XII. Determining the 2006 Child Support Schedules (by William T. Terrell and Jodi Messer Pelkowski, Economists)

Procedures employed in deriving the schedules involve estimation of spending on one child aged 12-18 years old as a function of gross monthly income in families with one, two, and three children. The three-child per capita results are extended to families of four, five, and six similarly aged children by means of constant divisors that allow for economies of scale. Per capita measures for younger children (ages 0-5 and 6-11) are computed from the foregoing six functions by means of age indexes. The latter provide reliable measure of spending on younger children as a proportion of that characterizing those that are aged 12-18. With expenditures as a function of gross income completed for all family sizes and ages of children, a minimum policy standard is established by recognizing that two households in place of one undergo certain costs that must be subtracted from spending on children (at each level of gross income). After these reductions, an allowance is made for families at or below the poverty guidelines. At this point one is able to compute the schedules that accompany the administrative order.

The main objective of these procedures is to take advantage of the findings of more elaborate and very expensive studies of expenditures on children as a function of gross income. Such efforts regularly rely upon individual household data (thousands of data points) collected by the Census Bureau on behalf of the Bureau of Labor Statistics in the Consumer Expenditure Survey. Child expenditures functions contained in these studies involve what in mathematics is called a power function, or, a function that is linear in logarithmic form. Once this is known, then it becomes possible to use expenditure survey data that has already been grouped into income classes by family size in the interest of updating the child support schedules. Further, one can easily provide some safeguards in using grouped data that would be difficult to execute with thousands of individual observations.

Consumer Expenditure Survey data for 2003-2004 underlie the spending estimates. Data on an annual basis were collected for households of three, four, and five or more persons. This set consists of 25 income classes and for each class the following series are collected: family size, annual expenditures, before-tax income, and after-tax income. Due to certain problems of income underreporting and overstated spending relative to income, three income classes were excised. All three showed spending that was more than 2.5 times before-tax income. Of the 22 remaining data sets, only seven revealed consumption spending that is less than before-tax income. After-tax income is a more reliable upper limit on spending for the purpose of child support.

Statistical techniques are employed that treat both per capita consumption spending as a percent of gross income and per capita after-tax income as a percent of gross monthly income as alternative dependent variables in functions of gross monthly income and family size. The former is known as the Equal Share Family Expenditure Model (ESFEM) and the latter is given the rubric Equal Share After-Tax Income Model (ESATIM). The total data set is pooled ($n = 22$) for each of these regression equations and dummy variables are used for family size. All variables are transformed to logarithms (base *e*) and the two resulting linear equations for two dependent variables show coefficients of multiple determinations greater than .98 with 18 degrees of freedom. This means that only two percent of the variation in the dependent variables is not associated with gross monthly income and family size. Gross monthly income is a very reliable measure from which to determine expenditure and after-tax income shares.

Initial regression results for the two models (ESFEM and ESATIM) follow in logarithmic form: $\ln Y = \ln a + b \ln X$. Note that the fact of constant values of b no matter family size is a consequence of using dummy variables.

	ESFEM		ESATIM	
No. Children	ln a	b	ln a	b
1	7.400111845	-.479281595	3.833792204	-.041651826
2	7.163993125	-.479281595	3.558907424	-.041651826
3	6.838938415	-.479281595	3.230540434	-.041651826

These equations have been examined in non-logarithmic form. For low to low middle levels of monthly gross income, per capita after-tax income is actually less than the per capita measure of consumption spending. Thus, the spending measure for a child aged 12-18 years needs to be adjusted downward so that the resulting function is below both of the equal share equations. Further, one aim of developing conservative spending equations is that the portion of gross income concerned remains constant at incomes less than or equal to the poverty guideline for the contiguous 48 states. This provides a point of gross monthly income equal to the poverty guideline (X coordinate). The corresponding percentage of income (Y coordinate) is computed from the ESATIM function at 1.25 times the poverty guideline. The result is a single point on the desired spending function, such point being less than the ESATIM function. Given this point, all one needs to establish a linear equation is the slope. The new slope is a weighted average of the b shown above, the weights being .6 for the ESFEM column and .4 for the ESATIM column. The new equations representing the share of gross income that is spent per older teenage child follow in logarithmic form. These functions are referenced by the term Feasible Equal Share Poverty Adjusted Model (FESPAM).

