Review Notes

Calculating Household Production Age Profiles by Sex in Time and Money Units

Gretchen Donehower, May 23, 2012

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| **Calculation Steps** | **Mathematical Notation** |
| 1. Find time use survey data which measures time spent on different activities for some sub-set of people in a household. The survey may have a weight variable which gives the population share of each person in the survey, or it may be self-weighting (no weights).
 | Let $t(i,j,x,s,a)$ represent the total hours in a day that person$ i$, who is a member of household $j$ and is age $x$ and sex $s$, spent doing activity $a$. Let $n(i,j,x,s)$ represent the survey weight of that person. If the survey is self-weighting, then all $n\left(i,j,x,s\right)=1$. |
| 1. Identify time spent on household production activities. Those activities satisfy two criteria: they are not counted in national accounts and you could pay someone else to do the activity for you (and still get the benefit).
 | Identify $t(i,j,x,s,a^{\*})$ where $a^{\*}$ are activities that meet the two criteria. |
| 1. Divide household production activities into groups that would be paid different wages if purchased in the market. The current methodology uses 11 different groups, but this may be modified for some country teams based on available data.
 | Divide $t(i,j,x,s,a^{\*})$ into groups $t(i,j,x,s,a\_{g}^{\*})$ for $g=1,\cdots , 11$. |
| 1. Calculate weighted-average age profiles of time spent in each household production group, separately for each sex.
 | $\overbar{t}\left(x,s,a\_{g}^{\*}\right)=\frac{\sum\_{i=1}^{I}\sum\_{j=1}^{J}t\left(i,j,x,s,a\_{g}^{\*}\right) n\left(i,j,x,s\right)}{\sum\_{i=1}^{I}\sum\_{j=1}^{J}n\left(i,j,x,s\right)}$ for each and age $x$, sex $s$, and household production activity $a\_{g}^{\*}$ for $g=1,\cdots , 11$. |
| 1. Find data on the average hourly wage for the year of the time use survey someone would earn in the market for each of the 11 household activities.
 | Let $w(a\_{g}^{\*})$ be the average hourly wage for household production activity $a\_{g}^{\*}$ for $g=1,\cdots , 11$.  |
| 1. Determine if the activity requires a quality adjustment factor (current methodology uses arbitrary factor of 0.75 for some activities)
 | Let $q(a\_{g}^{\*})$ be the quality adjustment factor for household production activity $a\_{g}^{\*}$ for $g=1,\cdots , 11$. $q\left(a\_{g}^{\*}\right)\in \{0.75,1\}$ |
| 1. From national accounts for the year of the time use survey, determine the level of supplements to wages and salaries in the market economy relative to wages and salaries. Calculate a supplement adjustment factor. “Supplements” include fringe benefits and mandatory employer-paid taxes for social protection programs. Note supplements to wages and salaries plus wages and salaries equals total compensation of employees from national accounts.
 | Let $SUPP=1+\frac{supplements to wages and salaries}{wages and salaries}$ where “supplements to wages and salaries” and “wages and salaries” come from national accounts.  |
| 1. Compute the money-based age profiles by sex by multiplying the time-based profiles by the imputed wage, the quality adjustment factor, and the supplement adjustment factor. These should be expressed in annual amounts.
 | $\overbar{m}\left(x,s,a\_{g}^{\*}\right)=365 \overbar{t}\left(x,s,a\_{g}^{\*}\right) w\left(a\_{g}^{\*}\right)q\left(a\_{g}^{\*}\right)SUPP$  |
| 1. Smooth both the time- and money-based profiles
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