"When Life Gives You Lemons": Using Cross-Sectional Surveys to Identify Chronic Poverty in the Absence of Panel Data[1]

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Abstract

At the core of poverty eradication strategies is the need to eliminate that poverty which is persistent over time (*chronic poverty*). Unfortunately, identifying and targeting the chronically poor is challenging to do in most contexts, as traditional measures of chronic poverty require the existence of panel data that is rarely available. In the absence of panel data, alternative approaches that rely on cross-sectional data can provide a second-best solution. In this context, this paper proposes a method for identifying the chronically poor using cross-sectional data on monetary and non-monetary poverty to construct a proxy indicator for chronic poverty. It puts forth two conjectures: that households that are classified as both income poor *and* multidimensionally poor have a higher likelihood of remaining in income poverty in the future, compared to households that are initially income poor only; and that the longer households remain in both income and multidimensional poverty, the more likely they are to remain in income poverty in the future. It uses three waves of panel data for three countries in Latin America (Chile, Mexico, and Peru) to test these conjectures. Using a proportional hazard model, the paper estimates households' probabilities of remaining in income poverty based on their past income and/or multidimensional poverty statuses. The results find empirical support for both conjectures that is significant, consistent across countries, and robust to the inclusion of controls and period of analysis. From a policy perspective, this implies the potential viability of a new metric for identifying the chronically poor in contexts of limited data and reinforces the notion that policies to end chronic poverty will likely be ineffective if they do not address both monetary and non-monetary dimensions.

Keywords: Chronic poverty, multidimensional poverty, longitudinal data

JEL codes: I31, I32, C25

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1. Introduction

"Ending poverty" is a critical goal for many societies around the world. The global agreement surrounding this objective is reflected in its noteworthy placement as Goal #1 in the Sustainable Development Goals, as well as in the preceding Millennium Development Goals. But what does it actually mean to "end" poverty? Arguably, what is meant by this is bringing an end to *chronic poverty*—or poverty that is persistent over time. Given the reality of households' income fluctuations over time, it is likely that some level of *transient poverty* will always be with us. From a policy perspective then, the goal should be to ensure that even if people enter poverty due to a temporary loss of income, they do not *stay* in poverty.

Despite the central importance of chronic poverty from a policy perspective, there is little readily available data to measure and monitor it. Traditional approaches to measuring chronic poverty require panel data in order to track households' income dynamics over time. Unfortunately, this type of data does not exist in most countries. Thus, there is a need for alternative methods that are able to identify chronic poverty in the absence of panel data. A growing literature has attempted to overcome this challenge by combining repeated cross-sectional surveys to construct "synthetic panel" data. While this method has been used effectively to characterize poverty dynamics in a range of different settings, it still requires multiple years of survey data and may be less useful for policy purposes such as identification and targeting of the chronically poor.

This paper proposes an alternative method for identifying chronic poverty which requires only one year of cross-sectional data on monetary and non-monetary poverty. The approach argues that the combined profile of a household as income poor and multidimensionally poor (note that multidimensional poverty in this paper refers to *non-monetary* multidimensional poverty) in a single year can be used as a proxy indicator of that household being chronically income poor. By adding the multidimensional poverty indicator (which arguably reflects some underlying conditions that prevent households from moving structurally out of poverty) to an income poverty indicator, this paper contends that it is possible to partially capture persistent income poverty—even when the actual duration of that poverty cannot be observed. Based on this notion, this paper puts forth two conjectures to test empirically: that households that are classified as both income poor *and* multidimensionally poor have a higher likelihood of remaining in income poverty in the future, compared to households that are initially income

poor only; and that the longer households remain in both income and multidimensional poverty, the more likely they are to remain in income poverty in the future.

In order to test these conjectures, this paper uses a proportional hazard model to estimate the probabilities of remaining in income poverty based on past income or multidimensional poverty statuses. It draws on three waves of panel data from three countries in Latin America (Chile, Mexico, and Peru) to validate this approach, and the results suggest that both conjectures are true. The results are significant, consistent across countries, and generally robust to the inclusion of controls and period of analysis. From a policy perspective, this implies the potential viability of a new metric for identifying the chronically poor in contexts of limited data and reinforces the notion that policies to end chronic poverty will likely be ineffective if they focus solely on providing income support (and do not also address associated multidimensional deprivations).

The rest of this paper is organized as follows. Section 2 provides a brief overview of traditional approaches to measuring chronic poverty and discusses the data-intensive constraints they pose. Section 3 proposes a new approach for measuring chronic poverty using cross-sectional data and sets forth the two conjectures to be tested empirically. Section 4 describes the data and the two-stage empirical strategy used to test these conjectures. Section 5 discusses the results and main findings. Section 6 concludes with reflections on the viability of the proposed metric as well as implications for policy.

2. The challenge of identifying chronic poverty in the absence of panel data

When measuring poverty, there are three primary characteristics that matter: depth, complexity, and persistence. Depth refers to how severe poverty is, and it can be captured by measuring the prevalence of poverty at different poverty lines (i.e., poverty vs extreme poverty) or by measuring how far away people are from a given poverty line (i.e., the poverty gap). Complexity refers to the various ways in which poverty manifests and can be measured by indicators such as multidimensional poverty indices that capture overlapping deprivations in areas such as education, health, or housing. Finally, persistence refers to the chronicity of poverty, and its measurement aims to distinguish between poverty that is continuous over time (chronic poverty) and poverty that is temporary due to intertemporal variations in income (transient poverty). While the depth and complexity of poverty can be measured based on

information at a given moment in time, measures of persistence typically require information across multiple points in time.

There are two traditional approaches to measuring the persistence poverty: the components approach and the spells approach (Yaqub 2000). Under the *components approach*, a household is considered chronically poor if its permanent component of income or consumption is below the poverty line. Thus, the components approach primarily relies on separating a household's permanent component of income (that which is related to expected long-term earnings) from its transient component (that which is related to short-term fluctuations). Under the *spells approach*, a household is considered chronically poor based on the duration of time that it spends in poverty. Thus, the spells approach primarily relies on counting the number or length of consecutive periods in which a household's income falls below the poverty line.

Within the *components approach*, common methods to isolate the permanent component of income include Lillard and Willis (1978) and Gaiha and Deolalikar's (1993) prediction models on longitudinal data, which aim at capturing the relationship between observable characteristics and, respectively, earnings of prime-age males[2] and households' incomes by purging the effect of transitory shocks. Predicted earnings or incomes from such models can therefore be used to estimate the extent of expected poverty—the share of people likely to remain poor on average over a given period. Another influential method to identify the permanent component was introduced by Ravallion (1988) and applied extensively in Jalan and Ravallion (1998, 1999, 2000) and uses the average of individuals' income over time as a measure of permanent income.[3] This approach, however, assumes that resources are transferred across periods at no cost, effectively assuming perfect substitutability over time. In order to take into account that individuals could make inter-temporal transfers up to a level that is sustainable by saving and borrowing at current interest rates, Rodgers and Rodgers (1993) introduced the notion of average-annual poverty.[4] Yet, introducing interest rates to the analysis may not reflect the full

[2] A well-known shortcoming of the earnings function for a comprehensive poverty dynamics assessment is that it does not take into account households' composition, varying stocks of assets and returns on those, variety of income sources, or intertemporal demographic changes (Lillard and Willis 1978, p. 1007). See also Duncan and Rodgers (1991) and Jenkins (2000).

[3] This method derives an individual intertemporal measure of poverty defined as a function of the poverty line z and individuals' income stream over time y_{it}, that is $P_i = P(y_{it}; z)$ with $t = 1, \dots T$, which is then aggregated through the FGT family of poverty measures (Foster, Greer, and Thorbecke 1984) with $\alpha = 2$, either across the total population as a mean of overall poverty at each t or across t as a mean of the average share of time each individual spends in poverty—that is, the aggregate intertemporal measure of poverty is additively decomposable both across time and across the population. If $\bar{y}_{iT}$ is set to reflect the average of individuals' income over time, then an expected intertemporal measure of chronic poverty can be expressed as $P_i^c = P(\bar{y}_{iT}; z)$, namely the component that persist when income variability has been smoothed-out, whereas the difference $P_i - P_i^c$ will yield the transient component of intertemporal poverty.

[4] In their framework, permanent income y_{it}^* is given by annual income minus (plus) saving (borrowing); that is, $y_{it}^* = y_{it} - s_{it}$, with $s_{it} = y_{it} - \bar{y}_{iT}$ and $s_{it} > 0$ for savings and $s_{it} < 0$ for borrowing. If positive interest rates are explicitly considered in the process, then $y_{it}^* < \bar{y}_{iT}$. As before, y_{it}^* is compared with z to identify the chronic poor, or $P_i^c = P(y_{it}^*; z)$, and aggregation is performed also through the FGT family of measures.

complexity of costs the poor face in transferring income over time. Over time, these hidden costs reduce permanent income thus making intertemporal substitutability rather volatile. In an attempt to capture this volatility, Foster and Santos (2014) introduced a variant of the permanent income approach that allows for an imperfect degree of substitutability across periods.[5]

Within the *spells approach*, a common method to identify the chronic poor is the "tabulation" method (for instance, Baulch and McCulloch 2002; Coe 1978; Duncan, Coe, and Hill 1984; Gaiha and Deolalikar 1993; Levy 1977). This method tabulates the number of periods in which people fall below the poverty line—and distinguishes between those who are poor in most or all time periods (the chronically poor) and those who are poor in only a few time periods. While the simplicity of this approach is appealing, it faces the limitation of not knowing households' poverty statuses in the years before, between, and after data points are collected—what Bane and Ellwood (1986) refer to as "censored spells." To overcome this constraint, a "duration" method can be used to model the length of poverty spells. In this approach, techniques such as survival functions and hazard functions allow for the estimation of exit probabilities to calculate the likelihood that individuals will or will not remain in poverty (Bane and Ellwood 1986; Ruggles and Williams 1989). While these methods incorporate the duration of poverty into the identification of the chronic poor, resulting poverty headcount measures still remain time insensitive. In order to account for the duration of poverty in aggregate measures, Foster (2009) introduced a duration-adjusted headcount ratio that accounts for households' average amount of time spent in poverty.[6]

While both the components approach and the spells approach provide a myriad of rigorous methods to measure chronic poverty, they fundamentally rely on the existence of panel data as an input. Unfortunately, in most developing countries, this type of data is rare or nonexistent.

