Unpaid Work and Household Living Standards in the U.S.

Franziska Ellen Dorn
(University of Duisburg-Essen, Germany)

Nancy Folbre
(University of Massachusetts Amherst, USA)

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Franziska Dorn[1] and Nancy Folbre[2]
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Abstract

Time poverty is an important dimension of household living standards in the U.S., as elsewhere. However, there is little agreement regarding its definition and measurement. Many estimates of time poverty on the household level are based on assumptions regarding thresholds of "socially necessary" unpaid work for households of different compositions and income, based on average or median values of unpaid work time. Also, they rely heavily on assumptions regarding substitutability between money expenditures and unpaid work. We make use of household-level data on both expenditures and time use for one- and two-adult households in the 2017 and 2019 Panel Study of Income Dynamics to challenge these assumptions. First, we explore the meaning of "thresholds," comparing different relative statistical measures. Second, we directly estimate substitutability between household expenditures, unpaid work time in general, and child care time. The results reveal a distinctly non-linear pattern of substitutability as both expenditures and levels of unpaid work increase.

Time poverty is easily defined as a stand-alone measure on the individual (rather than household) level and is often specified either in absolute or relative terms based on the amount of time devoted to leisure, personal care, or both (Aloè 2023; Bardasi and Wodon 2010). However, like income poverty, time poverty can also be defined on the household level, and this poses greater conceptual difficulties. In this context, time devoted to unpaid work, as well as leisure, is relevant, especially since such work is particularly relevant to household living standards, including the care of young children or adults needing assistance. Income poverty and time poverty can, in principle, be measured separately, and the very concept of necessary thresholds implies they are not perfectly substitutable. However, they are likely substitutable to some extent within a certain range.

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[1] University of Duisburg-Essen, Germany, email: franziska.dorn@uni-due.de
[2] University of Massachusetts, Amherst, USA, email: nancy.folbre@gmail.com

Here, a brief review of research on household time poverty sets the stage for empirical exploration of two related issues—the threshold of unpaid work for which money expenditures cannot provide substitutes, which we term "socially necessary" unpaid work, and the extent of substitutability (when and if it is feasible). The empirical implications reach beyond specification of time poverty thresholds to estimates of extended income (the sum of market income and the imputed market value of unpaid work) on the household level. Most such estimates simply multiply hours of unpaid work by a replacement cost wage and add the product to household money income. This approach assumes linear substitutability between money and unpaid work time, which may well overstate household living standards. For instance, it implies that a household with income below the income poverty line could escape it by engaging in more unpaid work.

Time Poverty, Money and Substitutability

Claire Vickrey established the analytical framework used in most measures of time poverty on the household level (Vickery 1977; Zacharias et al. 2012, 2019). Her approach was motivated by concern that a certain amount of unpaid work time was necessary in order to convert money income into actual consumption. The U.S. poverty lines devised in the 1960s disregard this constraint. They are based on estimates of the cost of a "low income budget" for food items such as rice and beans, which require considerable preparation time.

Vickery concluded that U.S. poverty lines were, as a result, set too low; households likely to have little time for unpaid work, such as single mothers of young children employed full-time, need more income to compensate. As subsequent research has shown, Vickery's analysis provides a useful way of factoring "time to do the chores" into measures of poverty in the U.S. (Douthitt 2000.) The time constraints associated with virtually mandatory employment make life especially difficult for single parents in the U.S. (Albelda 2011).

Vickery's analytical framework includes a minimum money income threshold M_0,

appropriate for a household that has sufficient unpaid work time to escape poverty defined by that threshold (at point A in Figure 1). The total time available to a single adult household for unpaid work is T_m, determined by hours of employment plus the minimum quantity of time necessary for leisure and personal care. All households require a minimum amount of time they must devote to unpaid work, T_0. At T_0, they require money income of at least M_1 to escape poverty.
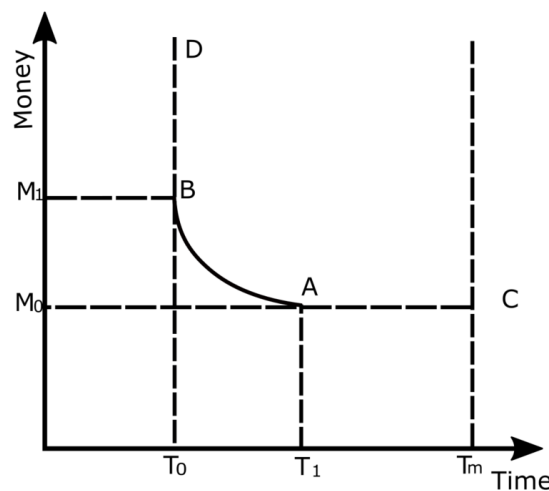

Figure 1: Vickery's Money and Time Poverty Thresholds and Tradeoffs

As we build on Vickery's approach, we set aside the issue of minimum time for leisure and personal care, which must be specified on the individual level. Instead, we focus on the relationship between money income or expenditures and unpaid household work. In Vickery's model, unpaid labor time can help the household reach the standard of living defined by the income poverty line, but beyond that point, has no effect. Having insufficient unpaid time increases the money income required but having more than enough unpaid time does not lower the monetary income line. This asymmetry is inconsistent with a measure of extended income, which implies that every additional hour of unpaid work contributes equally to household consumption and living standards.

Surely the truth lies somewhere in between: Unpaid work cannot compensate for extremely low money income. Obviously, a person can't cook if they don't have a stove and

can't clean house if they live on the street. On the other hand, unpaid work can contribute to consumption and living standards within a certain range and to a certain extent. For instance, provision of unpaid child care often saves households money they would otherwise be forced to spend to purchase care services. While perfect substitutability can't be taken as a given, some substitutability between time and money affects household consumption and living standards.

Vickery's model neatly illustrates thresholds that limit substitutability and also specifies an area in which substitutability is feasible (between points A and B). This substitutability is illustrated by a downward sloping curve that is convex to the origin, suggesting an indifference curve that reflects diminishing rates of marginal utility. Yet the shape of this curve is theoretically indeterminate, since diminishing marginal productivity of unpaid work would suggest something more like a production possibility curve, concave to the origin. Alternatively, in a slight modification of the extended income approach that simply incorporates necessary thresholds for money and time, substitution could be depicted by a straight line, yielding a region of linear substitutability bounded by thresholds of socially necessary money income and unpaid work time.

