that points to whom they are related.

Of secondary individuals over the age of 14, the new questions allow them to become a part of a 'family' unit. There are 12.8 million, weighted estimates, of these, and the new questions allow over half of them to be incorporated into new income-sharing units, thus decreasing the probability that they will be classified as poor.

### **New Relationships and New Assumptions about Sharing**

The new questions in the ASEC allow us to form units of individuals who identify themselves to be in 'special' relationships with certain individuals to whom they are not related. Including these individuals in the unit of analysis for poverty measurement requires the assumption that individuals identified as 'boyfriend/girlfriend or partner' and

who reside in the household with the respondent, share their income and economic resources. We identify 14.2 million partners in the 2008 ASEC. Relatives of cohabiting partners residing in the household are also included, if they can be identified. For example, an elderly parent of a cohabiting partner, if a parent pointer is set, will be included with the partner in the new poverty group unit. Besides the cohabiting couples, an additional 7.6 million individuals are included in newly constructed units.

In the following, these individuals are grouped together for purposes of sharing resources both on the income side and for purposes of capturing needs and economies of scale in the threshold. Once the new group is formed, the income of the new member(s) is added into that of the other related family members. Typically this increases the income that will be compared to the poverty thresholds. At the same time, a new poverty threshold is computed based on the new family composition. The comparison of these two new computations results in a new proportion of people whose relevant unit's income does not exceed the comparable threshold. These groups are compared to official statistics to assess the impact of family definitions on our perception of the number of individuals who face economic difficulty.

In general, we expect to see that there are fewer people with insufficient resources when more individuals are sharing and capturing economies of scale. For example, we might find two unrelated individuals in a household. The reference person reports annual income of \$20,000 and the unrelated additional person reports annual income of \$3,000. As individuals (under age 65), their respective poverty thresholds are \$10,787. Comparing individual incomes to respective thresholds yields one nonpoor and one poor individual.

If these two individuals have identified themselves as being a boyfriend/girlfriend or partner, we assume for the purpose of this exercise, that they are sharing income. Between the two partners their total annual income is \$23,000. The official poverty threshold for two people under age 65 is \$13,884, and therefore, neither of these individuals are classified as poor.

On the other hand, it is possible for a different outcome to occur. One household may include a cohabiting couple with four children. The householder and his four children report income of \$1,000. An unmarried partner in the household reports income of \$12,000. The unmarried partner is not classified as poor by herself, while the householder and his children, of course, are poor. Combining their incomes and assigning a new threshold for two adults and four children results in all of the household members being classified as poor. This occurs because the combined income is now below a much higher poverty threshold.

Another example where it is possible to fall below a new poverty line is when negative incomes are reported. It may be that one individual reports a total negative income. Combining that individual's income with another's results in lower total income for the other partner.

### **Poverty Thresholds**

These examples illustrate the potential effect on estimated poverty rates using the current official thresholds and how results are dependent upon the implicit economies of scale in those thresholds. Other thresholds with different equivalence scales may yield somewhat different results. For that reason there are other poverty thresholds used in this analysis. The National Academy of Sciences (NAS) 1995 report on poverty measurement

addressed the scales implicit in these official thresholds. They recommended a different equivalence scale, one that has been used in subsequent Census Bureau reports on experimental poverty measures.<sup>3</sup> Further work by Betson (1996) refined the equivalence scale to a 3-parameter one. Of course, that NAS report also recommended that new levels of poverty thresholds should be computed generally, and we use those here.

The NAS panel recommended that new thresholds should be computed using expenditure data from the CE. These thresholds have been used in the presentation of NAS poverty measures by the Census Bureau. The thresholds used here, referred to as the FCSU threshold, differs from previously published NAS thresholds in that they include payments toward mortgage principal as an out-of-pocket shelter expenditure. Further, thresholds can be calculated from CE data using families or consumer units. All previous NAS estimates used an FCSU threshold based on families. For this paper, when we include cohabiting couples in the new unit, that definition is more like the definition of a consumer unit (CU), and so for the new units we employ a threshold based on consumer units.