[5]They estimate the measure of permanent income through a family of generalized means of order β, namely μ_β. If μ_β is applied to individuals' income stream over time, then each generalized mean can be interpreted as a measure of permanent income, say $\bar{y}_{iT\beta}$. With $\beta = 1$, μ_β becomes the arithmetic mean so that $\bar{y}_{iT\beta} = \bar{y}_{iT}$ and thus income is perfectly substitutable over time and volatility ignored. With $\beta < 1$, however, $\bar{y}_{iT\beta} < \bar{y}_{iT}$ thus reflecting the degree of volatility, or the inequality in the intertemporal distribution of income, making substitutability rather imperfect. Having computed $\bar{y}_{iT\beta}$ the identification of the chronic poor is based on the standard function $P_i^c = P(\bar{y}_{iT\beta}; z)$, whereas aggregation is based on the Clark, Hemming, and Ulph (1981) family of poverty measures with $\alpha < 1$ and $\alpha \neq 0$, and the Watts (1968) poverty index with $\alpha = 1$.

[6] This approach introduces a second cut-off, or duration threshold τ with $0 < \tau < 1$, into the intertemporal measure of chronic poverty, namely $P_i^c = P(y_{it}; z, \tau)$. Instead of relying on the permanent component of income, the identification starts with the standard condition $y_{it} < z$ and then applies τ to classify an individual as chronic poor q_i ($q_i \in q$) if her share of time spent in poverty ρ_i is at least τ, $\rho_i \geq \tau$. Aggregation is based on the FGT family of measures and yields a *duration-adjusted* headcount ratio which represents the share of the population n who are chronically poor, $H^c = q/n$, adjusted by their average duration in poverty, $E = \sum_{i=1}^{q} \rho_i / q$. Notice that while H^c may remain unchanged, any slight variation in ρ_i, and consequently in E, will lead the duration-adjusted headcount to change, thus satisfying a time monotonicity property which is analogous to Sen's (1976) monotonicity and Alkire and Foster's (2011) dimensional monotonicity axioms.

Implementing large scale surveys that track household income or consumption over time can be both costly and administratively difficult to implement. In the rare cases where panel data does exist, it often faces challenges of insufficient sample sizes, high levels of attrition, or is collected with limited frequency or duration (Mckay and Lawson 2003). Recently, innovative approaches have been used to overcome this lack of panel data by constructing "synthetic panels." By exploiting data from repeated cross-section surveys, these synthetic panels can derive bounds estimates (Dang et al. 2014) or point estimates (Bourguignon and Moreno 2020; Dang and Lanjouw 2013) to characterize poverty dynamics and economic mobility patterns. This approach is appealing and has effectively been used to in a range of settings —including regional applications in Latin America and the Caribbean by Ferreira et al. (2013) and Vakis, Rigolini, and Lucchetti (2016). However, while this approach in our view can be useful to *characterize* poverty transitions, it is less useful for the purpose of identification and targeting —and still requires multiple years of repeated cross section surveys. Moreover, some recent literature has questioned the statistical accuracy of some of these methods (see, for instance, Hérault and Jenkins 2019).

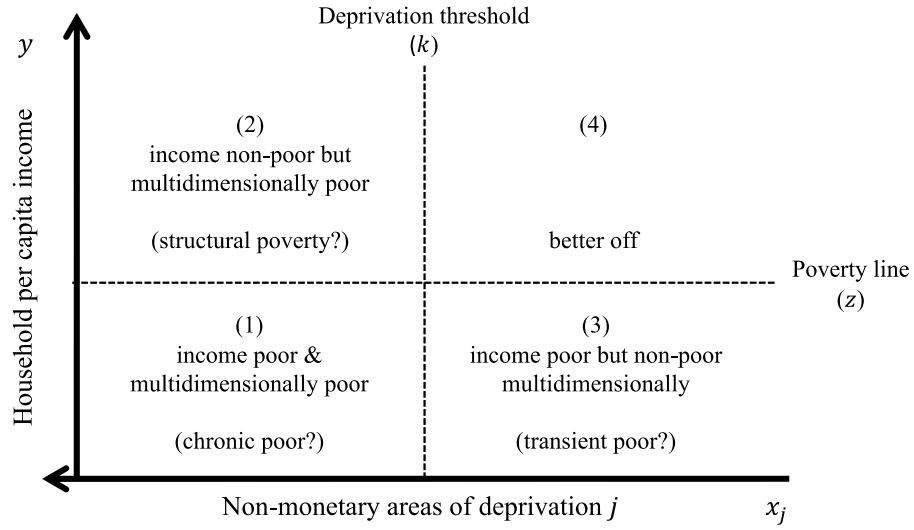
3. An alternative method: Using cross-sectional monetary and non-monetary data to construct a proxy indicator

This paper proposes an alternative approach to measuring chronic poverty in the absence of panel data, using monetary and non-monetary poverty data from a single cross-sectional survey. Specifically, the approach put forth here argues that the combined profile of a household as income poor and multidimensionally poor in a single year can be used as a proxy indicator of that household being chronically income poor. This does not suggest that multidimensional poverty is *per se* indicative of the chronicity of poverty, nor is a multidimensional variant of existing approaches to chronic poverty being proposed.[7] Rather, our argument is that if income poverty is observed in any given point in time t but not its duration, as is the case with cross-sectional data, persistent income poverty can be partially captured by adding the effect of a non-monetary multidimensional poverty indicator, which is observable in t and, arguably, reflects some underlying conditions that prevent households from moving structurally out of poverty in, say, $t + \Delta t$. The starting point of our approach is

[7] For an axiomatic measure of multidimensional chronic poverty see, for instance, Alkire et al. (2014), who propose an innovative, yet data-demanding method, by combining the dual cut-off approach of Alkire and Foster (2011) to measure multidimensional poverty in t, and the duration-adjusted measure of Foster (2009) to measure multidimensional poverty persistence in the interval $[t, t + \Delta t)$.

illustrated in the left-hand quadrant at the bottom of Figure 1, where households are identified both as income poor if their per capita income y_i is at or below a poverty line z and as multidimensionally poor if their number of deprivations j is at least a cross-dimensional deprivation threshold k.

Figure 1. A graphic representation of a household's poverty status in t



More specifically, this paper seeks to test two conjectures related to this notion:

> **Conjecture 1**. If the association between non-monetary multidimensional poverty and persistence in income-based poverty is high, then a household that is both income poor and multidimensionally poor in t is more likely to remain in income poverty in $t + \Delta t$ than if it is income poor but not multidimensionally poor.
>
> **Conjecture 2**. The longer a household is both income poor and non-monetary multidimensionally poor the more likely it is to remain in income poverty in the future

If the two conjectures are, in general, true, then a household that is poor in t under both income-based and non-monetary multidimensional approaches could be deemed as a proxy for whether such household is persistently income poor. In other words, this would allow us to identify chronic poverty in the absence of panel data.

Conceptually, these conjectures are linked to two aspects of the "poverty trap" [8] argument: first, that if a person is already below a "critical threshold" of assets, it will be more difficult for her to generate income; and second, that the longer a person remains in poverty, the less likely it will be that she exits poverty. The "critical thresholds" argument is based on the view that one's initial endowments of assets as well as one's enabling environment to use those assets and generate returns is critical for unlocking pathways of upward mobility (Attanasio and Székely 1999; López-Calva and Rodríguez-Castelán 2016). If households are below a "critical threshold" of assets, they may face high structural barriers to exiting poverty in the future (Bowles, Durlauf, and Hoff 2006; Carter and Barrett 2006; Zimmerman and Carter 2003).[9] The duration argument is based on the literature resulting from the spells approach to measuring chronic poverty, which finds that longer past experiences of poverty increase the likelihood that a person will remain in poverty (Bane and Ellwood 1986) as well as their tendency to repeat spells of poverty (Stevens 1994, 1999; Devicienti 2011, Arranz and Cantó 2012).

In order to test these conjectures, this paper adapts the technique of using hazard models to estimate the probability of exiting poverty as used in some of the "duration" methods within the spells approach to measuring chronic poverty (discussed above). While the traditional approach to estimating the likelihood of exiting poverty in this context relies mostly on the length of time a person has already been poor, this paper updates this approach by allowing for the inclusion of other factors such as non-monetary characteristics and exogenous shocks that influence households' capacity to generate income. In the traditional duration-dependent approach, the probability of whether an individual will leave poverty today depends primarily on how long they have already been poor. In this model, the probability that an individual i exits poverty in the interval $[t, t + \Delta t)$ given that it has not yet occurred can be expressed as $Pr[t \leq T < t + \Delta t | T \geq t]$, where $T \geq 0$ is the duration of the poverty spell with probability density function $f(t)$ and cumulative distribution function $F(t) = Pr(T \leq t)$. The hazard rate is found by taking the limit of the above probability,

[8] In the macroeconomics literature on growth and convergence, poverty traps are those self-reinforcing mechanisms that perpetuate poverty (Azariadis and Stachurski 2005; Bowles, Durlauf, and Hoff 2006). Theoretical work on the microeconomics of poverty traps offers several mechanisms —such as low initial stock of assets, diminished opportunities, investment indivisibilities, or credit market imperfections— by which some households are trapped in chronic, persistent poverty (for reviews of the literature, see Barrett, Garg, and McBride 2016; Ghatak 2015; Kraay and McKenzie 2014). Although empirical evidence supporting the existence of poverty traps has been mixed, recently Balboni et al. (2020) offered strong support for the critical asset threshold in an S-shaped savings function in Bangladesh thus confirming the existence of a poverty trap mainly driven by individuals' circumstances and lack of opportunities.

[9] The literature usually refers to it as the Micawber frontier, a term first used by (Lipton 1995, p. 113) —in reference to the character W. Micawber in Dickens's David Copperfield novel— to distinguish those individuals who are able to engage in paths of accumulation from those who are not.

$$\lambda_{it}(t) = \lim_{\Delta t \to 0} \frac{Pr(t \leq T < t + \Delta t | T \geq t)}{\Delta t} \quad (1)$$

which can be estimated through well-known functional forms such as logit or probit functions. However, if the likelihood of poverty persistence also depends on observable characteristics and other time varying factors captured by a set of covariates $\boldsymbol{X}_i(t)$, then the hazard function in expression (1) can be rewritten as $\lambda_{it}[t, \boldsymbol{X}_i(t)]$. Proportional hazard models, in which covariates are multiplicatively related to the hazard rate, define the above function in the following way:

$$\lambda_{it}[t, \boldsymbol{X}_i(t)] = \lambda_0(t) \cdot exp[\boldsymbol{\beta} \boldsymbol{X}_i(t)] \quad (2)$$

where $\lambda_0(t)$ denotes the underlying baseline hazard function and $\boldsymbol{\beta}$ the effect parameters. If one of the factors affecting a household's income-based poverty status *today* is whether the household is *also* poor according to a multidimensional indicator, then the $\boldsymbol{\beta}$ corresponding to that factor would give the extent to which, holding everything else fixed, non-monetary multidimensional poverty is associated to persistence in income poverty *tomorrow*.