To explore these issues, it is helpful to insert some elements of Vickery's framework into a more general picture of household living standards that highlights the tradeoffs between time devoted to earning money for consumption expenditures and time devoted to unpaid services for own consumption. Rather than asking, as Vickery did, how much additional money (presumably in the form of public assistance) would be necessary to compensate for inadequate unpaid work time, we can ask to what extent households are able to substitute unpaid work and money income, and how their range of choices is affected by their wage rate and the cost of purchasing substitutes for unpaid work time.

For purposes of simplicity, consider a unitary household that is pooling both market income and unpaid labor, and devotes all its income to expenditures (no savings). (In our

empirical analysis we focus on single adult households with and without children). In Figure 2 the vertical axis represents consumption based on money expenditures, the product of hours devoted to paid work and a constant hourly wage. The horizonal axis represents time devoted to unpaid work. Leisure time is taken as exogenously given and productive time not spent on unpaid work is spent on paid work. The hypothetical minimum threshold for money income is M_0, and for time, T_0.
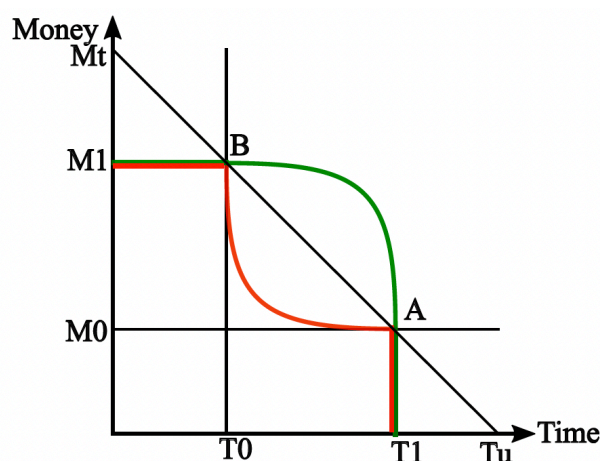

Figure 2: Tradeoffs between Earnings and Unpaid Work Time

A household below both thresholds is doubly constrained, lacking sufficient money to substitute for unpaid work time or sufficient unpaid work time to substitute for money. In this region of Figure 2, time and money are complements rather than substitutes, though it is unclear how households can improve their position, and they may well be "stuck" in the absence of public or private assistance. A household below the money threshold but beyond the unpaid work time threshold gains no improvement by increasing unpaid work time and must prioritize earning more money. A household below the unpaid work time threshold but above the money threshold gains no improvement by earning money, only by increasing unpaid work time. Here again, choices are limited. For instance, a household with inadequate money income may not be able to purchase the child care needed to engage in paid employment. Likewise, a household with inadequate time for unpaid work may be unable to

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prepare nutritious meals or adequately care for and supervise children or other dependents. The only area of potential tradeoffs between money and time is above the money threshold and beyond the time threshold.

Here, choices are limited by the wage rate and the cost of purchasing substitutes for unpaid work. M_T represents the money expenditures available to the household if all time is devoted to paid work, and no time to unpaid work, ignoring thresholds. T_U represents the maximum amount of unpaid time if no time is spent on market work and all consumption is produced by unpaid work (also ignoring minimum thresholds). A linear tradeoff is depicted between money and unpaid work, connecting M_T and T_U. The slope of this line is represented by the wage, a measure of opportunity cost. The higher the wage, the higher M_T will be, and the steeper the negative slope of the line connecting M_T and T_U. Taking the specified thresholds into account, the range of efficient feasible choices lies on the portion of the black line between B and A. Households could also choose combinations below this line, but these are not efficient, since they would be able to increase utilization of money without reducing unpaid work time (or vice versa).

The level of the thresholds determines the range of possible substitutability and their very existence defies the assumption of linear substitutability. However, the shape of the line connecting A and B is also at issue. If the axes in Figure 2 were interpreted not as money and time, respectively but as the utility of money and the utility of time, we would expect the line connecting B and A to be convex to the origin, rather than linear, reflecting an indifference curve representing diminishing marginal utility, as indicated by the red curve. (At a high level of money income, the decision-maker would be willing to sacrifice a relatively large amount of money for a small additional amount of time). This figure mimics the convex curve in Vickery's framework depicted in Figure 1. However, the tradeoff between money and unpaid time can't be analyzed purely in terms of opportunity cost and household utility. Opportunity cost provides only a measure of the subjective wellbeing derived from the services of unpaid

work, not its contribution to household consumption or well-being. The very notion that some unpaid work is socially necessary assumes that it does more than increase subjective wellbeing—it affects household consumption or living standards.

Replacement cost valuation offers a different approach, designed to approximate the money saved by performing unpaid work that could, in principle, be replaced by asking a counterfactual question: What would the household need to pay on an hourly basis to hire a substitute wage earner to perform the task? This is the approach to valuation applied in estimates of income on both the national and the household level (Abraham and Mackie 2005; Folbre et al. 2013). However, replacement cost valuation, like opportunity cost valuation, implies a linear relationship between hours worked and productive contribution; every hour is valued at the same wage.

Economic theory holds that when capital is fixed, an increase in hours worked leads at some point to diminishing marginal productivity. Common sense, everyday experience *and* thresholds based on socially necessary time suggest that people engaging in unpaid household work prioritize the most irreplaceable and most valuable tasks. The more time people engage in unpaid work, the more likely that they are engaging in tasks that provide discretionary amenities of declining marginal value.

One way to conceptualize this complexity is to depart from the common assumption that opportunity cost and replacement cost valuations are simply alternative methods and combine the two. Consider a labor time budget constraint that consists of a fixed number of hours that can be spent on productive work—the sum of paid and unpaid work. (This constraint is consistent with a specified number of hours devoted to leisure and personal care—determined either by what is socially necessary in this domain, or, alternatively, by a process of utility maximization in which individuals continue productive activities until the decreasing marginal utility of additional productive activity equals the marginal utility of leisure).

In this framework, time devoted to unpaid work imposes an opportunity cost (wages foregone) that is partially compensated by savings resulting from averted replacement costs. For instance, a household might compare the hourly earnings a mother could potentially earn with the hourly cost of purchasing child care during employment hours. Child care is likely to be particularly substitutable because it often directly conflicts with hours of employment and cannot be fully postponed until evenings or weekends. Housework can be more easily postponed, and meals can, to some extent be prepared ahead of time, lowering opportunity costs associated with paid work.

