

Dorn, Franziska

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Time and income poverty: Definitions, thresholds and tradeoffs

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Franziska Dorn

Time and Income Poverty: Definitions, Thresholds and Tradeoffs

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Time and Income Poverty: Definitions, Thresholds and Tradeoffs

Franziska Dorn¹

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Abstract

A comprehensive understanding of economic deprivation requires examining income, the value of unpaid household services, and leisure. These concepts can be understood either through subjective utility or objective indicators such as measurable expenditures and time use, and much depends on how they are theorized. Divergent economic theories lead to different methods for estimating the market value of non-market work, which significantly impacts the definitions of household income and time poverty. Most empirical studies of time and income poverty identify deprivation by measuring shortfalls in unpaid household work once minimum thresholds for leisure and paid work are set. These approaches, however, primarily reflect household budget constraints rather than the combined bundle of time and income needed to sustain a standard of living above poverty. To advance poverty measurement, it is essential to examine time and income jointly and recognize their interdependence, as money can buy time, and time can save money. This paper examines the conceptual challenges involved in integrating time and income into a unified framework, including the evaluation of thresholds, the substitutability between time and income, and the valuation of unpaid work. Addressing these issues clarifies how integrated measures of time and income poverty can more accurately capture the resources required for the development of human capabilities.

Keywords: poverty, time use, gender inequality, living standard, unpaid work, measurement

¹ Institute for Socioeconomics, University of Duisburg-Essen, Germany, email: franziska.dorn@uni-due.de

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1. Introduction

Measures of bidimensional income and time poverty typically reveal compound inequalities based on gender (Vickery 1977; Zacharias 2011; Dorn et al. 2024). Women often face a double burden of paid and unpaid work that improves household living standards and enhances the capabilities of others, but reduces their own leisure time. Quantification of this burden, however, is highly sensitive to definitions of work, leisure, and income, all somewhat contested concepts in social theory. Neoclassical economic theory generally defines work as an activity that delivers income or enables consumption, but non carries intrinsic benefits. Leisure, in contrast, is conceptualized as a source of direct utility or intrinsic satisfaction. The alternative approach avoids assumptions regarding subjective experience, defining work as any activity that someone else could, in principle, be paid to perform (Reid 1934). Leisure is often defined implicitly as activities other than work, but sometimes distinguished from necessary self-care, time for personal maintenance such as sleeping and eating.

Traditional measures of living standards based on market income are misleading because they ignore the value of non-market work, performed predominantly by women (Koo 2021; Sarker 2021). Household income and poverty lines have conventionally been defined in market terms—earnings, non-labor income, and transfers—overlooking unpaid work. Recent research highlights the implicit income and consumption generated by household services and in-kind public services, underscoring the need to integrate time use into poverty analysis. Doing so reveals the economic value of unpaid work, the gendered effects of work–family policies, and broader implications for women’s labor market outcomes and social status (Brady et al. 2020). Valuation methods vary: neoclassical approaches rely on opportunity-cost measures, treating

unpaid work much the same as leisure, while replacement-cost approaches estimate what hiring a market substitute would cost. Both typically apply linear methods, multiplying hourly wage rates by hours of non-market work.

Most policy-driven measures of time and income poverty rely on thresholds that allow little or no substitutability between money and time. Often, only part of unpaid household work is monetized, and thresholds are set with weak theoretical or empirical grounding. For example, influential approaches such as Vickery (1977) assume a fixed minimum of unpaid work at the monetary poverty line, yet assign no value to unpaid work beyond that point. This asymmetry is problematic: falling short of the threshold increases poverty, but exceeding it does not reduce it. The extent to which time can substitute for money depends on how income poverty is defined, and it is important to recognize that, within a certain range, money can buy time, and time can save money. Linear substitutability may capture the budget constraints under which paid work reduces the time available for unpaid work. However, once poverty is understood beyond simple adjustments to the monetary poverty line, the necessary combination of time and income may no longer be linear.

Building on this perspective, the paper does not propose a new empirical index but clarifies underlying assumptions, synthesizes existing approaches, and identifies directions for future research and policy. It addresses how time and income jointly shape deprivation, arguing that poverty cannot be fully understood through monetary measures alone. Both paid and unpaid time contribute to individual and collective well-being, as well as the expansion of human capabilities (Folbre 2006). The paper builds on Sen's (1976, 1987) critique of utility-based approaches to welfare and poverty, emphasizing that deprivation should be assessed through the

distribution of essential resources—such as time and income—rather than through individual utility or aggregate norms. By situating time and income poverty within the human development and capabilities framework, it highlights how both resources are essential for sustaining well-being, addressing gender inequalities, and informing more comprehensive measures of poverty.

2. Public Policy and Economic Theory

Public debates over welfare reform in the U.S. expose the limits of poverty measures that focus narrowly on market income while ignoring time constraints and unpaid work. Neoclassical, classical, and feminist economic traditions provide contrasting ways of valuing household labor, with important implications for how poverty is defined. Together, they highlight why measures of time and income poverty must be integrated and why replacement-cost valuation offers a more meaningful basis for assessing living standards.