Family Size	Number of Children	Poverty Level($)	1.25 Poverty Level($)	FESPAM ln a	FESPAM b
3	1	1400	1750	5.726671636	-.304229687
4	2	1700	2125	5.502280765	-.304229687
5	3	1950	2450	5.21021386	-.304229687

Note that the 2006 annual poverty guidelines are divided by 12 and rounded up to the nearest $50 in order to obtain the monthly levels. In turn, the latter are multiplied by 1.25 and the result rounded up to the nearest $50 for the purpose of computing new ordinates (the Y coordinate that corresponds to X = poverty level income).

At the risk of some redundancy, these three FESPAM equations are transformed from logarithmic form to arithmetic form. The latter are power functions that predict (Y) the percent of gross income spent on an adult child (ages 12-18) as a function of gross monthly income (I): Y = A(I)^b, where ^ indicates exponentiation and A = antilog [ln a]. Further, the power function applying to three-child families is extended to a) families with four children by dividing A by 1.165; b) families with five children, division of A by 1.31; c) families with six children, division of A by 1.44. These constant divisors account for both the increase in family size and the scale economies that characterize purchasing for larger families.

Number of Children	2006 Poverty Annual Rate ($)	2006 Poverty Monthly Rate ($)	FESPAM in Factor A	Per Cent Exponent b
1	16,600	1400	306.9459384	-.304229687
2	20,000	1700	245.250654	-.304229687
3	23,400	1950	183.1332189	-.304229687
4	26,800	2250	157.1958961	-.304229687
5	30,200	2550	139.796503	-.304229687
6	33,600	2800	127.1758465	-.304229687

These equations can be used to compute estimated expenditures per adult child as a function of gross monthly income and number of children. However, these are not suited to the task of developing child support schedules because they fail to recognize that extra costs appear upon dissolving a marriage (dissolution burden) or, what may be the other side of the same coin, the minimum policy standard to be set by the court-appointed advisory commission. That is, if the standard is set below the expenditure equations, the difference could be referenced by the term *dissolution burden*. Alternatively, if one begins by subtracting an estimated dissolution burden then the resulting equation for the child support schedule could be labeled as a *policy standard*.

The following table presents the child's dollar share of a dissolution burden that is subtracted from the FESPAM equations (above) at two values of gross monthly income. One of these is the monthly poverty level. The other is determined by the monthly gross income that has been established by the advisory commission as the maximum income for the printed child support schedules, *viz*., $14,500. Recall that adjusting linear equations (even in logarithms) requires either a point and a slope (as above) or, two new points, as at present. Once these child burdens have been removed from the expenditure equations, the new power functions are used to compute the child support schedules up through the gross monthly income of $14,500. These functions are sometimes referenced as BURDEN equations. They are presented below in arithmetic form Y = A(I)^B, where Y is child support basic obligation in dollars per month, I is gross monthly income and the carat (^) indicates exponentiation.

Number of Kids	Child Share of $ At Poverty	Burden Deducted At $14,500	Factor A	Exponent B
1	186.32	407.58	.7045070465	.830052019
2	178.61	465.23	.5967588834	.814441857
3	100.51	129.03	.5364410065	.814109063
4	82.59	110.76	.4604643832	.814109063
5	70.71	98.50	.4094969515	.814109063
6	62.52	89.60	.3725284767	.814109063

Coefficients for the BURDEN equation (last two columns) provide the functions that are used to compute the child support schedules at gross monthly incomes above the poverty level and up to the income of $14,500. The complete functions also appear in the single table of functions attaching to the proposed administrative order. For gross monthly incomes at or below the poverty income, these same functions are used to compute the support amount as a proportion of income exactly at the poverty level. Then this proportion is held constant for calculating child support at lower incomes. The relevant proportions are shown in the first column of the table accompanying the administrative order. The same table, as well as a footnote to the six basic obligation schedules, provides the functions for computing child support at incomes greater than $14,500 per month. These begin at an income greater than $14,500 (no matter how close to $14,500) and the exponent (.695770313) is merely that pertaining to the FESPAM equations above plus the number one (1): 1-.304229687 = .695770313.