This interpretation departs from the Beckerian or "new home economics" approach which conceptualizes money and labor time as inputs into a unified production function (in this case, money and time could be pictured as isoquants with a shape similar to indifference curves). Instead, it suggests that households are choosing between two different types of goods and services, those that are purchased and those that are produced for household consumption. This implies a tradeoff resembling a production possibilities curve, since household production is subject to declining marginal productivity. The difference between opportunity cost and replacement cost determines the slope of line, which is not constant, but declining and concave to the origin. As more time is devoted to unpaid work, its marginal productivity begins to fall, leading to an increasingly steep decline in the slope of the line between M_T and T_P , illustrated by the green line.

(Note that market earnings are generally considered constant per hour, though some empirical research work suggests that they may actually *increase* along with hours of work in some jobs, presumably because some employers value flexibility, availability and continuity of services (Cha and Weeden 2014; Goldin 2014). This could also be true of unpaid work, but it seems unlikely).

It is difficult to speculate a priori which of the three possible shapes of substitutability (black, red, or green)—is correct. Both diminishing marginal utility and diminishing marginal

productivity may come into play. The main take away of this theoretical foray is that substitutability between purchased goods and unpaid work likely far more complicated than conventional theoretical approaches suggest, and there is little reason to believe that it is either continuous or linear.

Empirical Explorations

We explore two specific questions. First, is there empirical evidence of minimum thresholds of unpaid household work? Second, what do tradeoffs between expenditures and unpaid work look like, and how do they vary across households in three different groups within the distribution of expenditure (which is largely a function of the distribution of income)? We utilize pooled data from the 2017 and 2019 Panel Study of Income Dynamics (PSID), which is one of the few (if not the only) U.S. data set that includes data on both unpaid work (for up to two adults per household) and expenditures on the household level.

The PSID asks respondents how much time they devoted to unpaid work in a typical week, and the resulting estimates are consistent with measures from the American Time Use Survey in corresponding years (Gautham and Folbre, 2024; Insolera et al. 2019). The dataset encompasses adults aged 18 to 65, limiting total paid and unpaid work hours to no more than 112 hours per week and requiring at least one hour of unpaid work in the typical week. This limitation is based on our assumption that one has to do a minimal amount of unpaid work, even if only managing the work done by someone else. Time-use research indicates that individuals generally sleep eight hours a day and require some time devoted to personal care; thus more than 112 hours of combined work seems to be implausible (Krueger and Friedman, 2009).

We separate the unpaid work variable into household work and childcare for our analysis. The household work variable encompasses two categories from the PSID: reporting hours for household work and shopping. [3] Childcare hours are kept separate for our empirical explorations. [4] [5] We conduct separate analyses for household work and childcare as follows:

- Single households' housework: We perform separate estimations for single men and single women, both without children and with at least one child under the age of 6.

- Single households' childcare: We analyze single men and single women who have at least one child under the age of 6.

- Couple households' housework: For couple households, we use the total hours of household work, analyzing couples without children and those with at least one child under the age of 6.

- Couple households' childcare: We examine the total household hours spent on childcare for couples with at least one child under the age of 6.

Our results here are preliminary, primarily a guide for future research, and should not be cited.

Minimum Thresholds

Most efforts to estimate the threshold for socially necessary unpaid work have relied on time-use data documenting average or median amounts of time devoted to unpaid tasks. Vickery estimated that an adult household member must spend at least 2 hours a day "managing the household and interacting with its members if the household is to function as a unit" (Vickery 1977:46). Variations on this assumption have been widely adopted. For

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[3] The PSID reports housework as follows: "In a typical week, how many hours (do you/does [he/she]) spend doing housework, for example, cooking, cleaning, and other work around the house?"

[4] In a typical week, how many hours [do you/does [he/she]] spend) Shopping, for example, buying groceries or clothes, or shopping online?

[5] For this analysis we are not looking at elder care.

instance, Zacharias et al. assume that each adult household member must spend 7 hours a week on socially necessary unpaid work, independent of household composition (Zacharias et al. 2012:24; Aloé 2023). More attention has been devoted to socially necessary leisure time, and it has often been specified in relative terms, set, for instance, at 50% and 70% of the median (Harvey & Mukhopadhyay 2007).

As noted above, we focus on patterns of unpaid household work, setting the issue of leisure thresholds aside. We compare median, mean, and modal values, the 60% of the median value (as the most commonly applied relative income poverty measure) and the most commonly assumed minimum threshold of 7 hours per adult person (Zacharias et al. 2012) or 14 hours per household (Vickery 1977). The purpose here is to estimate which statistical analyses, correspond more closely to what is commonly thought of as a threshold.