Debates over U.S. public assistance highlight the need to redefine poverty beyond the market income. The 1996 welfare reforms, which tightened paid work requirements, show how a narrow focus on earnings obscured losses in time and well-being, especially for women. Many single mothers entered paid work during a period of low unemployment, but gains in income were often offset by reduced benefits, higher taxes, and work-related costs such as childcare and transportation. As a result, disposable income for many single-parent families in the lowest quintile declined, with some falling into extreme poverty (Zedlewski 2002).

To address shortcomings in official measures, the U.S. Census Bureau introduced the Supplemental Poverty Measure (SPM) in 2011. The SPM broadened the income concept to include in-kind transfers and tax credits, replacing food-basket estimates with average expenditure data. While it accounts for employment-related costs such as childcare (if both

parents are employed), it does not value unpaid work or total hours of work and leisure. Evidence from single-mother families after welfare reform shows that increased market work reduced non-market time, leaving many worse off despite higher earnings (Meyer and Sullivan 2008). Their classification of childcare as “non-work” reflects a neoclassical emphasis on utility maximization, which overlooks unpaid labor’s role in household living standards. This underscores the limits of opportunity-cost valuation and the need for replacement-cost to capture time as well as income in poverty thresholds.

The neoclassical model of household production, developed by Becker (1993) and Gronau (1973, 1980), assumes that individuals allocate time across market work, household production, and leisure in order to maximize utility subject to income and time constraints. Household production is valued at the opportunity cost of foregone wages, which—because of gender wage disparities—implies higher values for men’s non-market time. In this framework, “full income” is the sum of utilities from all activities valued at market wages, a subjective measure that cannot be compared directly with income or used to establish poverty thresholds. Moreover, utility maximization frameworks treat all non-market time as interchangeable and equally valued in terms of opportunity cost, even though activities such as leisure and care work may yield very different levels of utility. This approach reinforces gender bias and obscures temporal deprivation by assigning the same value to qualitatively distinct uses of time.

By contrast, classical and feminist approaches emphasize the material requirements of social reproduction and the costs of producing and maintaining labor power. Reid (1934) defined household work as any activity replaceable by paid labor, grounding valuation in replacement cost rather than forgone earnings. This principle shifts attention from individual preferences to

objective needs: what it would cost to secure equivalent services if unpaid providers were absent. Many scholars (Kendrick 1979; National Research Council 2005) endorse replacement-cost valuation, which better reflects the contribution of unpaid services to household living standards. Time use surveys show that childcare yields no greater satisfaction than paid work, and enjoyment declines with intensity: U.S. mothers spend more time on childcare than fathers yet report enjoying it less (Connelly and Kimmel 2015; Fisher 2010).

This focus on objective living conditions highlights that preferences are shaped by social norms and structural constraints, not only individual choice. Needs such as food, rest, and care are non-negotiable, while time demands differ by gender, household resources, and citizenship. Some argue that market work beyond poverty-level income should be considered discretionary (Goodin et al. 2005). Multidimensional poverty research has expanded attention to diverse needs (Alkire et al. 2015), but rarely accounts for unpaid work or minimum leisure.

In sum, whereas neoclassical theory emphasizes utility maximization and opportunity cost, classical and feminist approaches foreground material requirements for sustaining human capabilities. This perspective suggests that unpaid work should be valued by replacement cost, and that poverty analysis must account for both income and time as essential inputs to living standards.

3. Time and Income Poverty

Most approaches to time and income poverty focus on explicitly measurable thresholds, rather than subjective utility (for an exception, see Merz and Rathjen, 2014). These thresholds can be defined in absolute terms (as with the standard U.S. poverty line) or in relative terms, as a percentage of a median level of expenditures or income (as with the U.S. Supplemental Poverty

Measure and many European countries). In either case, definitional issues set the basic parameters, along with assumptions regarding limited substitutability between consumption expenditures and unpaid household services. We focus here on research that explicitly recognizes the contribution of unpaid work to material living standards, rejecting exclusive reliance on market income (Vickery 1977; Douthitt 2000; Bardasi and Wodon 2010; Zacharias 2011; Zacharias et al. 2012; Aloè 2023; Dorn et al. 2024). This research highlights the distinction between unpaid work and leisure and confronts the difficulty of assigning a market value to unpaid work, while treating leisure as an activity that should be measured in hours, rather than converted to a dollar value.

3.1. Basic Definitional and Measurement Issues

Bidimensional poverty can be defined either by the union of the two areas falling below the thresholds of monetary income and time in time use categories measured in time units, or by their intersection (Alkire and Foster 2011). The two thresholds suggest that a basic minimum level is necessary for each. Minimum amounts of time may be needed for self-care, leisure, paid work, and unpaid work.

