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Limits to Economic Growth and the Effect of Redistribution in Mexico

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Abstract:

In this study, we examine the effectiveness of growth and redistribution in reducing poverty in Mexico during the period from 1992 to 2012, using repeated cross-section household data. We first decompose the observed changes in poverty reduction into components arising from growth, improved income distribution, and heterogeneous inflation. We find the component of inflation to be non-negligible, as the inflation experienced by the poor was higher than the national average. The decomposition also shows improvement in income distribution to be the main contributor to poverty reduction in Mexico. In the second part of our analysis, we compile a unique panel dataset at the state level from the household data and estimate a system of equations that characterize the dynamic relationship between growth, inequality, and poverty, being careful to avoid spurious correlation arising from data construction. The GMM regression results show that Mexican states are characterized by income convergence and inequality convergence, and that poverty reduction in Mexican states is highly responsible to income and inequality levels in the previous period. This implies that once a small perturbation occurs in a state that reduces the inequality level, the state is expected to experience sustained poverty reduction in subsequent periods, which is consistent with the findings from the decomposition.

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1. Introduction

This study investigates the effectiveness of growth and redistribution in reducing poverty in Mexico during the period from 1992 to 2012. By controlling for the potential bias due to intertemporal changes in the official poverty lines and the spurious correlation bias that can occur if the same microdata are used to generate measures of growth, inequality, and poverty, this study intends to shed new light on the dynamic relationships that exist between growth, inequality, and poverty in Mexico. This study thus helps validate important and hotly debated hypotheses in development economics.

In the development economics literature, there is a general consensus that growth is good for the poor (Besley and Burgues, 2004; Dollar and Kraay, 2002) and that a reduction in inequality contributes to a decline in poverty (Bourguignon, 2004; Dagdeviren et al., 2004; Lopez, 2006; Ravallion, 1997; 2005). However, some have shown that not all the benefits arising from growth trickle down to the poor (Datt and Ravallion, 1992; Kakwani et al., 2000; Oxfam, 2000). Furthermore, there is no guarantee that any improvement in the distribution of income raises the incomes of the poor (Iniguez-Montiel, 2014). These issues have been hotly debated over the past decades (Jain and Tendulkar 1990; Kakwani and Subbarao, 1990; Kakwani et al., 2000; Kalwiji and Verschoor, 2007; Lopez and Serven, 2006; Ravallion, 2001; 2007), particularly after the general agreement on the Millennium Development Goals (United Nations, 2000), which embrace the ideology of a world free of poverty and hunger.

Nevertheless, several important considerations have been either overlooked or downplayed, when analyzing the particular stories of individual countries. This study addresses two of these considerations. First, most studies consider the poverty line as being constant over time, and evaluate only the impact of real growth (growth at constant prices) on poverty, as this is the standard treatment in the intertemporal analysis of poverty (see for example, Deaton, 1997; Ravallion, 1992). However, it is possible that the official poverty lines correspond to different levels of purchasing power over time, partly due to measurement errors, heterogeneous increases in the prices of goods that compound the basic-needs basket for the poor, and/or changes in the social notions of absolute poverty over time. To address this possibility, a "triple" decomposition of poverty change has been proposed by Günther and Grimm (2007). We apply their methodology to the case of Mexico to provide a more precise overview of the relationship between poverty, inequality, and economic growth in this country. Although this methodology uses the distribution-neutral growth or zero-growth-Lorenz-curve changes as a benchmark for the simulation exercises, it offers a clear picture of the manner in which growth, redistribution, and inflation can interact dynamically, affecting poverty and the entire distribution of income or consumption.

Second, most of the existing studies on the relationship between growth, inequality, and poverty use the three measures compiled from the microdata of household income and expenditure surveys of the same year. When a household expenditure survey dataset is available, we can aggregate the data to compile empirical variables for mean consumption/income, poverty, and inequality. Since the three variables in any given period are dependent by construction, regressing one on the others causes a potential bias due to spurious correlation. Such regression analyses could be valid as a mere description of the distribution of individual-level consumption/income. However, it is difficult to infer the structural relationship between growth, inequality, and poverty from these exercises since the changes in poverty, average income, and inequality in the same period are linked by data construction. To avoid this spurious correlation, a regional panel data analysis, using a system of equations that carefully incorporates a lagged structure, was proposed by Kurita and Kurosaki (2011). We apply their methodology to the case of Mexico using "state" within Mexico as the unit of observation.

The two methodologies are applied to repeated cross sections of household-level expenditure/income data for Mexico from 1992 to 2012. In the first methodology, the microdata are used at the household level and the decomposition is conducted for the national level, distinguishing between rural and urban areas. In the second methodology, we aggregate the microdata into a unique panel dataset at the state level. We show that the parametrically estimated response from the second methodology is useful for understanding the decomposition results from the first methodology. The salience of this study thus lies in combining the two methodologies. The combined results deepen our understanding of the relationship between poverty, inequality, and economic growth in Mexico.

The rest of the paper is organized as follows. Section 2 describes the datasets and macroeconomic background. Section 3 presents the empirical model and results using the triple decomposition applied to household-level data, and Section 4 presents the empirical model and results using the state-level panel data. Section 5 concludes the paper.

2. Data

The datasets used in this study are compiled from the Household Income and Expenditure Survey (ENIGH) for the period 1992–2012. The ENIGH is a nationally representative survey that covers both the rural and urban populations. It has been conducted biannually since 1992 by the National Institute of Statistics, Geography and Informatics (INEGI) in Mexico. In addition to the biannual surveys, a similar survey was conducted in 2005 as well. We thus have twelve yearly observations (1992, 1994, 1996, 1998, 2000, 2002, 2004, 2005, 2006, 2008, 2010, and 2012). From these datasets, household-level income figures are obtained as repeated cross sections to be used in Section 3 (10,530 sample households in 1992, 30,169 in 2010, and 10,062 in 2012). From these datasets, state-level average consumption/income, inequality, and poverty are compiled and used in Section 4. The number of states in Mexico is 32 and has not changed over time. As the time interval was different, the 2005 survey data were not used in the regression analysis. Therefore, the state-level panel dataset is balanced (32 states times 11 biannual observations).