This last result concerns a technical point that is well known in mathematical economics. The exponent for the power functions showing dollar measures, say child support, that depend on gross income reveal what is called the *income elasticity of expenditure*. This is the percentage change in outlay (whether spending or child support) divided by the attending percentage change in income. For example, the coefficient in the above table for a one adult child family is 0.83. This means that on a cross-section basis (across families at a particular date as opposed to families over time) a ten percent increase in income (.10) leads to an 8.3 percent increase (.083) in child support. By and large, this result stems from safeguards discussed earlier in this section. Studies that do not account for certain biases in the underlying data will find exponents for expenditure percentages on the order of .8. When these are converted to dollar equations, the exponents are near .2 (1-.8 = .2). See the study published by the Virginia Assembly (Richmond VA) for an example of this outcome.

Adult child support equations lead to support amounts for younger age groups by means of certain measures that derive from the work of Mark Lino, Ph.D., in the Center for Nutrition Policy and Promotion, U.S. Department of Agriculture. The advisory commission examined his estimated expenditures on children by age for 2001 and 2005. Specifically, total expenditures less health care, child care, and education indicate that spending on younger children is gradually approaching that for older children. The previous child support tables contained values for age groups 0-6, 7-15, and 16-18. The committee re-examined these age groups. Upon inspection of the data in Lino's report, the age brackets were adjusted to 0-5, 6-11, and 12-18. These age brackets are more consistent with the timing of the increase in expenditures as children age (according to

Lino's work). It is worth noting that these age groups match closely to the age in which children move from pre-school to elementary school, and from elementary to junior high school. For comparison purposes, spending on younger children in the age groups used in the 2001 tables compared to those proposed herein based on Lino's 2005 report are shown below for three different income levels in each year.

	Relative Percent	
Income Level	2001	2005
Age Group:	0-6	0-5
Low	78.62	76.28
Middle	82.03	80.65
Upper	86.18	85.09
Age Group:	7-15	6-11
Low	94.65	86.06
Middle	95.09	89.05
Upper	96.10	91.17

In the interest of conservative increases, the percentages for the 2006 child support schedules were changed from 78 in the current administrative order to 76 for children aged 0 – 5 years and from 90 to 86 for children in the school age years 6 – 11. For children age 12 – 18, the percentage for the 2006 child support schedule is 100%. These percentages appear in footnotes to the child support schedules and in the table of support functions in the proposed administrative order.

SUPPORT FUNCTIONS FOR A CHILD AGED 16-18*
C = Support in dollars per month per child.
I = Combined gross monthly income
^ = Exponentiation

Number of Children	Income up to Poverty Level**	Poverty Level Income to $14,500	Income Above $14,500
1	0 < I ≤ $1400 C = .2056871844(I)	$1400 < I ≤ $14,500 C = .7045070465(I)^.830052019	I < $14,500 C = 2.550826591(I)^.695770313
2	0 < I ≤ $1700 C = .1500938122(I)	$1700 < I ≤ $14,500 C = .5967588834(I)^.81444157	I < $14,500 C = 1.860522203(I)^.695770313
3	0 < I ≤ $1950 C = .131200157(I)	$1950 < I ≤ $14,500 C = .5364410065(I)^.814109063	I < $14,500 C = 1.667143786(I)^.695770313
4	0 < I ≤ $2250 C = .109661822(I)	$2250 < I ≤ $14,500 C = .4604643832(I)^.814109063	I < $14,500 C = 1.431024709(I)^.695770313
5	0 < I ≤ $2550 C = .095280873	$2550 < I ≤ $14,500 C = .409496951(I)^.814109063	I < $14,500 C = 1.272628844(I)^.695770313
6	0 < I ≤ $2800 C = .085185179	$2800 < I ≤ $14,500 C = .372528476(I)^.814109063	I < $14,500 C = 1.157738741(I)^.695770313

* For younger child equations multiply these function by .76 for ages 0-5 and by .86 for ages 6-11.
** Annual rates divided by 12 and rounded up to the nearest $50.