The Hidden Poor: Solving Time Poverty through Redistribution of Household Production

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Abstract

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Keyword: Time Poverty, Income Poverty, Redistribution , household production, care work, gender equality, LIMTIP, Time Poverty, Income Poverty, Redistribution , household production, care work, gender equality, LIMTIP

1 Introduction

Redistribution of household production, which includes unpaid caregiving and domestic chores, has been identified as an important tool to achieve gender equality. The incorporation of the 3R (recognizition, reduction adn redistribution) strategy as a target in the sustainable development goals, is a testament to the decades of activism and advocacy emphasizing that inequality on this front cannot be justified in the name of "private family matter" rather is a matter of public policy. While redistribution of household production responsibilities from women to men is important intrsinsically for human rights and fairness concerns, it is also instrumental in achieving gender equality in labor market outcomes (Bruyn-Hundt, 1996; Elso, 2017; Esquivel, 2016). Studies have demonstrated that gender gaps in the workforce and the unequal sharing of household responsibilities can severely impede economic growth and development (Berik et al., 2009; Duflo, 2012; Elson, 2009)). Yet, difficult questions remain about public policies and collective actions that would reduce inequality, especially in poorer countries with constrained fiscal capacity,widespread absence of formal wage labor and weak welfare states. Moreover, in patrirachal contexts, cultural barriers restrict redistribution of household production, particularly unpaid care work from women to men and to the public and private spheres. While in some developed countries such as Norway and Sweden, public policies have been able to promote gender -equitable sharing of household production, for eg: paid paternity leaves in addition to paid maternity leaves , such policies seem to have attained limited consensus in other countries.

In the case of the US, issues related to lack of public prpovisioning of care infrastructure and services, persistence of childcare deserts, lack of paid parental leave laws among others have gained momentum.

In 2021, the value of unpaid household work in the U.S. amounted to $600 billion, constituting approximately 2.6% of the GDP (Reinhard et al. 2023). Moreover, like most other countries, we observe gender disparity in sharing of household work such that women disproportionately shoulder the burden. According to the 2018 American Time Use Survey, among adults aged 15 and older, women on average spent 5.7 hours per day on unpaid household and care work, compared with 3.6 hours for men. In other words, women spent 37 percent more time on unpaid household and care work than men (Hess et al., 2020). Additionally, the U.S. falls behind many OECD countries in effective childcare policies, spending only 0.4% of GDP on early childhood education and care (ECEC), compared to the OECD average of 0.8% (OECD, 2020). Notably, the U.S. lacks federal laws granting paid parental leave, setting it apart from other OECD nations. Around 51% of the U.S. population resides in childcare deserts, defined as census tracts with more than 50 children under the age of 5 and either no childcare providers or significantly limited options, resulting in a severe shortage of licensed child care slots (Malik et al., 2018). In the above setting, care demand falls onto the households, partculalrly women. This in turn restricts care providers allocation of time to other activities including employment, leisure, socializing and self care. Time-trade off are crucial in determining individual's well-being. While some hosuheolds may be able to outsource

some of these care needs, other income-constraint hosueholds may not be able to. Over the last two decades, there has been growing interest in studying time and income poverty and in developing their linkages (Levy studies). Time constraints that stem from the overlapping domains of paid and unpaid work are of central concern to the debates surrounding economic development and gender equality. In this backdrop, we develop a novel measure of poverty for the U.S. that incorporates time deficits, known as the Levy Institute Measure of Time and Income Poverty (LIMTIP). The topic of time poverty due to household production is gaining attention in the U.S given the persisting lack of publicly provided care, affordable child and elderly care, and limited paid parental leave benefits. The associated time deficits constrain people's time allocation in a range of activities, in turn affecting their overall well-being, productivity, labor market participation, and earnings. The consequences are particularly serious for women due to the disproportionate burden of household responsibilities they bear, which are closely intertwined with labor market and well-being outcomes. Standard measures of poverty fail to capture hardships caused by time deficits and thereby do not provide a complete picture for effective poverty-alleviation and welfare programs. Understanding the incidence of time poverty that individuals face and how that may have implications for the study of poverty, gender equality and overall development is therefore important.