To convert nominal figures into real figures, we followed the methodology proposed by the Technical Committee for the Measurement of Poverty (CTMP, 2002) in Mexico, using the national consumer price index (CPI) and setting the data into constant prices of August 2011. The same methodology and data are used by the National Council for the Evaluation of Social Development Policy (CONEVAL) in Mexico to evaluate poverty, inequality, and other development issues as mandated by Mexican law.

Regarding poverty measures, we adopt the following three Foster–Greer–Thorbecke

(FGT) measures: (1) the headcount (H) index, a measure of poverty incidence, (2) the poverty gap (PG) index, a measure of poverty depth, and (3) the squared poverty gap (SPG) index, a measure of poverty severity. To compile poverty measures, we use the official poverty lines designated by the Government of Mexico. There are three types of official poverty lines: "food," "extreme," and "basic-needs" (Iniguez-Montiel, 2014). The food poverty line is the lowest of the three, and it is calculated as the cost of a basic-food basket for the poor to survive; the extreme poverty line additionally considers education and health necessities; the basic-needs poverty line is the highest as it covers the costs of three additional commodities/services (clothing, housing, and transportation) that are not included in the other two poverty lines. Although these official poverty lines are meant to capture the absolute poverty level that is constant over time, in reality, their purchasing powers changed over time, because of higher inflation rates for the goods that were considered to estimate the official poverty lines, compared to the goods that were included in the basket used to estimate the CPI in Mexico. In other words, the poor in Mexico suffered from inflation rates that were higher than those indicated by the national CPI. This is the reason we apply the triple decomposition methodology proposed by Günther and Grimm (2007).

During the past three decades, which include the period covered by our datasets, the Mexican economy has grown quite slowly (Arias et al., 2010; OECD, 2009), mainly because its growth pattern is characterized by economic instability or volatility, combined with negative growth rates (Iniguez-Montiel, 2014). The economy grew at an annual rate of 0.62% for the period 1980–2011, or 1.23% for the period 1992–2011 in per-capita terms (Feenstra et al., 2013). In fact, we can corroborate this phenomenon with the microdata from the ENIGH as well, which shows that rural and urban per-capita incomes grew by only 6.95% and 6.55%, respectively, during the period 1992–2012; however, our analysis of the period 1992–2010 shows that the mean income per capita in both the rural and urban sectors was actually lower in 2010 than in 1992 (see Figure 1). Because of the relatively high growth that occurred between 2010 and 2012, we present empirical results for the two periods (1992–2010 and 1992–2012) separately in the next section and examine their differences.

On the other hand, we can also verify that the real values of the official poverty lines (at constant prices) increased by 12% and 11% in the rural and urban centers, respectively, over the period 1992–2012. This implies that the price increases of goods for the poor were greater than those faced by the nation as a whole. In other words, the purchasing power of the poor in Mexico decreased more rapidly over time than that of average Mexicans. Therefore, if we adjust real incomes in Mexico to the inflation rate underlying the poverty line, we end up with income growth rates that are actually negative.

Another important characteristic of our datasets is that inequality in the distribution of income declined in the country (see Figure 2). For instance, rural income inequality measured by the Gini coefficient declined by more than 7 and 6 percentage points during the periods 1992–2010 and 1992–2012, respectively, whereas urban inequality fell by 2.5 and 1 percentage point, respectively, during the same periods, which is what actually rendered the slow growth of the Mexican economy as being pro-poor (Iniguez-Montiel, 2014), and which, according to our estimations, increased the incomes of the poor by 17% and 13% in the rural and urban sectors, respectively, in the period 1992–2012. A closer examination of Figure 2 shows that the decline in inequality levels occurred sometime during 2000–04. According to the literature (Iniguez-Montiel, 2011; Lustig et al., 2013), the inequality decline in Mexico after 2000 was mainly associated with a narrowing of the skill-premium gap between low- and high-skilled workers, an improvement in the distribution of education, and an increase in public transfers primarily related to redistributive polices of the 1990s and 2000s, such as Oportunidades (a conditional cash transfer program that investments in the human capital of the poor) and the Popular Health Insurance (PHI) program. Progresa, the forerunner of Oportunidades, was formally initiated in 1998 and greatly expanded in 2001, whereas the PHI program was launched in 2004.

To summarize the macroeconomic situations underlying our datasets, we might say that 30 years of economic reforms and policies, since Mexico became an open economy, have been completely insufficient for spurring economic growth, and that the low growth that has occurred cannot cope with the constant increase in the population as well as in the prices of goods over time. Consequently, extreme and basic-needs poverty were found to decline, in relative terms, by only 15% and 6%, respectively, whereas moderate poverty remained practically unchanged in the period 1992–2012 (see Figure 3), but the decline could have been mainly attributed to the lower levels of inequality in the country, especially those observed in the rural areas. It is possible that if Mexico had not adopted its main redistributive polices, poverty would have been higher today than it was 20 years ago. These issues will be investigated in detail in the next two sections.