4. Empirical approach

4.1. Data

To test its conjectures, this paper draws on longitudinal data for Chile, Mexico, and Peru. Three waves of survey data are used in each country—spanning a total period of ten years in Chile and Mexico and a period of four years in Peru. Details of each country's survey are provided below and summarized in Table 1.

For Chile, the data come from the longitudinal version of the Socioeconomic Characterization Survey (CASEN Panel) for the years 1996, 2001 and 2006. The first round covers a random sub-sample of 5,210 households taken from the cross-section version of the CASEN survey in that year and is representative of four regions of the country concentrating 60% of the total population; around 3,790 of the baseline households were reinterviewed in 2001, and close to 3,130 of these were followed in 2006. These figures imply attrition rates of approximately 27% between 1996 and 2001 and 40% between 1996 and 2006. In order to correct for potential attrition bias, sample weights were adjusted for longitudinal consistency through logistic methods based on observed determinants of attrition (Bendezú et al. 2007).

For Mexico, the data come from the nationally representative sample of the Mexican Family Life Survey (MxFLS). The first round was collected in 2002 and covered almost 8,440 households, of which 7,494 were surveyed in the second round of 2005-6 (2006 hereafter), and 6,767 were also observed by the third round collected during 2009-12 (2012 hereafter). These figures imply attrition rates of, respectively, 11.2% and 19.8% in comparison to the baseline. No correction for attrition was carried out as the loss of observations was not selective and attrition rates, at less than 20%, were relatively low for typical longitudinal datasets.

For Peru, the data come from a nationally representative longitudinal version of the National Household Survey (ENAHO Panel) collected each year over 2002-06. The initial sample covered almost 6,260 households and ranged from around 4,200 to almost 6,800 households in the following years, thus resulting in an unbalanced panel. As this implies an important reduction in the number of households that were surveyed each year, the analysis is restricted to 5,092 households interviewed in both 2002 and 2006 and to 5,081 households found in 2002-04-06 for attrition rates of about 19% relative to the baseline. No correction for attrition was carried out for the same reason as stated in the case of Mexico.

Table 1. Summary of panel data sources: Chile, Mexico, Peru

	Chile	**Mexico**	**Peru**
Survey name	Socioeconomic Characterization Survey (CASEN Panel)	Mexican Family Life Survey (MxFLS).	National Household Survey (ENAHO Panel)
Total survey duration	10 years	10 years	4 years
Survey years	1996, 2001, 2006	2002, 2006, 2012	2002, 2004, 2006
Attrition rate	Round 1-2: 27.3%, Round 1-3: 40.3% (Adjusted for attrition)	Round 1-2: 11.2%, Round 1-3: 19.8% (Not adjusted for attrition)	Round 1-2: 18.7% Round 1-3: 18.8% (Not adjusted for attrition)
Representativity	4 regions of the country, concentrating 60% of the total population	Nationally representative	Nationally representative

4.2. Strategy

The empirical strategy for testing these conjectures comprises two stages. In the first stage, two indicators of households' poverty status are computed in each round of the surveys: income poverty and multidimensional poverty. In the second stage of the analysis these poverty

statuses are used as explanatory variables in a probabilistic model estimating the likelihood of being income poor at the end of the time period.

First stage

In this stage, the survey data is used to compute households' income poverty status and multidimensional poverty status. This allows for the classification of households in each wave of the longitudinal survey into the four poverty statuses shown previously in Figure 1: (1) households that are both income poor and multidimensionally poor (arguably regarded as the chronic poor conditional on the two conjectures being true); (2) households that are multidimensionally poor but not income poor; (3) households that are income poor but not multidimensionally poor; and (4) households that are non-poor under both approaches.

The identification of a household i as income poor follows the standard condition $y_i \leq z$; that is, a household is poor if its per capita income y_i is at or below a poverty line z whose value equals the typical international standard across Latin American countries: \$5.50-a-day per person (2011 PPP). The identification of a household as multidimensionally poor, on the other hand, is based on the counting method of Alkire and Foster (2011). This method first identifies whether a household is deprived in any of the d dimensions considered in the analysis. This analysis looks at 5 dimensions (overcrowding, dwelling's basic services, quality of dwelling's building materials, basic education, and health insurance) using a subset of 9-10 indicators (depending on the country) to measure deprivation. It then categorizes a household as multidimensionally poor if the total number of dimensions that it is deprived in is greater than the threshold k (with $k = 1 \ldots d$). In this analysis, the threshold k is set to 2; in other words, a household is considered to be multidimensionally poor if it is deprived in at least two of the five dimensions. Table 2 summarizes the measures used to identify households as income poor or multidimensionally poor, noting country-specific variants where relevant. Note that robustness checks for alternative poverty lines (\$3.20-a-day per person income poverty line and $k = 3$ multidimensional poverty threshold) have been conducted and a comparative table of effects is included at the end of the results section and in the annex.

Table 2: Summary of poverty measures used: Income poverty and multidimensional poverty

Income poverty
Poor if income is ≤ \$5.50-a-day per person (2011 PPP)

Multidimensional poverty
Poor if deprived in ≥ 2 of out 5 dimensions 5 Dimensions • *Overcrowding*: Deprived if number of household members per room > 2.5 • *Dwelling's basic services*: Deprived if no access to either running water, sewage network, or electricity (or uses noxious fuels for cooking in the case of Mexico) • *Quality of dwelling's building materials*: Deprived if floor, ceiling, or walls are of poor quality • *Basic education:* Deprived if the head did not complete primary education • *Health insurance:* Deprived if no household member is covered by any health services (Mexico and Peru) or deprived if household members are enrolled in the public health subsystem rather than the private system (Chile[10])

Second stage

In this stage, the data on households' poverty statuses across time is used to test conjectures 1 and 2 through a probabilistic model.

To test conjecture 1, the probability of a household i being income poor in $t + \Delta t$ is given by the probit specification

$$Pr(p_{it+\Delta t} = 1|\boldsymbol{X}_{it}, \boldsymbol{Z}_{it}) = \Phi(\alpha + \boldsymbol{\beta}\boldsymbol{X}_{it} + \boldsymbol{\delta}\boldsymbol{Z}_{it}) \quad (3)$$

where $p_{it+\Delta t}$ is the dependent variable taking on the value 1 if the household i is income poor in $t + \Delta t$, and 0 otherwise; $\boldsymbol{X}_{it}$ is a vector of the four poverty statuses as observed at the initial point in time t; $\boldsymbol{Z}_{it}$ is a vector of controls that are not part of the multidimensional poverty status and include indicators in t such as household head's age, sex, marital status, labor market characteristics, and regional and urban-rural location, as well as time-varying factors in the interval $[t, t + \Delta t)$ such as the incidence of health and economic shocks and changes in the household size and in the number of members engaged in work; $\boldsymbol{\beta}$ and $\boldsymbol{\delta}$ are the model parameters, with $\boldsymbol{\beta}$ being the parameters of interest; and, α is a constant term and Φ is the cumulative distribution function for the normal distribution.

Testing conjecture 2 requires a slight modification of the model in equation (3) to allow for the inclusion of an additional point in time. In particular, the dependent variable takes on the value 1 if the household i is identified as income poor in the last round of each longitudinal survey,

[10] In Chile, where health coverage is universal, the indicator is based on whether household members are enrolled in the public health subsystem which for the period under study was characterized by rationing of and low-quality services —as opposed to the private subsystem for higher-income households (Bitrán 2013).

and 0 otherwise, whereas the vector of households' past poverty statuses now considers the following categories derived from the main diagonal of a transition matrix of the four poverty statuses between the first and second rounds of each survey: income poor and multidimensionally poor in both rounds; multidimensionally poor but not income poor in both rounds; income poor but not multidimensionally poor in both rounds; and, non-poor under both income-based and multidimensional approaches in both rounds.

In the testing of both conjectures, two types of estimations of the model in equation (3) are calculated. First, we estimate the marginal effects of being income poor at the end of the period, using several characteristics and the household's past poverty status (using their initial poverty status for conjecture 1, and their persistent poverty status for conjecture 2)—and then show the pairwise comparison of predictive margins for initial experience of income poverty only vis-à-vis income and multidimensional poverty. Second, we estimate the levels and changes in probabilities of being income poor at the end of the period by changing the poverty statuses of households (again, using their initial poverty status for conjecture 1, and their persistent poverty status for conjecture 2) vis-à-vis a base model that characterizes the reference household in a specific way.

5. Results

5.1 Stage 1: Poverty status and transitions over time

The estimates of the share of households in each of the poverty statuses represented in Figure 1 above are summarized in Table 3. Focusing on the two relevant statuses for the testing of conjectures 1 and 2, viz. households that are both income poor and multidimensionally poor and those that are income poor but not multidimensionally poor, the data reveals the following trends. In the four Chilean regions for which the survey is representative, the share of households that experience both types of poverty halved between 1996 and 2006, from 15.5% to 7.6%, whereas the share of those living only in income poverty declined by 2 percentage points, from 8.4% to 6.2%, over the same period. These changes are consistent with the improvement in incomes during those years —for instance, per capita GDP rose by 4% annually over 1991-2005 (Schmidt-Hebbel 2006)— and drove the share of better off households (those that are out of any type of poverty) to almost two thirds by 2006. In Mexico, the percentage of income and multidimensionally poor households also reduced over the period

under analysis, but such a decline was modest and only evident during the second half, from 41% in 2006 to 35% in 2012. Contrary to the trend observed in Chile, the main driver of this change seems to be related with a noticeable improvement in the non-monetary indicators; yet, a simultaneous worsening in the income poverty indicator occurred thus leaving the share of better off households virtually unchanged at 29% over a decade. Finally, in the case of Peru, the share of income and multidimensionally poor declined by 7 percentage points during the period, from above 37% in both 2002 and 2004 to 30.6% in 2006, and such change was associated with a relative improvement in both monetary and non-monetary indicators, thus pushing the share of non-poor households upwards from 31-34% to almost 40% by 2006.

Table 3: Distribution of households by poverty status, Chile, Mexico and Peru (%)

	Chile			Mexico			Peru		
	1996	**2001**	**2006**	**2002**	**2006**	**2012**	**2002**	**2004**	**2006**
Income and multidimensionally poor	15.5	13.4	7.6	40.0	41.3	35.0	37.2	37.6	30.6
Multidimensionally poor only	19.6	20.5	25.0	13.9	11.5	9.2	19.9	24.4	21.4
Income poor only	8.4	9.0	6.2	17.1	19.1	26.2	9.1	7.2	8.3
Better off	56.5	57.1	61.2	29.0	28.2	29.6	33.9	30.9	39.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Income poor, total	24.1	22.5	14.2	57.2	60.5	61.3	46.1	44.5	38.7
Multidimensionally poor, total	35.1	33.9	32.5	55.9	55.0	44.7	57.0	61.9	52.0

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Cross-sectional estimates.