2 LIMTIP: A New Measure of Time Poverty for the United States

- Describe the LIMTIP measure and how it is constructed: Methods paper
- Brief description of the LIMTIP measure and the Hidden Poor in the US. Small section

Poverty is a multidimensional concept that goes beyond the simple notion of lack of income. In addition to income, poverty can be understood as a lack of access to resources, including time. The LIMTIP is a metric that incorporates in addition to income poverty, aspects of time poverty. Time poverty refers to a scenarion wherein people may not have any time left after engaging in activities that are essential for taking care of the household, its members, self-care, and paid work (!leisure also?).

As with any other measures of poverty, it is necessary to identify a threshold to determine if given the resources available to a person or household, they should be classified as poor or non-poor. In the case of time, all individuals have the same amount of time available to them i.e 24 hours in a day, therefore, thinking about a threshold is less intuitive. Instead, the approach used for the construction of the LIMTIP has been to identify the time balance people would potentially face after considering the necessary time spent on essential activities and household responsabilities. In this framework, people with a negative balance are considered time-poor. We express the weekly time balance of individual i in household j, X_{ij}, as:

$$X_{ij} = 168 - M - \alpha_{ij} R_j - D^0_{ij}(L_{ij} + T_{ij}) \tag{1}$$

where 168 is the number of hours in a week, M is the sum of personal care and non-substitutable

Table 1: **Four-way classification, LIMTIP**

[!ht]

Four-way classification, LIMTIP	Individual	Household
Income Poor, Time Poor	3.46	6.03
Income Poor, Time Nonpoor	11.94	9.75
Income Nonpoor, Time Poor	21.71	39.39
Income Nonpoor, Time Nonpoor	62.89	44.83
Time poor (1+3)	25.17	45.42
LIMTIP poor (1+2)	15.40	15.78
N		

household production requirements, R_j is the required time of household production that a family j needs to maintain the household, α_{ij} is the share of individual i in the household production requirements. To account for required time due to working, the eq-bal also includes D_{ij}, a dummy variable that takes a value of 1 if the person is employed and zero otherwise. Thus, for those employed, one also accounts for hours of employment L_{ij} , the hours of commuting T_{ij}.

To construct this measure, we need a dataset that contains information on individuals' time use, in addition to standard information required for poverty analysis. The main source of information for time use comes from the American Time Use Survey (ATUS), which only provides information for a single person in the household and a single day. We understook a statitical matching procedure to combine time use data from ATUS to the Annual Social and Economic Supplements (ASEC) data. It is necessary to combine the ATUS with the ASEC data to construct a synthetic dataset that contains information on time use for all household members, which will allow us to impute all required variables for eq-bal.

Using the the matched data we then construct income and time poverty estimates for the individuals and households in the United States for the years 2005 to 2022. Note that we classify a household as time poor, if atleast one working age member experiences time deficit.

The LIMTIP is finally measured as:

$$P_j^L* = P_j^O - p_j * X_j \tag{2}$$

The underlying idea is that if we were to monetize the time deficits of individuals and add those to the offical income poverty thresholds, we get an adjusted poverty line - LIMTIP. The LIMTIP estimates can be classified into four braod categories: Income poor,time poor, (ii)Income poor, time non-poor; (iii) Income non-poor, time poor; and (iv) Income non-poor, time non-poor. In Table 1 we present the distribution of individuals and households across the four-way classification of LIMTIP, averaged out across years 2005 to 2022.

Moreover, the estimation of LIMTIP helps us calculate the number of hidden poor, i.e time poor indivuals who are left outside the scope of official income poverty estimates. The difference between

the LIMTIP measure of poverty and the official poverty estimates give us the number of hidden poor.

In Figure 1 we present time trend from 2005 to 2023 of time poverty estimates, the offical income poverty trend, and the LIMTIP poverty trend. We observe that the official poverty estimates shows a slight rising trend between 2005 to 2014 and then starts to decline. When we adjust for time deficits, as expected our LIMTIP estimates shows a higher level of poverty across all years, around 3-5 percentage points higher. For the LIMTIP poverty estimates, we observe that the pandemic years show some steep decline from 13.8 % in 2020 to 10% in 2022 before rising back to the pre-pandemic level of around 15%. Moreover, it is notable that time poverty peaked around the Great Recession and Covid-19 pandemic recession. While time poverty rate has remained more or less stable until 2019, it fell slightly in 2020 before rising again between 2020 to 2023. In the latest year, 2023, nearly 3.5 percent of individuals are hidden poor.