3. Triple Decomposition of the Change in Poverty

3.1 Empirical Methodology

Following Günther and Grimm (2007), we decompose the change in poverty measure into components arising from growth, distribution, and inflation. The method of decomposition is as follows:

$$\Delta P_{t+n,t} = [P(\mu_{t+n}, L_t, z_t) - P(\mu_t, L_t, z_t)] + [P(\mu_t, L_{t+n}, z_t) - P(\mu_t, L_t, z_t)] + [P(\mu_t, L_t, z_{t+n}) - P(\mu_t, L_t, z_t)] + R_{t+n,t},$$

where $P(\mu_t, L_t, z_t)$ is the poverty measure with a mean income μ_t, a Lorenz curve L_t, and a poverty line z_t in period *t*. Both μ_t and z_t are in real terms adjusted by the national CPI in period t. The first component of the equation corresponds to the change in poverty as explained by general growth and should be interpreted as the poverty change that would have occurred with the observed growth rate, given that the poor had experienced the same increase in cost of living as indicated by the national CPI (Günther and Grimm, 2007). The second component corresponds to the change in poverty as explained by the distribution effect in a growth- and poverty-line-neutral case, whereas the third component corresponds to the change in poverty as explained by the inflation difference between the poverty line and the national CPI in a growth- and distribution-neutral case.

3.2 Empirical Results

We decompose poverty changes in Mexico for two periods (1992–2012 and 1992–2010), the three official poverty lines (food, extreme, and basic-needs), and the three commonly used FGT poverty measures (headcount (H), poverty gap (PG) and squared poverty-gap (SPG)). The reason we consider two separate but almost identical periods is that the decomposition results are highly sensitive to the choice of periods.

a. 1992–2012.

Table 1 shows the results corresponding to the period 1992–2012. It is clear that although growth and redistribution contributed to a decline in poverty at all levels, the increase in the real value of the poverty line strongly counteracted the poverty-reducing impact of higher levels of income and lower levels of inequality in Mexico during the period analyzed. In fact, it is possible to corroborate that the poverty-line (inflation) effect eliminates the income-growth effect in all cases and partially counteracts the redistribution effect as well, which implies that the poverty-reducing impact of growth is nullified by the rise in prices over time of goods purchased by the poor, leaving the distribution component as the only factor that is truly responsible for the decline in poverty in the last two decades.

When considering the impact of growth and distribution on poverty alone (see the lower panel in Table 1) with respect to H, our estimates confirm that the improvement in the distribution of income in the period 1992–2012 was responsible for approximately 65% of the reduction in the incidences of food poverty and extreme poverty at the national level, whereas the remaining 35% was due to the increase in per capita income in the rural and urban sectors. Additionally, when a higher poverty line (basic needs) is used, the poverty-reducing impact of growth on poverty increased to 52%, and the effect of redistribution, although smaller, had an almost equal contribution (48%) to that of growth in reducing the incidence of poverty in Mexico.

Regarding the contrast between the rural and urban areas (see Table 2), the effect of lower levels of inequality on poverty reduction was consistently stronger in the rural than in the urban areas. Regardless of the poverty line used, the improvement in income distribution played a crucial and primary role in enhancing the standard of living of the poor by accounting for a decrease in the level of poverty from 73% to 64% in the H index during the period 1992–2012. The effect of redistribution in the urban sector is equally as important as that of growth up to the extreme poverty line, where both factors contributed evenly to reducing the incidence of poverty. However, the impact of lower levels of inequality on poverty in the urban centers decreased to 34% when the broadest basic-needs poverty line was used.

When analyzing the relative impacts of growth and redistribution on the depth and severity of poverty represented by the PG and SPG indexes, respectively, we find that the impact of an improved income distribution is consistently the factor that explains 68% or more of the decline in poverty in Mexico at the national level, regardless of the poverty threshold used (see Table 1, lower panel). Moreover, when the rural and urban sectors are analyzed separately, the lower inequality that is observed in the rural areas contributed to approximately 75% of the decline in poverty, whereas redistribution in the urban areas was, in the majority of the cases, the most important factor as well, accounting for 47% to 57% of the reduction in the PG and SPG measures (see Table 2, lower panel).

b. 1992–2010.

As the growth rate was lower in 1992–2010 than in 1992–2012, the contribution of improved income distribution to poverty reduction in Mexico was more significant in the former than in the latter period. This observation holds regardless of the poverty line and measure used.

As shown in Table 3, based on the headcount index, the reduction in income per capita and the increase in the real value of the poverty line both contributed to the partial increase in the incidence of poverty, whereas lower income inequality in Mexico effectively countered the poverty-augmenting impact of growth and heterogeneous inflation, consequently reducing the level of poverty during the period. It should be noted that the negative effect of growth on poverty is not minor, accounting for approximately 23% to 38% of the partial rise in the headcount measure, whereas the remaining 62% to 77% was due to the higher prices of goods in 2010, compared to 1992 (see Table 3, lower panel).

Another interesting finding, when analyzing the impact of growth and inflation in the rural and urban sectors separately (see Table 4), is that the negative effect of lower levels of income on rural poverty was very small, whereas that of higher prices accounted for most of the increase in poverty in the rural areas. This suggests that rural households are somehow isolated from the negative effects of recessions, which may be a result of the fact that income levels have remained quite low and stable in the rural sector during the last two decades (see Figure 1). However, rural and urban incomes are not isolated from the negative effects of the higher inflation facing the poor. The heterogeneous inflation reinforces and accentuates the harmful effects of economic slowdowns or recessions, as the one that occurred in Mexico after the world financial crisis in the late 2000s. On the other hand, the effects of lower incomes and higher prices are actually quite even in the urban sector, where, regardless of the poverty line, they accounted for 42% and 58%, respectively, of the slower rate at which poverty was reduced during the period analyzed (see Table 4, lower panel).

Tables 3 and 4 show that our results corresponding to the PG and SPG indexes are quantitatively and qualitatively similar, which indicates that our findings are robust across all poverty lines and measures considered. Therefore, we may conclude that redistribution (lower income inequality) has played a crucial role in alleviating poverty in Mexico at all levels. How individual policies such as Oportunidades and the Popular Health Insurance contributed to the improvement in income distribution is beyond the scope of this study. Instead, we attempt to elucidate the dynamic relationship between growth, inequality, and poverty from a different angle, using parametric regressions. This is the theme of the next section.