Household work

For single adult households without children, both women (Figure 3) and men (Figure 4), the mode of time devoted to household work is about 6 hours per week. Additionally, 60% of the median for single men (5.4 hours) and women (6.6 hours) without children is close to 6 hours. These indicators are arguably the most appropriate measures for minimum thresholds. Both are below the weekly 7 hours assumed by Zacharias et al. (2012) and Vickery's (1977) 14 hours. Either the mode or 60% of the median appears to be a more empirically grounded measure of a minimum threshold.
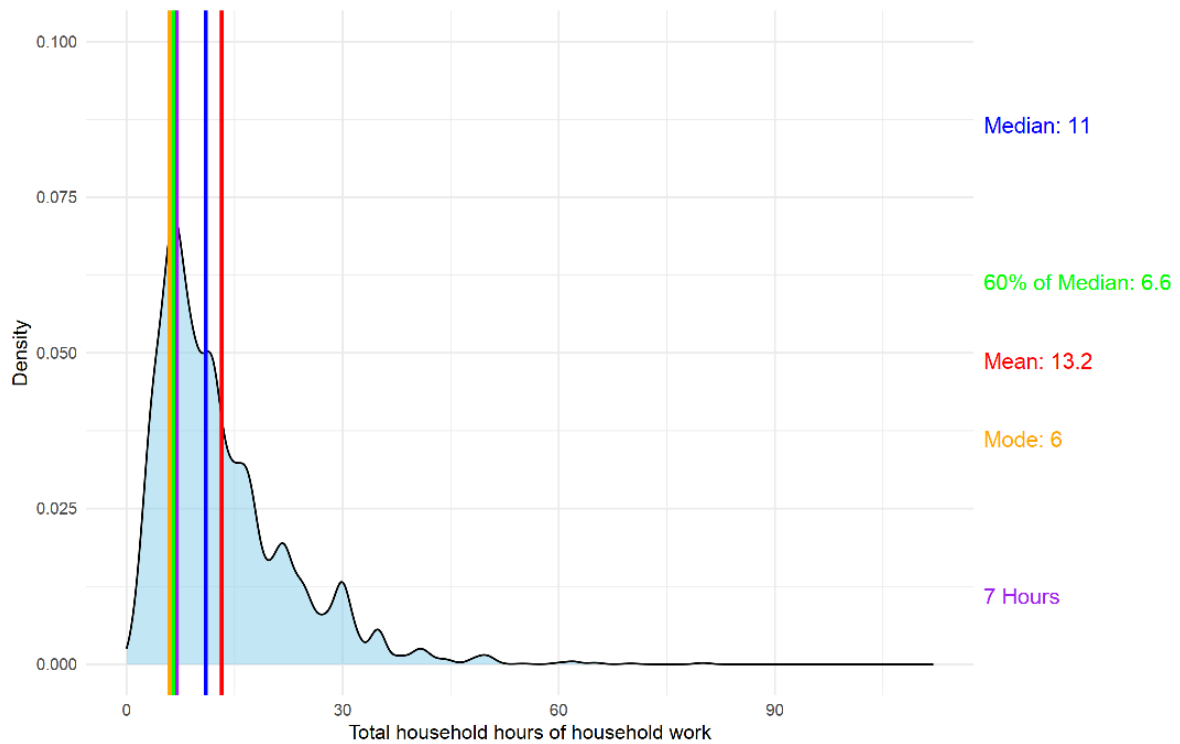
Figure 3: Total hours of household work for single women without children
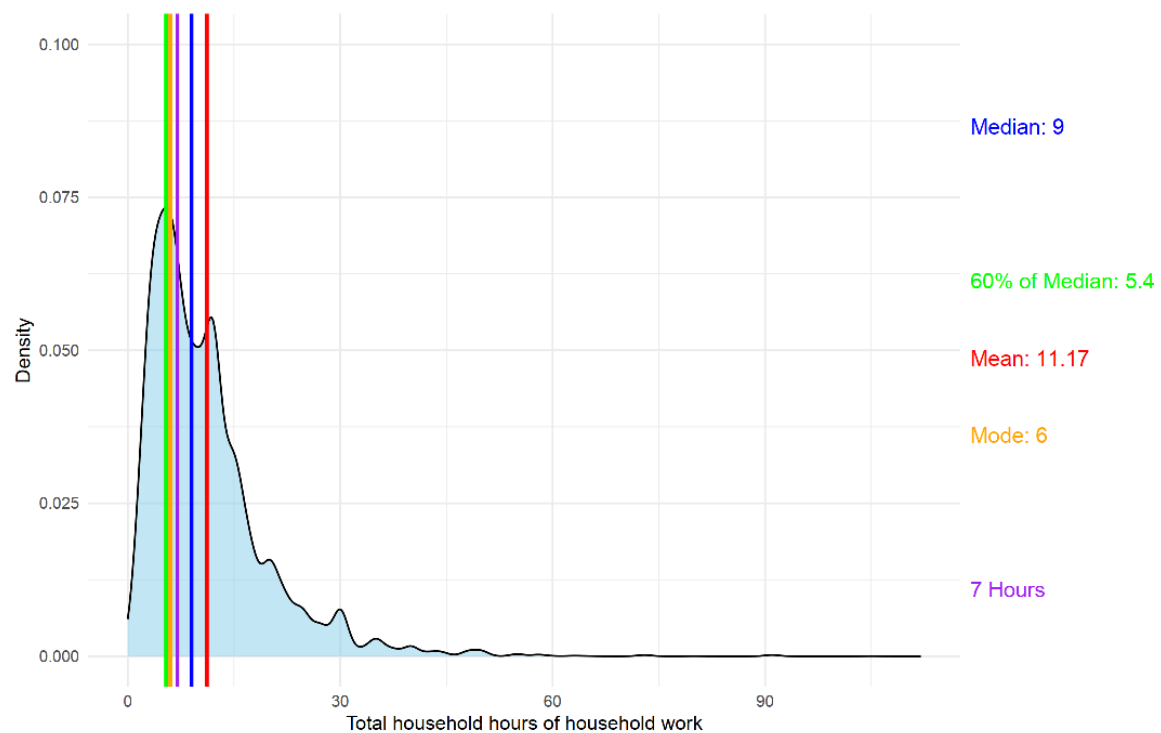

Figure 4: Total hours of household work for single men without children

For single adults with at least one child under 6, the mode is less distinct. However,

the data is more informative for single women (Figure 5) than for men (Figure 6). The dataset

includes only 53 observations for single men with at least one child under 6, compared to 308 observations for women, making the estimates for men less reliable for determining a minimum threshold. Focusing on single women, 60% of the median intersects with the first local mode at approximately 8 hours. This suggests that single adults with at least one child under 6 require a minimum of two additional hours of household work compared to singles without children. The distribution of housework for single female and male households with at least one child under 6 does not have a high range, with medians at 13 hours for women and 9 hours for men, indicating that at least 50% of this population does not need more than 13 hours for unpaid work.
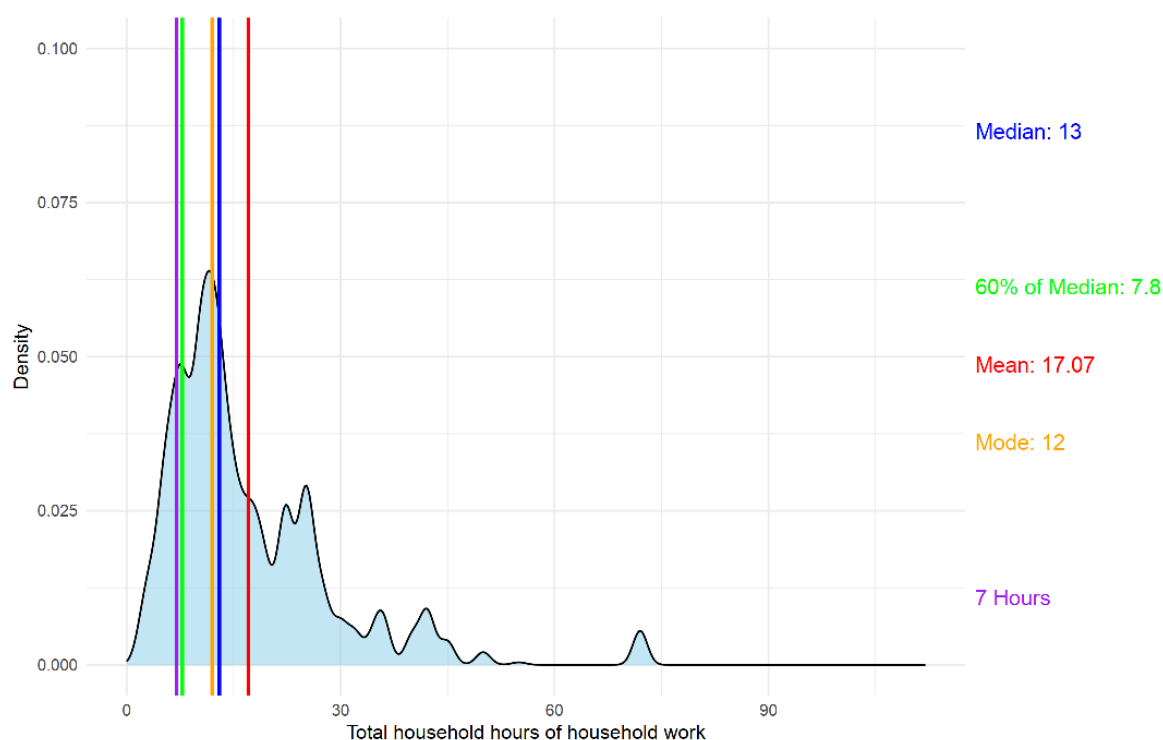