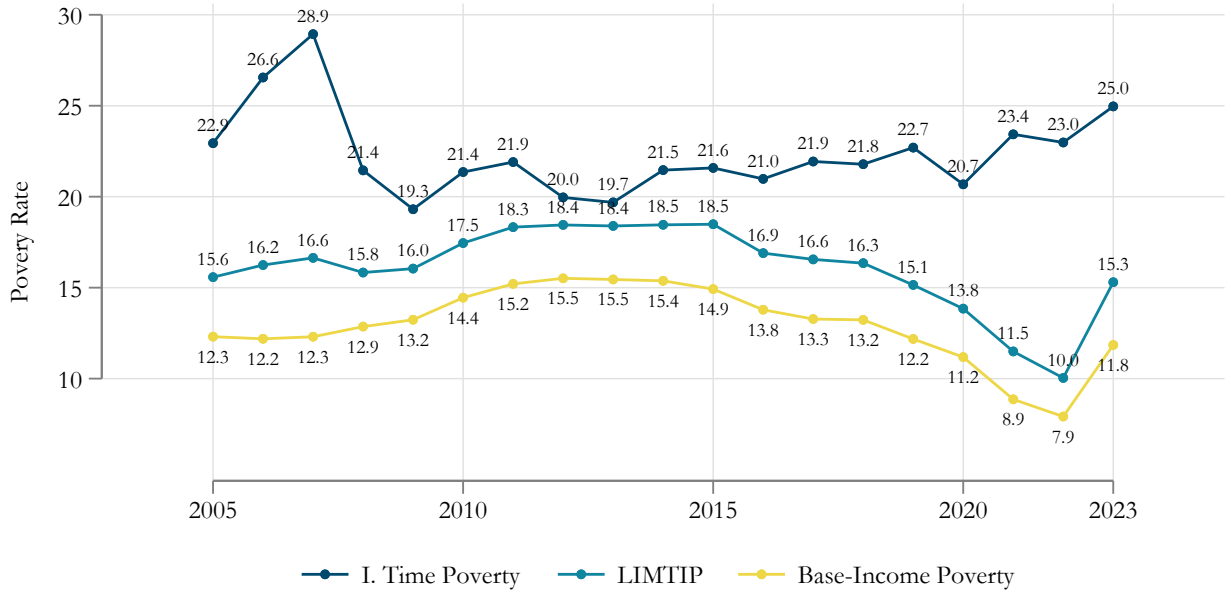


Figure 1: Trends of Time, Income and Limtip Poverty in the U.S.

In the next section, we identify the subsample that can potentially be brought out of poverty.

3 Identifying the Problem

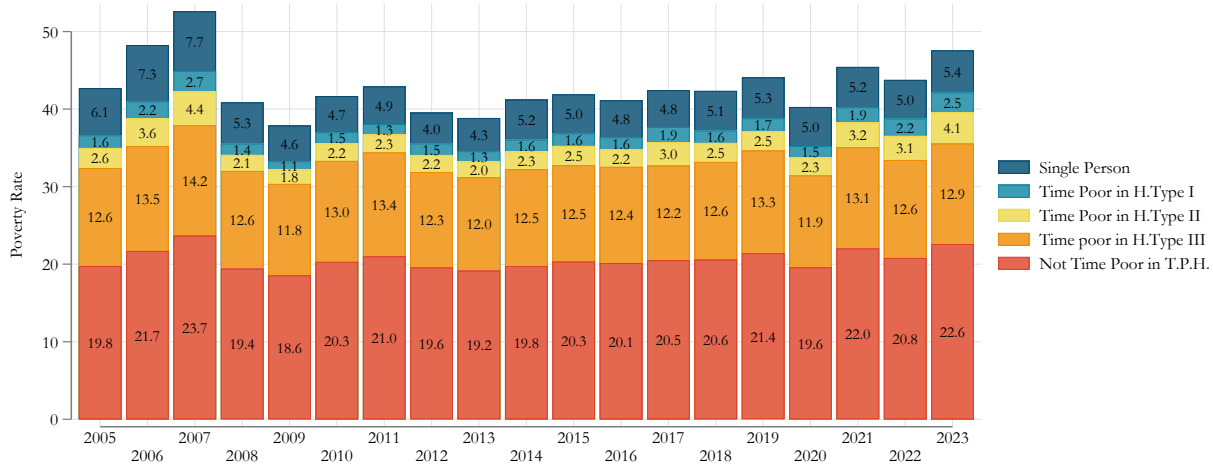
One of the strategies that could help reducing the problem of time poverty, and thereby the incidence of hidden poor, is the redistribution of household production responsibilities across all capable (!add footnote on capable!) members in the household. At best, household members with time surpluses could take on more household responsabilities, reducing the burden of those with time deficits, and potentially bringing out household out of poverty. At worst, the redistribution could make the time deficits more equal among the household members, even if the household remains time poor.

