Transient, Chronic, and Intergenerational Poverty: Evidence from the Cebu Longitudinal Health and Nutrition Survey

by
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Abstract

This paper examines poverty dynamics in the Philippines by decomposing poverty into its transient and chronic components using censored fluctuation approaches. Findings reveal that aggregate squared poverty gap is mostly transient. Using censored quantile regression, the paper then identifies the following as significant correlates of transient poverty: location of residence, household dependency burden, mother's age, and work in the farming sector. Transient poverty is also linked with single-person headed households. Meanwhile, significant correlates of chronic poverty include work in the farming sector and number of years of mother's education Households with heads who are regular wage earners and who are contractual workers experience more chronic poverty than households with heads who are self-employed. Once we extend our model to account for intergenerational poverty, we find that estimated elasticity between parent and child's income ranges from 0.165 to 0.197 suggesting that moderate income rigidity exists between two generations.

Honor Statement

I attest that this master's thesis I have submitted is my own. I have not cheated, plagiarized or received unauthorized assistance in the completion of this paper.

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Relevant portions of this work may be quoted and used for research and other scholarly purposes provided the proper citation be made.

Marian Angelica K. Panganiban

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1 Introduction

The Philippines' poverty reduction record the past twenty years can be described as lackluster at best, especially when compared to its Southeast Asian neighbors. Vietnam, for example, started with higher levels of poverty incidence than did the Philippines during the early 1980s, but their absolute poverty soon dwindled and became much lower than the Philippines' during the early 2000s. Malaysia and Thailand also had virtually eliminated absolute poverty in the past twenty years. While the average per capita income in the Philippines in the mid-2000s (PPP $4,381) was much higher than in Vietnam (PPP $2,683) and Indonesia (PPP $3,402), its absolute poverty was actually much higher than in either of the latter countries.[1]

Indeed, the country's poor poverty reduction performance motivates various proposals to address what Balisacan [2007:1] describes as "the single most important policy challenge of the Philippines." Most of the earlier studies of poverty focused on the static aspects - incidence, gap and severity at a point in time. Whereas they give an effective snapshot of the country's poverty situation and distribution, they do not necessarily provide a systematic narrative of welfare stability over time.

A serious shortcoming of static poverty analysis is that it tends to give the impression that the poor is a temporally-homogeneous group – those who were identified poor before are the same poor in current measurements. An initial attempt to introduce a dynamic element in Philippine poverty research by Reyes [2002] shows that the poor consists of people who are 1) chronic poor, 2) the transient poor who are vulnerable to external shocks and cannot recover[2], and 3) the transient poor who are able to recover from external shocks but only temporarily. Thus, persistence in aggregate poverty statistics such as incidence may be concealing shifts in welfare status among households and individuals, and hiding significant changes in the composition of poor people over time and in the kind of poverty they

[1] Statistics are in 2000 prices, from Balisacan [2007] . The paper provides a thorough picture of the country's poverty situation vis-à-vis other Southeast Asian countries.

[2] Shocks in this case pertain to the impact of the Asian financial crisis of 1997. Reyes uses data for the years 1997, 1999, 2000 from the Family Income and Expenditure Survey (FIES) and Annual Poverty Indicators Survey (APIS).

experience. Introducing a dynamic component to our analysis provides us with a sharper understanding of the country's poverty situation as well as a better grasp of the appropriate interventions that can be implemented.

Chronic and transient poverty differ not only in their manifestation, they also call for distinct policy responses – something that has been acknowledged as early as the eighteenth century:

> "[O]fficials and social commentators in eighteenth century France distinguished between the *pauvre* and the *indigent*. The former experienced seasonal poverty when crops failed or demand for casual agricultural labour was low. The latter were permanently poor because of ill health (physical and mental), accident, age, alcoholism or other forms of 'vice'. The central aim of policy was to support the *pauvre* in ways that would stop them from becoming *indigent*" [Hulme and McKay 2005:3].

While the role of policy in this passage consists of preventing seasonal poverty from becoming permanent poverty, Jalan and Ravallion [1998:2] refine the policy responses that can be made for both the chronic and transient poor:

> "Longer term investments in the poor, like increasing their human and physical assets, or the returns to those assets, are likely to be more appropriate for chronic poverty. On the other hand, insurance and income-stabilization schemes which protect households against idiosyncratic economic shocks would appear to be more important when poverty is transient."

Decomposing poverty into its transient and chronic components is a useful exercise in helping us determine the design and effectiveness of poverty reduction strategies. Haddad and Ahmed [2003], for example, note that chronic poverty is a more serious situation than transient poverty. Hence, well-founded anti-poverty programs entail knowledge of the relative share of chronic as opposed to transient poverty.

This study contributes to the literature by strengthening existing Philippine evidence on household poverty dynamics by applying the components approach in decomposing poverty into its chronic and transient parts. It utilizes a longer panel data set than what was previously used in Reyes [2002] which allows us to measure poverty persistence across two generations. It also aims to facilitate discussion on poverty reduction initiatives by identifying significant determinants of chronic and transient poverty using quantile regression.

The rest of the paper is organized as follows. Section 2 reviews the literature on transient, chronic, and intergenerational poverty and their correlates. Section 3 maps out the theory that will guide the investigation on poverty dynamics while Section 4 describes the data that will be used. Section 5 discusses the empirical results and Section 6 concludes.

2 Review of Related Literature

In this section, we identify the two approaches to distinguishing transient and chronic poverty within a generation. We then summarize the various determinants of poverty in the literature. The final part of this section tackles intergenerational poverty as an extended definition of chronic poverty.

2.1 Spells and components approach

The past two decades of poverty research have increasingly emphasized that poverty is not a static concept - how people undergo poverty varies according to the length of time they remain poor and the severity of their stay. A deepening understanding of people's experience of poverty has led researchers to distinguish between chronic and transient poverty [Hulme, Moore, and Shepherd 2001]. Broadly speaking, poor people can be categorized between people who move in and out of poverty over a period of time – the 'transient poor'- and people who remain persistently poor, often for all or much of their lives – the 'chronic poor' [Rose and Dyer 2008].

Barrientos et al. [2005] identify the spells approach and the components approach as the primary ways of distinguishing between the chronic and transient poor. The spells approach stresses the duration of poverty, using the length of time per capita income or consumption falls below the poverty line to capture chronic poverty. This focuses on poverty transitions of an individual or household and helps identify who are the chronic poor or transient poor, according to a given poverty line for a given period.

Bane and Ellwood's [1986] study introduces the spells approach to examine poverty dynamics. Using a fifteen-year sample of the United States' Panel Study of Income Dynamics (PSID), they first define poverty in each given year as income below a needs standard calculated on the basis of household size. To identify poverty transitions, they define a spell of poverty as beginning when income falls below poverty line, after having been above poverty line the previous year while a spell of poverty is ending when income goes above poverty line after having been below poverty line the previous year. Tracing the events that signal the beginning and end of poverty spells, they find that majority of poor people is in the midst of rather long spells of poverty. They further estimate that less than

40 percent of poverty spells begin because of a drop in a household head's earnings while 60 percent of poverty spells end when the household head's earnings increase.

A problem with using this approach is that poverty becomes an arbitrary state: very small movements in income or small measurement errors can move households across the poverty line, thereby creating a spell, even though no significant changes household welfare occurred. Dreze et al. [1992] have raised doubts as to whether current per capita income in a particular year is a reasonable criterion of poverty in economies where current incomes are subject to large short-run variations. Furthermore, household incomes in developing countries are commonly measured with massive errors.

There are, however, ways of adjusting the measurement of poverty spells to adjust for pure randomness or measurement errors. Bane and Ellwood [1986] eliminate one-year spells from income changes that were less than one-half of the needs standard. Dreze et al. [1992] also recommend the use of shifts in occupational categories (e.g. employment status), combined with information on the local political economy, as substitute for poverty spells measures based on income or consumption. Fuwa [2003] applies this definition in his study of socioeconomic mobility in a Philippine village by using categories such as 'irregularly-employed', 'tenant-farmer', 'small-owner', and the 'regularly- employed' to capture poverty transitions in the absence of consumption or income data.