Definitions of leisure vary. Most broadly, leisure is defined as all activities outside market and non-market work, such as sleep, personal care, and time devoted to education. Most narrowly, it is restricted to activities that survey respondents designate as enjoyable or discretionary (subjective definitions consistent with neoclassical reasoning). Time use researchers typically rely on a list of specific activities informed by social norms, but categorical distinctions are often fuzzy. For instance, participation in sports can be a form of self-care and/or recreation comparable to playing a video game. There is more consensus around basic thresholds for self-

care (such as an average of 8 hours of sleep for adults) than for psychological needs for “time-off” (Williams et al. 2016).

Historically, time use surveys have treated family time devoted to childcare separately from housework, and some economists argue that it is more akin to leisure than to work (Kimmel and Connelly 2007). Furthermore, the need to supervise or be “on call” for young children (as well as for people experiencing illness or disability) is a significant constraint on time allocation that is hardly captured in time diary data. Even when respondents are asked to report “passive care” their responses fall short of plausible levels of constraint (UN Women 2021).

Acknowledgement of the value of this supervisory time, which often overlaps with many other activities, has large implications for the valuation of unpaid family work (Suh and Folbre 2016).

Defining leisure in terms that include time devoted to unpaid household work is particularly problematic because unpaid household services contribute to household consumption and increase extended income (the sum of market income, including transfers and the imputed value of unpaid household services). This implies that there is some substitutability between expenditures based on market income and goods and services provided by unpaid household services. This complicates the traditional economic emphasis on a market labor/leisure tradeoff: an additional hour of market labor can generate income that increases leisure by enabling the purchase of substitutes for unpaid family services such as meals at home or family care.

Leisure is experienced by individuals, while the value of unpaid household services is often shared with other household members, increasing their potential consumption. Individuals deciding how to allocate their time may well take its opportunity cost into consideration, but this opportunity cost cannot simply be conflated with their actual or potential market wage, because it

also includes the opportunity cost of reducing unpaid household services, which — if considered a material contribution to the household rather than simply a source of personal utility — is not equivalent to the market wage. This complexity suggests that leisure should be denominated in hours, rather than converted to some money equivalent. In turn, unpaid work can either be defined in replacement cost or time unit in a bidimensional household level approach.

Recognition of the contribution of unpaid household work to living standards alters the appropriate definition of household income, raising questions regarding the imputation of its market value. A simple approach applying replacement cost logic applies time use survey data, multiplying hours of unpaid household work by a quality-adjusted replacement wage. This is somewhat problematic on the household level, since most time use surveys collect data for only one or two days, and little is known about whether such snapshots are representative of annual time use. Considerable evidence suggests that standard time-diary measures understate the constraints of supervisory childcare (UN Women 2021). Nonetheless, even a crude approximation of the contribution that unpaid household work makes to household living standards is better than the assumption that such work contributes nothing.

Another measurement issue concerns the assumption of linear valuation—that every hour devoted to unpaid household work is of equal value. It seems likely that households prioritize their most important tasks, and that time devoted to unpaid household services is subject to diminishing marginal productivity. The simple counterfactual question on which replacement cost valuation is based, “Could someone else be paid, in principle, to undertake this task?” does not imply that household members would actually pay for it, especially if they lack the resources to do so.

Complex issues of joint production come into play. For instance, a household member may stay home to provide personal care (including being “on call”) for a young child or an adult suffering illness or disability because a market substitute lacks the necessary emotional connections and person-specific skills. A replacement cost valuation undershoots the value of this contribution. Once constrained by the demands of personal care, a caregiver may make many small, intermittent contributions to household living standards (e.g., putting clothes in the washing machine or food on the stove), which are likewise undervalued in a replacement cost approach.

In addition, household income does not translate equally into individual consumption, as children require more care time, economies of scale differ between money and time, and women often lack control over household income (Folbre et al., 2017; Klasen and Lahoti, 2021). Intra-household control over money remains a blind spot in standard economics. All these issues are further illustrated by consideration of important efforts to define bivariate income and time poverty.

3.2. Approaches to Bivariate Income and Time Poverty

Efforts to operationalize the entangled double constraints of income and time fall into two categories: 1) reliance on market income, ignoring the productive contribution of unpaid work, treating time devoted to unpaid household work only as a reduction in time available for leisure or 2) attention to a minimum threshold of unpaid work necessary to escape poverty at the monetary income line, assuming that a necessary personal care/leisure level has been met.² Both

² Note that the “discretionary time” approach of Goodin et al. (2005) falls into an entirely separate category that is beyond the scope of this paper.

approaches typically cite an early paper on time poverty by Vickery (1977), which critiques the failure of U.S. money income poverty thresholds to account for time constraints.

Examples of the first approach include an analysis of Ghanaian data that defines leisure as all time remaining after time devoted to market work and unpaid household work (Bardasi and Wodon 2010). The authors define access to market-based consumption (closely related to income) on the household level, and total hours of work on the individual level. By this account, an individual is time-poor if they work more than 1.5 times more than the weekly median time for paid and unpaid work (which they estimate at 70.5 hours per week) and they are consumption-poor if they live in a household with consumption expenditures below the country's consumption-based poverty line. This approach essentially ignores the extent to which unpaid household services invisibly augment household consumption above and beyond monetary expenditures. Another example is an analysis of Mexican data by Dorn et al. (2024), which examines the codependence of money income and leisure time using copula regression.