Before we start analyzing the potential that redistribution could have in reducing time poverty, we must first identify the households where redistribution is possible and desirable. Specifically, we exclude from the analysis households that are not time poor, even if such households could potentially benefit from redistribution, reducing the gaps of time surpluses among household members and even resulting in more gender-equitable sharing of household work. From the sample of individuals living in a time poor household we classify them into five different groups:

- Single: These are time poor individuals that live in a household where they are the only working-age person. In this case, redistribution is not possible, and thus are excluded from the analysis.
- Time Poor living in H. Type I: These are time poor individuals who live in households where all working-age members are time poor. While redistribution is possible, and may help in reducing the time deficits of individuals, and even allow some to transition out of time poverty, the household will remain time poor in any redistributional scenario.
- Time Poor living in H. Type II: These are time poor individuals who live in households where there are non-time poor individuals. However, the combined time surpluses is insufficient to lift the household out of time poverty.
- Time Poor living in H. Type III: These are time poor individuals who live in households where there is enough time surplus to lift the household out of time poverty. Redistribution in these households can lift all working members of the household out of time poverty.
- Non Time poor living in a time poor household: This last group consists of individuals with time surpluses living in a time poor household. The goal of the redistribution scenarios is to allocate household responsabilities in such a way that these invididuals can help lift other household members out of time poverty. However, it is also possible that some of these individuals may end up experiencing time poverty in the redistribution scenarios. (!present this info in a table across columns: Red possibile or not and efficient or not/or what outcome it brings in, by hhtype)

Figure 2 provides a visual representation of the classification of individuals living in time poor households. As it can be observed, across years, about 40% of individuals were living in a time poor household. While this share shows a sharp increase between 2005 and 2007, it has remained stable from 2008 onwards, with a small increase across years. There is an additional 4-5% of individuals who are time poor but redistribution is not possible. From the rest, about 15% of individuals constitute our main group of analysis, i.e., those living in households where redistribution is possible and some individuals could benefit from it. The remaining 20% are individuals who are not time poor but live in a time poor household.

In the next section, we discuss three redistribution scenarios wherein household responsabilities can redistributed across working-age members, under different criteria. Nevertheless, we should keep in mind that we will only be analyzing the impact of redistribution on time poor households with at least 2 working-age members.



Note: T.P.H.= Time Poor Household, H.Type I : All working age members are time poor, H.Type II: There are Non-time poor individuals Living in the HH, but time surplus is insufficient to Lift HH out of Time poverty, H.Type III: There is enough time surplus to lift HH out of time poverty.

Figure 2: Time Poverty classification, across time

4 Redistribution Scenarios

- Here we would describe the three redistribution scenarios we have developed. This would be "realistic" scenarios.
- Describe the scenarios and the assumptions behind them.

Intrahousehold redistribution can potentially reduce time deficits and bring households out of poverty. We construct three redistrubution scenarios based on different guiding principles. The extent of the reduction would depend on the principle that we use in distributing household responsibilities among the members. First, we use the simple egalitarianism principle that involves an equal division of total household productiom time among all working age members. Second, we redistribute conditional on the available time people have. In the thord scenario, we redsitribute based on the opportunity cost of time for people.

We outline the methods used for implementing the principles in our data, with the detailed explanation of some aspects below.