Figure 5: Total hours of household work for single women with at least one child under 6
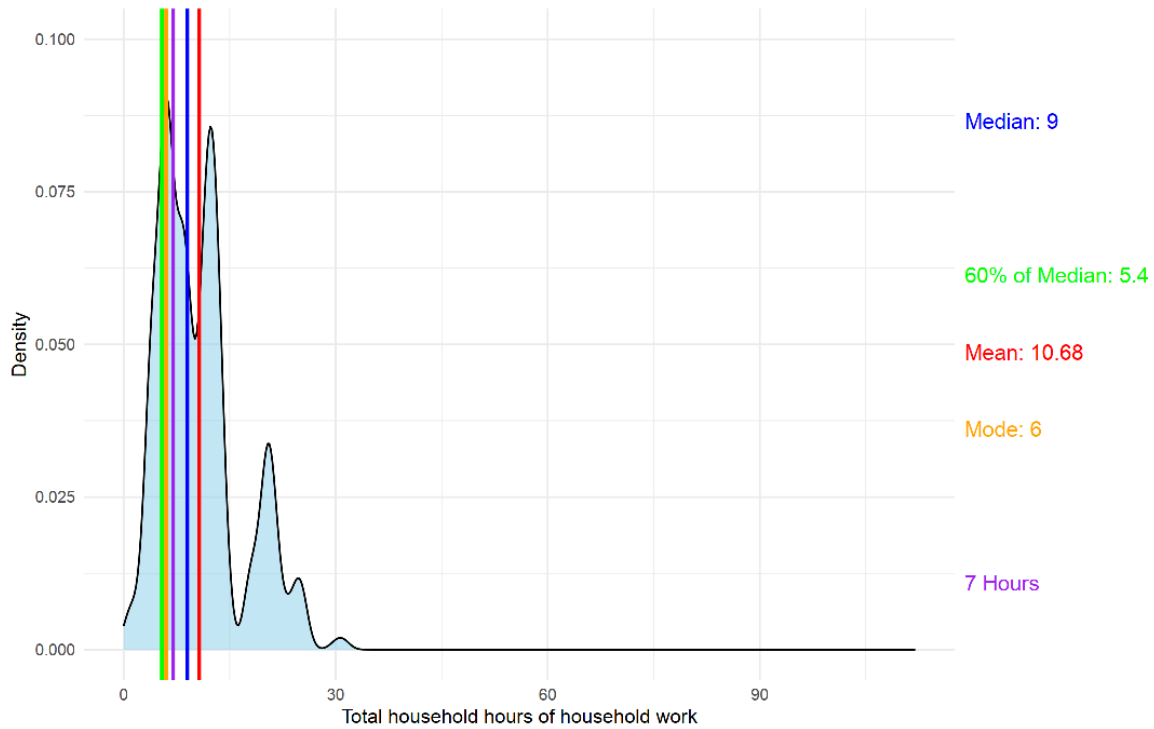
Figure 4: Total hours of household work for single men with at least one child under 6

Note that the estimates for the four cases are considerably lower than the 14 hours a week that Vickery (1977) suggested, probably because she did not differentiate between single and couple adult households. In all cases, the mean and median are above the mode and 60% of the median threshold.