Vickery (1977), representing the second category, emphasizes the minimum amount of time necessary for the unpaid household services needed to convert purchased commodities (e.g., food) into consumable items (e.g., a meal), after basic needs for leisure and personal care are met. In other words, she adheres to the monetary income-based poverty line but treats an unpaid labor time threshold as a constraint that must be satisfied to lift households above this poverty line.³ Several scholars build on this approach, including Aloè (2023) and Zacharias et al. (2012).

³ She observes that U.S. poverty thresholds were derived from calculations based on the amount of money income necessary to provide a minimum food standard set by the U.S. Department of Agriculture (the “Thrifty Food Plan”), which assumes purchases of items such as dried beans, rice, and other food items that require up to two hours a day of preparation, far more time than most American women (much less men) spend on average (Carlson 2021).

3.2.1. Theoretical Discussion of Income and Time Poverty Approaches

Figure 1 conveys Vickery's argument that every household requires a minimal quantity of time devoted to unpaid household services (T_1) to escape deprivation at the market income poverty line (M_0). Likewise, every household requires a minimum level of market income (M_0), no matter how much time they devote to unpaid household services. Households with unpaid work time below T_0 are time-poor, those with money income below M_0 are money poor, and all those below the line DBAC are experiencing one, the other, or a combination of both. She argues that many single-mother households with money income above the poverty line but available time to the left of T_1 should be counted as poor but are not. T_m denotes total household hours for paid and unpaid work.

To the left of point T_0 , the true income poverty threshold should be the horizontal portion of the line M_1 , which basically implies that less money will be more detrimental if one is already time-poor. The extra money income associated with M_1 can compensate for the shortfall in unpaid work time (so that individuals above M_1 but below T_0 are 'only' evaluated as time-poor). As time devoted to unpaid services increases from T_0 to T_1 , the amount of money income required to compensate for the shortfall declines; in this range unpaid household services provide substitutes for purchased services at initially steep rate that declines, due to the diminishing marginal productivity of unpaid work (the line between B and A is convex to the origin). This graphical analysis represents no substitutability of income for own-produced services up to T_0 (because a certain threshold of unpaid time must be reached), declining substitutability up to T_1 , and no substitutability past point T_1 (because a certain threshold of money income, M_0 , must be maintained).

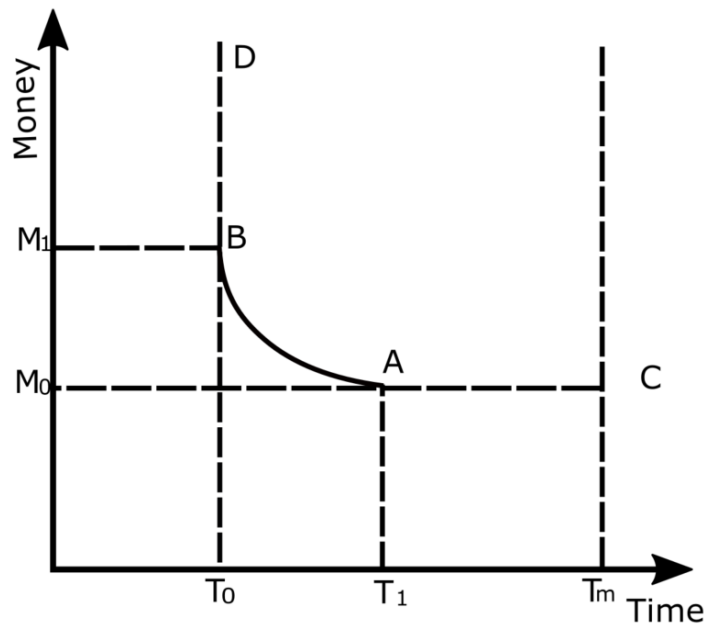


Figure 1: Poverty thresholds theoretically hypothesized by Vickery (1977).

Vickery (1977) emphasizes that single parent households have less total adult available time than two-adult households and are therefore particularly likely to fall below T_1 , experiencing deprivation even if their market income exceeds the conventional poverty line. She defines a “critical wage” as one that allows adults to earn sufficient money to reach at least the official poverty line while having sufficient time to devote to meeting their personal needs and the household’s unpaid work requirement (Vickery 1977). Her formulation anticipates research on minimum family budgets and “living wages,” which have gradually come to include childcare costs as a necessary expense for families with young children (Fisher 2020). These approaches have essentially dropped the issue of adequate unpaid work time in favor of a higher monetary income or wage standard.

This theoretical approach emphasizes the contribution that unpaid household services make to living standards, and calls attention to differences among households in the availability

of time for such services. However, it suffers from several conceptual limitations. For one, it does not explore gender differences in time devoted to unpaid household services, assuming that men are just as available as women are for this task, which is not necessarily the case. Men are both consumers and producers of unpaid household services, and it is their net (not their total) contribution that is relevant to household time budgets (Douthitt 2000). Furthermore, Vickery (1977) also assumes leisure as a given, overlooking issues of gender inequality in this dimension of time allocation.