4.1 Distribution Rules for Household Production

Alternative values of α_{ij} indicate how household production requirements, net of the portion met by household members that are not of working age or are physically unable to take on more work, are shared among working-age people in the household. The three principles are:

4.1.1 Equal Shares Principle

The procedure for the equal shares scenario is relatively simple. Recall that the shares of those in the redistribution simulation in this scenario are simply:

$$\alpha_{ij}^{E} = 1/I_j * (1 - \alpha_j^{nw'}) \tag{3}$$

where α_{ij} represents the redistributed share of individual i; I^j denote the number of working-age persons in household j and $\alpha_j^{nw'}$ represents the share of non-working group, hence $(1 - \alpha_j^{nw'})$ representing the available redistributable share. We count how many people are in the redistribution simulation in each household and then assign them the appropriate fraction (1 for households with one person in the simulation, ½ for households with two people in the simulation, and so on) and apply that fraction to the redistributable share of required household production time. This scenraio overlooks time equity, i.e redistributes without taking into consideration the time available to individuals.

4.1.2 Time Available Principle

The time available scenario is based on equity such that the redistrubted shares are based on the time that is available after setting aside the time for personal maintenance requirements and income generation. In other words, the household members should split up the required household production time based on the time each one has available, i.e based on an equity criteria. The time available (Z_{ij}) is defined as the time left over after the minimum personal maintenance and time spent on income generation (including commuting time) have been subtracted from the total weekly hours. To calculate the shares for each individual based on this principle, we first calculate the time available for each individual, then add up the total among the household for those individuals that have positive time available. We then divide each individual's time available by the total and apply that fraction to the redistributable share of household production time. For those individuals that have negative time available we set their shares to zero in this simulation.

$$\alpha_{ij}^{A} = (Z_{ij} / \sum Z_{ij})(1 - \alpha_j^{nw'}), if Z_{ij} > 0, \tag{4}$$

$$\alpha_{ij}^{A} = 0, if Z_{ij} < 0 \tag{5}$$

4.1.3 Opportunity costs

The third possibility is based on the idea of opportunity costs along marginalist lines. The sharing rule depends on the relative actual (potential) wage. For example, if there are only two working-age adults, say husband and wife, and if the husband's wage is twice as much as the wife, the wife's share would be two-thirds and the husband's share would be one-third. We use the actual or

shadow wage for the employed and the potential wage for the nonemployed. Redistribution takes place based on the following equation:

$$\alpha_{ij}^{O} = (1/I_j - 1) * (1 - w_{ij}/w_{ij})(1 - \alpha_j^{nw'}) \tag{6}$$

First, we imputed wages for all of those not currently working for pay. In order to do this, we used a two-stage Heckman selection model (Heckman 1979), also known as the Heckit procedure, which we outline below. Once done, we used the imputed wages of those that are not currently working for pay and the actual wages of those that are working to divide up the redistributable share of required household production.

As the share of required household production needs to be inversely proportional to the individual's share of the sum of wages, we subtract their share of this sum from one. To ensure that the resulting shares sum up to unity, we divide by the number of individuals in the simulation minus one. We then apply this share to the redistributable share of required household production as in previous steps. In order to impute wages for those not currently employed for wages, we first impute the likeliest industry and occupation for each individual using a multinomial probit procedure. Industry and occupation are regressed on age, age squared, sex, race, education, and geographic region on all those in the working age population (18-64). The likelihood for each industry and occupation is then predicted for everyone, using the results of the multinomial probit. Then each individual not currently working for wages is assigned the industry and occupation corresponding to the xxxx/ largest predicted likelihoods for that individual.

Next, we move on to the first stage of the Heckit procedure, a probit estimation of a dummy variable for being employed in wage work (paid):

$$P(paid = 1|X) = F(X\beta) \tag{7}$$

where F is the cumulative density function of a normal distribution. The vector of explanatory variables, , comprises the individual's age, sex, race, disability, number of kids across age groups (0 to 5, 6 to 14, 15-17), presence of spouse and spouse's age, education and employment status education. The regression is run on the universe of all eligible adults separately by age (divided into four categories: 18 to 30 years old; 31 to 45 years old; and 46 to 64 years old) and sex. The Mills ratio, , is calculated for all individuals using the results of the first stage regression:

$$\lambda = f(X\beta)/F(X\beta) \tag{8}$$

where and are, respectively, the probability and cumulative density function of a normal distribution, and β is the vector of estimated coefficients from the probit model. The second stage is an ordinary least squares (OLS) estimate of the log of hourly wage:

$$lnw = (\gamma_2 * Z^w) + (\theta_2 \lambda) + \mu \tag{9}$$

This regression is run only on those that are actually employed for pay (!FRA). The vector of explanatory variables, [], includes age, sex, race, education, geographical region, disability, industry, occupation, presence of spouse, spouse's employment status, and, finally, , the Mills ratio calculated in the first stage. Inclusion of the Mills ratio corrects for the selection bias induced by limiting the regression to those in paid employment. The imputed log of wage is predicted for those not working for wages from the results of the regression, with industry and occupation replaced by the industries and occupations assigned in the previous step.