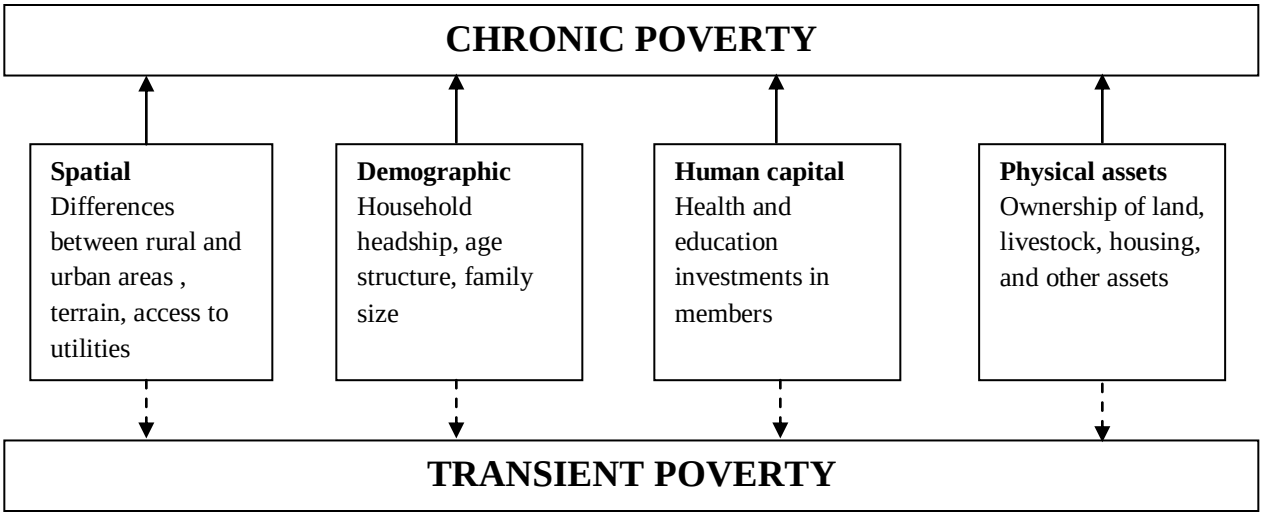
The components approach meanwhile distinguishes between the 'permanent component of income or consumption' to determine chronic poverty and the 'fluctuation component of income or consumption' to determine transient poverty. Using this approach, Jalan and Ravallion [1998] identify the chronic poor and transient poor based on the inter-temporal average household consumption data in China. They find that both chronic and transient poverty are reduced by greater command over physical capital. The similarities, however, end there. Demographic and geographic characteristics matter for chronic poverty but have little impact on transient poverty. Methodologically, Jalan and Ravallion's use of an intertemporal average of income or consumption makes the data less susceptible to signaling movements into and out of poverty due to random measurement errors [McKay and Lawson 2002].

Arguably, the components approach is more useful in understanding the causes of chronic poverty and poverty in general than the spells approach [Hulme, Moore, and Shepherd 2001] since it allows for a more precise definition of poverty that is less dependent on the length of period covered by the data – but it is not without problems. The components approach requires additional information on the household apart from income or consumption in order to have a more meaningful interpretation. Such added information allows us to better identify the chronically poor, as well as the underlying causes of poverty. McKay and Lawson [2002] also point out the superiority of the components approach in analyzing chronic poverty, but its reliability will depend on how well the household characteristics are able to explain the variations in income or consumption.

2.2 Correlates of household poverty

Correlates of poverty from longitudinal data generally fall into four types: 1) spatial (e.g. province, urban, proximity to market), 2) demographics and household type (e.g. household size, age structure, sex, and race), 3) human capital (e.g. education, health, labor market experience, economic sector), and 4) physical assets (e.g. land, livestock, housing, etc.) [Yaqub 2002]. Figure 1 summarizes these characteristics. The solid lines between chronic poverty and identified characteristics depict our hypothesis – as supported by earlier work by Jalan and Ravallion [1998, 2002] in China – that most determinants of poverty identified in the literature are linked with chronic poverty than with transient poverty.

Figure 1: Correlates of chronic and transient poverty



2.2.1. Spatial characteristics

Jalan and Ravallion's [2002] study on geographic poverty traps using six-year farm household panel data on China builds a case on why spatial characteristics strongly correlate with chronic poverty. They find that a number of indicators of geographic capital indicators have divergent impacts on consumption growth at the micro-level, controlling for (observed and unobserved) household characteristics. Positive externalities generated by publicly provided goods, investments in agriculture, and other area-specific factors can bring about substantial improvements in household welfare. Rural roads, for example, generate non-negligible gains in living standards while agricultural investments such as irrigation and fertilizers also play an important role in overcoming poverty traps.

2.2.2. Demographic characteristics

In Lipton's [1994] review of the interactions between poverty and population at the household level, births, deaths, ageing and age-dependency all correlate with upward mobility and conversely, poverty persistence. Household age structure had mobility effects consistent with long held views about age-profiles for poverty, income and wealth. More specifically, work by Orbeta [2005] on Philippine household data demonstrates how large family size, particularly, additional children, can contribute to poverty and vulnerability through its impact on household savings, labor supply, and parental earnings and education of children. After controlling for individual, household, and community factors, Orbeta [2005] finds that additional children, on average, cause a substantial decline in household savings rates and levels by reducing the work participation and wage income of mothers, although it has no impact on the labor force participation of fathers. It also reduces the proportion of school-age children attending school. Additional children have bigger negative impacts on school attendance of all school-age children and this effect increases as one goes to higher schooling levels. Labor force participation of mothers from the bottom three quintiles are negatively affected by additional children. Cross-tabulation evidence in the same study also shows that additional children have a negative effect on the savings levels for all households except for the poorest quintile.

Further empirical work by Stevens [1999] in the United States, Finnie and Sweetman [2003] in Canada, and Ssewanyana [2009] in Uganda give credence to the importance of demographic characteristics and changes, particularly female headship. Stevens [1999] finds that for individuals in households where the head is a single female, or has less than high school education, poverty is a more persistent state. Among adults in female-headed households who fall below the poverty line, between 26 and 64 percent (depending on race and education level) will live below the poverty line for six or more of the next ten years. Among children in female-headed households the comparable figures range from 47 to nearly 90 percent. Households headed by single mothers also have higher entry rates into poverty and lower exit rates from poverty in Finnie and Sweetman's [2003] analysis of poverty dynamics in Canada. Ssewanyana's [2009] recent study on chronic poverty and household dynamics in Uganda suggests that demographic changes significantly influence the persistence of poverty. For instance, an increase in adult males and reduction in child population especially between 6-14 years old decrease the likelihood of being chronically poor. However, while the effect of demographic changes on both types of poverty is significant, changes in household demographics had a greater effect on chronic poverty than transient poverty.

2.2.3. Physical assets

Lawson et al. [2003] study the relationship between poverty and physical assets ownership in their work in Uganda using a two-wave household panel data for the years 1992 and 1999. In a multinomial logit marginal effects model that quantifies the relative importance of various factors in determining household poverty status (poor versus non-poor) and poverty transition (moving into poverty and out of poverty), they find that the most important determinants include assets, particularly housing. Households that owned cattle in 1992 are significantly less likely to have been chronically poor by 1999; the same variable has a quite large positive but not quite significant impact on the likelihood of a household being never poor. Similarly, households with better dwellings measures in terms of number of rooms per adult equivalent are also more likely to be never poor, and less likely to be chronically poor. They also find that households whose main economic activity is non-agricultural are also significantly more likely never to have been poor over the period covered by the study.

The importance of asset ownership is further stressed in the work of Barrett et al. [2006] and Krishna et al. [2006]. Ownership of assets structurally position the poor to take advantage of new economic opportunities or can hamper the effects of negative shocks that can destroy economic opportunities. It also enables households to finance long-term investments that make possible future welfare improvements [Carter and Barrett 2006]. Moreover, physical asset depletion leads to longer and more severe spells of poverty. Since the poor face imperfect or incomplete financial markets, most investment is self-financed, and the need to smooth income fluctuations reduces savings and thus lessens future economic activity and investment. This inevitably leads to low growth [Carter and May 2001].

2.2.4. Human capital

Apart from physical assets, the role of human capital in explaining chronic poverty is also emphasized in the same study by Lawson et al. [2003]. Secondary education of the household head has a strong positive influence on the likelihood that a household is never poor. Fuwa [2003] also finds schooling to be an important factor in explaining poverty exits in the 1980s.

Quimbo, Kraft and Capuno [2009] present a comprehensive work on the various links between human capital and poverty. They introduce the idea of poverty webs to highlight the pathways that connect health, education, and poverty. Poverty is channeled within and across generations through the following pathways: labor productivity, quantity and quality of human capital investments in health and education, and complementarities between human capital investments. In their review of literature and analysis of data from Quality Improvement Demonstration Study (QIDS) in Visayas, Philippines, they find that poverty webs linking health, education, and poverty are real. For instance, more sickly mothers were more likely to report that their children had fair to poor health rating and less likely to give their children very good to excellent health status. A child's IQ is significantly correlated with the number of years of mother's schooling, although the marginal effect of mother's schooling on child's IQ is significantly smaller for the lowest income quartile. A earlier study by Kaestner and Corman [1995] also suggests that mother's labor participation has a positive impact on child cognitive achievement.

