Economics Bulletin

Volume 30, Issue 4

"Chronic and transient poverty in Mexico: 2002-2005"

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Abstract

This paper uses panel data to decompose total poverty into its chronic and transient components and to estimate the determinants of each type of poverty for the case of Mexico. It was found that 69 percent of total poverty is chronic and 31 percent is transient. Using censored quantile regressions techniques, it was observed that the variables explaining chronic poverty are different from those explaining transient poverty. These results indicate that chronic poverty is an issue which should have a high priority on the public policy agenda and that different public policies are needed to target chronic and transient poverty.

The authors thank the Editor John P. Conley and an anonymous referee for helpful suggestions and comments.
Citation: Jorge Garza-Rodriguez and Martha Gonzalez-Martinez and Marcela Quiroga-Lozano and Luz Solis-Santoyo and Gabriela Yarto-Weber, (2010) "'Chronic and transient poverty in Mexico: 2002-2005'", *Economics Bulletin*, Vol. 30 no.4 pp. 3188-3200.
Submitted: Apr 16 2010. **Published:** December 02, 2010.

1. Introduction

Poverty in Mexico is widespread and pervasive. According to the most recent official estimates, 50.6 million people were living in poverty in 2008, which represents 47.4 percent of the Mexican population. In the first decade of this century, poverty levels decreased very little, only to increase again in 2008. Furthermore, the strong recession that affected the Mexican economy during 2009 should have increased poverty levels in the country further.

Although there have been many studies of poverty in Mexico, the literature about the dynamics of poverty is scant. This is largely due to the fact that there was no panel data on incomes available for Mexico, except for labor income. The only study we encountered about the time dimensions of poverty in Mexico (León Bravo, 2005) makes use of this kind of data, without taking into account non-labor income. Fortunately, with the availability of a new, longitudinal survey (the Mexican Family Life Survey, ENNVIH in Spanish), it is now possible to investigate the dynamics of poverty in Mexico.

Poverty is a dynamic phenomenon: some households are poor for long periods of time, this situation is known as chronic poverty, whereas other households experience poverty temporarily, which is called transient poverty. Both for economic reasons as well as ethical reasons, it is important to distinguish chronic poverty from transient poverty. On ethical grounds, it can be argued that chronic poverty is more unfair than transient poverty because the chronically poor have been poor for a long period of time, for all of their lives or for generation after generation. It could also be argued that chronic poverty can be more damaging to the social fabric of society as it can generate more political instability. From an economic viewpoint, chronic and transient poverty can have different causes and consequences and it is very important to analyze the economic processes that contribute to each type of poverty as well as the effects that they can have on human capital formation in particular.

In the case of Mexico, where poverty is so high, it is even more important to measure chronic and transient poverty and to identify if they can be traced to different determinants, in order to design appropriate public policies for each.

Hulme and Shepherd (2003) define chronic poverty as a situation in which an individual experiences significant deprivation for a period of five years or more. Harper, Marcus and Moore (2003), argue that a distinctive feature of chronic poverty is its extended duration, during which people remain poor for a long time and there is a high probability of the transmission of poverty to future generations.

Yaqub (2000) distinguishes between two types of methods to identify and measure chronic and transient poverty: the spells approach and the components approach. In the spells approach, the chronically poor are identified depending on the number of times they have been in poverty. Under the components approach, a household is considered as chronically poor if its permanent income is below the poverty line. Both approaches involve extreme assumptions regarding the transfer of income over time. The spells approach assumes that there is no possibility of transfer of income between periods (Aaberge & Mogstad, 2007), while the components approach assumes that there can be a perfect transfer of income over time, since in this approach poverty is

defined as a function of permanent income. According to McKay and Lawson (2003), the spells approach has the advantage of being able to take into account the persistence of poverty, while the components approach succeeds in considering the depth of poverty.

According to Jalan and Ravallion (2000, J&R hereafter), chronic poverty is the result of household characteristics that prevent households from meeting their basic needs over long periods of time. J&R argue that the long run income of these households is below the poverty line. In contrast, transient poverty is the result of income shocks or other shocks which affect those households whose demographic profile makes them vulnerable to falling into poverty. J&R note that, in order to design appropriate policies to reduce poverty, it is necessary to know the severity of each component of total poverty and to determine whether chronic and transient poverty are caused by the same or different factors.