The FCSU thresholds are higher on average than the official thresholds, the family based FCSU thresholds are similar on average to the CU based threshold . The mean across individuals of the official poverty thresholds for 2007 is \$17,935, while the mean of the FCSU thresholds is \$22,540 for families and \$22,547 for the new units. Also, the FCSU thresholds employ a different equivalence scale. All of these elements of poverty thresholds will result in different outcomes when the unit of analysis changes from family to the new poverty group.

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<sup>3</sup> Thresholds used here are calculated from the Consumer Expenditure Survey for the family rather than for consumer units.

## **Shared Resources and Necessary Expenses**

In the first exercise in this paper we only look at before-tax money income, as in the official measure, and vary the assumptions about sharing among household members. Following that, we use the NAS thresholds without changing the income measure to assess the effect of using different assumptions about economies of scale and threshold levels. Then we examine the effect of calculating child care expenses for different family units. Incorporating all of the elements of a NAS poverty measure using a new unit of analysis will be addressed in future work.

## **Valuing child care expenditures**

The Census Bureau has been publishing experimental poverty measures since the NAS report was released in 1995. Over that time, several approaches have been used to value child care expenses for those households with children. The current approach to these valuations is described in Short (2001) and is based on a study by John Iceland and David Ribar (2001). That study employed the 1993 SIPP child care module to model child care expenses for two groups separately, unmarried and married mothers. In addition to modeling child care expenses, the NAS report recommended capping the amount subtracted from income, when combined with other work related expenses, so that these do not exceed reported earnings. This capping procedure is not considered explicitly here.<sup>4</sup> This paper updates that approach using SIPP data for 2005, the most recent data available. These data are collected in wave 4 of the 2004 panel, administered between February 2005 and May 2005. The SIPP asks about child care arrangements and expenses

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<sup>4</sup> Some analysts have suggested that this cap may be inappropriate in certain cases, such as if the parent is in school, looking for work, or receiving other kinds of compensation other than earnings.

for children in a household where the designated parent or guardian is working, owns a business, or is going to school, or a combination of all three.

**Table 1: Descriptive statistics for parents with children who paid for child care while they worked**

	SIPP 2005		ASEC 2007	
	Mean	Std dev	Mean	Std dev
Children 0-2	0.385	0.726	0.403	0.754
Children 3-5	0.416	0.742	0.493	0.793
Children 6-11	0.679	0.966	0.720	1.011
Children 12-15	0.221	0.616	0.216	0.632
ln family income	8.437	1.320	9.800	1.080
Mother's earnings share	0.572	0.415	0.536	0.385
Age	34.953	10.250	36.352	0.745
Age2 (/100)	12.813	7.558	13.921	8.769
Married	0.674	0.622	0.666	0.618
Avg. hours	35.124	17.093	38.188	12.991
Avg. hours2 (/100)	13.996	9.582	15.568	10.319
Urban residence	0.855	0.468	0.842	0.477
Suburb	0.576	0.656	0.525	0.654
Some college	0.398	0.650	0.320	0.611
College	0.236	0.564	0.245	0.563
Advanced degree	0.116	0.426	0.036	0.243
Subsidy	0.054	0.299	0.054	0.296
Extra adult	0.158	0.484	0.107	0.405
Midwest	0.229	0.557	0.249	0.566
South	0.349	0.633	0.370	0.632
West	0.244	0.570	0.213	0.536
Ln child care expenses	4.143	1.494	4.620	0.732

The unit of analysis in the SIPP is designated parent. The unit used for the CPS ASEC is primary family or poverty group unit. There may be in the CPS more than one designated parent in a primary family or poverty group unit. Standard deviations incorporate a sample design effect of 2.3 for the SIPP and 1.4 for the ASEC.