Another crucial conceptual issue concerns the threshold, T_1 , beyond which unpaid household services no longer contribute to household living standards. This threshold implies an inconsistent asymmetry: If the household income poverty line should be moved up for households with less than a minimum threshold of unpaid work time, should it not be moved down for households with considerably more than the threshold necessary to escape poverty? If the value of unpaid household services has implications for poverty thresholds, surely it is also relevant to the larger issue of inequality in family living standards. Vickery (1977) begins with a minimum income threshold based on the cost of a basic food basket, implicitly assuming non-substitutability with unpaid labor—especially for non-farm households assumed not to grow their own food. While her method offers a conceptual foundation for defining a non-substitutable income minimum, no empirical validation has yet tested whether this threshold indeed reflects irreducible time and income needs. Nevertheless, the logic points toward the need for a dual threshold framework—one for income (M_0) and one for time (T_0)—that recognizes the limits of substitutability between the two and sets a floor below which neither resource can adequately compensate for the lack of the other.

3.2.1. Discussion of empirical applications of Income and Time Poverty approaches

Vickery's (1977) empirical parameters are weak, as her estimates of necessary unpaid work hours rely on averages from single-earner households with homemakers, and subsequent analyses yield differing results. She derives household-composition-specific averages for personal care, leisure, and unpaid household services and assumes fixed hours for work and personal needs. Douthitt (2000) shows that few married or single mothers meet Vickery's standard; Canadian data support her claim that single mothers face time-related poverty (Harvey and Mukhopadhyay 2007), whereas U.S. evidence rejects it (Kalenkoski et al. 2011).

In contrast to her theoretical discussion, Vickery's (1977) empirical approach proposes a linear version of her model, adjusting poverty lines by the time required for unpaid household work valued at replacement costs. This framework was later adapted into the Levy Institute Measure of Time and Income Poverty (LIMTIP), applied to low-income countries (Zacharias, 2011; Antonopoulos et al. 2017) and to Italy (Aloè 2023). Unlike Vickery's (1977) U.S. estimates, LIMTIP incorporates individual time use data, monetizing household time deficits with replacement wages such as the average pay of domestic workers. By including individual time deficits—defined as falling short of minimum thresholds for personal care and leisure—the approach captures gender inequalities within households. These thresholds are framed as social norms but typically operationalized with averages from time use surveys. The linear adjustment of income poverty lines to account for deficits in unpaid work can thus be understood as a budget constraint (see Figure 2).

None of the existing empirical applications of time and income poverty that incorporate replacement cost measures account for the non-linear trade-offs between unpaid

work and monetary income. The empirical literature summarized by Rodgers (2023), who outlines five key principles for constructing time or time-and-income poverty measures, also does not explicitly address the issue of non-linear substitutability. Additionally, work on identifying the necessary bundles of time and income to sustain a living is lacking. Accordingly, we depict the trade-off in Figure 2 as linear, since the replacement cost approach applied does not consider the potential diminishing marginal productivity of unpaid work in this range. The black-grey line in the figure represents this linear poverty threshold. In Figure 2, money represents extended income—the sum of household market income and the replacement cost of household services. Time refers to individual time for unpaid work.

In Figure 2 the interaction between M_0 and T_0 defines the boundary of joint non-substitutability. T_0 defines the threshold of non-substitutable unpaid household services, arbitrarily set in current approaches to 7 hours on the individual level or 14 hours for households (Aloè 2023; Vickery 1977; Zacharias et al. 2012). Analogously, M_0 marks the minimum monetary income threshold necessary for subsistence, commonly operationalized as either an absolute poverty line (e.g., minimum food basket) or a relative threshold (e.g., 60% of national median income) (Vickery 1977; Zacharias 2012; Antonopolus 2017; Aloè 2023). Despite their intuitive appeal, both thresholds currently lack a robust empirical or theoretical foundation. Future research is needed to identify and validate these critical boundaries in the context of multidimensional poverty.

The area between T_0 and T_1 , describing the household time deficit for unpaid services, which is covered by a replacement cost estimate – often operationalized as the cost of a domestic

servant – but only up to point T_1 . As in Vickery's (1977) analysis, any level of unpaid household services over this level is essentially not substitutable by market services: Some households are unable to compensate for a loss of unpaid household work below the basic requirement, but no households are able to benefit from unpaid household work above the basic requirement indicated by the grey line. The grey line represents the area up to which extra time for unpaid work can substitute monetary income and thus benefit living standards. Similarly, T_2 represents the upper limit of time within which such substitution is feasible. Together, these thresholds underline the need for empirically grounded, bidimensional poverty measures that reflect the constrained substitutability between time and income in household welfare.