This work uses the methodology proposed by J&R to decompose poverty into chronic and transient components at the household level and to estimate the determinants of each type of poverty for the case of Mexico. Following J&R and Cruces and Wodon (2003), we identified a group of socioeconomic and demographic variables and used censored quantile regressions techniques to evaluate the effect of these variables on chronic and transient poverty in Mexico.

The paper is structured as follows. The next section presents the methodology used in the decomposition of chronic and transient poverty as well as the methodology used to identify the determinants of each type of poverty. Section 3 describes the data and discusses the results obtained from the poverty decomposition methodology and the regression analysis. Finally, section 4 presents our conclusions.

2. Methodology

A common approach to identify the chronic component of household poverty is based on the average intertemporal income of the household (J&R; McCulloch and Baulch, 2000). Following this approach, a household experiences chronic poverty if its average income is below the poverty line, and it experiences transient poverty if it is poor for at least one period and its income varies. Note that, under these definitions, a household can experience both chronic poverty and transient poverty. Thus, even a persistently poor household will experience transient poverty as long as its income varies over time.

For the estimation of chronic and transient poverty we followed the methodology proposed by J&R, who used the components approach. The function P is used as an empirical measure of poverty. Let $y_i = (y_{i1}, y_{i2}, \ldots y_{iT})$ denote the vector of normalized household incomes of household i in periods $1,\ldots,T$. At any point in time t, poverty for household i is denoted $P(y_{it})$. Intertemporal poverty (P_i), chronic poverty (C_i) and transient poverty (T_i) are defined as follows:

$$P_i = \frac{1}{T}\sum_{t=1}^{T} P(y_{it})$$

$$C_i = P(\bar{y}_i), \qquad \text{where } \bar{y}_i = \frac{1}{\mathrm{T}} \sum_{\mathrm{t}=1}^{\mathrm{T}} \mathrm{y_{it}} \tag{1}$$

$$T_i = P_i - C_i$$

Intertemporal poverty is the average of the poverty measures obtained each year while chronic poverty is evaluated with the expected value of income over time, $\bar{y}_i$. Transient poverty is the difference between intertemporal poverty and chronic poverty.

To obtain country level estimates of chronic, transient and total poverty, we add the estimates of each type of poverty for all households, omitting non-poor households, and we divide by all sample households, whether poor or not poor.

Thus, households are divided into three groups: first are those who are poor in each period, these households have positive chronic poverty and could also have transient poverty due to variability of income. There are also households which are not poor in all periods but that experience chronic poverty as their average income is below the poverty line; these households must necessarily have positive transient poverty. Finally, there are households which are only transiently poor as their average income is above the poverty line, but which in some periods were poor.

Following J&R, the empirical measure of poverty should meet several conditions. It should be additive over time and across households. Also, in order to satisfy the transfer axiom, the poverty function should be strictly convex. Since these conditions are not met by the poverty headcount index nor by the poverty gap index, we use the squared poverty gap index proposed by Foster, Greer and Thorbecke (1984), which does satisfy the conditions. Assuming that incomes are normalized by the poverty line, this index, abbreviated as FGT(2) from now on, can be defined as follows:

$$\mathrm{P}(\mathrm{y_{it}}) = (1 - \mathrm{y_{it}})^2 \text{ if } \mathrm{y_{it}} < 1$$

$$\mathrm{P}(\mathrm{y_{it}}) = 0 \text{ otherwise} \tag{2}$$

Once we decompose household poverty into its chronic and transient components, we will seek to examine which socioeconomic and demographic characteristics are related to total, chronic and transient poverty. Three models are estimated regressing each poverty measure against a group of demographic and socioeconomic characteristics, which were selected based on J&R and Cruces and Wodon (2003). Initial characteristics are used to determine if the baseline scenario explains the components of poverty for the whole panel data period.