Using these data I estimate a model of expenses for all parents with children who paid for child care. Usual approaches for modeling child care expenses also typically model the choice to both work and to then pay for child care, Connelly and Kimmel (2003). This approach estimates only expenditures, conditional on these choices having already been made. Since the values will be assigned to families in the ASEC who

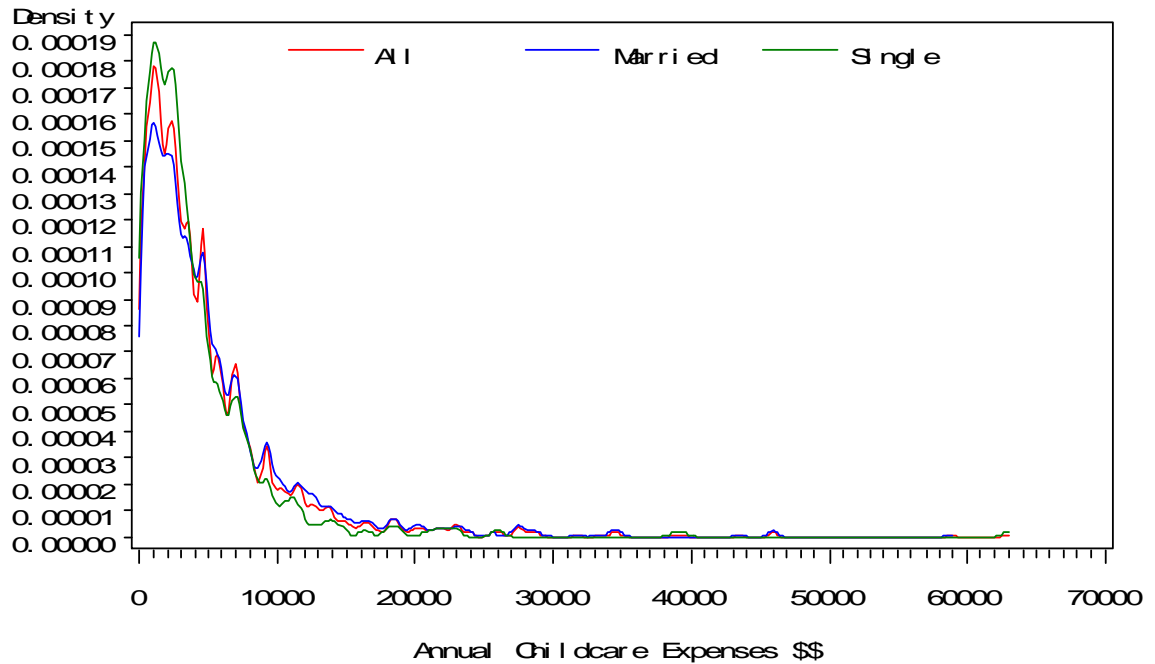
indicate they have made the decision to work and to pay for child care, this method seems appropriate for this application. Table 1 shows descriptive statistics for the explanatory variables in the SIPP and the ASEC.

This approach is consistent with the use of spending in the experimental thresholds in that it only measures reported out of pocket costs. In general, it does not account for the fact that many parents with low income cannot afford to purchase higher quality child care services. Further, it does not account for the fact that some parents, faced with choices between low earnings and high costs of child care, choose not to work at all.

In addition, the SIPP approach to collecting information about child care expenses is directed at parents or designated guardians, rather than family heads of ‘primary’ families. In cases where there are two designated parents living together in a household, for example, two sisters, each with her own two children, living together would be queried separately about child care expenses and would represent a separate observation in the sample used to estimate the model. Figure 1 depicts density functions of actual reported child care expenses for two groups of parents, single and married (green and blue lines) and for both groups combined (red).



**Figure 1: Reported child care expenses; SIPP 2005 by marital status**



Source: Survey of Income and Program Participation 2004 Panel

The ASEC asks if anyone in the household paid for child care while they worked, and if so, the child is listed. In the calculations presented here child care expenses are imputed for each family that contains children who are listed. So the two sisters described above would have child care expenses estimated as though they were only one parent with four children. This discrepancy could have some small effects on the resulting estimates of child care expenses and will be addressed in later work.