4. Panel Analysis of Regional Data

4.1 Empirical Model

Following Kurita and Kurosaki (2011), we estimate a system of equations that characterize dynamic changes that occurred between growth, inequality, and poverty. More concretely, denoting each state by subscript j, we first estimate the following system of equations:

$$\ln y_{jt} = \beta_{11} ln\, y_{j,t-1} + \beta_{12} Ineq_{j,t-1} + \beta_{13} Pov_{j,t-1} + X_{j,t-1}\theta_1 + \alpha_{1j} + \eta_{1t} + \varepsilon_{1jt}, \quad (1)$$

$$Ineq_{jt} = \beta_{21} ln\, y_{j,t-1} + \beta_{22} Ineq_{j,t-1} + \beta_{23} Pov_{j,t-1} + X_{j,t-1}\theta_2 + \alpha_{2j} + \eta_{2t} + \varepsilon_{2jt}, \quad (2)$$

$$Pov_{jt} = \beta_{31} ln\, y_{j,t-1} + \beta_{32} Ineq_{j,t-1} + \beta_{33} Pov_{j,t-1} + X_{j,t-1}\theta_3 + \alpha_{3j} + \eta_{3t} + \varepsilon_{3jt}, \quad (3)$$

where X_{jt} is defined as a vector of observable factors, α stands for the unobservable and time-invarying characteristics of state j, η represents unobservable macro shocks that affect all states in Mexico in period *t*, and ε is an idiosyncratic error term. The inclusion of α and η is also meant to minimize bias due to measurement errors associated with the non-representativeness of the original microdata at the state level.

As we have found in Section 3 that redistribution (lower income inequality) played a crucial role in alleviating poverty in Mexico, our key interests are in parameters β_{12}, β_{22}, β_{31}, and β_{32}. Improvement in income distribution in period *t* may result in poverty reduction in period *t*+1, which is captured by parameter β_{32}, expected to be positive (a higher inequality measure leads to higher poverty in the next period). The improvement has a persistent and favorable impact on poverty if more equal distribution accelerates growth, captured by parameter β_{12}, expected to be negative, and growth reduces poverty, captured by parameter β_{31}, expected to be negative. The improvement has a persistent favorable impact on poverty through parameter β_{22} as well. If the parameter is positive and close to unity, a shock to the inequality measure (for example, a one-time reduction in income inequality) has a highly persistent effect on future values of inequality, contributing to persistent poverty reduction. The reason we estimate the system of equations (1)–(3) or its restricted form (see below) is to estimate these parameters so that we can interpret the decomposition results in Section 3 from a different angle.

As each of equations (1) to (3) contains the lagged value of the left-hand-side variable in the list of right-hand-side variables, the system is characterized by the dynamic panel structure. For instance, in equation (3), we do not use the current values of average consumption or the inequality measure since such regression suffers from spurious correlation bias due to data construction. Instead, we use their lagged values. Equations (1)–(3) can be estimated by a system generalized method-of-moments (GMM), suggested by Blundell and Bond (1998), a difference GMM, or a single-equation fixed-effect method.

As we do not have a priori reason to expect that the lagged value of poverty directly affects growth, inequality, or poverty, once we control for the lagged values of mean consumption/income and inequality, we also estimate a restricted version of the above system, where $\beta_{13} = \beta_{23} = \beta_{33} = 0$. This results in the following restricted system:

$$\ln y_{jt} = \beta_{11} ln\, y_{j,t-1} + \beta_{12} Ineq_{j,t-1} + X_{j,t-1}\theta_1 + \alpha_{1j} + \eta_{1t} + \varepsilon_{1jt}, \quad (4)$$

$$Ineq_{jt} = \beta_{21} ln\, y_{j,t-1} + \beta_{22} Ineq_{j,t-1} + X_{j,t-1}\theta_2 + \alpha_{2j} + \eta_{2t} + \varepsilon_{2jt}, \quad (5)$$

$$Pov_{jt} = \beta_{31} ln\, y_{j,t-1} + \beta_{32} Ineq_{j,t-1} + X_{j,t-1}\theta_3 + \alpha_{3j} + \eta_{3t} + \varepsilon_{3jt}. \quad (6)$$

We let the data decide which model provides a useful prediction of the dynamic relationship between mean consumption/income, inequality, and poverty. Additionally, we estimate a model where income and inequality at time *t* determine the current level of poverty for each state j as follows:

$$Pov_{jt} = \gamma_1 ln\, y_{jt} + \gamma_2 Ineq_{jt} + X_{jt}\theta_1 + \alpha_{1j} + \eta_{1t} + \varepsilon_{1jt}, \quad (7)$$

which is likely to suffer from spurious correlation. By comparing the results from equations (6) and (7), we can examine whether the bias due to such spurious correlation is serious.

To estimate equations (1)–(7), we used the state-level panel dataset that is balanced (352 observations = 32 states times 11 biannual observations from 1992 to 2012). The period t-1 thus implies two years before period t. When a single-equation fixed-effect method is applied to equations (1)–(6), the effective sample size is 320, as we lose the first period observations due to the use of lagged dependent variables. When a system GMM or a difference GMM method is applied to equations (1)–(5), the effective sample size is 288, as we further lose the second period observations due to the differencing for instruments.

4.2 Empirical Results

In this paper, we report estimation results based on the difference GMM estimation methodology proposed by Arellano and Bond (1991). The reason we report the difference GMM results is that the system GMM results were unstable, which is possibly due to the high collinearity among GMM instruments. As Kurita and Kurosaki (2011) prefer the system GMM to the difference GMM, robustness checks with respect to estimation methodology is left for further analysis.