Table 4 presents the intertemporal transitions across these poverty statuses. Focusing on the panels a, the data for Chile reveal that the share of households that remained as income and multidimensionally poor was very low relative to the other two countries, reaching 7.6% over 1996-2001, and just under 4% of total households in both 2001-06 and 1996-2006. Looking at the three waves of the longitudinal survey, only 2.7% of the Chilean households experienced income and multidimensional poverty simultaneously. In both Mexico and Peru, by contrast, persistence of the simultaneous experience of income and multidimensional poverty affected approximately a quarter of the total households, regardless of whether two or three rounds of data are employed. In terms of the share of households living in income poverty only, the intertemporal persistence of this poverty status affected less than 2% of Chilean households in both 1996-2001 and 2001-06, about 1% in the period 1996-2006, and just 0.3% if considering the three waves of data. In the case of Mexico, persistence of the same poverty status affected just under 7% of total households in each of the 2-year periods, and 2.8% during 2002-06-12, whereas in Peru the corresponding share affected 2.3% over 2002-06 and 0.9% during 2002-04-06.

Table 4: Dynamics across households' poverty statuses, Chile, Mexico and Peru (% of total households)

Chile				
	1996-2001	**2001-06**	**1996-2006**	**1996-2001-06**
	a. Transition matrix for each period			
Always income and multidimensionally poor	7.6	3.8	3.5	2.7
Always multidimensionally poor but income non-poor	11.5	14.1	12.1	9.5
Always income poor but non-poor multidimensionally	1.9	1.2	1.0	0.3
Never poor	46.0	50.2	38.1	41.6
Mobile households	33.1	30.8	45.4	46.0
Total	100.0	100.0	100.0	100.0
	b. Income poor at the end of each period			
Income and multidimensionally poor in the first (and second) round(s)	9.1	5.2	5.4	3.5
Income poor only in the first (and second) round(s)	3.0	2.3	1.7	0.5
Mexico				
	2002-06	**2006-12**	**2002-12**	**2002-06-12**
	a. Transition matrix for each period			
Always income and multidimensionally poor	26.9	25.7	25.5	20.2
Always multidimensionally poor but income non-poor	4.8	2.8	2.7	1.5
Always income poor but non-poor multidimensionally	6.7	6.8	6.9	2.8
Never poor	19.3	16.2	15.2	11.8
Mobile households	42.4	48.5	49.7	63.7
Total	100.0	100.0	100.0	100.0
	b. Income poor at the end of each period			
Income and multidimensionally poor in the first (and second) round(s)	31.6	33.0	33.7	24.4
Income poor only in the first (and second) round(s)	9.8	10.7	9.9	3.9
Peru				
			2002-06	**2002-04-06**
			a. Transition matrix for each period	
Always income and multidimensionally poor			25.2	23.0
Always multidimensionally poor but income non-poor			9.4	6.9
Always income poor but non-poor multidimensionally			2.3	0.9
Never poor			25.1	19.1
Mobile households			38.0	50.2
Total			100.0	100.0
			b. Income poor at the end of each period	
Income and multidimensionally poor in the first (and second) round(s)			28.0	24.6
Income poor only in the first (and second) round(s)			4.3	1.1

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.

The figures above are consistent with the cross-tabulations shown in the panels b, although the shares in the latter are obviously slightly higher because the income poverty status at the end of each period does not distinguish whether income poor households experience this poverty status only or they also experience multidimensional poverty. Additional noticeable results from the transition matrices are, on one hand, the magnitude of the share of mobile households (those that experience transitions across the different poverty statuses), which tends to be relatively high across the three countries, ranging between a third and above half the total households, and, on the other hand, the cross-country heterogeneity in the percentage of households that never experience any type of poverty over the periods under study: 40-50% in Chile, 20-25% in Peru, and 10-20% in Mexico.

5.2 Testing conjecture 1

This section discusses the results of the estimations to test conjecture 1 (that households that are both income poor and multidimensionally poor are more likely to remain income poor than households that are income poor only).

The first set of results shows the estimations from the model for each country across a five-year and ten-year period, showing the likelihood of multidimensionally poor, income poor, and multidimensionally poor & income poor households becoming income poor by the end of the period compared to non-poor households. Three specifications of the model are estimated for each country and period to verify consistency and robustness of the parameters of interest $\boldsymbol{\beta}$. The first specification uses the vector of households' past poverty status $\boldsymbol{X}_{it}$ as the only explanatory variables, the second one adds controls for geographical location in t and time-varying factors in the interval $[t, t + \Delta t)$, and the third specification adds the main characteristics of the household head in t. A summary of results for the parameters of interest is shown in Tables 5-6 below, while results for the full set of specifications are presented in the annex. Two emerging messages from these results are worth noticing. First, households that initially experienced both income poverty and multidimensional poverty were more likely to remain as income poor at the end of the period than those that were initially income poor only. This result holds in all three countries, although the increase in likelihood is particularly large in Mexico and Peru. Second, in all three countries the size and statistical significance of the parameters, at the 1% level, are both robust to the inclusion of controls and consistent regardless of period length, either about five years (Table 5) or a decade (Table 6).

Table 5. Probit regressions of income poverty at the end of period (half-decade) on past poverty statuses in Chile, Mexico and Peru

	Income poor at end of period									
	Chile 1996-2001		Chile 2001-6		Mexico 2002-6		Mexico 2006-12		Peru 2002-6	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Poverty status at initial year										
Non-monetary multidimensionally poor	0.646***	0.679***	0.485***	0.209	0.512***	0.329***	0.483***	0.323***	0.772***	0.438***
	(0.122)	(0.155)	(0.111)	(0.173)	(0.100)	(0.113)	(0.105)	(0.122)	(0.081)	(0.099)
Income poor	1.164***	1.110***	1.115***	1.010***	0.697***	0.727***	0.505***	0.519***	1.049***	0.898***
	(0.138)	(0.159)	(0.156)	(0.170)	(0.100)	(0.116)	(0.097)	(0.115)	(0.095)	(0.115)
Income poor and non-monetary multidimensionally poor	1.579***	1.291***	1.507***	1.332***	1.431***	1.206***	1.218***	1.055***	2.021***	1.600***
	(0.111)	(0.162)	(0.110)	(0.174)	(0.083)	(0.104)	(0.082)	(0.112)	(0.070)	(0.098)
Geographic controls	✗	✓	✗	✓	✗	✓	✗	✓	✗	✓
Time-varying controls	✗	✓	✗	✓	✗	✓	✗	✓	✗	✓
Head's characteristics	✗	✓	✗	✓	✗	✓	✗	✓	✗	✓
Constant	-1.443***	-0.933	-1.728***	-2.785***	-0.535***	0.788*	-0.316***	0.464	-1.275***	0.258
	(0.076)	(0.789)	(0.079)	(0.878)	(0.064)	(0.464)	(0.063)	(0.524)	(0.055)	(0.381)
Observations	3,691	2,481	3,074	1,934	3,995	3,631	3,915	3,350	3,739	3,226
Pseudo R^2	0.179	0.281	0.170	0.302	0.146	0.217	0.110	0.177	0.278	0.358

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: The reference category corresponds to non-poverty at the initial year. Geographic controls and initial characteristics of the household head are for the initial year of each country-period; time-varying controls refer to the incidence of health or economic shocks and changes in both the household size and in the number of household members engaged in work over each period. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Probit regressions of income poverty at the end of a decade on past poverty statuses in Chile and Mexico

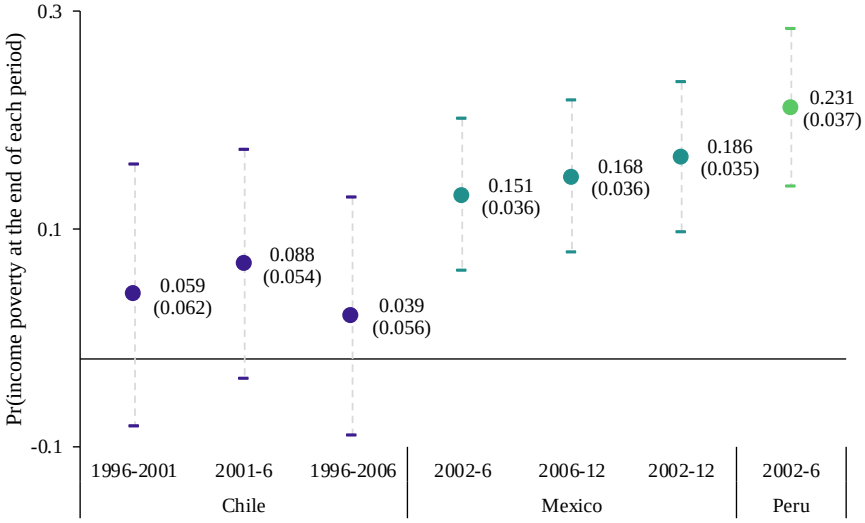
	Income poor at end of period			
	Chile 1996-2006		Mexico 2002-12	
	(a)	(b)	(a)	(b)
Poverty status at initial year				
Non-monetary multidimensionally poor	0.573***	0.241	0.527***	0.294**
	(0.141)	(0.184)	(0.105)	(0.124)
Income poor	0.984***	1.041***	0.488***	0.506***
	(0.168)	(0.214)	(0.103)	(0.118)
Income poor and non-monetary multidimensionally poor	1.414***	1.182***	1.174***	1.113***
	(0.125)	(0.186)	(0.084)	(0.105)
Geographic controls	✗	✓	✗	✓
Time-varying controls	✗	✓	✗	✓
Head's characteristics	✗	✓	✗	✓
Constant	-1.824***	-0.463	-0.303***	-0.135
	(0.095)	(1.035)	(0.067)	(0.443)
Observations	2,586	1,827	4,074	3,672
Pseudo R^2	0.154	0.260	0.102	0.191

Source: Authors' estimates based on CASEN Panel and Mexican Family Life Survey.
Notes: The reference category corresponds to non-poverty at the initial year. Geographic controls and initial characteristics of the household head are for the initial year of each country-period; time-varying controls refer to the incidence of health or economic shocks and changes in both the household size and in the number of household members engaged in work over each period. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Note that in these results the magnitude of the coefficients is computed relative to non-poor households at the initial year, which were used as the reference poverty status in the probit regressions. Thus, in order disentangle the effect that the initial experience of both income poverty and multidimensional poverty exerts on the persistence of income poverty at the end of each period, vis-à-vis the initial experience of income poverty only, Figure 2 plots the pairwise comparison of predictive margins between these two initial poverty statuses based on the full specifications in columns (b) of Tables 5-6 above. In Mexico and Peru, the results provide additional statistically significant support to conjecture 1 —suggesting an increased likelihood of remaining in income poverty of between 15 and 23%. The results for Mexico suggest that, on average, households' simultaneous experience of income poverty and multidimensional poverty in the initial year would increase their likelihood of remaining in income poverty by between 15% and 17% over 2002-6 and 2006-12, respectively, and by almost 19% over the decade 2002-12 (significant at the 1% level in all cases), in comparison to households that are initially income poor only. The corresponding effect in Peru, also significant at the 1% level, reaches 23% over 2002-6. In Chile, by contrast, the average marginal effects of being initially both income poor and multidimensionally poor on the

persistence of income poverty are statistically indistinguishable from zero in comparison to being initially income poor only.