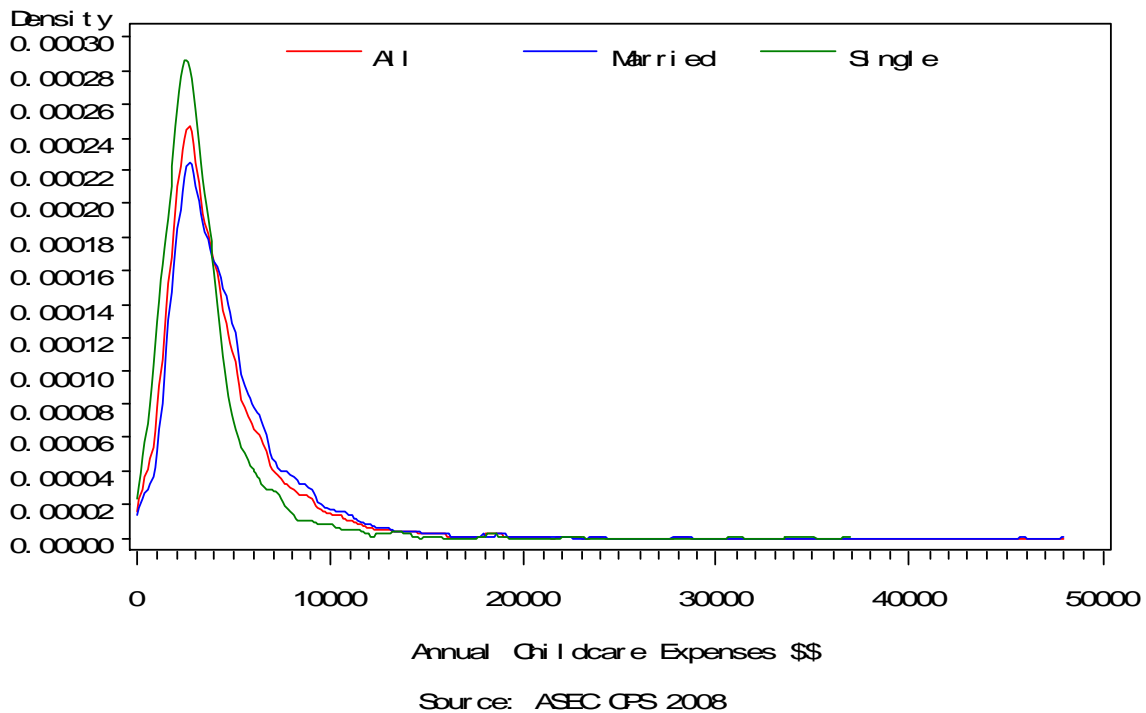
Table 2 shows the estimates for the model based on Iceland/Ribar estimates for single parents and married couples separately and the newer estimates for all families with expenses. The model presented here is very similar to the Iceland/Ribar model with some important differences. Tests for estimating separate models for unmarried and married parents did support significant differences. In the update, though only one model is estimated, interaction terms on important variables are also included. Most important is

the inclusion of an indicator that the parent received help with child care expenses. This variable is significant and suggests that out-of-pocket costs are lower when subsidies are received. Including this variable in the model assigns lower expenses to parents who indicate receipt of a child care subsidy.

Applying this model to families in the ASEC with child care expenses results in an aggregate amount spent on child care of \$30.5 billion. Six percent of families have expenses, as indicated by respondents, and the average for these families is \$4,139.

Figure 2 shows density functions of predicted child care expenses for the two groups, Married and single parents, and for all families in the ASEC.