Regarding y_{jt} in the empirical model, we report results based on the mean consumption; regarding $Ineq_{jt}$, we report results based on the Gini coefficient; and regarding Pov_{jt}, we report results based on the poverty headcount index. In calculating poverty measures for the empirical model, we used the official poverty lines corresponding to the extreme poverty. The robustness of our results with respect to these choices is discussed at the end of this subsection (4.2 (d)).

a. Unrestricted model

The estimation results of equations (1)–(3) are shown in Table 5, first for a model with fewer controls and then for a model with more controls. Both models include state-specific effects (α_j), but they are different in their lists of additional variables: one with year effects (η_t) only, and the other with η_t and $X_{j,t-1}$ (Education, Urban, Services, and Aged). The signs and statistical significance of the β parameters in the two versions are qualitatively and quantitatively similar but unexpectedly large in their absolute values in some cases.

The income convergence parameter (β_{11}) is estimated to be 0.80 and 0.74, significantly smaller than one at the 1% level when using the model with fewer and more control variables, respectively. The results thus indicate that income convergence exists within Mexican states (the growth rate is slightly higher for states with lower initial consumption). Similarly, the inequality convergence parameter (β_{22}) is estimated to be 0.80 and 0.77 in the model with fewer and more control variables, respectively, which are significantly smaller than one at the 1% level. The results shown in Table 5 thus imply that inequality tends to decline faster in states with higher initial inequality. Therefore, qualitatively, our estimates for β_{11} and β_{22} appear reasonable.

The first problem in the results presented in Table 5 is our estimates for parameter β_{12}. It is estimated to be -2.78 (the model with fewer controls) and -2.51 (the model with more controls), which differ significantly from zero at the 1% level. Therefore, the unrestricted model predicts that more equal distribution accelerates growth in Mexico. The negative impact of initial inequality on subsequent growth is consistent with what is suggested in the literature (Aghion et al., 1999; Stiglitz, 2012). However, its absolute value appears too large. As a result, the 2x2 matrix of parameters with (β_{11}, β_{12}) in the first row and (β_{21}, β_{22}) in the second row has characteristic roots whose absolute value is much larger than unity. This implies that the vector of $\ln y_{jt}$ and $Ineq_{jt}$ has a property of quick explosion as a system. Such a prediction is not useful when using the parametric estimation results in this section to interpret the decomposition results in Section 3.

Regarding equation (3), three parameters are estimated with either wrong signs (β_{31} and β_{32}) or unreasonable magnitude (β_{33}). This could be due to multicollinearity, as we do obtain the expected signs for β_{31} and β_{32} when estimating the restricted model (see below). Given the size and the significance of parameter β_{33} (1.51 and 1.54), the results may suggest that states in Mexico with higher initial levels of poverty experience slower poverty reduction over time, compared to states with lower initial poverty levels. Nevertheless, our preferred interpretation is that the results in Table 5 are misspecified. The 3x3 matrix of parameters with (β_{11}, β_{12}, β_{13}) in the first row, (β_{21}, β_{22}, β_{23}) in the second row, and (β_{31}, β_{32}, β_{33}) in the third row has characteristic roots whose absolute value is very large. As a result, the vector of $\ln y_{jt}$, $Ineq_{jt}$, Pov_{jt} explodes very rapidly as a system. Based on the results in the lower panel of Table 5 (the model with more controls), a disturbance to inequality in period *t* has an effect ten years later with a multiplier of -159.0 on mean consumption, 69.5 on the Gini coefficient, and -145.9 on the poverty headcount index. We judge these multipliers to be unreasonably high and decide not to adopt the results of the unrestricted model.

b. Restricted model

The results of the restricted model corresponding to equations (4)–(6) are shown in Table 6. The restricted model does not incorporate the effects of lagged poverty on subsequent growth, inequality, and poverty. As in the previous model, we estimate two separate versions, one with year effects (η_t) only and the other with η_t and $X_{j,t-1}$ (Education, Urban, Services, and Aged).

All the coefficients of interest yield expected signs and are statistically significant. The income convergence parameter (β_{11}) resembles that of the unrestricted model but its size is much smaller (0.41 and 0.47), indicating a more rapid convergence. This is because the restricted model attributes the indirect effect through own poverty dynamics allowed in the unrestricted model as a part of the direct effect. In both cases, the estimated coefficients are significantly different from zero and one at the 1% level. Consequently, this indicates that growth in Mexico is higher for those states whose initial consumption levels are lower, and vice versa, which is consistent with the conditional convergence hypothesis (Jones, 2002).

Similarly, the inequality convergence parameter (β_{22}) is estimated to be between zero and one, and it is significantly different from zero at the 10% level in both models, and significantly different from one at the 1% level in both cases. This implies that inequality tends to decline faster in states with higher initial inequality, which is analogous to the inequality convergence found in Ravallion (2003).

The impact of inequality on subsequent growth, captured by the parameter coefficient (β_{12}), is estimated to be negative, as expected, and statistically significant at the 1% level. According to our estimations, the parameter is -1.79 and -1.72 in the model with fewer and more control variables, respectively. This implies that an increase in the level of inequality, equivalent to one standard deviation (0.0449) in the Gini coefficient, reduces the level of growth in the next period by 0.0804 or 0.0772, or approximately 1.0% of the mean of *Consumption*. This is an economically significant number that suggests that higher levels of inequality in Mexico have a negative impact on growth, whereas lower levels of inequality tend to spur growth in the economy, as suggested by the new growth theories (Aghion et al., 1999; Alesina and Rodrik, 1994; Benabou, 1996).

The effect of growth on subsequent inequality, represented by parameter β_{21},is negative and statistically significant at the 1% level. These results imply that states in which initial levels of growth are higher tend to experience lower levels of inequality than states with lower levels of growth in the next period. They also suggest that growth contributes to reducing inequality in Mexico in a similar fashion as the one Kuznets (1955) predicted for countries with a comparable level of development as Mexico.