2.3 Intergenerational poverty

Takahashi and Otsuka [2007] build on the earlier work by Estudillo et al. [2006] to identify pathways out of poverty across generations in rice-growing households in Central Luzon, Philippines. Using intergenerational panel data, these studies find that the real per capita income of children is about 2.6 times larger than that of their parents This was accompanied by a sharp reduction of poverty and an increase in the share of non-farm income in total household income from 41% to 78%. Further regression analyses demonstrate that landholdings and irrigation of the original household are critical factors underlying the income growth of parents, which leads to the improvement in human capital of children through schooling investment. The improved human capital of children, in turn, increases the probability of obtaining lucrative non-farm jobs especially in cities and abroad. In addition, the increased schooling is a decisive determinant of non-farm income, especially in cities. These findings suggest that the increased income of parents contributes to poverty alleviation for the children in the long run through its effect on improvements in the human capital of children. Together with the Quimbo, Kraft, and Capuno[2009] paper, these studies provide us with evidence of what mitigates the persistence of poverty across generations and what could possibly cause it.

Hulme, Moore, and Shepherd [2001] describe intergenerational poverty as the "most severe form of chronic poverty." They expand the definition of chronic poverty to include not only individuals or households who remain poor for many years but also those that pass on poverty to subsequent generations. They further add that while it may or may not be severe, "intergenerational poverty is likely to be relatively intractable, and is therefore likely to escape current poverty reduction efforts" [2001:14].

Initial regressions on poverty inheritance explore how strongly correlated father's income is with the child's, usually the son's, income. Coefficients of income correlation from these regressions range between 0 and 1, with 0 implying perfect mobility, and 1 signifying perfect rigidity. Empirical studies for United States, Sweden, Norway, and Switzerland summarized in Becker [1991] have coefficients that range between 0.02 and 0.36. Estimates by Naga and Cowell [2002] of income correlation in their study of income inheritance in

Britain range between 0.45 and 0.60, implying higher income rigidity across two generations.[3]

Jenkins and Siedler [2007] show that children from low-income families compared to children from higher-income families turn out to be disadvantaged in many dimensions in their review of research on the intergenerational transmission of poverty in industrialized countries. On average, they have lower birth weight, higher risk of infant mortality, more behavior problems, are less successful in school, and poorer labor market outcomes. However, these patterns, both for the developed and developing countries, do not necessarily imply causal inks. Jenkins and Siedler [2007:2] caution that "outcomes and family income may both be determined, at least in part, by other unobserved individual or family characteristics, e.g. genetic make-up and related concepts such as 'ability', and environmental factors related to where individuals live, e.g. their neighborhood, housing, and schools" .

[3]Coefficients of income correlation summarized in Becker [1991] are not directly comparable with estimates of Naga and Cowell [2002] due to differences in estimation techniques. The coefficients in both papers can be loosely interpreted as a measure of how closely a child's earnings are correlated with his or her parent(s).

3 Theoretical and econometric models

We present in this chapter Jalan and Ravallion's [1998] method of decomposing poverty into its transient and chronic components[4]. We then introduce a method of estimating the inheritability of poverty between two generations by drawing insight from Becker's [1991] model of human capital and intergenerational mobility.

3.1 Transient and chronic poverty

We use the components approach of Jalan and Ravallion [1998] instead of the spells approach since it gives us a more precise definition of chronic and transient poverty.

Let $(y_{i1}, y_{i2},...,y_{it})$ be household *i*'s income (or consumption) over *t* periods. We assume that income has been normalized for differences in demographics and prices, such that y_{it} becomes an agreed metric of household welfare.

Let $P(y_{i1}, y_{i2},...,y_{it})$ be an aggregate inter-temporal poverty measure for household *i*. The transient component (T_i) of $P(.)$:

$$T_i = P(y_{i1}, y_{i2},...,y_{it}) - P(Ey_i) \qquad (1.1)$$

where Ey_i is the expected value of income over time (time-mean consumption) for household *i*.

The chronic component (C_i) of $P(.)$ is:

$$C_i = P(Ey_i) \qquad (1.2)$$

The intertemporal poverty measure is the sum of the chronic and transient components. Re-arranging (1.1), this is equal to:

$$P(y_{i1}, y_{i2},...,y_{it}) = T_i + C_i \qquad (1.3)$$

We require that our poverty measure $P(.)$ measure be additive over time and across households. We also assume the following: 1) that the individual poverty function $p(y_{it})$ is

[4] Duclos, Araar, and Giles [2010] extend Jalan and Ravallion's method of decomposing poverty using the components approach by introducing bias corrections arising from the finite number of periods.

the same for all households and dates;[5] 2) that the function $p(y_{it})$ must also be strictly convex [6] and decreasing up to the poverty line and zero thereafter; 3) and that the poverty measure vanishes continuously as one approaches the poverty line from below.[7]

We use the squared poverty gap index (SPG) developed by Foster et al. [1984] in measuring household poverty.[8] Apart from satisfying the conditions stated above, another advantage of the SPG is that it penalizes inequality amongst the poor, unlike other measures such as the headcount index (number of people living below the poverty line) or the poverty gap (mean proportionate distance below the poverty line).

Aggregate inter-temporal poverty measure is now defined as the expectation over time of the poverty measure each point in time

$$P_i = t^{-1} \sum_{i=1}^{t} p(y_{it}, \alpha, z) \qquad (1.4)$$

$$\text{where } p(y_{it}, \alpha, z) = \begin{cases} (1 - \frac{y_{it}}{z})^{\alpha}, & if\ y_{it} < z \\ 0 & , \ if\ y_{it} \geq \text{z} \end{cases}$$

where z is the poverty line, and the value $\alpha \geq 0$ is a measure of poverty aversion, or more concretely, a measure of aversion to inequality and variability. Since we are using the SPG, we let $\alpha = 2$.

[5] One can choose appropriate deflators for consumption to make this assumption reasonable. In this study, we use adult equivalence scales of the World Health Organization to make the poverty function the same across households and consumer price indices to make the function the same across periods.

[6] Convexity assures that the measure satisfies the transfer axiom proposed by Sen [1976] i.e. "all other things being equal, a pure transfer from a person below the poverty line to someone who is richer, but may still be poor must increase the poverty index."

[7] This assumption rules out kinks in the measured individual poverty as the poverty line is crossed.

[8] Kurosaki [2003] points out that the relative magnitudes of chronic versus transient poverty can become sensitive to the choice of a poverty measure. The SPG, for example, is sensitive to changes in the poverty line and expected level of consumption. We use the SPG in our analysis for the meantime for easier comparison with previous studies.

From equation (1.2) and equation (1.4), chronic poverty for household *i* now becomes

$$C_i = P(E[y_i], \alpha, z) \qquad (1.5)$$

$$\text{where } C_i = \begin{cases} (1 - \frac{E[y_i]}{z})^2, & if\ E[y_i] < z \\ 0 & , \ if\ E[y_i] \geq \text{z} \end{cases}$$

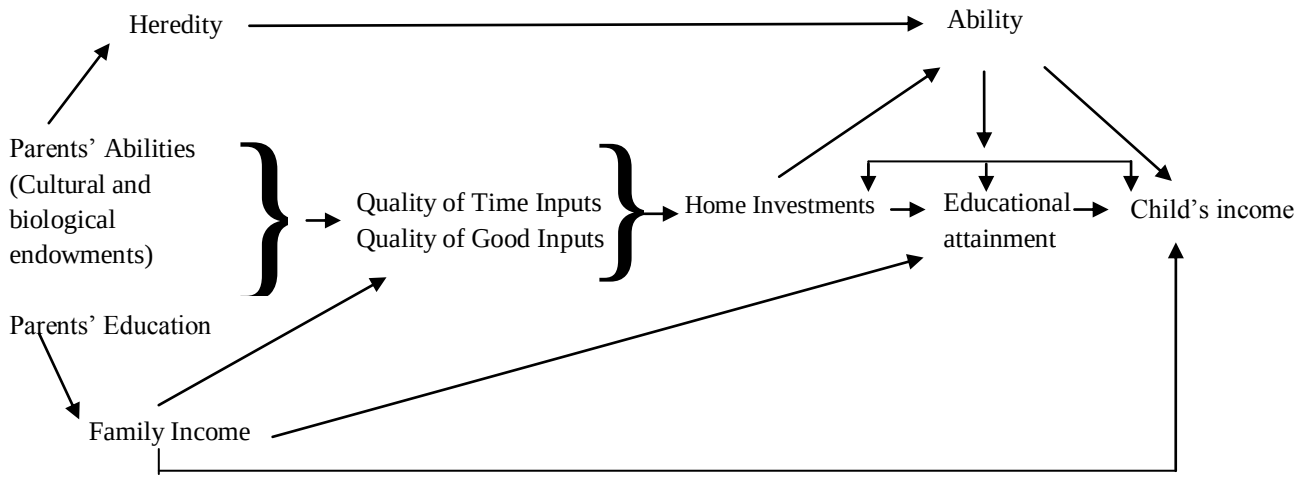
Chronic poverty is a function of the household's expected income over time, the poverty line and α. Transient poverty is calculated as a residual after subtracting the component of chronic poverty from aggregate poverty as in equation (1.1).