We simulate each of these principles of redistribution and recalculate individual and household time and income poverty using the LIMTP framework described above.

- Next, we provide an assessment of the different principles in terms of how far they improve the position of women and how much such improvements are congruent with the betterment of the economic well-being of their families. In the subsequent section, we compare and contrast the joint distribution of time and income poverty among families and individuals that would result from each principle.

5 Results

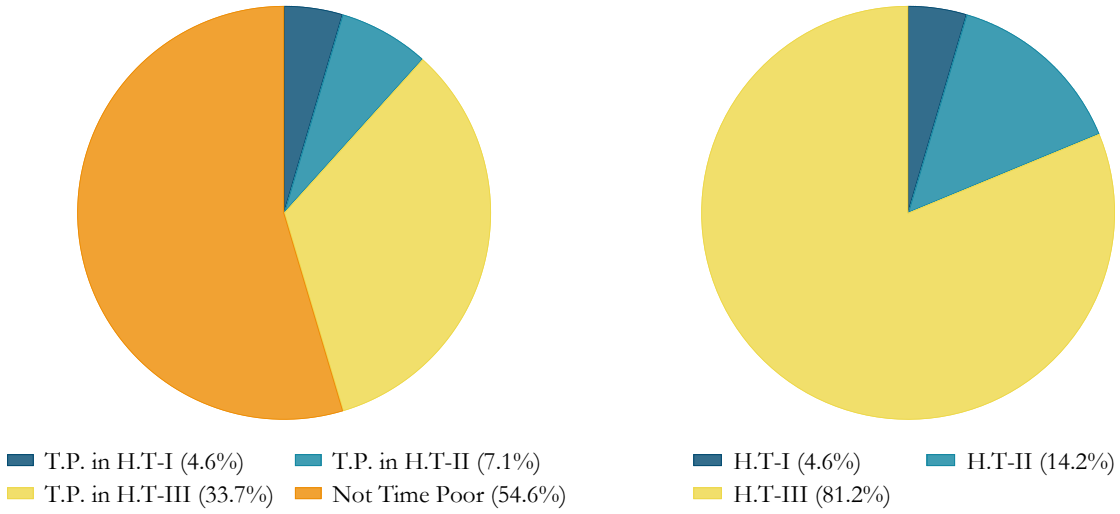
As described in the previous section, we consider three scenarios to analyze the impact that redistribution could have on time poverty, focusing on individuals living in time poor households with at least two working-age members. In this section, we present the results of the redistribution scenarios and discuss the implications for time poverty and the incidence of hidden poor. Since most of the results acrosstime (see online appendix) are similar, we focus on providing results that average the impacts of redistribution across all years.

5.1 Redistribution Scenarios and Time Poverty: General Results

Based on the imputed data, and considering people in working age only, 55 out of 100 individuals that live in time poor households are not time poor themselves. 4.6 live in households where everyone is time poor,

To understand the impact of the diferent redistribution scenarios on this groups, we will focus on transition probabilities. Thus, for those out of poverty, our statistic of interest would be the likelihood that they fall back into poverty, and for those in poverty, the likelihood that they transition out of poverty.

Of course, the scenarios also have implications in terms of time poverty gap (time deficits). As shown in



(a) Individuals (b) Households

Note: H.Type I : All working age members are time poor, H.Type II: There are Non-time poor individuals Living in the HH, but time surplus is insufficient to Lift HH out of Time poverty, H.Type III: There is enough time surplus to lift HH out of time poverty.