For couple households, we consider the total hours spent on household work, focusing on the distribution of hours by household composition. For couples without children (Figure 7), 60% of the median is 15 hours, while for couples with at least one child under 6 (Figure 8), it is 16.8 hours. Similar to single female adults, the 60% of the median is approximately 2 hours more for households with a child under 6 compared to those without children. In both cases, the mode and the 60% of the median exceed Vickery's (1977) estimate of 14 hours. The distribution and modal value are higher for households with children.
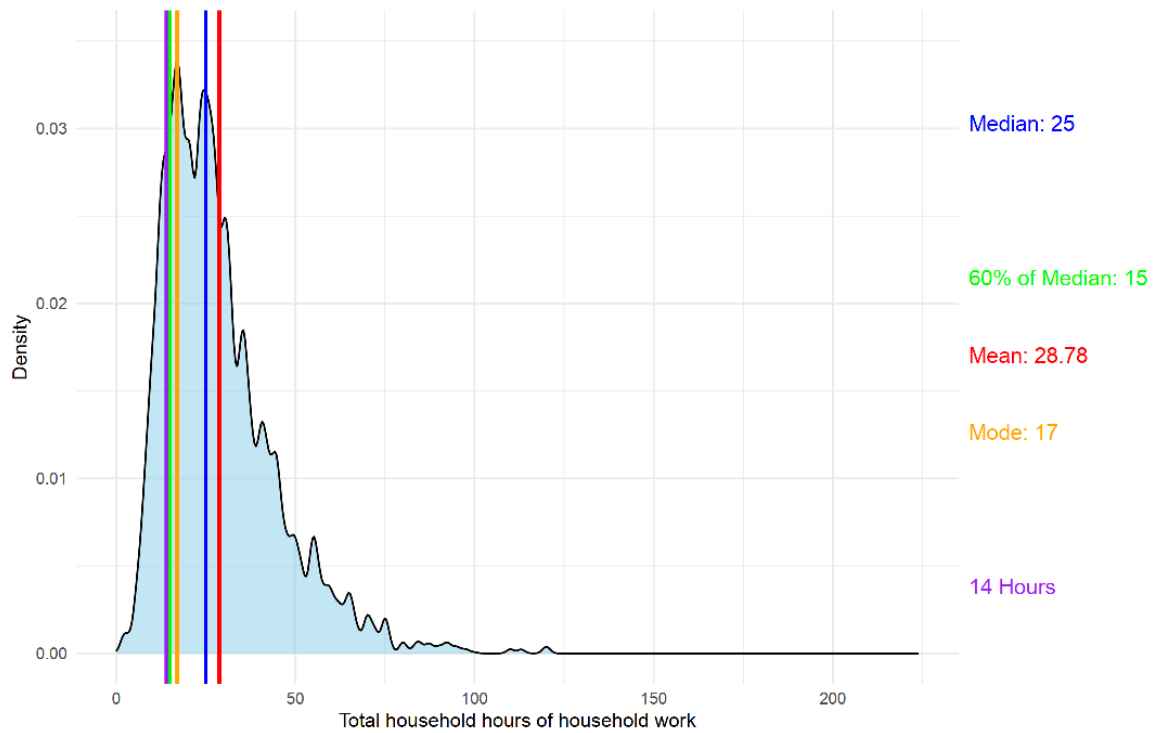
Figure 5: Total hours of household work for couples without children
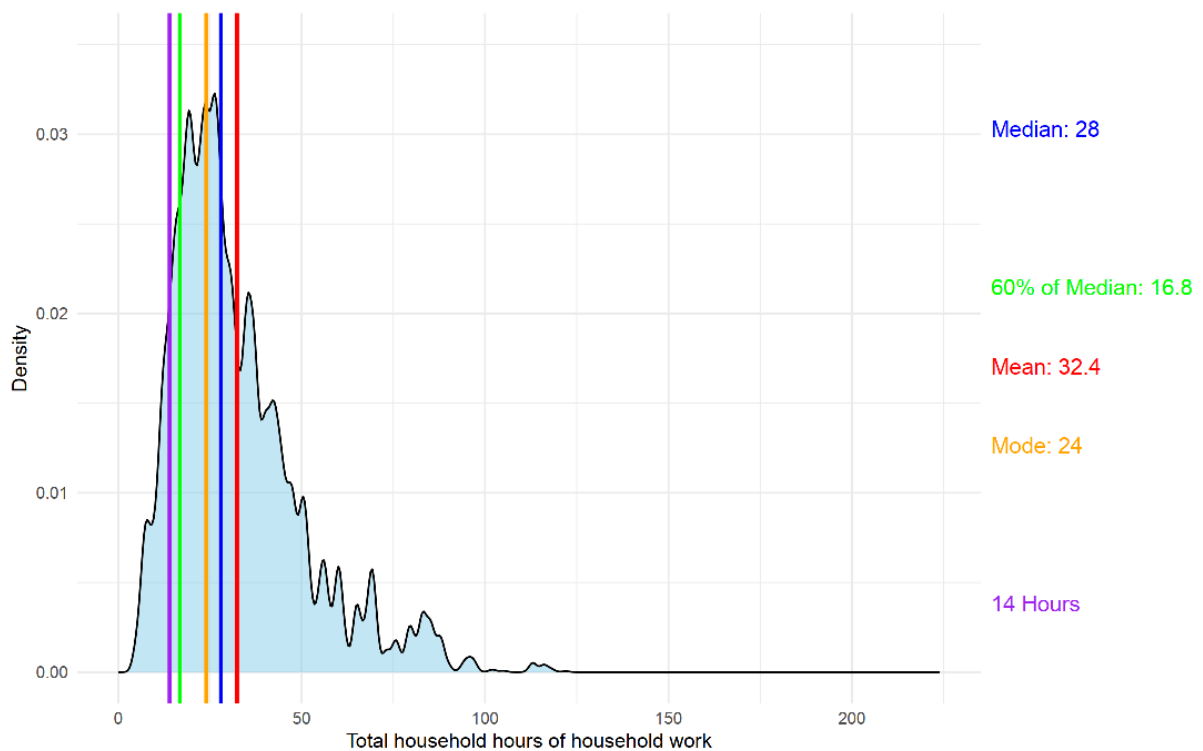

Figure 6: Total hours of household work for couples with at least one child under 6

Based on our exploratory analysis, we suggest using 60% of the median of household

work per week as the minimum threshold. In all six cases, the 60% of the median value is at

the lower end of the distribution, yet it remains within a plausible range. This measure aligns with the commonly used relative income poverty line, which considers the overall income distribution and reflects the living standards within a society.

Childcare

Unlike household work, childcare time lacks a clear pattern, making relative statistical measures potentially misleading. Time devoted to childcare is highly variable, even controlling for household structure, probably as a result of uneven patterns of assistance from family, friends, and neighbors, as well as purchased or subsidized childcare.

Figures 9 (single female households), 10 (single male households), and 11 (couple households), all with at least one child under 6, illustrate this complexity by showing the statistical thresholds and distribution of household time for different household types. Determination of an appropriate thresholds for childcare probably requires a child-centric data set, such as the Child Development Supplement of the PSID, which records time that children spend with non-parents.