Since chronic poverty is a function of expected income over time, no transient poverty will be observed if households were to receive their permanent income (time-mean income) at all periods, assuming that their permanent income is above the poverty line. Thus, the measure of transient poverty indicates how much of household poverty can be attributed to transient income rather than permanent income [Muyanga et al. 2007]. Variations in permanent income are allowed if the value of income can be predicted by a trend, e.g. linear or non-linear, over the whole period. This, however, requires a longer data span and more frequent periods of measurement [Hulme and Shepherd 2003].

3.2 Intergenerational Poverty

Figure 2 summarizes the predicted relationships and transmission mechanisms through which poverty can be passed on from parents to children. This encapsulates the literature on intergenerational mobility discussed in the previous chapter. Note however, that the figure implicitly assumes that children grow up in a two-generation household and form their own household after education. Multigenerational households may be prevalent, particularly in a developing country like the Philippines. The extended family may provide an additional source of resources (e.g. child care from a grandmother) or additional costs that reduce the resources available to children (e.g. caring for infirm elderly relatives). It also glosses over the prevailing practice in most developing countries wherein older children may work in the household (e.g. provide child care, or work on a family plot), or work for pay in a labor market. We adjust accordingly for these types of household in our data in the next chapter.

Figure 2: A schematic summary of intergenerational transmission process[9]



We use a model by Becker [1991] of analyzing intergenerational mobility[10] found in his landmark book *'A Treatise on the Family*.' The model incorporates the key features of intergenerational poverty transmission in Figure 2. The upper branch in Figure 2 shows that parents' abilities, which capture a broad base of biological and cultural traits, are inherited by children. The exact process of transmission of biological and cultural attributes will not be our concern in this study. Suffice it to say, we follow the assumption that there is a measure of inheritability of both biological and cultural traits from parents to children and find no need to separate the contributions of biology and culture to the total endowments of each family. Furthermore, we assume that parents cannot invest in their children's biological and cultural endowment.

We begin with a stochastic-linear or Markov equation to signify the transmission mechanism of endowments [Becker and Tomes 1979]:

$$N_t^i = \delta_t^i + hN_{t-1}^i + v_t^i \qquad (2.1)$$

[9] This figure is based on Jenkins and Sielder [2007: 7]

[10] We adopt in large parts the model found in the supplement to Chapter 7 - *Human Capital and the Rise and Fall of Families.*

where N_t^i is the endowment (or vector of endowments) of the *i*th family in the *t*th generation, h is the degree (or vector of degrees) of "inheritability" of these endowments, and v_t^i measures unsystematic components or luck in the transmission process.

In this model, h is less than one and greater than zero, implying that endowments are only partially inherited.[11] This assumption also depicts what has been observed on previous studies that intergenerational endowments regress to the mean, i.e. variations in endowments become smaller through time.

The term δ_t can be interpreted as the social endowment common to all members of a given cohort in the same society. Thus, if the social endowment were constant over time[12], and if $h < 1$, the average endowment would eventually equal $1/(1 - h)$ times the social endowment (i.e. $\lim \bar{N}_t^i = \alpha/[1-h]$).

We now shift our focus on the lower branch of Figure 2. Parents' education determines family income which in turn determines the quality of investments to children. Parents do not only pass on some of their endowments to children, they also influence the adult earnings of their children by expenditures on their skills, health, education and many other characteristics. These expenditures are determined by the abilities of children and also by the incomes, preferences, and fertility of parents and by the public expenditures on education and other human capital of children and other variables. Since earnings are practically the sole income for most people, parents influence the economic welfare of their children primarily by influencing their potential earnings.

We capture these influences first by assuming two periods of life - childhood and adulthood. We then assume that adult earnings depend on human capital (H) and market luck (φ):

$$Y_t = \gamma(T_t, f_t)H_t + \varphi_t \qquad (2.2)$$

[11] Becker (1991) however states that *a priori* restrictions on the magnitude or even on the sign of the inheritability of endowments may be unnecessary, because the degree of inheritability can be estimated from accurate information on the earnings of parents and children. We restrict the values of h for simplicity.

The earnings (Y) of one unit of human capital (γ) is determined by equilibrium in factor markets. It depends positively on technological knowledge (T) and negatively on the ratio of human capital to nonhuman capital in the economy (f). We will not be concerned with the exact value of f since we are studying differences among earnings in families, and f is the same for all families. Therefore, we assume that the measurement of H is chosen so that the function γ=1.

We further assume that other forms of human capital, apart from health and education, are homogeneous in different families. Differences in human capital across households will depend on differences in investments in health and education, particularly during childhood. Bloom [1976] shows that development during childhood is vital to later development. We incorporate this finding by assuming that the total amount of human capital accumulated is proportional to the amount accumulated during childhood.

Adult human capital and expected earnings are determined by endowments inherited from parents and by parental (x) and public (s) expenditures on the child's development.

$$H_t = \psi(x_{t-1}, s_{t-1}, N_t) \; with \; \psi_j > 0, \;\; j=x, s, N \qquad (2.3)$$

Ability, early learning, and other aspects of what Becker [1991] calls a “family's cultural and genetic infrastructure" [1991:260] usually raise the marginal effect of family and public expenditures on the production of human capital:

$$\frac{\partial^2 H_t}{\partial j_{t-1}} = \psi_{jN} > 0, \quad j = x, s \qquad (2.4)$$

Computing for the marginal rate of return on parental expenditures (r_m), we have:

$$\frac{\partial Y_t}{\partial x_{t-1}} = \frac{\partial H_t}{\partial x_{t-1}} = \psi_x = 1 + r_m\,(x_t, s_t, N_t) \qquad (2.5)$$

where $\partial r_m / \partial N > 0$, by the inequality(2. 4)

Much of the endowed luck of children (v_t) is revealed to parents prior to most of their investment in children. Therefore, we assume that rates of return on these investments are fully known to parents (as long as the social environment, α_{it}, and public expenditures, s_{t-1} are known). Parents allocate their total 'bequest' to children between human capital and assets.

Access to capital markets draws a sharp distinction between poor and non-poor households [Carter and Barrett 2006]. As demonstrated in Quimbo, Kraft and Capuno [2009], parents' inability to finance investments in children forms critical channels of poverty transmission across generations. Ideally, parents of all households would be able to contract debt to easily finance investments in their children. However, Becker [1991] observes that rich families can more readily self-finance a given investment in children than can poor and middle-level families. Poor families particularly are subject to borrowing constraints that effectively decrease human capital investment. Comparative static results in a study by Lee [1981] show that the removal of borrowing constraints increases human capital investment unambiguously. Part of the focus of our inter-generational poverty analysis is on the handicap imposed by imperfect access to capital markets on parents' investments in their children's human capital.

Financing investments in children's human capital is difficult for poor households who own no or minimal assets. Becker [1991], for example, notes that children make poor collateral – they can easily default on the market debt contracted for them by investments made by their parents by working less energetically or by entering occupations with lower earnings and higher psychic income. To isolate the effect of imperfect access to debt contracted for children, we assume that parents must finance investments in children by selling assets, by reducing their own consumption, by reducing the consumption by children, or by raising the labor force activities of children. Parents without assets, for example, would have to finance the efficient investment in human capital on their children by reducing their own consumption since they cannot borrow on behalf of their children. A reduction in their own consumption would raise its marginal utility relative to the marginal utility of resources invested in children and thereby discourage some expenditure on children. Thus, both the amount invested in children and parental consumption are reduced by limitations on the debt that can be made on behalf of the children. This implies that richer parents would tend

to have both higher consumption and greater investments in children. Expenditures on children (x_{t-1})) depend not only on endowments of children (N_t) and public expenditures (s_t) but also on earnings of parents (Y_{t-1}) and their generosity toward children (w), and perhaps also on the uncertainty (ε_{t-1}) about the luck of children and later descendants:

$$x_{t-1} = g\,(N_t, s_{t-1}, Y_{t-1}, \varepsilon_{t-1}, w)\ with\ g_Y^* > 0 \qquad (2.6)$$

3.3 Econometrics models

This section specifies the estimation procedures to be employed in determining the correlates of transient and chronic poverty and in establishing how persistent the experience of household poverty is across generations.

3.3.1 Transient and chronic poverty

We first estimate two models that regress measures of transient and chronic poverty as separate independent variables on the same set of household and community characteristics. The econometric model for transient poverty becomes:

$$T_i = \begin{cases} T_i^* \text{ if } T_i^* > 0, \text{ where } T_i^* = x_i'\beta^T + u_i^T \\ 0 \text{ otherwise} \end{cases} \qquad (3.1)$$

where T_i^* is a latent variable, T_i is the observed transient poverty β^T is a k x 1 vector of unknown parameters and x_i is a 1 x k vector of explanatory variables, and u_i^T are the model residuals.