Figure 2. Average marginal effects of the initial experience of both income poverty and multidimensional poverty on persistence of income poverty in Chile, Mexico and Peru (effects with respect to the initial experience of income poverty only)



Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Vertical lines indicate 95% confidence intervals. Delta-method standard errors in parentheses.

Although revealing, the predictive margins above take households' initial and time-varying characteristics at their mean values, which at least in the case of binary indicators can be somewhat misleading. In order to get a clearer picture of the effect that the initial simultaneous experience of both types of poverty exerts on income poverty persistence, we also estimate the marginal effects for a reference household with well-defined characteristics in each country. The characteristics used to define the reference household are ones associated with a lower likelihood of being in income poverty in the probit regressions (note that the conclusions hold regardless of whether the reference household is defined either ad hoc by setting a particular profile or statistically by taking the median values of the controls included in the regressions as representative of the typical household). Following this approach, the reference household is defined by their initial poverty status (neither income poor nor multidimensionally poor in the initial year of each period, household head's gender (male), marital status (married), and occupation; experience of shocks (no household member experienced any adverse shocks that required dissaving and substantial expenditure over the analyzed period); and geographic location (urban setting). Country specific variations of these characteristics are summarized in Table 7. The continuous variables measuring household head's age and the changes in the

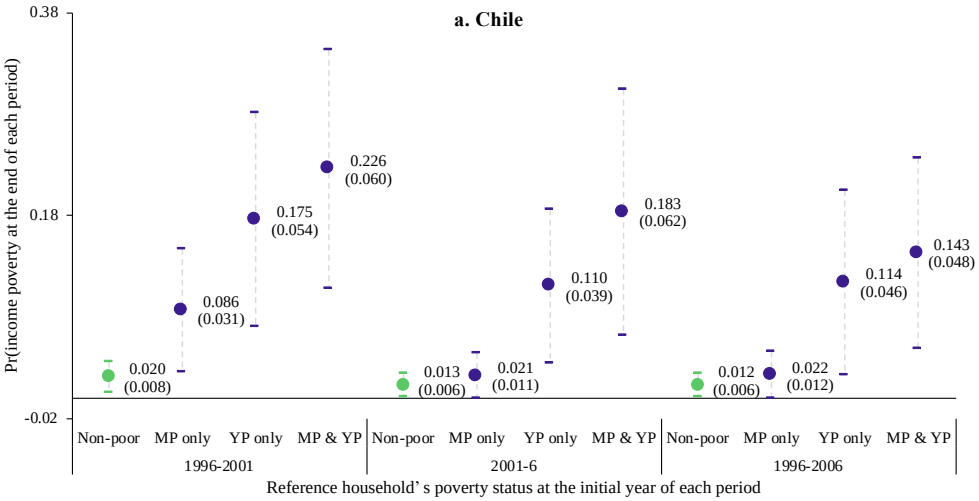
household size and in the number of members working are held at the sample mean in the three countries.

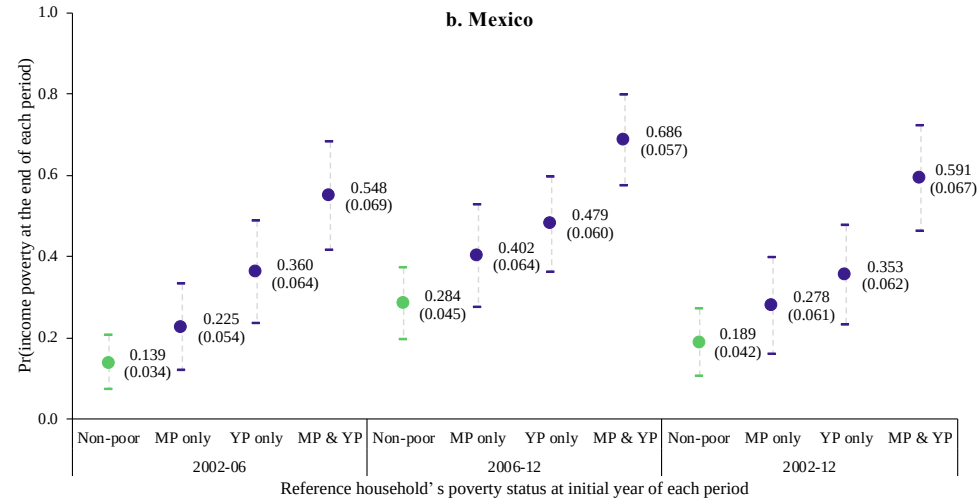
Table 7: Summary of reference household characteristics

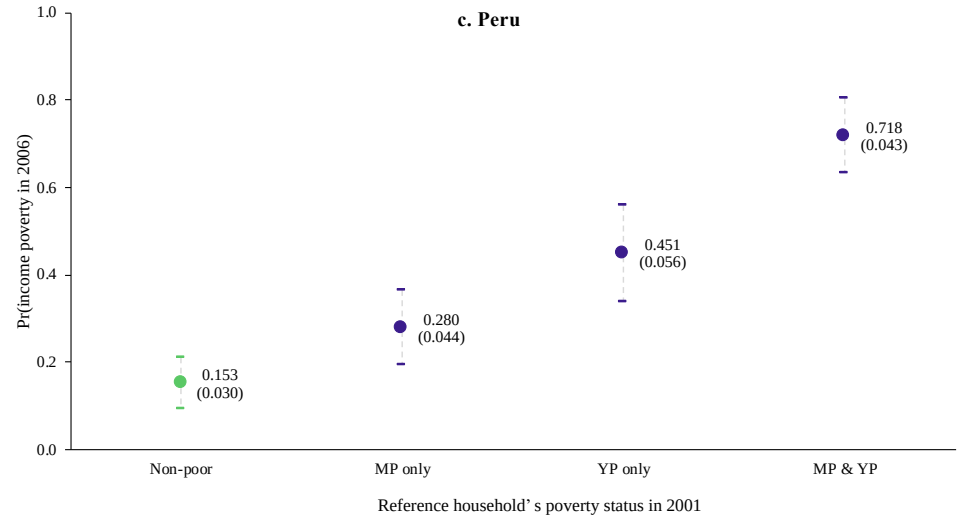
	Chile	Mexico	Peru
Poverty status	Neither income poor nor multidimensionally poor in the initial year	Neither income poor nor multidimensionally poor in the initial year	Neither income poor nor multidimensionally poor in the initial year
Household head	Married male, performs clerical activities	Married male, performs clerical activities, non-indigenous	Married male, works in the hospitality sector
Experience of shocks	No adverse shock (Types of shocks considered: health-related)	No adverse shock (Types of shocks considered: health related, bankruptcy, unemployment, and the loss of assets due to climate-related events)	No adverse shock (Types of shocks considered: health-related)
Geographic location	Urban setting in the metropolitan area of Santiago	Urban setting in the northwest region of Mexico	Urban setting in the metropolitan area of Lima

The results from this analysis for each time period and each country are shown in Figure 3 and elaborated in the text below. The green dot shows the likelihood of the reference household falling into income poverty at the end of the period, and the purple dots show the likelihood of the reference household falling into income poverty at the end of the period if its initial poverty status were varied (if it were initially multidimensionally poor only, income poor only, or multidimensionally and income poor). Overall, we see that across all countries and time periods, the results suggest an initial poverty status of multidimensionally poor & income poor had the highest likelihood of becoming income poor by the end of the period compared to the reference household. In comparison to an initial poverty status of income poor only, the increase in probability was particularly high in Mexico and Peru (roughly double in both cases) and lower in Chile.

Figure 3. Marginal effects of varying initial poverty statuses of a reference household on its probability of falling into or staying in income poverty by the end of each period in Chile, Mexico, and Peru







Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Vertical lines indicate 95% confidence intervals. Delta-method standard errors in parentheses. MP refers to multidimensional poverty only, YP to income poverty only, and MP&YP to multidimensional and income poverty.

In Chile, for the respective time periods 1996-2001, 2001-06, and 1996-2006 the reference household is estimated to have a 2%, 1.3%, and 1.2% probability of becoming income poor by the end of the period (significant at the 5% level). If the same reference household were to initially be *income poor* only, holding everything else fixed its probability of becoming income poor by the end of the period would rise to 17.5%, 11%, and 11.4% —an increase of 15.5, 9.7, and 10.2 percentage points compared to baseline. Likewise, if it were to be initially *income poor and multidimensionally poor*, the probability would rise to 22.6%, 18.3%, and 14.3%—an increase of 20.6, 17, and 13.1 percentage points[11] compared to baseline. Note that the magnitude of this latter probability increase is only slightly higher than the probability increase resulting from the initial experience of income poverty only (just 2.9 percentage points higher during the period 1996-2006). However, the increase in the probabilities of income poverty persistence exerted by the simultaneous experience of both types of poverty at the beginning of each period is sizeable, is significant at the 1% level in all cases and gives statistical support to conjecture 1.

In Mexico, for the respective time periods 2002-06, 2006-12, and 2002-12 the reference household is estimated to have a 13.9%, 28.4%, and 18.9% probability of becoming income poor by the end of the period (significant at the 1% level). If the same reference household were to initially be *income poor* only, holding everything else fixed its probability of becoming income poor by the end of the period would rise to 36%, 47.9%, and 35.3%—an increase of 22.1, 19.5, and 16.4 percentage points compared to baseline. Likewise, if it were to be initially *income poor and multidimensionally poor*, the probability would rise to 54.8%, 68.6%, and 59.1% —an increase of 40.9, 40.2, and 40.2 percentage points compared to baseline. Note that this latter probability increase is roughly double the probability increase resulting from the initial experience of income poverty only. These results, significant at the 1% level, confirm conjecture 1.