Letting $\mathrm{P_i}$, C_i and $\mathrm{T_i}$ represent total, chronic and transient poverty, respectively; X the vector of explanatory variables and ε a vector of random disturbances, we have:

$$\begin{aligned} P_i &= \alpha_{1i} + \beta'_{1i} X + \varepsilon_{1i} \\ C_i &= \alpha_{2i} + \beta'_{2i} X + \varepsilon_{2i} \\ T_i &= \alpha_{3i} + \beta'_{3i} X + \varepsilon_{3i} \end{aligned} \tag{3}$$

Finally, we note that the explained variables are censored because they take the value zero for the nonpoor. To deal with this problem we follow J&R in the use of censored quantile regression techniques, which provide consistent estimates even under non-normality and heteroscedasticity (Muller, 2002). Other examples of the use of this methodology to estimate the determinants of chronic and transitory poverty are Cruces and Wodon (2003) for Argentina, Ahmed and Haddad (2002) for Egypt and Muyanga, Ayieko and Bundi (2007) for Kenya. To focus the analysis on the poorest, we used the 70th quantile for total and chronic poverty and the 90th quantile for transient poverty. The variance-covariance matrix of the parameter estimates was obtained using bootstrapping techniques through the *bsqreg* Stata command.

3. Data and Empirical Results

For the estimation of the determinants of chronic and transient poverty we used ENNVIH, which was designed to be statistically representative at the national, rural-urban and regional levels. ENNVIH has only two waves available, for the years 2002 and 2005, with an approximate sampling size of 8,440 households. Since the probability sample weights were not available, the study is performed at the sample level, using a balanced panel of 7572 observations. We estimated total current income of households (without adjustment for equivalent adults) for the years 2002 and 2005 using the methodology of Bernal (2007) and missing or zero values were imputed using the Gaussian normal regression imputation method. The poverty lines used in the regression analysis are the official patrimonial poverty lines for 2002 and 2005.

Chronic and transient poverty at the national level were estimated using the program "Distributive Analysis Stata Package" (DASP), developed by Araar and Duclos (2007). Given that, according to Bernal (2007), ENNVIH underestimates current income by approximately 50 percent compared to data from the National Household Income and Expenditure Survey (ENIGH in Spanish), we reduced the poverty line by 70 percent in order to make our poverty estimates comparable to those estimated by the National Council for the Evaluation of Social Development Policy (CONEVAL, by its Spanish acronym), which in turn are estimated based on ENIGH. However, this was done only for the estimates of total, chronic and transient poverty, while for the determinants of poverty regression analysis we used the full poverty lines in order to avoid the problem of having a large number of censored observations for the dependent variables (total, chronic and transient poverty).

As can be seen in Table 1 (estimated using a poverty line equal to 30 percent of the official CONEVAL's patrimonial poverty line), 69 percent of total poverty is chronic and 31 percent is transient. Total poverty (FGT(2)) is estimated at 0.123.

Table 2 divides the sample in four mutually exclusive groups: households persistently poor (poor in both periods), households chronically poor but not persistently poor, households who are only transiently poor and households who are never poor. It can be seen in this table that 60 percent of households in the sample experience chronic poverty with half of them suffering persistent poverty. From the estimates contained in Tables 1 and 2 it is clear that chronic poverty is an issue which should have high priority in the public policy agenda, but at the same time the

estimates for transient poverty indicate that it is also necessary to create programs that provide stability to households incomes in order to protect them from economic shocks.

In what follows we discuss the findings related to the determinants of poverty analysis obtained by using quantile regressions (Table 4). In general, the econometric results obtained are in line with standard results in poverty analysis. The economic and sociodemographic variables that have a direct relation with total poverty are household size, the number of illiterate adults in the household, rural location and the age of the head of the household between 20 and 39. These same variables have a direct relationship with chronic poverty also.

The regression results show that a larger household size is directly related to both chronic and total poverty. This result is consistent with the findings of J&R for China, McCulloch and Baulch (2000) for Pakistan, Aliber (2003) for South Africa and Cruces and Wodon (2003) for Argentina.

Variables inversely related to chronic and total poverty are if the household head completed primary or secondary school or the university; if the household head is over the age of 60, and if the household is located in a town of more than 100,000.