Analogously, we have the following model for chronic poverty:

$$C_i = \begin{cases} C_i^* \text{ if } C_i^* > 0, \text{ where } C_i^* = x_i'\beta^C + u_i^C \\ 0 \text{ otherwise} \end{cases} \qquad (3.2)$$

Jalan and Ravallion [1998] caution against the use of Tobit models in estimating equations (2.1) and (2.2) although this is standard in poverty literature (see for example, Gibson [2001] and Obmina and Reyes [2007]). This is because Tobit estimates are not robust to misspecifications and the error-distribution estimates are both inconsistent and inefficient in the presence of heteroskedasticity and/or non-normality in the errors.

Due to the limitations of Tobit models, Jalan and Ravallion [1998] suggest the use of semi-parametric methods.[13] For the consistency of non-intercept coefficients, the only assumptions required by these semi-parametric methods are that errors be independently and identically distributed, and continuously differentiable with positive density at the chosen quantile. Quantile regression, in particular, is robust to distributional misspecifications in the error term. Moreover, quantile regression will be more robust in response to large outliers, as in the income data we use.

The minimization function of the model for transient poverty is thus:

$$Q_n\ (\beta; \theta) = \frac{1}{N}\sum_{i=1}^{N} \rho_\theta\ \left|\mathbf{T_i} - \max(\theta, \mathbf{x_i'\beta^T})\right| \qquad (3.3)$$

and the analogous function for chronic poverty is:

$$Q_n\ (\beta; \theta) = \frac{1}{N}\sum_{i=1}^{N} \rho_\theta\ \left|\mathbf{C_i} - \max(\theta, \mathbf{x_i'\beta^C}\right| \qquad (3.4)$$

which is minimized over all β in the parameter space. The ρ_θ is a weighting function to center the data, given the quantile θ:

$$\rho_\theta(\lambda) \equiv [\theta\ I(\lambda \geq \theta + (1-\theta)I(\lambda < \theta)]|\theta| \qquad (3.5)$$

where $I(.)$ is an indicator function.[14]

Most available panel data will typically involve a relatively modest number of time periods. This can create substantial systematic differences between sample estimates and the value of the true (unobserved) poverty indices. With Jalan and Ravallion's approach, these biases will directly affect the estimation of chronic poverty. Transient poverty will also be biased since they are obtained as differences between biased estimators. We utilize the bias correction introduced by Duclos, Araar, and Giles [2010] and present their method in Appendix 7.1.

[13] Jalan and Ravallion [1998] use Powell's Censored Quantile Regression (CQR) [1986] to overcome the problem of non-robustness of the maximum likelihood estimators to distributional misspecifications. We also adopt this in our paper. Another method is Horowitz's [1986, 1988] Semiparametric Generalized Least Squares (SGLS) estimator.

[14] From Buchinsky [1992]. We use QREG in Stata 10 to estimate this function.

3.3.2 Intergenerational poverty

The first econometric estimation classifies households according to their experience of chronic and transient poverty and identifies significant correlates of their experience. In this section, we now specify the estimation procedure to determine how the experience of transient and chronic poverty persists across generations. We begin by substituting Equation (2.6) to Equations (2.3) then in Equation (2.2).

$$Y_t = \psi[g^*(E_t, Y_{t-1}, k_{t-1}), s_{t-1}, E_t) + \varphi_t$$
$$= \emptyset^*(E_t, Y_{t-1}, r_{t-1}) + \varphi_t \qquad (3.6)$$

where r_{t-1} captures w, s_{t-1}, E_t. Earnings of children Y_t now depend directly on the earnings of parents Y_{t-1}, and indirectly through the transmission of endowments.

If Y_t were approximately linearly related to E_t and Y_{t-1} as in Becker (1991), we have:

$$Y_t \cong c'_t + (\beta^* + h)Y_{t-1} + \beta^* h Y_{t-2} + \varphi_t^* \qquad (3.7)$$

where $\beta^* = \phi_Y^*$

The coefficient of parents' earnings Y_{t-1} exceeds the degree of inheritability h by the marginal propensity to invest in the human capital of children (β*).

Ordinary Least Squares (OLS) estimates of the coefficient of Y_{t-1} are biased downward by the transitory component of lifetime earnings. Estimates of the relation between Y_t and Y_{t-1} would approach:

$$\beta^* < b_{t,t-1}^* = \frac{b_{t,t-1,t-2}^*}{1+h\beta^*} \leq \min(1, \beta^* + h, b_{t,t-1,t-2}^*) \qquad (3.8)$$

where $b_{t,t-1,t-2}^*$ is the partial regression coefficient on Y_t and Y_{t-1}.

Becker suggests that the use of the lifetime earnings of parents such as lifetime earnings of grandparents or great-grandparents to correct the biases in the OLS estimates. The estimating equation we will use will be similar to that of Charles and Hurts'[2002] study of wealth correlation across generations:

$$Y_t = c_t^{'} + \beta_1 Y_{t-1} + \beta_2 Age_t + + \beta_3 Age_{t-1} + \beta_i Z_i + \varphi_t \qquad (3.9)$$

where Y_t is child's household income, Y_{t-1} is parent's household income, β_1 *i*s the coefficient that captures age-adjusted elasticity of income earnings between parents and children; Z_i is a 1xk vector of controls whose explanatory role is being assessed and φ_t are the model residuals.

4 Data

In this section, we describe our data sources and explain the computation of the dependent variable in our regression. We also explain the various measures we will use to capture the determinants of chronic and transient poverty and how households between parents and children were matched and selected for the analysis of intergenerational poverty.

4.1 The Cebu Longitudinal Health and Nutrition Survey[15]

Longitudinal data sets that periodically track households in the Philippines are quite rare. Initial analyses of poverty dynamics in the country have mostly used the spells approach since it lends itself well to shorter spans covered by existing data.[16] Because we will use the components approach in determining transient and chronic poverty within a lifetime as well as poverty transmission across two generations, we find the Cebu Longitudinal Health and Nutrition Survey (CLHNS) most apt for our purposes[17]. The CLHNS is an ongoing study of a cohort of Filipino women who gave birth between May 1, 1983 and April 30, 1984. Originally conceptualized as a study of infant feeding patterns, particularly the overall sequencing of feeding events (i.e., of both milk and non-milk items), the various factors affecting feeding decisions at each point in time, and how different feeding patterns affect 3the infant, mother, and household, the study's focus eventually expanded to address more issues related to selected health, demographic, and nutritional outcomes. Follow-up surveys of the mothers and index children were conducted in the years 1991, 1994, 1999, 2002, and 2005.

By 2002, the index children born in the 1983-1984 survey period are now young adults and thus provide us with intergenerational data for our study. As this paper is being written, tracking surveys are being conducted by the CLHNS study team.

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[15] The survey procedures and content presented here are summarized from http://www.cpc.unc.edu/projects/cebu/about.html

[16] Reyes [2002] and Obmina and Reyes [2007] both used Family Income Expenditure Survey for the years 1997, 2002, 2005 in their studies.

[17] This was one of the two data sets identified by Moore [2004] in her survey of existing panel data sets available in developing countries that would be applicable for life-course analysis of poverty. The other is the Philippines Cash Cropping Project in Southern Bukidnon Province.

4.2. Measure of welfare

According to the permanent income hypothesis of Friedman [1975], welfare indicators based on expenditure are preferred over those based on income[18]. Due to the absence of complete household consumption data in the CLHNS, we use household income as the next best alternative welfare indicator. We first measure total household income for the years 1991 and 1994 for the parents' households and 2002 and 2005 for the children's households. Although CLHNS data are available for as early as 1983, we begin measurement of income and other variables in 1991 since information on income sources, assets, and other household characteristics is more complete and better-matched beginning 1991. This imposes a limitation in our measurement of average household income through time. We use value of house owned in 1983 as proxy for household income during the early stages of childhood.

After computing for household income, we then convert it to income per adult equivalent[19] using the World Health Organization (WHO) adult equivalence scales (see Section 7.2 in the Appendix). These equivalence scales are derived from research on the nutritional requirements of males and females of different ages in developing countries. We do this conversion to control for nutritional needs that varies with age and sex as we make comparisons of poverty status among households. We also control for temporal price variability by adjusting income through consumer price indices (CPI).[20] Lastly, we use the provincial annual poverty threshold for Cebu, also converted into adult equivalent terms[21], recorded by the National Statistical Coordination Board, in our computation of poverty indices.

[18] See Massari [2005] for a more comprehensive discussion on this issue.