In Peru, for period 2002-06 the reference household is estimated to have a 15.3% probability of becoming income poor by the end of the period (significant at the 1% level). If the same reference household were to initially be *income poor* only, holding everything else fixed its probability of becoming income poor by the end of the period would rise to 45.1% —an

[11]Note that the declining trend in the probabilities of income poverty persistence towards 2006 coincides with a period of relatively high growth and significant improvements in the living conditions of the Chilean population, well documented elsewhere, which may help to understand this trend —and also why the initial condition of multidimensional poverty only is not statistically different from the non-poverty condition in both 2001-06 and 1996-2006 for the reference household.

increase of 29.8 percentage points compared to baseline. Likewise, if it were to be initially *income poor and multidimensionally poor*, the probability would increase to 71.8% —an increase of 56.5 percentage points compared to baseline. This is a particularly high increase compared to baseline and is almost double the probability increase resulting from the initial experience of income poverty only. These results, significant at the 1% level, also confirm conjecture 1.

5.3 Testing conjecture 2

Testing the conjecture 2 (that the longer households remain in both income and multidimensional poverty, the more likely they are to remain in income poverty in the future) requires the addition of a third period to estimate the parameters $\boldsymbol{\beta}$ in a *duration* version of the model in equation (3). As noted at the end of section 4.2, the explanatory variables for the past poverty statuses are based on households' persistence in such statuses over the first two rounds of each longitudinal survey. Table 8 summarizes the results of this model for each country and reveals that the coefficients for duration in both income poverty and multidimensional poverty are significant at the 1% level, are between 1.5 and 2 times larger than the corresponding coefficients for duration in income poverty only, and are robust to the inclusion of extra controls. Moreover, the size of such coefficients is also larger, in a non-trivial magnitude, than the coefficients for the initial simultaneous experience of income and multidimensional poverty reported in Tables 5 and 6 above, thus suggesting that conjecture 2 could be plausibly true.

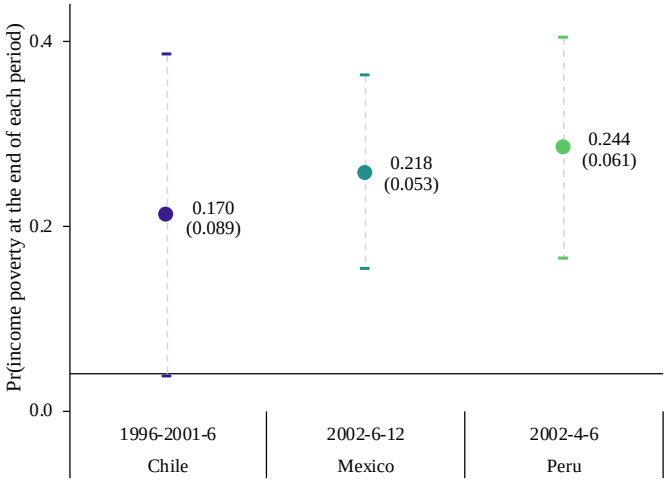
Based on the full specifications in columns (b), Figure 4 shows the magnitude of the average effects exerted by the past persistence of both income poverty and multidimensional poverty on the likelihoods of persistence in income poverty in the future, vis-à-vis the influence exerted by the past persistence of income poverty only. In Chile, the average marginal effect reaches 17%, although it is significant at the 10% level only, whereas in Mexico and Peru it reaches 22% to 24% and it is unambiguously significant at the 1% level.

Table 8. Probit regressions of income poverty at the end of period on persistent poverty statuses in the past in Chile, Mexico and Peru

	Income poor at end of period					
	Chile 1996-2001-6		Mexico 2002-6-12		Peru 2002-4-6	
	(a)	(b)	(a)	(b)	(a)	(b)
Poverty status in the first two years						
Non-monetary multidimensionally poor in both	0.503***	0.044	0.387**	0.268	0.775***	0.611***
	(0.178)	(0.309)	(0.187)	(0.203)	(0.105)	(0.135)
Income poor in both	1.301***	1.446***	0.687***	0.827***	1.595***	1.490***
	(0.252)	(0.316)	(0.178)	(0.195)	(0.161)	(0.189)
MP & YP in both	1.990***	1.966***	1.569***	1.655***	2.482***	2.248***
	(0.151)	(0.264)	(0.122)	(0.172)	(0.088)	(0.129)
Geographic controls	✗	✓	✗	✓	✗	✓
Time-varying controls	✗	✓	✗	✓	✗	✓
Head's characteristics	✗	✓	✗	✓	✗	✓
Constant	-2.052***	-0.792	-0.482***	-0.099	-1.595***	-0.418
	(0.113)	(0.977)	(0.097)	(0.696)	(0.076)	(0.481)
Observations	1,508	1,039	1,766	1,595	2,223	1,942
Pseudo R^2	0.304	0.392	0.203	0.336	0.408	0.456

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: The reference category corresponds to non-poverty in both the first and second rounds of each survey. Geographic controls and initial characteristics of the household head are for the initial year of each country-period; time-varying controls refer to the incidence of health or economic shocks and changes in both the household size and in the number of household members engaged in work over each period. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure 4. Average marginal effects of the persistence of both income poverty and multidimensional poverty on the future persistence of income poverty in Chile, Mexico and Peru (effects with respect to past experience of income poverty only)

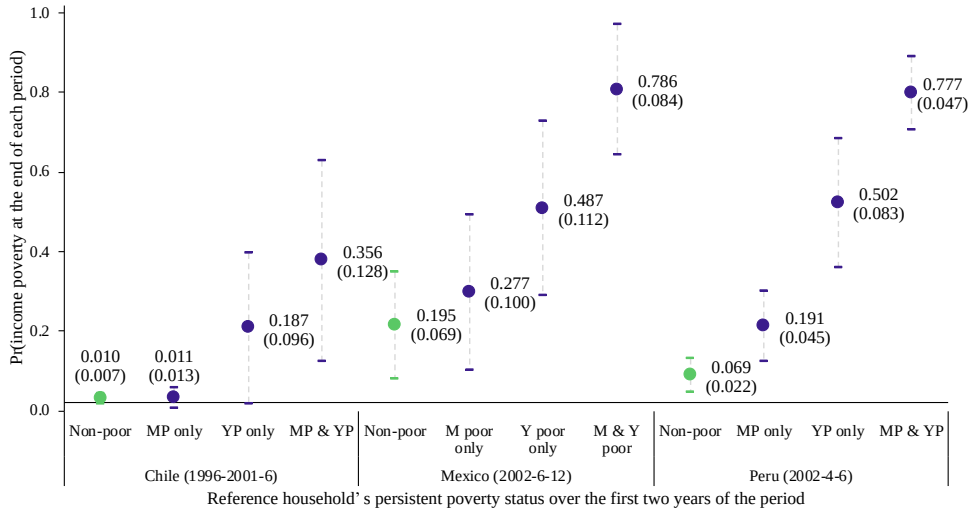


Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Vertical lines indicate 95% confidence intervals. Delta-method standard errors in parentheses.

In order to better appreciate the magnitude of these effects on the probability of income poverty persistence, we replicate the analysis that focuses on the marginal effects for the reference household defined above, with the only difference that its baseline poverty status corresponds to being consistently out of any type of poverty over the first two rounds of each longitudinal survey. The results from this analysis for each country are shown in Figure 5 and elaborated in

the text below. Overall, the changes in the magnitude of the probabilities of income poverty persistence by the end of each period as a result of the past persistence of both types of poverty is significant at the 1% level in all three countries. Moreover, the size of the marginal effect is approximately 1.5 to 2 times the size of the effects estimated for the reference household's simultaneous experience of income and multidimensional poverty in the initial year of the two-year periods analyzed in the previous subsection (see Figure 3 above). This increased magnitude of the marginal effects confirms the expectation that the longer a household is both income and multidimensionally poor the more likely such household is to remain in income poverty in the future, thus giving strong support to conjecture 2.

Figure 5. Marginal effects of past persistent poverty statuses of a reference household on its probability of falling into or staying in income poverty by the end of each period in Chile, Mexico and Peru



Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Vertical lines indicate 95% confidence intervals. Delta-method standard errors in parentheses. MP refers to multidimensional poverty only, YP to income poverty only, and MP&YP to multidimensional and income poverty.

In Chile, the likelihood that the reference household faces to become income poor by 2006, given that it has been persistently non-poor over 1996-2001, is statistically undistinguishably from zero. Holding everything else fixed, if such household had been *persistently income poor* over this period, the probability of it becoming income poor by 2006 would rise to 18.7% — an increase of around 18 percentage points compared to baseline (although this change is significant at the 10% level only). If, instead, holding everything else fixed, the reference

household had been *persistently both income poor and multidimensionally poor*, the probability would rise to 35.6% —a significant increase of almost 35 percentage points relative to the baseline (almost double the increase from persistent income poverty alone).

In Mexico, the likelihood that the reference household faces to become income poor by 2012, given that it has been persistently non-poor over 2002-2006, is 19.5% (significant at the 1% level). Holding everything else fixed, if such household had been *persistently income poor* over this period, the probability of it becoming income poor by 2006 would rise to 48.7% —an increase of 29.2 percentage points compared to baseline. If, instead, holding everything else fixed, the reference household had been *persistently both income poor and multidimensionally poor*, the probability would rise to 78.6% —an increase of 59.1 percentage points relative to the baseline (over 2.5 times the increase from persistent income poverty alone).

In Peru, the likelihood that the reference household faces to become income poor by 2006, given that it has been persistently non-poor over 2002-2004, is 6.9% (significant at the 1% level). Holding everything else fixed, if such household had been *persistently income poor* over this period, the probability of it becoming income poor by 2006 would rise to 50.2% —an increase of 43.3 percentage points compared to baseline. If, instead, holding everything else fixed, the reference household had been *persistently both income poor and multidimensionally poor*, the probability would rise to 77.7% —a dramatic increase of 70.8 percentage points relative to the baseline (over 1.5 times the increase from persistent income poverty alone).

5.4 Do conjectures 1 and 2 hold for other poverty lines?

In order to check the robustness of these results to other poverty lines, the exercise has been repeated for an income poverty line of $3.20-a-day per person (2011 PPP) and multidimensional poverty threshold of $k = 3$. In both cases, this implies an increase in the depth of poverty. A comparative table of effects from this exercise for testing conjectures 1 (panel a) and 2 (panel b) is presented in Table 9. As the results show, the two conjectures generally hold, in particular for Mexico and Peru. In Chile, the results are mixed, as relatively few households are poor under these deeper thresholds.