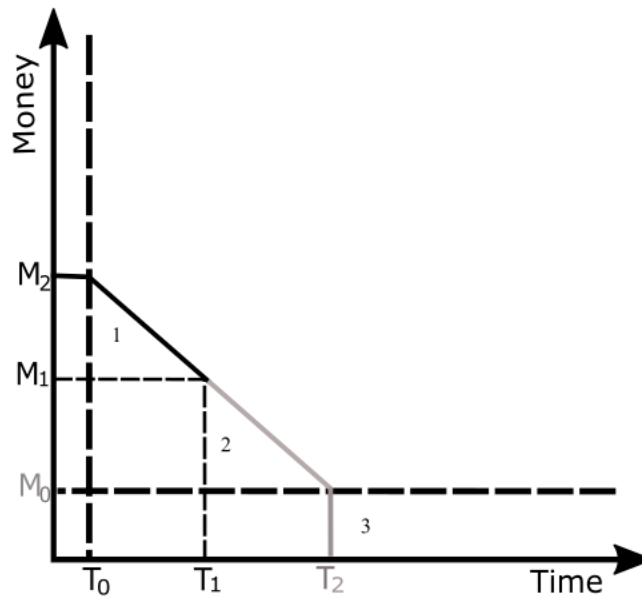


Figure 2: A Methodological Interpretation and Extension of the Empirical Application of Vickery (1977) and the LIMTIP Poverty Threshold Framework.

To illustrate the issue of extended income and the possible benefits of unpaid work for living standards let us represent three examples, illustrated in Figure 2: 1) one family that is above the income poverty level but lacks time for their necessary unpaid work responsibilities, 2) one family that is below the income poverty threshold but has extra time for unpaid work beyond the necessary level and 3) one family with unemployed adults that engage only in unpaid work. Family 1 exceeds the possible maximum of time for paid work and thus has a deficit in time for unpaid work – they are to the left of T_1 . This family has to substitute their lack of time for unpaid work with paid market substitutes. Therefore, their need for monetary income rises above M_1 . Family 2 works fewer paid hours and has thus more time available for unpaid work, and lies to the right of T_1 . This family should be able to substitute unpaid services for market purchases, but it is still considered poor because its money income is below M_1 . Yet it is above the level of M_0 – the threshold of money income that is not substitutable. This is the asymmetry we reject—in principle, depending on the definition of the monetary poverty line a lower income poverty line should apply in these circumstances.

At the other extreme, ignoring threshold effects and counting the entire imputed value of unpaid work as extended income can be misleading. If family money income is below M_1 but above M_0 , family members may experience declining marginal productivity (consistent with the convex tradeoff between B and A pictured by Vickery in Figure 1). Indeed, they may continue to engage in unpaid work as long as its marginal productivity is above zero, far past the point at which they would pay for any replacement. If unpaid work tasks are not very productive, valuing them at the replacement cost exaggerates their contribution. For example, the adults in family 3 volunteer full-time for a community garden in return for a share of the food produced. They

continue working as long as they believe it will generate any additional food for them to eat. Valuing this work at replacement cost would greatly exaggerate the contribution to their living standards.

In sum, the basic theoretical approach pioneered by Vickery (1977) has stimulated valuable research on a definition of poverty thresholds that takes the value of unpaid household services into account. It differs substantially from a more general replacement cost approach in which the imputed value of unpaid work is added to market income and defined as extended income (distinct from the neoclassical concept of full income, which includes the value of leisure (Suh and Folbre 2012). In principle, a poverty line could be set in terms of a minimum level of extended income, assuming continuous and linear substitutability between money income and the imputed value of time devoted to unpaid work. However, this definition ignores the emphasis on thresholds and limited tradeoffs central to Vickery's (1977) theoretical approach.

More importantly, the thresholds on which Vickery-style estimates are based lack strong empirical grounding. They often represent a kind of "back of the envelope" standard based on population means rather than systematic inquiry into thresholds of necessity. As Harvey and Mukhopadhyay (2007, 75) put it, "it is important to establish better estimates for the relevant time allocation norms required" and "attention needs to be given to understanding the time-purchase curve." The theoretical issues at stake suggest a specific research and data-collection agenda with important policy implications.

The comparison of current approaches to time and income poverty shows that efforts have been made to design adjusted income poverty lines that account for unpaid work time deficits. Yet no approach fully defines the necessary bundle of time and income required to sustain a

living. It is crucial to identify the matching combinations of income and unpaid work that households need to achieve a basic standard of living. Evidence from Mexico suggests that the relationship between time and income resources may not be linear, as estimates of income–leisure bundles (constrained by hours of paid and unpaid work) indicate (Dorn et al., 2024).

3.3. Summary of Time and Income Poverty Thresholds

Table 1 summarizes the main approaches to time and income poverty discussed earlier and highlights the differences across six relevant dimensions that have to be addressed when creating measures of time and income poverty. These dimensions relate to 1) the definition of the exact unit of observation (individual or household level); 2) the groupings use to describe time use, such as leisure, paid work, and unpaid work; 3) the consumption value of unpaid work, by assigning a monetary value; 4) definitions of the substitutability of money and unpaid work; 5) the substitutability of money and leisure; and 6) whether the threshold is defined as relative or absolute.