[19] The adult equivalent size m_i of household *i* may be expressed as where n_i is the number of individuals in the household and d_i is the vector of the household's demographic structure. Household income y_i is adjusted to obtain equivalent income or living standard defined by $z_i = y_i/m_i$ [Creedy and Sleeman 2005]. See also Balisacan [1992] for a longer discussion on the merits of incorporating equivalence scales in poverty measures.

[20] We get consumer price indices for years covered in the study from National Statistics Office and express income in 2000 prices.

[21] Based on the average family size in Cebu of 5, with two adults and three children, and approximately an equal ratio of females and males. Information from http://www.census.gov.ph/data/quickstat/region7/qs07020403.html

4.3. Measures of correlates of household poverty

The correlates of chronic and transient poverty in the research summarized in Chapter 2 and data availability guide our choices of the dependent variables in estimating Equations (3.1) and (3.2). Note that we are measuring our independent variables at the start of 1991, the base year in our sample, to identify how persistent their effects are on household poverty status.

Demographic characteristics are captured through the dependency burden ratio and dummy variable for single-headed households. The existence of horizontally and vertically extended families in our data set might overstate the effect of household size on poverty. Moreover, since Lipton [1994] posits that it is not necessarily household size, but rather the number of dependents relative to income earners that affects poverty, we use an indicator of household dependency burden instead of household size. We measure household dependency burden as the number of individuals aged below 15 and above 64 divided by the number of the number of individuals aged 15 to 64.

Physical asset variables include dummy variables for ownership of house and lot, ownership of vehicle (tricycle, jeep, pedicab, car, truck), ownership of electrical appliance and ownership of poultry and/or livestock.

According to human capital theories, the level of education and age of parents, particularly that of the mother's, matter significantly in explaining household income and poverty. We thus include these two variables in our regressions.

To account for spatial characteristics, as well as to signal access to utilities and services, we include dummy variables for settlement. Households are classified according to the following in the CLHNS data: congested and dirty urban area, less congested and dirty urban area, outskirts of city center urban area, town center in rural area, outside of town center rural area, remote (isolated town) rural area. Households living in isolated rural areas are used as reference.

Table 1 presents the summary statistics of the variables of interest and their expected signs in the regression with poverty status as dependent variable. For the sample years 1991 and

1994, households have experienced transient poverty around 11 percent of the time. Experience for chronic poverty is much smaller: households have only experienced chronic poverty for about 5 percent of the time, with some households experiencing no chronic poverty and some households experiencing it for about 56 percent of the time.

The average household in 1991 of the sample has the following characteristics: the mean age of the mother is 34 years old, with an average of almost 8 years of education and around 3 percent of the sample are households with only one head. In terms of asset ownership, around 8 percent of the sample own the house they live in, own an appliance or own furniture. Around 3 percent own a vehicle while around 1 percent own animals for livestock and poultry purposes. In terms of settlement, majority of the sample households live in an urban area: around 13 percent of the households live in an urban squatter area, 18 percent live in a congested urban area, 32 percent live in a less congested urban area, and 11 percent live in the city outskirts. Of the 26 percent who live in rural areas, only 1 percent live in the rural town center while 23 percent live outside the town center, and 2 percent live in isolated rural neighborhoods.

Fifty percent of the households have heads who are regular wage earners while around 9 percent have household heads who are not unpaid or contractual workers. The rest have household heads that are self-employed.

Of these variables, we expect the dummy variable for single-headed households to be positively correlated with poverty. We also expect the sign of mother's age squared to be positive, i.e., initially, poverty tends to decrease with mother's age but tends to rise after reaching a certain point. We could not make a priori judgments regarding the expected sign of the household head's industry of occupation. All the other variables are expected to have a negative relationship with our poverty measures

Table 1: Summary of panel variables

Variable	Mean or % of sample	Standard deviation	Minimum	Maximum	Expected sign with poverty index
Dependent variables					
Transient poverty index	0.11	0.15	0.00	0.75	
Chronic poverty index	0.05	0.11	0.00	0.56	
Explanatory variables (1991 household characteristics					
Mother's age	34.97	5.94	23.00	55.00	-
Mother's age squared	1258.19	441.75	529.00	3025.00	+
No. of years of mother's education	3.64	1.70	0.00	12.00	-
Dependency burden	0.55	0.16	0.00	0.88	+
Single-headed households	0.03	0.05	0.00	1	+
Owns house	0.08	0.38	0.00	1.00	-
Owns vehicle(s)	0.03	0.18	0.00	1.00	-
Owns animal(s) for livestock or poultry	0.01	0.07	0.00	1.00	-
Owns appliance(s)	0.08	0.27	0.00	1.00	-
Base variable: Lives in a rural area, isolated town					
Lives in an urban, squatter area	0.13	0.33	0.00	1.00	-
Lives in an urban area, congested and dirty	0.18	0.38	0.00	1.00	-
Lives in an urban area, less congested and dirty	0.32	0.47	0.00	1.00	-

Variable	Mean or % of Sample	Standard Deviation	Minimum	Maximum	Expected sign with poverty index
Lives in an urban area, city outskirts	0.11	0.31	0.00	1.00	-
Lives in a rural area, town center	0.01	0.08	0.00	1.00	-
Lives in a rural area, outside town center	0.23	0.42	0.00	1.00	-
Base variable: Main source is non-agricultural					
Main source is farming	0.09	0.29	0.00	1.00	+
Main source is fishing	0.01	0.11	0.00	1.00	+
Base variable: Household head is self-employed					
Household head is a regular wage earner	0.27	0.44	0.00	1.00	ambiguous
Household head is an unpaid or contractual worker[22]	0.60	0.49	0.00	1.00	+
N			2366		

[22] Ideally, we would be able to separate unpaid household heads from contractually-employed household heads, however the CLHNS data in 1991 does not permit us this disaggregation.

4.4 Two-generation households

After conducting poverty decomposition and regressions of poverty status in parents' households, we now check how closely correlated income is between parents and children. We limit our analysis to children who are now working and earning their own income by 2002. From an initial sample of 2,366 households we are now left with 284 mother-child pairs. We include mother's age base year of household measurement (i.e. 1991), value of house owned in 1983 as controls in estimating the association of earnings between parent and children.

Due to the absence of income data from the households of grandfathers and/or uncles, we compensate for the possible bias of the intergenerational elasticity estimate by averaging mother's household income over a period of two years (1991 and 1994) and child's income over a period of two years (2002 and 2005). This is a technique initially applied by Hauser et al. [1975] in their study of intergeneration earnings mobility between fathers and sons. We apply a logarithmic function for income association because it is more robust to extreme values, as is usual in data that are generally skewed such as income, and often yields more precise estimates than a model estimated in levels [Mulder et al. 2009]. Controls for ages at year of first measurement of household income (i.e. mother's age at 1991) are also included to further correct for possible bias of the elasticity of income correlation, as suggested in empirical work summarized in Becker [1991] and in Mulder et al. [2009]. We also add controls for the value of household assets of household in early childhood, gender, dependence, number of years of education and household poverty characteristics to control for further bias in the income elasticity estimates.

5 Results and Discussion

We decompose aggregate poverty into its chronic and transient components in this section. We then regress the components of squared poverty gap index on the panel variables presented in the previous section. Finally, we conduct our ordinary least squares regression using different functional forms and controls to analyze intergenerational poverty.

5.1 Poverty decomposition

Table 2 presents the decomposition for squared poverty gap index. Transient and chronic poverty both comprise total poverty. Without correcting for bias, total poverty stands at 0.170, with transient poverty making up 55 percent (0.094) of the total poverty. Once we correct for biases brought about by using panel data of a small number of time periods, transient poverty now accounts for as much as 82 percent (0.141) of total poverty. [23]

Table 2: Squared poverty gap index chronic and transient poverty decomposition, α=2, asymptotic standard errors in parenthesis

Index	Without bias correction	%	With bias correction	%
Bias	--	--	-0.047 (0.001)	--
Transient	0.094 (0.002)	55	0.141 (0.003)	82
Chronic	0.076 (0.02)	45	0.029 (0.003)	17
Total	0.170 (0.03)	100	0.170 (0.003)	100

The high share of transient poverty implies that cyclical income fluctuations in Cebu are quite prevalent. This also suggests relatively high cyclical class mobility – much of the poor population is able to rise above the poverty line over time.

[23] Possible biases in using Jalan and Ravallion's method are discussed in Appendix 8.1

5.2 Correlates of chronic and transient poverty

Given that transient poverty makes up a larger part of total poverty in our sample, would its correlates differ from chronic poverty? Or are they affected by the same factors that affect total poverty?