In contrast to the results of equation (3), the estimated parameters for equation (6) yield the expected signs and are statistically significant at the 1% level. In both versions of the model, the results imply that growth and inequality have a negative and positive impact on poverty, respectively. It should be noted that the parameter coefficient for inequality (β_{32}: 0.2655 and 0.2677) is much larger in absolute value than the growth parameter (β_{31}: -0.1128 and -0.1080) in both versions of the model, which suggests that a change in the inequality level may have a stronger poverty-reducing effect than that of growth if the improvement in the distribution of consumption is considerable.

Unlike the case for the unrestricted model, the 3x3 matrix of parameters with (β_{11}, β_{12}, β_{13}) in the first row, (β_{21}, β_{22}, β_{23}) in the second row, and (β_{31}, β_{32}, β_{33}) in the third row, with the restriction $\beta_{13} = \beta_{23} = \beta_{33} = 0$, predicts a long-run system convergence of the vector of $\ln y_{jt}$, $Ineq_{jt}$, and Pov_{jt}. It does not explode as a system. Nevertheless, the rate of convergence is reasonably slow, predicting a persistence of shocks. As these characteristics fit our observations of the Mexican economy well, we adopt the results in Table 6 associated with equations (4)–(6) as our preferred estimates to be used in Subsection 4.3 to describe dynamic changes in the Mexican economy.

c. Bias due to spurious correlation

The results of equation (7) are also shown in Table 6. Again, the coefficients have the expected signs and are statistically significant at the 1% level, reinforcing the results and our interpretation of the parameters obtained for equation (6). However, as explained in Kurita and Kurosaki (2011), the coefficients in equation (7) are more susceptible to spurious correlation than those in equation (6) because the three variables of interest (consumption, inequality, and poverty) are calculated from the same microdata for the same year. Consequently, as far as the dynamic effects of growth and inequality on poverty are concerned, the estimated parameters in equation (6) in Table 6 are better indicators than those in equation (7).

Comparing the key parameters, the poverty-reducing impact of improved distribution (β_{32}) is approximately 0.27 when proper lag structure is used (equation (6)), whereas it is approximately 1.06 when no lag is allowed (equation (7)); the poverty-reducing impact of economic growth (β_{31}) is approximately -0.11 when proper lag structure is used (equation (6)), whereas it is approximately -0.43 when no lag is allowed (equation (7)). Therefore, the spurious correlation overestimates the real dynamic relationship between poverty reduction and inequality reduction (or income growth).

d. Robustness check

We ran a series of robustness checks of the results discussed so far. As our preferred results are those in Table 6, corresponding to equations (4)–(6), we report in the appendix the summary results analogous to those in Table 6.

First, as the period 2010–2012 experienced macroeconomic changes that were different from the ones in the preceding years (see Sections 2 and 3), we examined the robustness of our results by restricting the period of analysis to 2010 (excluding 2012), and we found that all the results are quantitatively and qualitatively similar to those for the period 1992–2012 (see Appendix Table 1).

Second, as shown in Sections 2 and 3, the official poverty lines in Mexico were not constant over time in real terms if adjusted according to the national CPI. To control for this problem, we re-calculated the poverty measures using our own poverty lines, which are constant over time, and re-estimated the equations (see Appendix Table 2). Again, all of the results turned out to be quantitatively and qualitatively similar to the default results discussed above.

Third, regarding y_{jt} in the empirical model, we re-estimated the model by replacing mean consumption per capita by mean income per capita in each state in real pesos. Since the results are qualitatively similar (see Appendix Table 3), we continue our discussion using the mean consumption but interpret it as the proxy for the mean income as well.

4.3 Re-interpreting the decomposition results regarding the impact of improvement in distribution on poverty reduction

Our analysis in Section 3 shows improvement in income distribution to be the main contributor to poverty reduction in Mexico. On the other hand, our regression results above show that a reduction in the Gini coefficient in a round of the ENIGH survey in a state reduces the poverty headcount index in the subsequent round of the ENIGH survey in the same state by an elasticity of approximately 0.27. We can quantify the significance of the latter findings by calculating the dynamic response of the left-hand-side variables implied by the regression results reported in equations (4)–(6)

in Table 6. For the calculation, we use the results reported in the lower panel of Table 6 (the model with more controls).

A closer look at Figure 2 suggests a discontinuity around 2002. If we use national figures, the Gini coefficients were stable at approximately 54% until 2000, whereas they fell to a level of approximately 52% for the period 2002–2008. Therefore, we run a back-of-the-envelope calculation[1] of impacts of a one-time shock to equation (5) that reduces the Gini coefficient by 2 percentage points (or a 4% decline in the inequality level without the shock) in year 2002 in all states in Mexico. In the next period (2004), the poverty headcount index would decline by approximately 1.07% (0.2677 times -4). In the same year, the average consumption would increase by approximately 6.89% (-1.7223 times -4), whereas the Gini coefficient would decrease by approximately 0.63% (0.1578 times -4). After one more interval (2006), the poverty headcount index would decline further by approximately 1.00%, through both the reduction of income inequality (0.2677 times -0.63) and the increase in average consumption (-0.1080 times 6.89) in 2004.

The persistence of the shock, however, dies away with time, because our preferred parameter estimates predict a system convergence. The accumulated impact until 2012 can be calculated by multiplying five times the 3x3 matrix of parameters with (0.4672, -1.7223, 0) in the first row, (-0.1078, 0.1578, 0) in the second row, and (-0.1080, 0.2677,

[1] This is a back-of-the-envelope calculation without methodological rigor because the state-level regression results are not automatically aggregated into the national-level measures of average log consumption, Gini coefficients, and poverty headcount indices. Our calculation is valid only for the state that experienced the shock. Nevertheless, we show the calculation results here to offer a rough idea of the possible impact at the national level.

0) in the third row. The third row of the matrix after multiplication becomes (-0.0365, 0.1027, 0). Therefore, the persistent impact on poverty in 2012 of the shock in income distribution in 2002 would be a decline in the headcount index by approximately 0.41% (0.1027 times -4). Although much smaller than the immediate impact, the persistent effect after ten years is still substantial.