Table 9. Marginal effects of a reference household's past poverty statuses under different poverty lines on its probability of falling into or staying in income poverty by the end of each period; Chile, Mexico, and Peru

		a. Two-year periods					
		Chile (2001-06)		Mexico (2002-06)		Peru (2002-06)	
		$k = 2$	$k = 3$	$k = 2$	$k = 3$	$k = 2$	$k = 3$
$5.50	Non-poor	0.013**	0.013**	0.139***	0.157***	0.153***	0.169***
		(0.006)	(0.006)	(0.034)	(0.038)	(0.030)	(0.030)
	Income poor only	0.110***	0.137***	0.360***	0.413***	0.451***	0.551***
		(0.039)	(0.046)	(0.064)	(0.063)	(0.056)	(0.050)
	Income poor and M poor	0.183***	0.157***	0.548***	0.602***	0.718***	0.741***
		(0.062)	(0.057)	(0.069)	(0.072)	(0.043)	(0.044)
$3.20	Non-poor	0.003	0.003	0.035**	0.045**	0.029**	0.053***
		(0.002)	(0.002)	(0.015)	(0.018)	(0.012)	(0.017)
	Income poor only	0.052	0.072	0.095**	0.108***	0.280***	0.308***
		(0.040)	(0.044)	(0.038)	(0.038)	(0.073)	(0.063)
	Income poor and M poor	0.087*	0.090	0.178***	0.264***	0.453***	0.451***
		(0.052)	(0.056)	(0.057)	(0.072)	(0.068)	(0.069)
		b. Three-year periods					
		Chile (1996-2001-06)		**Mexico (2002-06-12)**		**Peru (2002-04-06)**	
		$k = 2$	$k = 3$	$k = 2$	$k = 3$	$k = 2$	$k = 3$
$5.50	Non-poor	0.010	0.007	0.195***	0.169***	0.069***	0.081***
		(0.007)	(0.005)	(0.069)	(0.061)	(0.022)	(0.023)
	Income poor only	0.187*	0.213**	0.487***	0.557***	0.502***	0.593***
		(0.096)	(0.082)	(0.112)	(0.100)	(0.083)	(0.063)
	Income poor and M poor	0.356***	0.358***	0.786***	0.796***	0.777***	0.779***
		(0.128)	(0.115)	(0.084)	(0.081)	(0.047)	(0.051)
$3.20	Non-poor	n.e.	0.001	0.175***	0.146***	0.015*	0.032**
		n.e.	(0.001)	(0.067)	(0.056)	(0.009)	(0.014)
	Income poor only	n.e.	0.081	0.676***	0.599***	0.260	0.367***
		n.e.	(0.089)	(0.134)	(0.116)	(0.159)	(0.093)
	Income poor and M poor	n.e.	0.165	0.661***	0.611***	0.512***	0.521***
		n.e.	(0.119)	(0.112)	(0.119)	(0.083)	(0.087)

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Delta-method standard errors in parentheses. For the three-year periods in panel b, the past poverty statuses correspond to those observed persistently in the first two waves of each longitudinal survey. n.e. indicates that results are not estimable due to the reduced number of observations.
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

This paper presented an alternative method for identifying chronic poverty in the absence of panel data. It argued for a second-best solution of using of cross-sectional data to identify the chronic poor through the proxy indicator of households that are both income poor and multidimensionally poor, and tested it using a proportional hazard model. The empirical results for Chile, Mexico, and Peru presented here provide robust and significant evidence for the two conjectures put forth by the paper: that households that are classified as both income poor *and* multidimensionally poor have a higher likelihood of remaining in income poverty in the future, compared to households that are initially income poor only; and that the longer households remain in both income and multidimensional poverty, the more likely they are to remain in income poverty in the future. For both conjectures the results are consistent across countries—

though for conjecture 1, in Mexico and Peru the size of effects appears to be larger and more robust to other poverty lines than in Chile. There are also important policy lessons to be learned from these results. First, if the underlying of objective of "ending poverty" is actually to end *chronic* poverty, the results here suggest a fundamental role for policies that target both non-monetary multidimensional aspect of poverty (such as education, health, and housing) in addition to monetary aspects of poverty. Second, while this approach allows for the identification and targeting of the chronic poor in a way that other approaches such as synthetic panels do not, as a proxy indicator it will never offer a fully precise measure. Subsequently, there is scope for both inclusion and exclusion errors in the context of policy targeting. While it is, of course, an imperfect measure, the results suggest that when life doesn't give you panel data, you can still make cross-sectional data work to identify chronic poverty and target policy interventions.

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Annex

Table A1. Probit regressions of income poverty at the end of period on past poverty statuses and extra controls, Chile

	1996-2001			2001-6			1996-2006		
	Income poor at end of period			Income poor at end of period			Income poor at end of period		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Non-poor at initial year [reference category]									
Multidimensionally (M) poor at initial year	0.646***	0.579***	0.679***	0.485***	0.350***	0.209	0.573***	0.405***	0.241
	(0.122)	(0.132)	(0.155)	(0.111)	(0.118)	(0.173)	(0.141)	(0.148)	(0.184)
Income (Y) poor at initial year	1.164***	1.264***	1.110***	1.115***	1.244***	1.010***	0.984***	1.214***	1.041***
	(0.138)	(0.150)	(0.159)	(0.156)	(0.161)	(0.170)	(0.168)	(0.182)	(0.214)
M & Y poor at initial year	1.579***	1.657***	1.291***	1.507***	1.592***	1.332***	1.414***	1.449***	1.182***
	(0.111)	(0.133)	(0.162)	(0.110)	(0.125)	(0.174)	(0.125)	(0.150)	(0.186)
Region: VIII [reference category]									
Region: III		0.223	0.290*		0.413**	0.406		0.518***	0.506**
		(0.154)	(0.176)		(0.196)	(0.256)		(0.191)	(0.235)
Region: VII		0.151	0.254		0.241	0.121		0.297	0.205
		(0.160)	(0.187)		(0.188)	(0.246)		(0.192)	(0.232)
Region: Metropolitana		-0.026	0.048		0.029	0.106		0.147	0.197
		(0.150)	(0.167)		(0.190)	(0.250)		(0.190)	(0.223)
Urban		-0.143	-0.131		-0.190*	-0.137		-0.289**	-0.240
		(0.112)	(0.155)		(0.113)	(0.157)		(0.126)	(0.171)
Incidence of health shocks		-0.000	0.288***		0.086	0.148		0.062	0.212*
		(0.093)	(0.109)		(0.090)	(0.110)		(0.108)	(0.126)
Change in number of members working		-0.319***	-0.405***		-0.368***	-0.534***		-0.325***	-0.408***
		(0.050)	(0.064)		(0.058)	(0.075)		(0.057)	(0.061)
Change in household size		0.288***	0.254***		0.220***	0.249***		0.230***	0.215***
		(0.038)	(0.047)		(0.041)	(0.063)		(0.042)	(0.052)
Head's age			0.026			0.048			-0.013
			(0.031)			(0.035)			(0.042)
Head's age squared			-0.001*			-0.001*			-0.000
			(0.000)			(0.000)			(0.000)
Head is male			0.109			0.396*			-0.208
			(0.256)			(0.203)			(0.190)
Head is cohabiting [reference category]									
Head is married			-0.338**			0.276*			-0.328*
			(0.168)			(0.163)			(0.173)
Head is single			-0.804***			-0.026			-0.576**
			(0.250)			(0.223)			(0.254)
Head is farmer [reference category]									
Head is unskilled manual			-0.100			-0.260			-0.045
			(0.169)			(0.183)			(0.185)
Head is skilled manual			-0.453**			-0.460**			-0.425*
			(0.223)			(0.224)			(0.225)
Head is self-employed			-0.278			-0.017			-0.394**
			(0.183)			(0.218)			(0.194)
Head is clerical worker			-0.712***			-0.730***			-0.533**
			(0.204)			(0.232)			(0.218)
Head is professional or manager			-0.720***			-1.870***			-0.607*
			(0.259)			(0.543)			(0.350)
Constant	-1.443***	-1.431***	-0.933	-1.728***	-1.744***	-2.785***	-1.824***	-1.847***	-0.463
	(0.076)	(0.192)	(0.789)	(0.079)	(0.220)	(0.878)	(0.095)	(0.253)	(1.035)
Observations	3,691	3,691	2,481	3,074	3,074	1,934	2,586	2,586	1,827
Pseudo R^2	0.179	0.231	0.281	0.170	0.239	0.302	0.154	0.223	0.260

Source: Authors' estimates based on CASEN Panel.
Notes: Geographic controls and initial characteristics of the household head are for the initial year of each period; the incidence of health shocks and changes in both the household size and in the number of household members engaged in work are considered over each period. Health shocks consider those requiring hospitalization. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A2. Probit regressions of income poverty at the end of period on past poverty statuses and extra controls, Mexico