The high values for childcare are impacted by the PSID's broad framing of childcare, which apparently includes supervisory time. Nonetheless, it is noteworthy that all relative statistical estimates for childcare alone are significantly higher than Vickery's (1977) suggestion of 14 hours per week of necessary unpaid work per household. Vickery's (1977) approach seems to
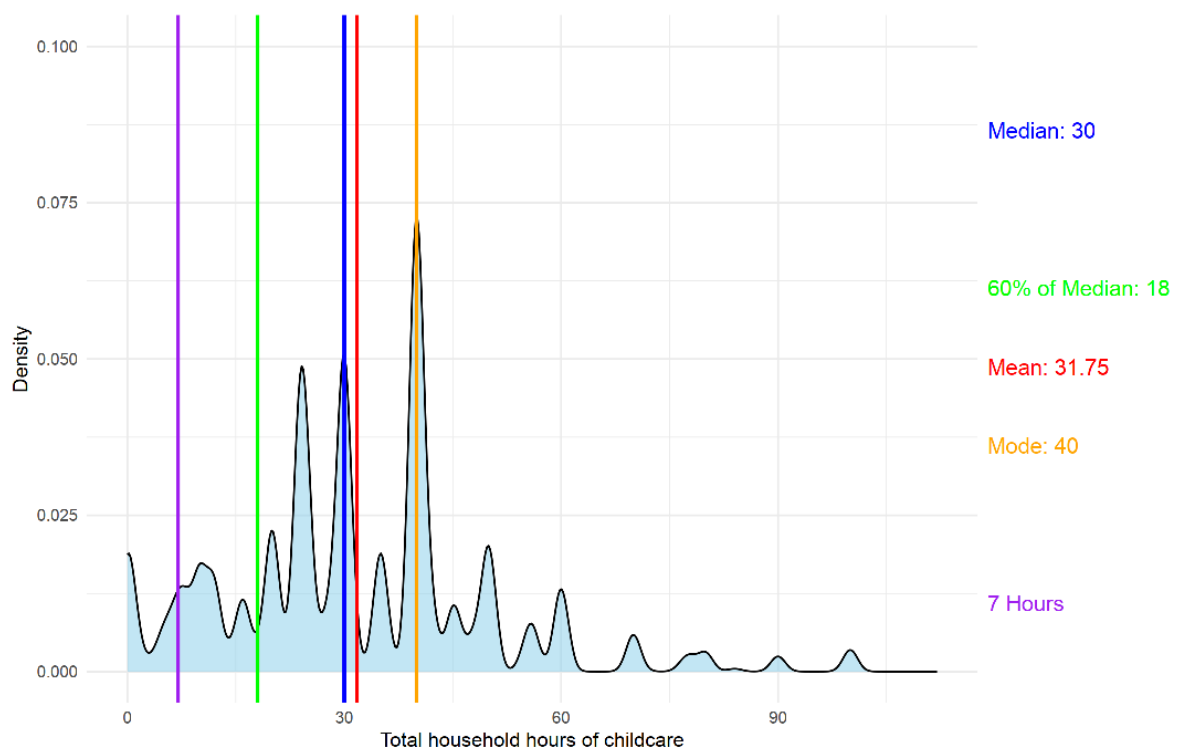
not be attentive to childcare.

Figure 7: Childcare for single women households with at least one child under 6
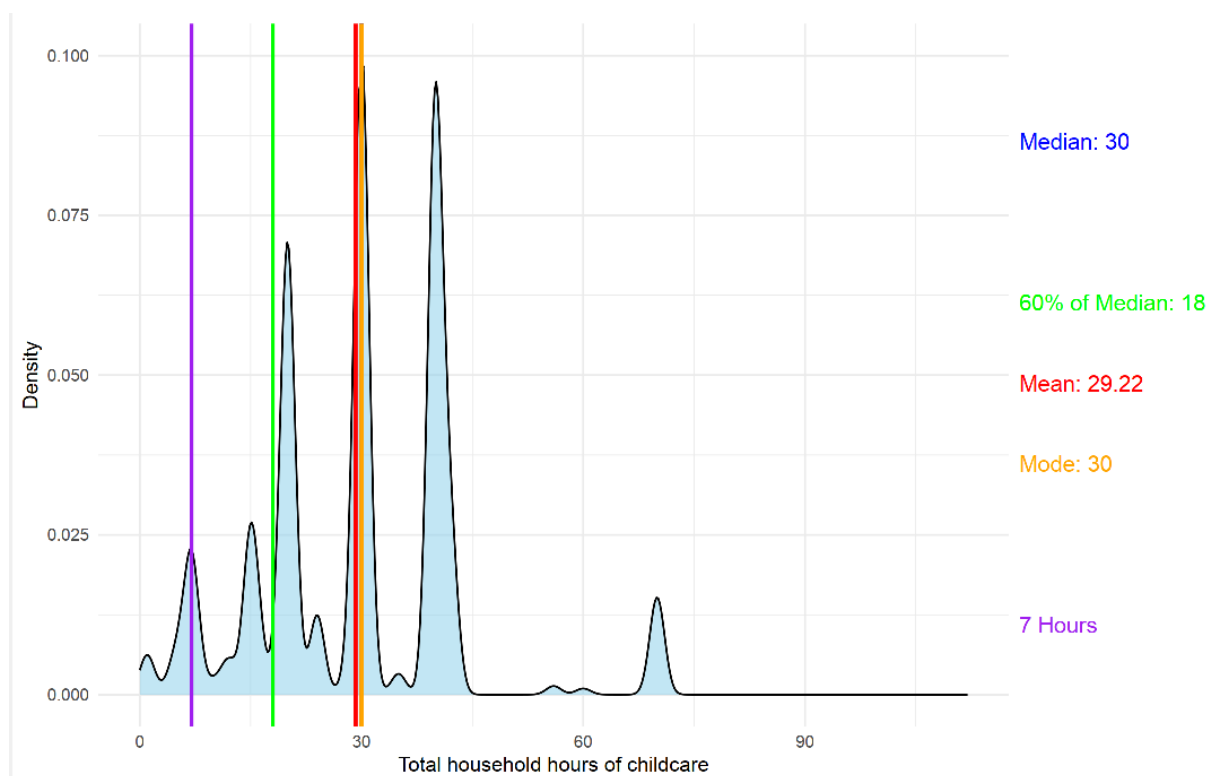