Several studies have found that the higher the level of education of the household members the less likely the household will fall into total or chronic poverty. The results obtained here for the education variables are consistent with the findings by Cruces and Wodon (2003) for Argentina, McCulloch and Baulch (2000) for Pakistan and J&R for China. The inverse relationship between living in an urban area and both total and chronic poverty may be due to the presence of more developed labor markets in urban areas than in rural areas.

Having a male household head decreases both total and chronic poverty while owning a business decreases chronic poverty, but has no effect on total poverty.

The most interesting finding was that, as expected, variables explaining transient poverty are different from those related with total and chronic poverty. Transient poverty is directly related with the household residing in urban areas of more than 100,000 inhabitants and inversely related to rural areas with less than 2,000 inhabitants. These results could perhaps be explained by the fact that in urban areas employment is more exposed to external shocks that cause income to fluctuate, whereas rural areas with less than two thousand people are isolated and therefore less affected by external shocks, so that their income is consistently low.

Illiteracy has an inverse relationship with transient poverty, which could perhaps be due to the fact that a person who can not read or write can hardly aspire to have a high income over the course of their lifetime and more likely will have a low income with little variation.

As opposed to the case of total and chronic poverty, the relationship between household size and transient poverty is inverse, maybe because a greater number of people contributing to household income can help households cope with external shocks and reduce income variability.

Four variables showed different sign from the one normally expected in terms of the analysis of the determinants of transient poverty. They were the number of adults aged 25 to 64 years and whether or not the household head works as a professional, and whether or not he/she completed high school or college. All of these variables were found to be directly related to transient poverty.

As in other studies (J&R, Cruces and Wodon (2003) and Ahmed and Haddad (2002)), we obtained a low pseudo R-squared coefficient for the transient poverty regression. As argued by J&R, this could be due to the fact that there are no variables in the survey which could reflect the presence of idyosincratic shocks to income and health.

4. Conclusions

Using the methodology proposed by J&R, the determinants of total, chronic and transient poverty were estimated. According to this methodology, a household experiences chronic poverty when its average income falls below the poverty line, while transient poverty occurs when household income varies, provided it is below the poverty line in at least one period.

The analysis was based on ENNVIH, which is the only panel survey in Mexico with the characteristics necessary to perform a dynamic analysis of poverty. Using a poverty line equal to 30 percent of the official patrimonial poverty line, it was found that 69 percent of total poverty is chronic and 31 percent is transient. Total poverty (FGT(2)) was estimated at 0.123. Given that poverty in Mexico affects almost half of the population, the finding that most of that poverty is chronic further accentuates the importance of the poverty problem in Mexico, both for ethical reasons as well as economic reasons. However, since more than 30 percent of poverty is transient, appropriate policies need to be enacted to attack both chronic and transient poverty.

After having estimated the degree of chronic and transient poverty in Mexico, we used censored quantile regression techniques to estimate the determinants of each type of poverty. The results indicate that total poverty is directly related to household size, the number of illiterate adults in the household and whether or not the household is located in a rural area. Factors inversely related to total poverty are the educational level of the household head, household wealth, urban residence in a place with more than 100,000 inhabitants and household head age 60 and older.

Household size, the number of illiterate adults in the household and residence in a rural area with a population 2,000 or less are directly related to chronic poverty. Variables inversely related to chronic poverty are the same as in the case of total poverty.

Transient poverty is directly related to urban residence in areas of 100,000 or more. Variables inversely related to transient poverty are household size, the number of illiterate adults in the household and rural residence in a place with less than 2,000 inhabitants. Some variables had a sign different than expected, such as the educational level of the household head and the number of adults aged 25-64. These variables were found to have a direct relationship with chronic poverty.

The results indicate that the determinants of transient poverty differ from those of total and chronic poverty. These results suggest that policies to combat poverty should be designed taking into account the type of poverty they intend to reduce, since the economic and sociodemographic characteristics that determine whether a household is poor for long periods of time or falls into poverty as a result of economic shocks, are different.