	2002-6			2006-12			2002-12		
	Income poor at end of period			Income poor at end of period			Income poor at end of period		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Non-poor at initial year [reference category]									
Multidimensionally (M) poor at initial year	0.512***	0.485***	0.329***	0.483***	0.457***	0.323***	0.527***	0.479***	0.294**
	(0.100)	(0.105)	(0.113)	(0.105)	(0.108)	(0.122)	(0.105)	(0.114)	(0.124)
Income (Y) poor at initial year	0.697***	0.807***	0.727***	0.505***	0.634***	0.519***	0.488***	0.650***	0.506***
	(0.100)	(0.105)	(0.116)	(0.097)	(0.106)	(0.115)	(0.103)	(0.110)	(0.118)
M & Y poor at initial year	1.431***	1.429***	1.206***	1.218***	1.267***	1.055***	1.174***	1.275***	1.113***
	(0.083)	(0.093)	(0.104)	(0.082)	(0.098)	(0.112)	(0.084)	(0.093)	(0.105)
Region: South [reference category]									
Region: Centre		-0.094	-0.077		0.054	0.076		0.225**	0.262**
		(0.095)	(0.105)		(0.102)	(0.114)		(0.097)	(0.106)
Region: West		-0.056	-0.034		-0.102	-0.146		-0.025	-0.033
		(0.093)	(0.104)		(0.092)	(0.107)		(0.092)	(0.102)
Region: Northwest		-0.179**	-0.198**		-0.128	-0.166		-0.132	-0.156
		(0.088)	(0.099)		(0.088)	(0.104)		(0.088)	(0.097)
Region: Northeast		-0.216**	-0.179		-0.066	-0.051		0.058	0.127
		(0.102)	(0.115)		(0.103)	(0.122)		(0.100)	(0.111)
Semi-urban		-0.211**	-0.119		-0.072	-0.016		-0.211*	-0.128
		(0.105)	(0.116)		(0.089)	(0.101)		(0.109)	(0.117)
Urban		-0.356***	-0.219***		-0.411***	-0.270***		-0.349***	-0.198**
		(0.068)	(0.082)		(0.071)	(0.082)		(0.070)	(0.084)
Incidence of shocks		0.220***	0.241***		0.080	0.038		0.017	0.004
		(0.075)	(0.079)		(0.072)	(0.078)		(0.070)	(0.073)
Change in number of members working		-0.278***	-0.273***		-0.273***	-0.261***		-0.258***	-0.259***
		(0.034)	(0.036)		(0.035)	(0.037)		(0.031)	(0.033)
Change in household size		0.202***	0.194***		0.172***	0.160***		0.180***	0.189***
		(0.035)	(0.040)		(0.023)	(0.025)		(0.020)	(0.023)
Head is indigenous			0.207*			0.194*			0.236**
			(0.124)			(0.116)			(0.117)
Head's age			-0.023			-0.015			0.003
			(0.017)			(0.020)			(0.016)
Head's age squared			0.000			0.000			-0.000
			(0.000)			(0.000)			(0.000)
Head is male			-0.051			0.127			0.014
			(0.157)			(0.135)			(0.150)
Head is cohabiting [reference category]									
Head is married			-0.330***			0.091			-0.008
			(0.111)			(0.131)			(0.118)
Head is single			-0.340**			-0.018			-0.058
			(0.165)			(0.160)			(0.169)
Head is farmer [reference category]									
Head is unskilled manual			-0.171			-0.131			-0.219
			(0.145)			(0.153)			(0.145)
Head is skilled manual			-0.333***			-0.270***			-0.222*
			(0.115)			(0.102)			(0.118)
Head is self-employed			-0.073			0.008			-0.228
			(0.195)			(0.217)			(0.205)
Head is clerical worker			-0.653***			-0.362**			-0.595***
			(0.174)			(0.143)			(0.173)
Head is professional or manager			-0.771***			-0.692***			-0.714***
			(0.159)			(0.157)			(0.160)
Head is engaged in commerce			-0.245*			-0.033			0.001
			(0.145)			(0.140)			(0.150)
Head is engaged in army or police			-0.521***			-0.478**			-0.518***
			(0.181)			(0.202)			(0.184)
Constant	-0.535***	-0.330***	0.788*	-0.316***	-0.061	0.464	-0.303***	-0.216**	-0.135
	(0.064)	(0.107)	(0.464)	(0.063)	(0.108)	(0.524)	(0.067)	(0.110)	(0.443)
Observations	3,995	3,995	3,631	3,915	3,915	3,350	4,074	4,072	3,672
Pseudo R^2	0.146	0.197	0.217	0.110	0.171	0.177	0.102	0.170	0.191

Source: Authors' estimates based on Mexican Family Life Survey.
Notes: Geographic controls and initial characteristics of the household head are for the initial year of each period; the incidence of health or economic shocks and changes in both the household size and in the number of household members engaged in work are considered over each period. Shocks include death, illness, bankruptcy or unemployment of any household member, and the loss of dwelling, business and crop due to climate-related events. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A3. Probit regressions of income poverty at the end of period on past poverty statuses and extra controls, Peru

	Income poor in 2006		
	(1)	(2)	(3)
Non-poor in 2002 [reference category]			
Multidimensionally (M) poor in 2002	0.772***	0.537***	0.438***
	(0.081)	(0.087)	(0.099)
Income (Y) poor in 2002	1.049***	1.048***	0.898***
	(0.095)	(0.103)	(0.115)
M & Y poor in 2002	2.021***	1.747***	1.600***
	(0.070)	(0.084)	(0.098)
Region: Costa Norte [reference category]			
Region: Costa Centro		-0.318**	-0.369**
		(0.130)	(0.150)
Region: Costa Sur		0.129	0.113
		(0.195)	(0.205)
Region: Sierra Norte		0.386***	0.367***
		(0.130)	(0.138)
Region: Sierra Centro		0.334***	0.388***
		(0.095)	(0.104)
Region: Sierra Sur		0.337***	0.426***
		(0.099)	(0.111)
Region: Selva		0.268***	0.247**
		(0.091)	(0.101)
Region: Lima Metropolitana		-0.278**	-0.255**
		(0.109)	(0.123)
Urban		-0.380***	-0.365***
		(0.069)	(0.085)
Incidence of health shocks		-0.075	-0.095
		(0.059)	(0.065)
Change in number of members working		-0.231***	-0.213***
		(0.028)	(0.030)
Change in household size		0.201***	0.191***
		(0.019)	(0.021)
Head's age			-0.028**
			(0.014)
Head's age squared			0.000
			(0.000)
Head is male			-0.138
			(0.121)
Head is cohabiting [reference category]			
Head is married			-0.165**
			(0.079)
Head is single			-0.391***
			(0.116)
Head is in agriculture [reference category]			
Head is in mining or utilities			-0.454*
			(0.243)
Head is in manufacturing			-0.190
			(0.138)
Head is in construction			0.053
			(0.153)
Head is in commerce and hospitality			-0.043
			(0.104)
Head is in transportation and communications			-0.057
			(0.148)
Head is in public administration			-0.216
			(0.149)
Head is in other activities			-0.363***
			(0.130)
Constant	-1.275***	-0.969***	0.258
	(0.055)	(0.105)	(0.381)
Observations	3,739	3,739	3,226
Pseudo R^2	0.278	0.357	0.358

Source: Authors' estimates based on ENAHO Panel.
Notes: Geographic controls and initial characteristics of the household head are for 2002; the incidence of health shocks and changes in both the household size and in the number of household members engaged in work are considered over 2002-6. Health shocks consider those requiring hospitalization. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A4. Probit regressions of income poverty at the end of period on persistent poverty statuses in the past and extra controls, Chile, Mexico and Peru

Chile, 1996-2001-6 Income poor in 2006		Mexico, 2002-6-12 Income poor in 2012		Peru, 2002-4-6 Income poor in 2006	
Non-poor in the first two rounds [reference category]		*Non-poor in the first two rounds [reference category]*		*Non-poor in the first two rounds [reference category]*	
Multidimensionally (M) poor in both 1996 and 2001	0.044	Multidimensionally (M) poor in both 2002 and 2006	0.268	Multidimensionally (M) poor in both 2002 and 2004	0.611***
	(0.309)		(0.203)		(0.135)
Income (Y) poor in both 1996 and 2001	1.446***	Income (Y) poor in both 2002 and 2006	0.827***	Income (Y) poor in both 2002 and 2004	1.490***
	(0.316)		(0.195)		(0.189)
M & Y poor in both 1996 and 2001	1.966***	M & Y poor in both 2002 and 2006	1.655***	M & Y poor in both 2002 and 2004	2.248***
	(0.264)		(0.172)		(0.129)
Region: VIII [reference category]		*Region: South [reference category]*		*Region: Costa Norte [reference category]*	
Region: III	0.593	Region: Centre	0.413***	Region: Costa Centro	-0.196
	(0.375)		(0.152)		(0.173)
Region: VII	0.616*	Region: West	0.032	Region: Costa Sur	-0.078
	(0.357)		(0.157)		(0.292)
Region: Metropolitana	0.492	Region: Northwest	0.003	Region: Sierra Norte	0.372**
	(0.354)		(0.153)		(0.168)
		Region: Northeast	0.331*	Region: Sierra Centro	0.403***
			(0.183)		(0.116)
				Region: Sierra Sur	0.447***
					(0.140)
				Region: Selva	0.193*
					(0.110)
				Region: Lima Metropolitana	-0.298*
					(0.175)
		Semi-urban	-0.123		
			(0.164)		
Urban	-0.363	Urban	-0.279**	Urban	-0.197*
	(0.235)		(0.138)		(0.113)
Incidence of health shocks	0.217	Incidence of shocks	0.085	Incidence of health shocks	-0.098
	(0.163)		(0.111)		(0.078)
Change in number of members working	-0.435***	Change in number of members working	-0.357***	Change in number of members working	-0.259***
	(0.091)		(0.052)		(0.039)
Change in household size	0.191***	Change in household size	0.282***	Change in household size	0.171***
	(0.059)		(0.035)		(0.025)
		Head is indigenous	0.303*		
			(0.171)		
Head's age	-0.043	Head's age	-0.010	Head's age	-0.024
	(0.036)		(0.024)		(0.016)
Head's age squared	0.000	Head's age squared	0.000	Head's age squared	0.000
	(0.000)		(0.000)		(0.000)
Head is male	-0.273	Head is male	-0.322	Head is male	-0.141
	(0.206)		(0.228)		(0.164)
Head is cohabiting [reference category]		*Head is cohabiting [reference category]*		*Head is cohabiting [reference category]*	
Head is married	-0.183	Head is married	0.136	Head is married	0.022
	(0.235)		(0.168)		(0.092)
Head is single	-0.263	Head is single	-0.172	Head is single	-0.378**
	(0.275)		(0.256)		(0.159)
Head is farmer [reference category]		*Head is farmer [reference category]*		*Head is in agriculture [reference category]*	
Head is unskilled manual	0.154	Head is unskilled manual	-0.078	Head is in mining or utilities	-0.190
	(0.246)		(0.197)		(0.304)
Head is skilled manual	-0.090	Head is skilled manual	-0.138	Head is in manufacturing	-0.377*
	(0.310)		(0.173)		(0.207)
Head is self-employed	-0.082	Head is self-employed	-0.576**	Head is in construction	0.094
	(0.283)		(0.265)		(0.219)
Head is clerical worker	-0.021	Head is clerical worker	-0.276	Head is in hospitality	-0.186
	(0.347)		(0.272)		(0.133)
Head is professional or manager	0.076	Head is professional or manager	-0.628***	Head is in transportation and communications	-0.093
	(0.426)		(0.229)		(0.193)
		Head is engaged in commerce	0.118	Head is in public administration	-0.234
			(0.211)		(0.187)
		Head is engaged in army or police	-0.501	Head is in other sector	-0.334**
			(0.307)		(0.158)
Constant	-0.792	Constant	-0.099	Constant	-0.418
	(0.977)		(0.696)		(0.481)
Observations	1,039	Observations	1,595	Observations	1,942
Pseudo R^2	0.392	Pseudo R^2	0.336	Pseudo R^2	0.456

Source: Authors' estimates based on CASEN Panel, Mexican Family Life Survey, and ENAHO Panel.
Notes: Geographic controls and initial characteristics of the household head are for the initial year of each country-period; time-varying controls refer to the incidence of health or economic shocks and changes in both the household size and in the number of household members engaged in work over each period. None of these controls is included in the multidimensional measure of poverty. Longitudinal weights are employed in the estimates. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1