Figure 8: Childcare for single male households with at least one child under 6
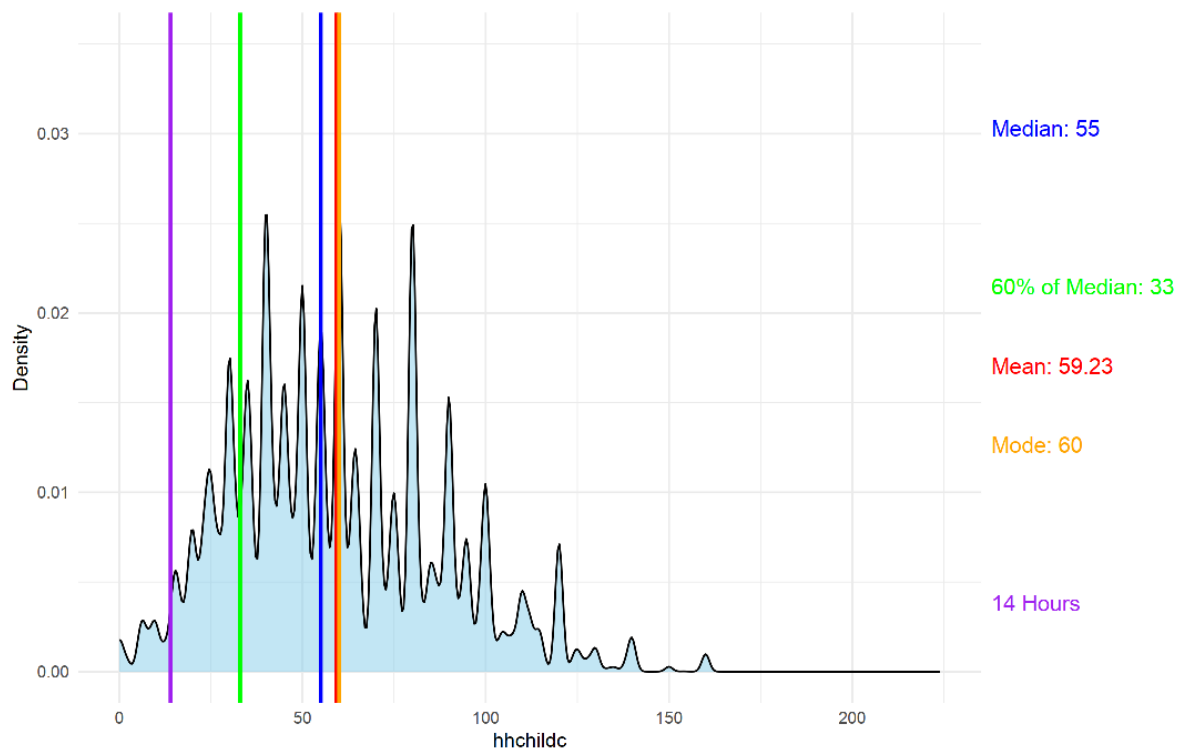
Figure 9: Total household hours of childcare for couples with at least one child under 6

Tradeoffs

Dear Discussant,

We have changed our empirical strategy to analyze the substitutability between money and time. Unfortunately, this section has not been finished by the deadline. We are still in the process of properly writing up this section.

I kindly ask you to get in touch with me to send you our latest draft as you prepare the presentation. I would greatly appreciate your understanding and the opportunity to send you our revised results.

You can reach me at: franziska.dorn@uni-due.de

Looking forward to meeting you and your feedback,

Franziska Dorn

Conclusion

References

Abraham, Katherine G., and Christopher Mackie (2005). *Beyond the Market: Designing Non Market Accounts for the United States*. Washington, D.C. National Academies Press;

Aloè, E. (2023). "Time and income poverty measurement," *Social Indicators Research*, *169* (1-2), 283-322.

Albelda, Randy (2011). "Time binds: US antipoverty policies, poverty, and the well-being of single mothers." *Feminist Economics* 1 (4),189-214.

Been, Jim, Susann Rohwedder, and Michael Hurd (2020). "Does home production replace consumption spending? Evidence from shocks in housing wealth in the Great Recession." *Review of Economics and Statistics* 102:1,113-128.

Bardasi, E., & Wodon, Q. (2010). "Working long hours and having no choice: Time poverty in Guinea," *Feminist Economics 16*(3), 45-78.

Cha, Youngjoo, and Kim A. Weeden. 2014. "Overwork and the slow convergence in the gender gap in wages." *American Sociological Review* 79:3, 457-484.

Douthitt, Robin A., 2000. "Time to do the chores? Factoring home-production needs into measures of poverty," *Journal of Family and Economic Issues* 21 (2000), 7-22.

Eilers, P. H. and Marx, B. D. (1996). "Flexible smoothing with b-splines and penalties," *Statistical Science* 11:2, 89–102.

Fisher, G. M. (2020). "Basic needs budgets in policy and practice," pp. 291-306 in C. Deeming, ed. *Minimum Income Standards and Reference Budgets: International and Comparative Policy Perspectives.* New York: Policy Press.

Folbre, Nancy, Janet Gornick, Helen Connolly and Teresa Munzie (2013). "Women's employment, unpaid work, and economic inequality, in Janet Gornick and Markus Janti, eds., Income Disparities and the Middle Class in Affluent Countries. Stanford, CA: Stanford University Press.

Gautham, Leila, and Nancy Folbre. 2024. Forthcoming. "Parental expenditures of time and money on children in the U.S. *Review of Income and Wealth*.

Goldin, Claudia. 2014. "A grand gender convergence: Its last chapter." *American Economic Review* 104, 1091-1119.

Harvey, A. S., & Mukhopadhyay, A. K. (2007). "When twenty-four hours is not enough: Time poverty of working parents," *Social Indicators Research*, *82*, 57-77.

Ilkkaracan, I., Kim, K., Masterson, T., Memiş, E., & Zacharias, A. (2021). "The impact of investing in social care on employment generation, time-, income-poverty by gender: A macro-micro policy simulation for Turkey," *World Development 144*, 105476.

Insolera, Noura E., David S. Johnson, and Beth A. Simmert. 2019. "Evaluation of the time use data in the PSID with comparisons to ATUS." Institute for Social Research, University of Michigan: Technical Series Paper #19-02.
Krueger, P. M., & Friedman, E. M. (2009). "Sleep duration in the United States: a cross-sectional population-based study." *American Journal of Epidemiology*, *169*(9), 1052-1063.

Vickery, C. (1977). "The time-poor: A new look at poverty." *Journal of Human Resources* 27-48.

Williams, J. R., Masuda, Y. J., & Tallis, H. (2016). "A measure whose time has come: Formalizing time poverty," *Social Indicators Research 128*, 265-283.

Wood, S. N. (2017). *Generalized additive models: an introduction with R*. CRC press.

Zacharias, Ajit, Rania Antonopoulos and Thomas Masterson, Thomas (2012). "Why time deficits matter: Implications for the measurement of poverty," United Nations Development Programme and Levy Economics Institute of Bard College.

Zacharias, A., Masterson, T., Rios-Avilla, F., Nikiforos, M., Kim, K., & Khitarishvili, T. (2019). "Macroeconomic and Microeconomic Impacts of Improving Physical and Social Infrastructure: A Macro-Micro Policy Model for Ghana and Tanzania, Research Project Report, September. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.