Figure 3: Distribution of individuals by type

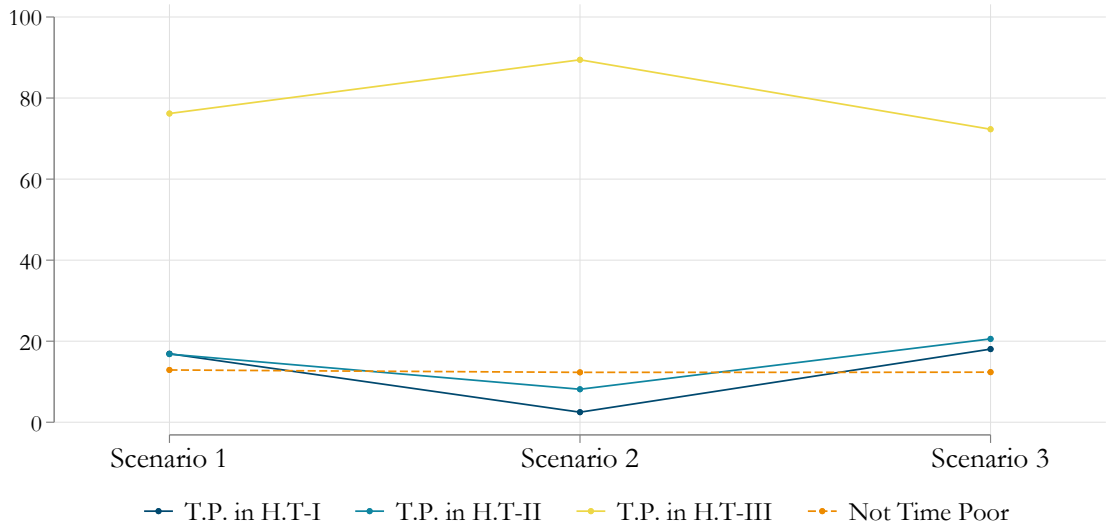


Figure 4: Transition probabilities by Redistribution Scenario

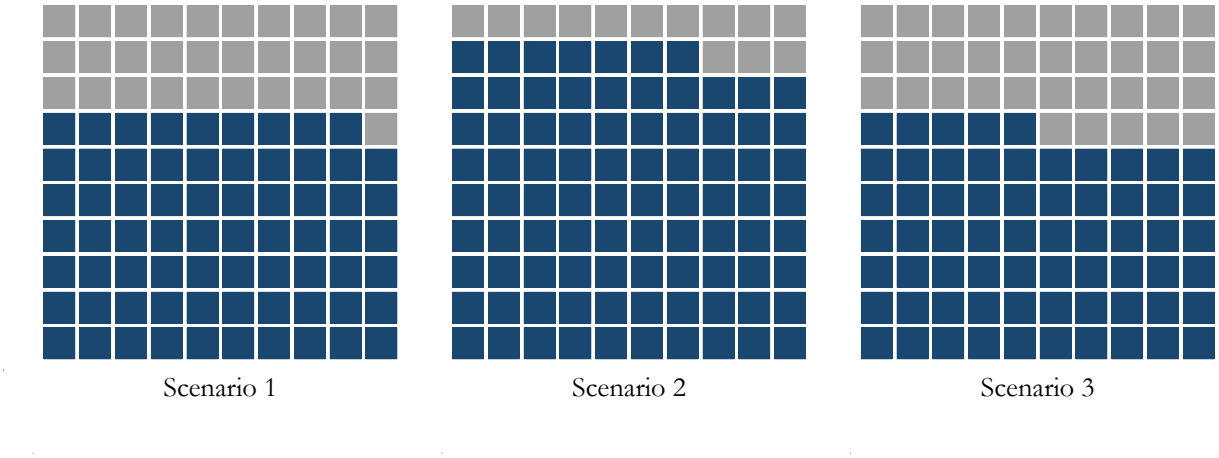


Figure 5: Transition probabilities for households

Plot on time Deficits: Across Different Scenarios

Figure 6: ——————+————————————- Not Time Poor | 0 -.7191797 -.5483149 -.7216919 Lives in T-I h | -10.68127 -11.5814 -10.72205 -11.62268 Lives in T-II h | -20.32136 -9.095953 -5.58591 -10.04065 Lives in T-III h | -10.45076 -2.27825 -.4266873 -2.103088 ——————+————————————- Perhaps Mandoline plot

5.2 Redistribution Scenarios and Time Poverty: Heterogeneity

In this section, we present the results of the redistribution scenarios analyzing the impact on time poverty across different demographic groups.

Perhaps Mandoline plot for all scenarios by group: Three groups. We only see Individuals Here

Transition probabilities across types individuals, by Group

Figure 7

6 Policy implications

7 Conclusion

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Deficits by group

Figure 8

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