**Figure 2: Predicted child care expenses: CPS 2007 by marital status**



**Table 2. Estimated Coefficients of Various Models of Family Expenditures on Childcare**

	1995		2005	
	Single parent/other	Married Couple	All Parents	std error
	Coefficient	Coefficient	Coefficient	
Intercept	-0.83	-1.02	1.67 ***	0.611
Family head black	0.23 **	0.06		
Fam. head Hispanic	0.24	0.10		
Children 0-2	0.82 ***	0.69 ***	0.75 ***	0.042
Children 3-5	0.57 ***	0.45 ***	0.58 ***	0.039
Children 6-11	0.13 *	-0.01	0.23 ***	0.034
Children 12-15	-0.39 ***	-0.07	-0.02	0.053
Midwest	-0.45 ***	-0.39 ***	-0.15 ***	0.071
South	-0.35 ***	-0.26 ***	-0.16 ***	0.070
West	-0.03	-0.06	-0.05	0.073
ln family income	0.37 ***	0.26 ***	0.20 ***	0.034
Mother's earnings share				
all earnings		0.15		
Avg. hours	0.03 **	0.03 ***	-0.02	0.007
Avg. hours2 (/100)	-0.03 *	-0.01	0.04 ***	0.012
No. of adults in HH	-0.15 **	-0.05		
Some HS	-0.97 **	-0.09		
High school	-0.81 **	-0.01		
Some college	-0.86 **	0.09	0.05	0.057
College	-0.74 *	0.17	0.20 ***	0.066
Urban residence	0.08	0.13 **	0.32 ***	0.076
Suburb			0.05	0.050
Age	0.07	0.06	0.01	0.030
Age2 (/100)	-0.10	-0.09	-0.02	0.042
Advanced degree			0.32 ***	0.075
Mother's earnings share				
all income			-0.19	0.185
Extra adult			-0.21 ***	0.076
Subsidy			-0.83 ***	0.146
Interaction w/ married				
Avg. hours			0.02 **	0.009
Avg. hours2 (/100)			-0.03 *	0.016
Mother's earnings share				
all income			0.50 **	0.217
Subsidy			0.47 *	0.276
Root MSE	0.88	0.84	0.97	
R2	0.31	0.31	0.26	
Observations	372	1029	2810	

Note: Estimates based on observations from the 9th wave of the 1993 and 4th wave of 2004 panel of the SIPP  
Because of differences in dependent variables and models, coefficients are not comparable across specifications.  
All models with natural logarithms specification of dependent variable.  
\* Significant at .10 level.\*\* Significant at .05 level. \*\*\* Significant at .01 level.

## **Child care expenses for new family groups**

In this final section of the paper we redo the child care expenses for a different family group. These groups will include foster children and other unrelated children, not included in family groups, and estimate expenditures on child care expenses for parents and guardians who work. Guardians who include foster care payments in their reported income and indicate that someone paid for child care will have child care expenses subtracted from total income as a necessary expense. Unmarried parents will combine their incomes and share child care expenses together in our calculation of available resources.

Recalculating child care expenses for new units assigns expenses to 6.4 percent of new units with an average value of \$4,984. Regrouping into new units increases the percent of groups assigned expenses and the amount, on average. Since there are, however, fewer groups overall, the aggregate value is only slightly higher, \$36.7 billion. This primarily reflects that additional children that are now included in the poverty universe.

The final calculation for this exercise is to subtract child care expenses while parents work from income for the purpose of determining poverty status. Note that, in order to calculate a full poverty measure based on NAS recommendations, one would have to calculate, for this new unit, all of the elements included in such a measure. The

calculations shown below only deal with one element of the NAS poverty measure – child care expenses.

### **Changes in poverty estimates from changing units**

The 2007 official poverty rate was 12.5 percent. This represented 37.3 million people whose shared family income did not exceed the poverty threshold for their particular family size and composition. Including unrelated individuals under 15, all of whom are poor by definition, in the universe yields a poverty rate of 12.6 percent under the official definition. This is the first group compared in table 3. Grouping people together into new units based on new relationship information changes the estimate of needs based on assumptions about economies of scale. Adjusting the thresholds for these new groups increases the average threshold since more people are combined in a given unit.