Table 1: Comparison of Methodological Assumptions for Time and Income Poverty Estimates

	Vickery (1977)	LIMTIP Zacharias et al. (2012)	Bardasi and Wodon (2010)	Dorn et al. (2024)
Income measure	Household	Household	Household	Individual
Time measure	Household adult hours for paid and unpaid work	Individual unpaid work	Individual hours for paid and unpaid work	Individual leisure
Imputes a value for unpaid household services for household consumption	Threshold- based	Threshold-based	No	No
Substitutability between money and unpaid work	Non-linear	Assumptions regarding minimum	No	No

		requirements and a linear tradeoff between unpaid work and money		
Substitutability between money and leisure	Linear	Linear	Linear	Non-linear, data-driven
Threshold definition	Absolute	Absolute	Absolute and relative	Relative

To empirically analyze time and income poverty, having access to time use data is crucial—especially for measuring paid work, unpaid work, and leisure activities.⁴

4. Research and Policy Implications

Many of the empirical difficulties of defining time and income poverty grow out of a history of segregation between time use surveys and economic surveys designed to collect information on household capital, consumer durables, and expenditures. This segregation partly reflects neoclassical emphasis on the generation of utility rather than material consumption. An opportunity cost-based measure of the value of unpaid household services implies that it can be equated with the market value of completely different work under completely different conditions. If all non-market time, including leisure, is valued at opportunity cost, there is no need to distinguish between household leisure and household work. This does not imply that opportunity cost is irrelevant. Any individual making time allocation decisions should consider counterfactual alternatives. These alternatives, however, will be based on personal preferences as well as productivity.

⁴ See Appendix A for information on data regarding time use and income.

While replacement cost comes closer to capturing the specificity of household tasks, it fails to capture actual contributions to household consumption. Unpaid household services often entail joint production, such as supervising children while preparing meals, and, more importantly, engaging in social interaction and partnership with others. The substitutability of personal services is limited. For instance, even families that rely heavily on purchased childcare services seldom utilize them more than 40 hours per week. Why raise children if you are not going to spend at least some amount of time caring for them? Even families who purchase care services for an elderly, sick, or disabled family member typically devote time to organizing, managing, and supplementing such care. Family/friend/neighbor care often requires temporal flexibility (including being “on call”) rather than some set number of hours per day.

Household production is largely limited to a relatively small set of services, because households lack the capital and skills to produce many goods for their own consumption. Many of the items that households purchase on markets are non-substitutable due to economic specialization. The two biggest opportunities for substitution are production of own meals rather than eating out and care of dependent family members. As a result, involuntary unemployment, such as that induced by the Great Recession, leads to relatively small increases in unpaid household work, especially among men (Aguiar et al. 2013; Berik and Kongar 2013). Family households that are income and employment-constrained may engage in very low-productivity activities (as in raising subsistence crops in agricultural settings) simply because they have no other options. Alternatively, they may engage in leisure because they lack access to sufficient opportunities for productive non-market work.

Vickery's approach is based on a summation of the available time of all household members, but the actual consumption of household services is a non-linear function of the number of adults. Many unpaid household services are characterized by significant economies of scale, especially for meal preparation and childcare. Research shows that the marginal time cost of a second child is lower than that of a first (Folbre et al. 2017). Zacharias et al. (2012) address this issue to some extent by calculating multiple thresholds based on household structure.

The household economies of scale built into conventional equivalence scales are based on estimates of household expenditures, and probably differ significantly from those based on time devoted to unpaid work (Folbre et al. 2017). Further, most economists would agree that unpaid services are characterized by diminishing marginal productivity at some point. The most pressing household tasks generally take priority, and, holding other factors such as household size constant, some tasks become unnecessary as well as tiresome. Social norms of household hygiene and tidiness are susceptible to change.

These are all reasons why more in-depth empirical analyses of unpaid household services could strengthen efforts to operationalize time and income poverty. Four particularly important directions for research include 1) disaggregation of unpaid work into subcategories such as childcare, cooking, shopping, housework, and household management and exploring their respective economics of scale, 2) developing approaches to measure responsibilities for supervision of dependent household members that constrain time allocation, 3) devoting greater attention to patterns of variation – all else equal, relatively low standard deviations in time devoted to specific activities suggests less discretion and more constraint and 4) constructing

estimates of the elasticity of specific uses of time with respect to individual wages and family income, indicators of both discretion and substitutability.

Issues of survey design and administration also invite attention. The addition of a module to the American Time Use Survey asking for reports of subjective well-being during specific activities offers new ways of thinking about individual motivation. In 2017, the Panel Study of Income Dynamics (PSID) added a question regarding time devoted to childcare to a questionnaire that already included basic information on household expenditures as well as time devoted to household tasks. The PSID now represents one of the few data sets available that includes information on both household expenditures and time use. The Bureau of Labor Statistics has recently commissioned an effort to statistically match data from the American Time Use Survey with data from the Consumer Expenditures Survey (Zacharias et al. 2024). This synthetic data set promises greater insights into the substitutability of market income and unpaid household services.