The simple calculation in this subsection thus explains why the inequality reduction during the period 1992–2012 was mainly responsible for the reduction in poverty in Mexico, as we demonstrated in our decomposition in Section 3. Another observation in Section 3 (i.e., for the period 1992–2010), which is that changes in the level of growth counteracted the positive effect of inequality on poverty, partially increasing the poverty level, could be understood in a similar way as an unexpected negative shock to average consumption in 2010.

5. Conclusion

Using micro datasets of households collected during the period 1992–2012, we examined the effectiveness of growth and redistribution in reducing poverty in Mexico. In the first part of our analysis, we used household-level data as repeated cross-sections and decomposed the observed changes in poverty reduction in Mexico into components arising from growth, improved distribution, and heterogeneous inflation. We found that the component of inflation to be non-negligible, as the poor experienced higher inflation than that indicated by the national CPI. The decomposition also showed improvement in income distribution to be the main contributor to poverty reduction in Mexico during the period 1992–2012 and the only factor that is responsible for the decline in poverty during the period 1992–2010. According to our estimations, redistribution alleviated poverty in Mexico from 1992 to 2010 by increasing the income of the poor by 9% and 7% in the rural and urban sectors, respectively.

In the second part of our analysis, we compiled a unique panel dataset at the state level and characterized the dynamic relationship between growth, inequality, and poverty, being careful to avoid spurious correlation arising from data construction. The GMM regression results show that Mexican states are characterized by income convergence and inequality convergence, and that poverty reduction in Mexican states is highly responsible to income and inequality levels in the previous period. The strong growth and inequality elasticities of poverty found in our results provide evidence of the stronger poverty-reducing impact of inequality on poverty for middle-income, high-inequality countries as suggested in the literature (Dagdeviren et al., 2004). As we also found that inequality has a harmful effect on growth, consistent with findings in other studies (Aghion et al., 1999; Stiglitz, 2012), once a small perturbation occurs in a state that reduces the inequality level, the state is expected to experience sustained income growth and accelerated poverty reduction. The back-of-the-envelope calculation of the dynamic response of poverty to a shock (reduction in income inequality) indeed showed that the impact is persistent.

We, therefore, conclude that growth becomes more inclusive in Mexico if the country adopts an active, pro-poor growth policy (Iniguez-Montiel, 2014) that can further reduce inequality. In addition, given the low growth of the Mexican economy over the past decades, it appears that a different development strategy—one that can truly spur the economic growth of the country, particularly that of the rural sector (McKinley and Alarcon, 1995), and reduce the poverty level at a faster pace—should be adopted.

The findings in this study contribute to a deeper understanding of poverty dynamics in Mexico. First, we quantified in two ways the contribution of improved distribution to poverty reduction in Mexico. Although the two methodologies are highly distinct from one another, the quantitative results are mutually consistent. Second, we showed that analyses that control neither for the potential bias due to intertemporal changes occurring in the poverty lines, nor for the spurious correlation bias that can occur if the same microdata are used to generate measures of growth, inequality, and poverty could result in biased inferences. The remaining issues include the quantification of impact of particular policies on distribution and more detailed analyses of the regional and periodic heterogeneity. These issues are left for further research.

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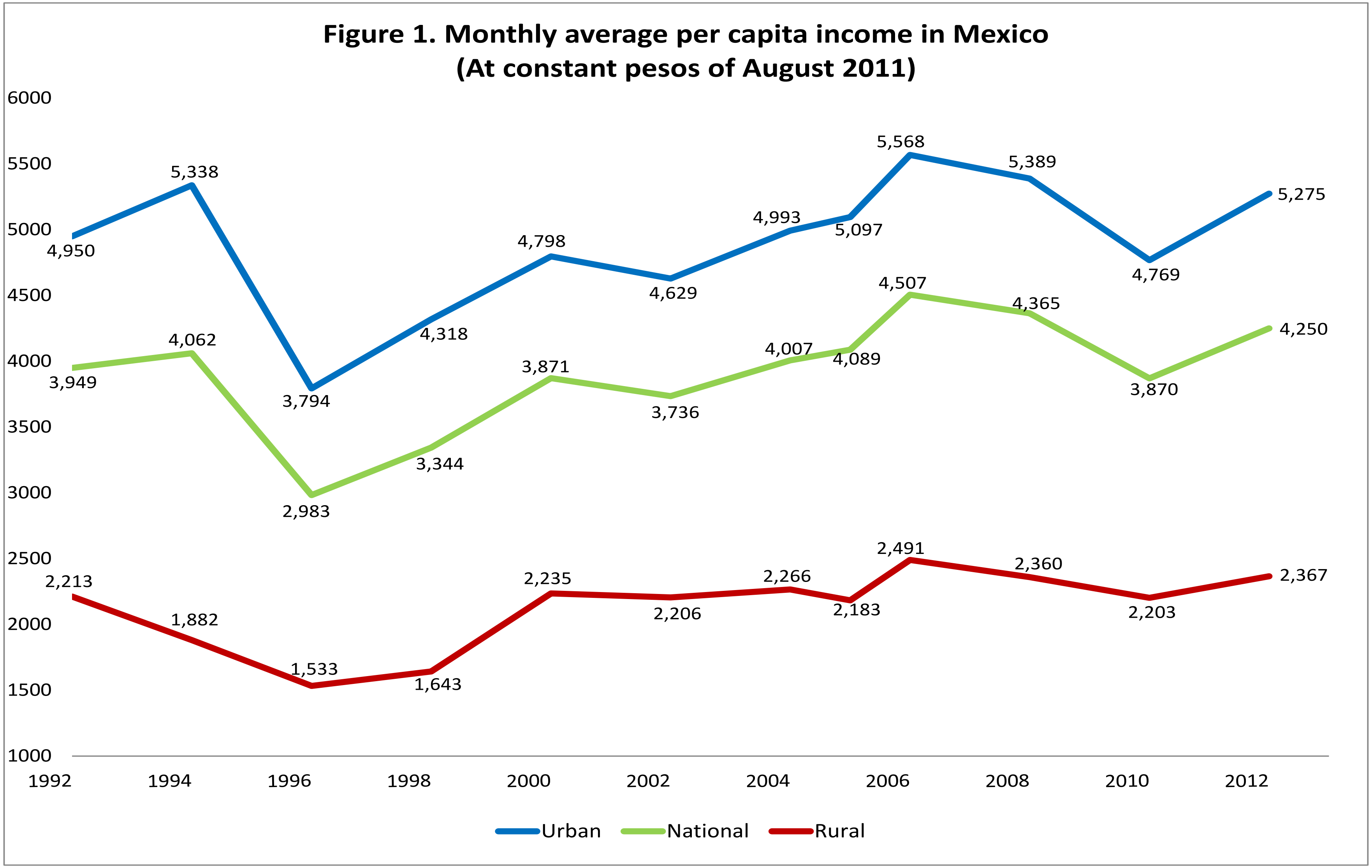