Table 3 compares these poverty rates, using different measures, for certain population subgroups. Column one uses the current official thresholds and family group but includes unrelated individuals under 15, all of whom are classified as poor. This is the group to whom all further comparisons will be made. The second column, labeled FCSU, uses a NAS recommended threshold for families. The next four columns incorporate the new unit of analysis, in steps. First the thresholds are changed using the new unit, increasing the poverty rate. Column 4 changes income only, so the poverty rate falls. In the column labeled “Both”, the thresholds and income are based on the new unit. The next column changes both the income and threshold but uses the NAS FCSU thresholds. Finally, childcare expenses for the new economic unit are calculated and subtracted from income and compared to the FCSU for the new unit only.

**Table 3: Poverty rates 2007**

	Family and UI's under 15					New Unit		
	Number in thousands	Official with UI<15	FCSU threshold	New Income	New Both	Both	minus childcare	
<b>All</b>	299,106	12.6	16.6	13.3	11.1	11.5	15.0	15.3
<b>In married couple family</b>	186,535	5.9	9.0	5.9	5.9	5.9	8.6	8.8
<b>In female householder family</b>	60,838	26.2	33.2	26.4	26.0	26.2	32.1	32.9
<b>In cohabiting groups</b>	20,500	28.1	32.5	36.4	7.7	11.6	15.6	16.1
<b>Children</b>	74,403	18.5	23.3	19.2	16.3	16.9	21.0	21.8
<b>Non-elderly adults</b>	187,913	10.9	14.1	11.6	9.4	9.7	12.6	12.8
<b>Elderly</b>	36,790	9.7	16.3	9.8	9.4	9.5	15.0	15.0
<b>White not Hispanic</b>	196,768	8.2	11.1	8.8	6.9	7.2	9.6	9.8
<b>African American</b>	37,774	24.7	30.6	25.6	23.0	23.6	28.5	29.2
<b>Hispanic</b>	46,026	21.7	29.5	22.9	19.4	20.2	27.5	28.0

If we only change the thresholds and do not change the unit income, then the percent of individuals whose family income does not exceed the new unit threshold rises to 13.3 percent. On the other hand, the result of including more individuals in poverty group units increases the ‘family’ income. Adjusting income of the new unit and not the thresholds reduces the percent poor to 11.1. The resulting poverty rate with both sides adjusted for new units is 11.5 percent. Overall, the reduction in the poverty rate, by incorporating new relationship information, is about one percentage point. Changing assumptions about sharing that include cohabitators and others related to them, reduces the poverty rate to 11.5 percent, or 34.0 million poor people. This result suggests that about 3.3 million individuals classified as poor under the official measure ‘may be’ sharing resources with others that allow them to adequately meet their basic needs.

The newer poverty thresholds based on NAS recommendations, as noted, are higher on average and use different assumptions about economies of scale as family sizes change. Therefore, they may show different results when changing the unit of analysis

from the family. Changing the experimental threshold to the FCSU threshold increases that proportion 'poor' to 16.6 percent. Comparing a measure with a CE-based threshold and resources that reflect the new economic unit yields a poverty rate of 15.0 percent, a difference of over 2 percentage points from the official poverty rate of 12.6 percent. This represents 44.8 million poor individuals in 2007.

Table 3 also shows resulting poverty rates after the child care expenses are subtract from income. As a result of accounting for child care expenses the percent of economic units with insufficient resources using the FCSU threshold increases to 15.3 percent, or 45.7 million individuals.

The table shows poverty rates for select subgroups by type of family or group, age, race, and ethnicity. Some different patterns emerge as certain subgroups have substantial changes in poverty estimates. Looking only at newly formed units with cohabiting couples also shows dramatic differences, though in this case the differences from the official measure are due to unit changes. Poverty rates fall significantly with the formation of these new units, falling from 28.1 percent to 11.6 percent.