New statistical methodologies also represent an important avenue for improvement. The copula, a joint cumulative distribution function, can effectively measure dependence between different dimensions of both material and subjective well-being (Decancq 2014). Its usefulness for examining the relationship between market income and leisure time has been demonstrated with Mexican data (Dorn et al. 2024). Qualitative research could also enrich consideration of income and time poverty. Discussions of income thresholds sometimes invoke responses to subjective questions such as “How much income do you think a family of four needs to reach the poverty line?” Focus group discussion of the tradeoffs between market income and other dimensions of well-being could be similarly relevant. Recent policy debates in the U.S. suggest

that tensions between paid employment and time to care for and spend time with family and friends are more salient than concerns about housework.

All these directions for research are relevant to interdisciplinary efforts to set minimum wages, develop improved work/family policies, better understand inequality in living standards, and analyze the impact of more flexible working arrangements that emerged during the first two years of the Covid-19 pandemic. The quantity of hours devoted to different activities may matter less than the temporal resilience that could be enhanced by improved coordination of public services and sharing of household responsibilities. Future research on the relationship between time use and family living standards could help improve both material and subjective well-being.

5. Conclusion

Accurately measuring time and income poverty is crucial for setting policy goals and designing interventions that ensure a decent standard of living for everyone. Time use is central to human development and the expansion of capabilities, and it is closely interlinked with income. Yet, despite growing awareness of time-related deprivation, there remains no universal framework for assessing time and income poverty jointly. The idea that money can buy time and time can save money—within a certain range—underpins the analytical foundation of this work.

The paper identifies key dimensions for developing measures of time and income poverty: the unit of observation (individual or household), categories of time use, valuation of unpaid work, substitutability of money with unpaid work and with leisure, and whether thresholds are relative or absolute. A central clarification is that unpaid work and leisure must be treated separately: unpaid work sustains household living standards through nonmarket activities such as cooking and caregiving, whereas leisure refers to time outside productive tasks for personal

enjoyment. Conflating the two risks obscures deprivation and mischaracterizes living standards.

We identify different sets of measures for time and income poverty. Most empirical approaches use a linear adjustment, where a replacement cost for unpaid work is added to the income poverty line. Conceptually, this treats poverty as a budget constraint and mainly focuses on a limited group: households or individuals who cannot meet their unpaid responsibilities due to long working hours and live at the income poverty line. This method is appropriate if the goal is to evaluate household consumption at the income poverty level using a composite index. However, it does not indicate what an adequate joint bundle of time and income would look like without the paid work hour constraint.

From this discussion, it follows that a comprehensive concept is needed to identify combined bundles of time and income that sustain a living. Both theoretical and empirical evidence suggest that the relationship between the time and money required to remain above the poverty line is likely nonlinear. However, empirical research is still lacking to identify these bidimensional bundles at the household level—linking time and income for household consumption—or three-dimensional bundles at the individual level, which incorporate unpaid work, paid work, and leisure. Such bundles could further be refined to serve as a foundation for exploring sustainable living, particularly when considering the time required for environmentally and socially sustainable practices.

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Appendix

A. Data sources

There are two main types of time use data collection methods: time-diary surveys and activity list surveys. Each approach has unique strengths and limitations that directly influence

how unpaid work and time poverty are measured. This section highlights the key points that emerge as relevant when working with time use data. The UN Women (2021) report provides a detailed analysis of how time use data can serve as a valuable resource.

Time-diary data requires respondents to report their daily activities throughout a certain time period. The diary entries are usually made at intervals of 10 to 15 minutes, right after activities occur. This format allows for recording simultaneous activities, such as cooking while watching TV. However, supervisory care is often underreported unless the survey explicitly prompts for it. While diaries provide detailed information and enable nuanced analysis of multitasking, they place a high burden on respondents and may still overlook some forms of unpaid care, most commonly supervisory care (UN Women 2021).

In contrast, activity list data involves respondents recalling the time they spent on a predefined list of activities during a previous reference period, usually the past week. While this method is easier to administer and some recent versions include direct questions about supervisory care – especially in Latin America – it is more prone to recall and rounding errors. It also often misses capturing simultaneous activities, which can lead to over- or underestimations of unpaid or overlapping work. Also, definitions and question wording can vary widely across surveys, making cross-country comparisons difficult (UN Women 2021).

However, a main drawback of these more specialized types of data is that they generally lack integrated income measures. Therefore, household surveys that use short activity lists combined with income modules may offer a more suitable vantage point for studying time and income poverty, yet they typically include rather broad categories of time use, making unpaid work estimates difficult (Dorn et al. 2024).

Hybrid approaches, such as simplified "light diaries" with structured intervals and specific questions on supervisory care, are a promising middle ground. Regardless of format, future surveys should standardize definitions and explicitly measure supervisory care to ensure more accurate and policy-relevant time use data (UN Women 2021).



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Institute for Socio-Economics
University of Duisburg-Essen

Lotharstr. 65
47057 Duisburg
Germany

uni-due.de/soziooekonomie
wp.ifso@uni-due.de



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