In our sample, there are 467 households with some chronic poverty and around 1,940 households with some transient poverty.[24] Given the high degree of censored observations, i.e., non-chronic poor households for whom the chronic poverty measure takes a value zero, the conditional quantile model has to be estimated at least at the 90th quantile. [25]

Table 3 presents the correlates of chronic and transient poverty. The pseudo-R^2 of chronic poverty estimation is slightly higher than that of transient poverty's, suggesting that the model predicts chronic poverty better than transient poverty. This echoes Jalan and Ravallion's earlier result in their work in China to which this decomposition method was first tested.

[24] Note that the total of the households here do not equal 2,366. There are some households who experience both transient and chronic poverty and some households who do not experience poverty at all.

[25] This method is suggested by Jalan and Ravallion [1998]. They however caution that while the higher quantile model is more informative in estimating the model parameters, the estimates themselves are less precise at a higher quantile because fewer observations are used in the estimation process.

Table 3: Censored quantile regression results, dependent variables are chronic and transient poverty indices

Variables	Transient poverty		Chronic poverty	
	Coefficient	t-statistic	Coefficient	t-statistic
Mother's age	-0.0092	-4.71***	-0.0082	-0.55
Mother's age squared	0.0002	4.83***	0.0001	0.68
Years of mother's of education	-0.0013	-1.66	-0.0001	-7.89***
Household dependency burden	0.0346	4.02***	-0.0864	-1.23
Single-headed household dummy	-0.0543	-3.03***	-0.071	-1.32
Own house	-0.0199	-0.66	0.0428	-1.64
Own vehicle	-0.0095	-1.48	-0.0187	-0.39
Own animal(s) for poultry and livestock	0.0522	3.43***	0.0661	1.43
Own furniture	-0.0029	-0.70	-0.0233	-0.70
Own appliance	0.00658	-1.55	-0.0845*	-1.45
Lives in an urban, squatter area	-0.0460	-6.12***	-0.0523	-0.85
Lives in an urban, congested area	-0.0429	-5.83***	-0.0095	-0.16
Lives in an urban, less congested area	-0.0391	-5.49***	-0.0080	-0.14
Lives in the city outskirts, urban	-0.0398	-5.22***	-0.0056	-0.09
Lives in the rural town center	-0.0409	-2.96**	-0.3820	-3.63
Lives outside the rural town center	-0.0040	-0.55	-0.0187	-0.32
Main occupation is farming	0.1640	20.57***	0.2290	2.17*
Household head is a regular wage earner household head	-0.0202	-2.72**	0.1270	2.20*
Household head is a contractual or unpaid worker	0.0010	0.14	0.179	3.10**
Constant	-0.0653	-1.77	-0.362	-1.26
Pseudo-R^2	0.0289		0.1047	
N	2356		2356	

**p<0.05, ** p<0.01, *** p<0.001*

In terms of magnitude, work in the farming sector has the greatest effect in raising transient poverty rates. This is consistent with the observation that income fluctuations are more prevalent in the agricultural sector than in other industries [Obmina and Reyes 2007]. While the ownership of assets would usually depress the transient poverty index, the significance of ownership of animals for poultry and livestock in positively affecting poverty can also be interpreted in light of the prevalence of income fluctuations in the agricultural sector. It may not be the ownership of livestock per se that causes an increase in a household's experience of transient poverty; rather livestock ownership signals that the household is mainly involved in agriculture.

All settlement variables take negative signs in relation to the remote / isolated rural area variable, although their impact on transient poverty score is quite low – it ranges from -0.039 to -0.046. The coefficient is largest for households who live in urban areas and smallest for households who live in rural areas, but outside the town center. This finding implies that area-specific factors such as improved road infrastructure, better access to utilities and public-provided goods are also significant in reducing transient poverty experience. Moreover, jobs that offer regular wages are more prevalent in urban areas, and farm work which is associated with income fluctuations is closely associated with rural areas.

Household demographic characteristics also demonstrate a significant relationship with transient poverty, although household demographic characteristics' effect on transient poverty is very subtle if compared to agriculture sector spatial factors, An increase in the number of dependents relative to income earners increases transient poverty score. Also echoing this result, single-headed households have transient poverty scores that are higher by 0.05 points than households have multiple heads. Families with single heads are more vulnerable to income fluctuations because of the absence of another member who can support the family should the current household head lose his or her source of income. The period of search by the household head for another job or for employment may denote an experience of transient poverty, holding all else constant.

Mother's age is also significantly correlated with transient poverty as predicted, although its impact is very marginal compared with other significant correlates. The negative sign of mother's age squared implies possible life cycle effects, i.e., transient poverty tends to be more prevalent during the younger years of the mother, then income stabilizes for a period causing a decline in transient poverty as she ages, and begins to fluctuate in the mother's later years.

We do not observe complete congruence in the correlates of transient and chronic poverty. One significant correlate of chronic poverty is work in the agricultural sector as main source of income for the household. Households who usually report farming or farm-related services as their primary source of income are more susceptible to long-run poverty because agricultural work yields lower returns than non-agricultural sources of income [Obmina and Reyes 2007].

Although household heads who are regular wage earners and who are contractual workers experience less transient poverty than self-employed household heads, they experience more long-run poverty. Self-employment may cause large dips in income in the long-run due to the costs of setting-up one's own business but pay more in the long-run than contractual or regular work.

The effect of mother's number of years of education is also positive, but its impact on chronic poverty score is almost negligible. Other factors such as mother's age, settlement variables, physical asset and other income variables are not found to be significant in affecting transient poverty. Our chronic and transient poverty estimation reveals that commonly-identified correlates of poverty are in fact correlates of chronic poverty.

5.3 Intergenerational poverty estimates

Does the experience of poverty extend beyond one generation? What repercussions do chronic and transient poverty have on children?

To answer these questions, we estimate a logarithmic specification for testing intergenerational transmission of poverty. Apart from controlling for age, we also add the following controls: a dummy variable if the child is still living in mother's household to control for income, asset ownership during child's early years as measured by value of house in 1983, child's gender, a dummy variable if the child comes from a household who experienced some transient poverty, and a dummy variable if the child comes from a household who experienced some chronic poverty.

Table 4 presents the summary statistics of the variables used in the regression. We take the average of the income earned by the child for the years 2002 and 2005 and the average income earned by the parent for the years 1991 and 1994[26] and express their values in logarithm. Mean age of the mother at time of first measurement is 34 years old. Since all index children followed are born in the year 1983 all are either 18 or 19 years old. Majority of the children already earning their own income still live in their mother's household and about half are male. The average value of house owned in 1983 expressed in 2000 prices is PhP 43,000. Around 90 percent of children in this sample come from households that experienced some transient poverty while approximately 70 percent come from households that experienced some chronic poverty.

[26] Incomes are in 2000 prices.

Table 4: Summary statistics of intergenerational variables

	Mean or % of sample	Standard Deviation	Minimum	Maximum
Dependent variable				
Child's average income for years 2002 and 2005	5906.38	4974	1197.09	10,345
Explanatory variables				
Mother's average income for years 1991 and 1994.	10,707	2317	1084.24	151,008
Age of mother at first measurement of household income (1991)	34	7.23	22	52
Child still living in mother's household	0.845	0.361	0	1
Value of house in 1983	43076	122434	150	2000000
Child is male	0.508	0.500	0	1
Number of years of education of child	6.82	4.55	0	11
Child coming from household which experienced some transient poverty	0.906	0.292	0	1
Child coming from household which experienced some chronic poverty	0.777	0.416	0	1
	N = 284			

Table 5 presents the results of regression with the log of the average child's income as dependent variable. The first model establishes the relationship between mother's income and child's income. The second model adjusts the elasticity estimate from the first model by introducing the age of mother in the regression.[27] Model 3 adds controls for asset ownership in 1983. Model 4 adds child characteristics such as gender and if he or she is still living in mother's household to the previous controls. Model 5 includes the number of years

[27] The initial estimation model also includes controls for the age of the child. At age of measurement of first income. However, since we are following index children who were all born in 1983, there is no variation in age in 2002.

of education received by the child. Finally, we assess the difference in intergenerational association between transient, chronic, and non-poor households by adding dummy variables for these household poverty characteristics in model 6.