Therefore, according to the results obtained in this paper, policies aimed at reducing chronic poverty should focus on reducing illiteracy, increasing schooling and increasing the incomes of the poor in rural areas, while reducing transient poverty would call for policies oriented at protecting the incomes of older people, unemployment insurance and income support programs, as well as the strengthening of social protection programs in general.

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Table 1: Total, chronic and transient poverty in Mexico: 2002-2005

Poverty line:	0.30
Alpha:	2.00
Number of observations:	7572
Number of periods:	2

Components of poverty	Estimate	Proportion of total poverty	STD
Transient	0.03822	31.2	0.00085
Chronic	0.08435	68.8	0.00182
Total	0.12257	100	0.00195

Source: Authors' estimation based on ENNVIH

Table 2: Total, chronic and transient poverty in Mexico: 2002-2005 (percentages of sample)

Chronically poor, of which:				
Always poor	Sometimes poor (mean income below the poverty line but not always poor)	Transiently poor only (mean income above the poverty line but sometimes poor)	Never poor	Total
30.19	29.82	1.52	38.47	100

Source: Authors' estimation based on ENNVIH

Table 3: Summary statistics by poverty status

Variable	Chronic poor		Transient poor		Not poor		Total sample	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household size	5.011	2.062	3.783	1.543	3.164	1.496	4.282	2.062
Household Head < 19 years old	0.003	0.055	0.009	0.093	0.004	0.067	0.004	0.061
Household Head 20-29 years old	0.101	0.301	0.078	0.270	0.108	0.311	0.103	0.305
Household Head 30-39 years old	0.244	0.429	0.183	0.388	0.218	0.413	0.233	0.423
Household Head 50-59 years old	0.184	0.388	0.191	0.395	0.169	0.374	0.178	0.383
Household Head 60 and older	0.218	0.413	0.322	0.469	0.287	0.452	0.246	0.431
Household Head Gender (Male=1)	0.816	0.388	0.783	0.414	0.770	0.421	0.798	0.402
Household Head Business Owner	0.002	0.044	0.000	0.000	0.004	0.067	0.003	0.054
Household Head Unemployed	0.813	0.390	0.748	0.436	0.782	0.413	0.800	0.400
Household Head Operative Worker	0.011	0.104	0.000	0.000	0.023	0.150	0.015	0.123
Household Head Professional Worker	0.007	0.084	0.113	0.319	0.036	0.185	0.019	0.138
Household Head completed primary education	0.195	0.397	0.155	0.363	0.167	0.373	0.184	0.387
Household Head completed junior high school education	0.172	0.377	0.113	0.319	0.204	0.403	0.183	0.387
Household Head completed high school education	0.050	0.218	0.113	0.319	0.110	0.313	0.074	0.262
Household Head completed university education	0.017	0.130	0.155	0.363	0.084	0.278	0.045	0.207
Number of illiterate members in the household	0.359	0.643	0.140	0.373	0.142	0.397	0.272	0.567
Number of adults with primary education	0.466	0.670	0.322	0.505	0.293	0.534	0.397	0.625
Number of adults with junior high education	0.533	0.748	0.504	0.654	0.448	0.662	0.500	0.716
Number of children with primary education	0.050	0.240	0.035	0.184	0.005	0.074	0.033	0.194
Number of children with junior high education	0.220	0.497	0.078	0.270	0.085	0.307	0.166	0.435
Number of children aged 6-14	1.260	1.250	0.600	0.846	0.512	0.807	0.962	1.154
Number of children aged 15-24	0.983	1.141	0.670	0.915	0.513	0.809	0.798	1.048
Number of adults aged 25-65	1.906	0.898	1.930	0.962	1.549	0.905	1.769	0.918
Number of adults aged more than 65 years	0.278	0.603	0.270	0.518	0.310	0.596	0.290	0.600
Rural location (Rural=1)	0.110	0.313	0.122	0.328	0.105	0.306	0.108	0.311
Population >100,000	0.256	0.436	0.435	0.498	0.556	0.497	0.374	0.484
Population <2,000	0.552	0.497	0.365	0.484	0.231	0.421	0.426	0.494