For the elderly, by far the biggest change in poverty rates comes from the move to the experimental FCSU thresholds, rising from 9.7 percent using the official measure to 16.3 using the FCSU thresholds. Changing the unit of analysis for both income and thresholds results in slightly lower poverty rates, from 9.7 to 9.5 percent.

Changes in the unit of analysis affected certain groups; the percent below the threshold fell for children from 18.5 to 16.9 percent, non-elderly adults, from 10.9 to 9.7 percent, White not-Hispanic individuals, from 8.2 to 7.2 percent, and Hispanic individuals, from 21.7 to 20.2 percent.

Accounting for child care expenses increases poverty rates of children by 3 to 4 percent. As might be expected, subtracting child care expenses does not result in statistically different poverty rates for the elderly.

## **Conclusions**

This paper has addressed two elements in an improved measure of poverty as recommended by the National Academy of Sciences. The two elements are the unit of analysis and child care expenses. The paper illustrated the effects on poverty estimates of changing each item individually and the overall effect of changing both and the relationships between the two.

The study demonstrated the effect on estimates of poverty rates in the U.S. if changing assumptions about who, within a household, shares resources and needs. Expanding the group to include cohabitators and their children and other relatives results in lower poverty rates overall and for some groups in particular. Overall the poverty rate decreased from the official rate of 12.5 percent to 11.5 percent of all people. Children, non elderly adults, Whites, and Hispanic individuals showed the declines in poverty rates from this change.

This paper also examined the effect of child care expenses on estimates of poverty as well as the change in child care expense estimates based on different units of analysis. The exercise illustrated that changes in one element of a poverty measure has important implications for other elements. Important parts of the NAS recommended measure, such as medical expenses, in-kind benefits, taxes, and even equivalence scales, were not considered here but will also be affected by changes in the unit of analysis. These items will be considered in future work.



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Appendix Table: Poverty rates 2007

	Family and UI's under 15					New Unit					FCSU		minus childcare		
	Number in thousands	Official with UI<15	std err	FCSU std err	New threshold only	std err	New Income only	std err	Both	std err	Both	std err	Both	std err	Both
<b>All</b>	299,106	12.6	0.2	16.6	0.2	13.3	0.2	11.1	0.2	11.5	0.2	15.0	0.2	15.3	0.2
<b>In married couple family</b>	186,535	5.9	0.2	9.0	0.2	5.9	0.2	5.9	0.2	5.9	0.2	8.6	0.2	8.8	0.2
<b>In female householder family</b>	60,838	26.2	0.6	33.2	0.6	26.4	0.6	26.0	0.6	26.2	0.6	32.1	0.6	32.9	0.6
<b>In cohabiting groups</b>	20,500	28.1	0.9	32.5	0.9	36.4	1.0	7.7	0.5	11.6	0.7	15.6	0.8	16.1	0.8
<b>Children</b>	74,403	18.5	0.3	23.3	0.3	19.2	0.3	16.3	0.3	16.9	0.3	21.0	0.3	21.8	0.3
<b>Non-elderly adults</b>	187,913	10.9	0.2	14.1	0.2	11.6	0.2	9.4	0.2	9.7	0.2	12.6	0.2	12.8	0.2
<b>Elderly</b>	36,790	9.7	0.3	16.3	0.4	9.8	0.3	9.4	0.3	9.5	0.3	15.0	0.4	15.0	0.4
<b>White not Hispanic</b>	239,399	10.6	0.2	11.1	0.2	8.8	0.2	9.1	0.2	7.2	0.2	9.6	0.2	9.8	0.2
<b>African American</b>	37,774	24.7	0.6	30.6	0.6	25.6	0.6	23.0	0.6	23.6	0.6	28.5	0.7	29.2	0.7
<b>Hispanic</b>	46,026	21.7	0.5	29.5	0.6	22.9	0.5	19.4	0.5	20.2	0.5	27.5	0.6	28.0	0.6