Table 5: Estimated intergenerational elasticity between mother and child's income, dependent variable is log child's income

	(1)	(2)	(3)	(4)	(5)	(6)
Log mother's income	0.165***	0.165***	0.172***	0.179***	0.181***	0.197**
	(5.38)	(5.36)	(5.26)	(5.36)	(5.44)	(5.66)
Age of mother		-0.002	-0.002	-0.002	-0.002	-0.0087
		(-0.27)	(-0.28)	(-0.28)	(-0.22)	(-1.04)
Estimated value of house in 1983			-0.0001	-0.00006	-0.00006	-0.00009
			(-0.60)	(-0.29)	(-0.29)	(-0.42)
Child still in mother's household				0.181	0.211	0.238
				(0.94)	(1.10)	(1.25)
Child is male				0.083	0.116	0.125
				(0.78)	(1.07)	(1.16)
Years of education of child[28]					0.026*	0.024
					(1.75)	(1.63)
Child comes from household that experienced transient poverty						-0.099
						(-0.47)
Child comes from household that experienced chronic poverty						-0.345*
						(1.70)
Constant	7.989***	8.047***	7.973***	7.661***	7.381***	7.195***
	(18.01)	(16.32)	(15.68)	(13.09)	(12.21)	(11.81)
R-squared[29]	0.093	0.093	0.094	0.099	0.11	0.13
N	284	284	284	284	284	284

t-values in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The elasticity of intergenerational income in model 1 is statistically significant and positive at 0.165. This figure remains the same even as we adjust for age of mother in model 2. The elasticity of income between mother and children rises to 0.172 once we control for asset ownership during early childhood in model 3 and increases to 0.179 when we control for

[28] We conduct a Durbin-Wu-Hausman test to check the endogeneity of number of years of education with the log of child's income. We find that at the 5 percent level, the ordinary-least squares regression yields consistent estimates.

[29] We also observe low-R-squared values, ranging from 0.01 to 0.19, for similar studies summarized in Becker [1991].

child characteristics such as gender and stay in household. We observe that the difference in income between children still living with their mothers and children who have moved out of the house is statistically zero. We also detect a similar relationship between the income of male and female children.

Model 5 now introduces number of years of child's education in the regression. This increases the explanatory power of the model marginally, and gives us an intergenerational income elasticity adjusted for age, asset, and gender of about 0.181. We find that the number of years of education has a significant and positive effect in raising log of child's income.

There are differences in child's income earnings between children coming from households that experienced chronic poverty and children who come from households that have not experienced any chronic poverty, as shown in model 6. The dummy variable for children from households that experienced some chronic poverty assumes a negative sign, hinting that the experience of chronic poverty in the early years can reduce a child's future income. The experience of transient poverty, however, does not appear to be as persistent as that of chronic poverty. The inclusion of controls for the experience of household poverty increases the explanatory power of the model but also raises our estimate of intergenerational elasticity of income to 0.197, suggesting that moderate income rigidity exists between two generations. [30]

[30] We are careful in interpreting the results in Table 5. The explanatory power of the five models is low and while the coefficients are significant, the magnitudes are likely to hint only the direction of the relationship and not give us an exact measure of elasticity unlike in the study of Solon [1999].

6 Conclusion

We contribute to Philippine poverty analysis by introducing dynamic components to give us better guidance in designing appropriate policy responses on poverty reduction. Using the Cebu Longitudinal Health and Nutrition Survey, we decompose poverty into its chronic and transient components using Jalan and Ravallion's [1991] method. Chronic poverty is measured by the amount of poverty in the distribution of time-mean consumption while transient poverty is defined by the amount of poverty ascribed to variability. We find that aggregate squared poverty gap index is mostly transient. Investigating further, we find that significant correlates of transient or chronic poverty include settlement factors, household dependency burden, mother's age, and work in the farming sector. Transient poverty is also linked with single person-headed households. Significant correlates of chronic poverty though are less than transient poverty's, although their individual impact on chronic poverty experience is larger. Again, work in the farming sector is a significant correlate. Household heads who are regular wage earners and who are contractual workers experience more chronic poverty than household heads who are self-employed. The number of years of mother's education is also negatively associated with chronic poverty experience, although its effect is very small.

After analyzing poverty in a single generation, we broaden our definition of chronic poverty to include intergenerational poverty. We adopt a model by Becker [1991] on the transmission of earnings from parents to children where intergenerational mobility of earnings depends on the inheritability of endowments and the effect of capital market constraints. If all parents can readily borrow to finance the optimal investments in children, the degree of intergenerational mobility in earnings essentially would equal the inheritability of endowments. However, poverty constrains families' ability to finance investments in children because loans to supplement their limited resources are not readily available when human capital is the collateral. Such capital-market restrictions lower investments in children from poorer families, particularly for those who experience more chronic poverty than others.

Results of our regression for intergenerational poverty show that there is some evidence of poverty persistence between mothers and their children. Once we control for age, asset ownership, child characteristics, and the experience of household poverty in the early years, estimated association between parent and child's income ranges from 0.165 to 0.197. From these estimates, we find evidence of persistence of income status across two generations and that the experience of chronic poverty in the early years can reduce a child's future income.

Indeed, even though transient poverty comprises a larger portion of total poverty within a generation, the consequences of chronic poverty are more enduring, and thus costlier. Easing credit access can help encourage parents to invest more in their children, but to solve an enduring problem such as intergenerational poverty would require long-term solutions. Hence, the benefits of programs targeted at increasing the human capital endowments of a generation significantly redound to the next generation.

In light of these findings, the policy suggestions of Quisumbing [2007] are made even more relevant.[31] Strategies should focus on enabling the poor to invest in the next generation's human capital as this will increasingly become the most important type of intergenerational transfer that the poor can make. Enabling the poor to invest in human capital even if they are credit-constrained is particularly pertinent in relieving the long-term impacts of transient poverty on human capital investments. In order to encourage human capital investment in the next generation, these strategies can be complemented with initiatives to assist the poor to accumulate assets over time and provide mechanisms to allow the poor to maintain their asset base in spite of negative shocks.

Since our data only focus on Cebu, future studies can establish the evidence for poverty persistence within and across generations for the whole Philippines. Such studies will depend on the availability of a representative panel data that tracks households for longer periods of time. Furthermore, while we have investigated the importance of household characteristics in influencing poverty status, the role of external, time-varying factors (e.g., quality of governance) and household permanent characteristics that can obstruct income mobility can be explored.

[31] See Quisumbing [2007] for a more in-depth discussion of the policy responses and implications of intergenerational poverty.

7 Appendix

7.1 Analytical bias correction for Jalan and Ravallion's chronic and transient poverty measurement [32]

Let $\overline{y_i}$ be the expected income of household I, i.e., its permanent income. This is defined as $\overline{y_i} = \int y dF_i(y)$. A household *i*'s true as opposed to estimated chronic poverty is then given by:

$$\overline{P^*_{\alpha,i}} = (1 - \overline{y_i})^{\alpha} \qquad (7.1)$$

A natural estimator of $\overline{y_i}$ with panel data is $\widehat{\overline{y_i}} = t^{-1} \sum_{j=1}^{t} y_{ij}$ where y_{ij} is the observed sample income of individual *i* at time *j*. An obvious estimator for $P^*_{\alpha,i}$ is simply $(1 - \widehat{\overline{y_i}})^{\alpha}$. This however is biased upwards for finite values of *t* since we can show[33] that

$$E[(1 - \widehat{\overline{y_i}})^{\alpha})] = \overline{P^*_{\alpha,i}} + \frac{\alpha(\alpha-1)}{2t}(1 - \overline{y_i})^{\alpha-2}\text{var}(y_{ij}) + O(t^{-2}) \quad (7.2)$$
$$\geq \overline{P^*_{\alpha,i}}$$

where $\text{var}(y_{ij}) = \int (y - y_i)^2 dF_i(y)$. Hence, an estimator that includes a second-order bias correction for the bias of $(1 - \widehat{\overline{y_i}})^{\alpha})$ is given by $\widehat{\overline{P^*_{\alpha,i}}}$ and is defined as

$$\widehat{\overline{P^*_{\alpha,i}}} = (1 - \widehat{\overline{y_i}})^{\alpha} + \frac{\alpha(\alpha-1)}{2t}(1 - \overline{y_i})^{\alpha-2}\text{var}(y_{ij}) \qquad (7.3)$$

All elements in can be estimated consistently, *inter alia,* by substituting $\widehat{\overline{y_i}}$ for $\overline{y_i}$ and $(t-1)^{-1} \sum_{j=1}^{t} (y_{ij} - \widehat{\overline{y_i}})^2$ for var (y_{ij}). Hence, equation (7.3) provides an implementable second-order correction for Jalan and Ravallion's index of chronic poverty.

[32] From Duclos, Araar, and Giles [2010:270].
[33] This is done through Taylor expansion. See Appendix of Duclos et al's article for complete derivation.

7.2 Adult equivalence scale

Table 6: Conversion factors to compute household income in adult-equivalent terms

Age	Adult Equivalence Scale	
	Male	Female
Under 1 year	0.33	0.33
1 – 1.99	0.46	0.46
2 – 2.99	0.54	0.54
3 – 4.99	0.62	0.62
5 – 6.99	0.74	0.70
7 – 9.99	0.84	0.72
10 – 11.99	0.88	0.78
12 – 13.99	0.96	0.84
14 – 15.99	1.06	0.86
16 – 17.99	1.14	0.86
18 – 29.99	1.04	0.80
30 – 59.99	1.00	0.82
60 and over	0.84	0.74

Source: World Health Organization

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