Source: Authors' estimation based on ENNVIH

Table 4: Censored Quantile Regressions for the Determinants of Poverty

	Total Poverty (70th quantile)	Chronic Poverty (70th quantile)	Transient Poverty (90th quantile)
Socioeconomic and Demographic Characteristics of the Household			
Household size	0.0586***	0.0625***	-0.00654*
	[0.00356]	[0.00447]	[0.00362]
Number of illiterate members in the household	0.0417***	0.0458***	-0.0232***
	[0.00421]	[0.00546]	[0.00428]
Number of adults with primary education	0.00244	0.00736	-0.0111**
	[0.00546]	[0.00599]	[0.00538]
Number of adults with junior high school education	-0.00548	-0.00206	0.00426
	[0.00426]	[0.00562]	[0.00684]
Number of children with primary education	-0.0139	-0.0146	0.0165
	[0.0108]	[0.0135]	[0.0101]
Number of children with junior high school education	0.00468	0.0094	-0.00195
	[0.00657]	[0.00797]	[0.00675]
Number of children aged 6-14	0.00634	0.00855	-0.00374
	[0.00390]	[0.00526]	[0.00494]
Number of children aged 15-24	0.00393	0.00286	0.00119
	[0.00414]	[0.00633]	[0.00473]
Number of adults aged 25-64	0.000931	0.006	0.0130**
	[0.00556]	[0.00677]	[0.00631]
Number of adults aged more than 65 years	0.00558	0.00919	0.00221
	[0.00991]	[0.00976]	[0.00841]
Household wealth	-5.32e-10**	-5.36E-10	8.09e-10
	[2.36e-10]	[4.51e-10]	[5.10e-10]
Characteristics of the Household Head			
Age - 19 and younger	0.0438	0.0863	-0.0490**
	[0.0845]	[0.0751]	[0.0245]
Age - 20-29	0.0367***	0.0511***	0.00215
	[0.00982]	[0.0118]	[0.0143]
Age - 30-39	0.0171**	0.0274***	-0.0140*
	[0.00841]	[0.0101]	[0.00835]
Age - 50-59	-0.00778	-0.0119	0.0132

Table 4: Censored Quantile Regressions for the Determinants of Poverty

	Total Poverty (70th quantile)	Chronic Poverty (70th quantile)	Transient Poverty (90th quantile)
	[0.00928]	[0.00910]	[0.0127]
Age - 60 and older	-0.0445***	-0.0462***	0.0252**
	[0.0136]	[0.0137]	[0.0122]
Male	-0.0135*	-0.0190**	0.00256
	[0.00806]	[0.00938]	[0.00990]
Business Owner	-0.0373	-0.0667**	-0.0359
	[0.0362]	[0.0308]	[0.0824]
Unemployed	0.00371	0.00381	-0.0178*
	[0.00794]	[0.00919]	[0.00979]
Operative Worker	0.0406	0.0105	0.0300
	[0.0432]	[0.0405]	[0.0323]
Professional	-0.0902***	-0.0674***	0.0916**
	[0.0287]	[0.0245]	[0.0364]
Primary education – Complete	-0.0234***	-0.0302***	0.0110
	[0.00867]	[0.00890]	[0.0120]
Junior high school education – Complete	-0.0450***	-0.0523***	-0.00214
	[0.00927]	[0.00845]	[0.0135]
High school education – Complete	-0.121***	-0.135***	0.0410***
	[0.0145]	[0.0149]	[0.0143]
University education- Complete	-0.164***	-0.183***	0.0678***
	[0.0230]	[0.0237]	[0.0245]
Household Location			
Rural	0.0431***	0.0523***	0.00936
	[0.0144]	[0.0160]	[0.0169]
Population >100,000	-0.0542***	-0.0559***	0.0306**
	[0.0112]	[0.0121]	[0.0154]
Population <2,000	0.140***	0.162***	-0.0294*
	[0.0115]	[0.0124]	[0.0158]
Constant	0.249***	0.189***	0.130***
	[0.0170]	[0.0207]	[0.0182]
Observations	6269	6269	6269
Pseudo R squared	0.3237	0.3277	0.0882

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Standard errors in brackets

Source: Authors' estimation based on ENNVIH