Figure 1. Monthly average per capita income in Mexico
(At constant pesos of August 2011)
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
4,950
5,338
3,794
4,318
4,798
4,629
4,993
5,097
5,568
5,389
4,769
5,275
3,949
4,062
2,983
3,344
3,871
3,736
4,007
4,089
4,507
4,365
3,870
4,250
2,213
1,882
1,533
1,643
2,235
2,206
2,266
2,183
2,491
2,360
2,203
2,367
Urban
National
Rural

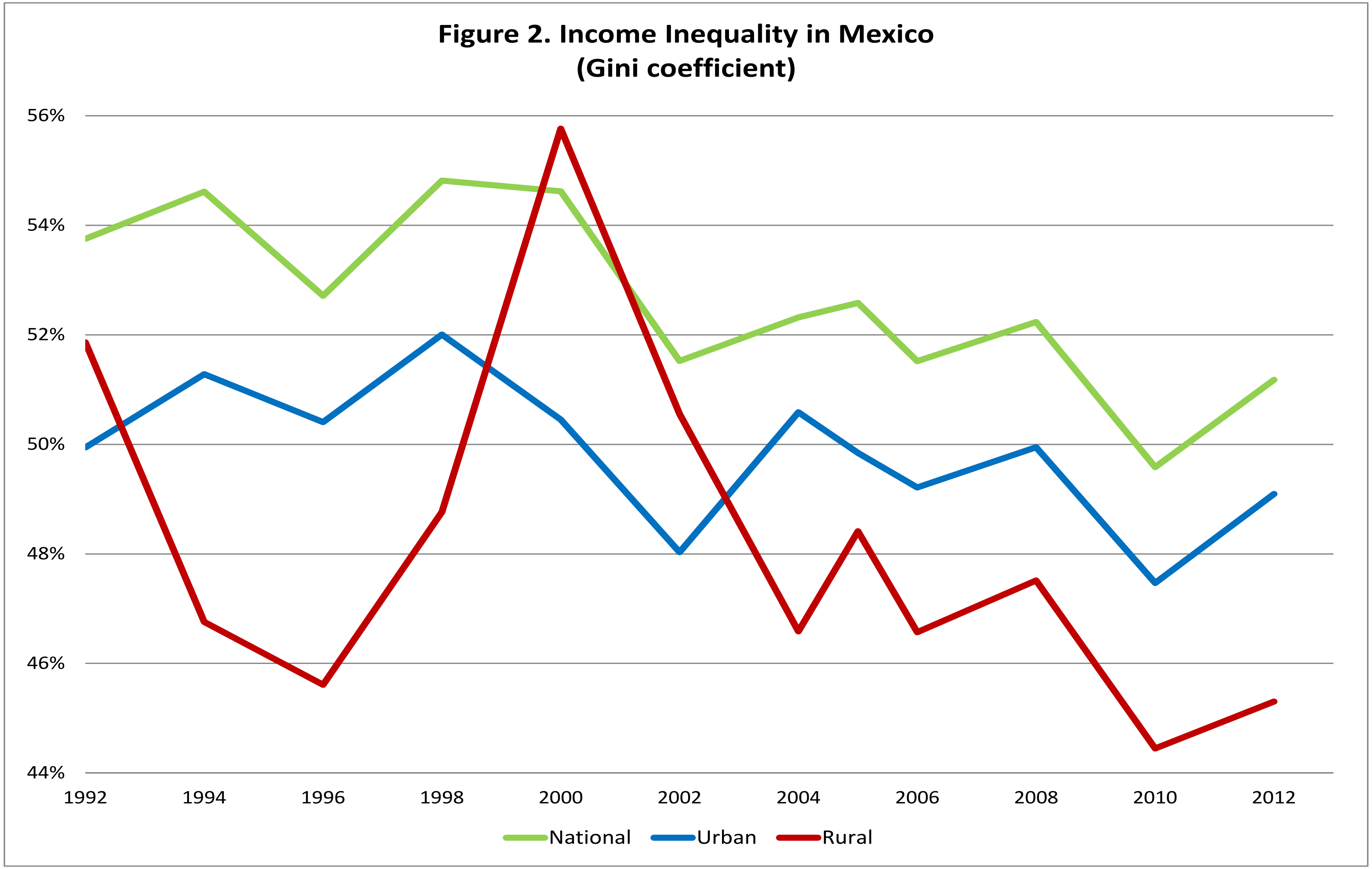
Figure 2. Income Inequality in Mexico
(Gini coefficient)
56%
54%
52%
50%
48%
46%
44%
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
National
Urban
Rural

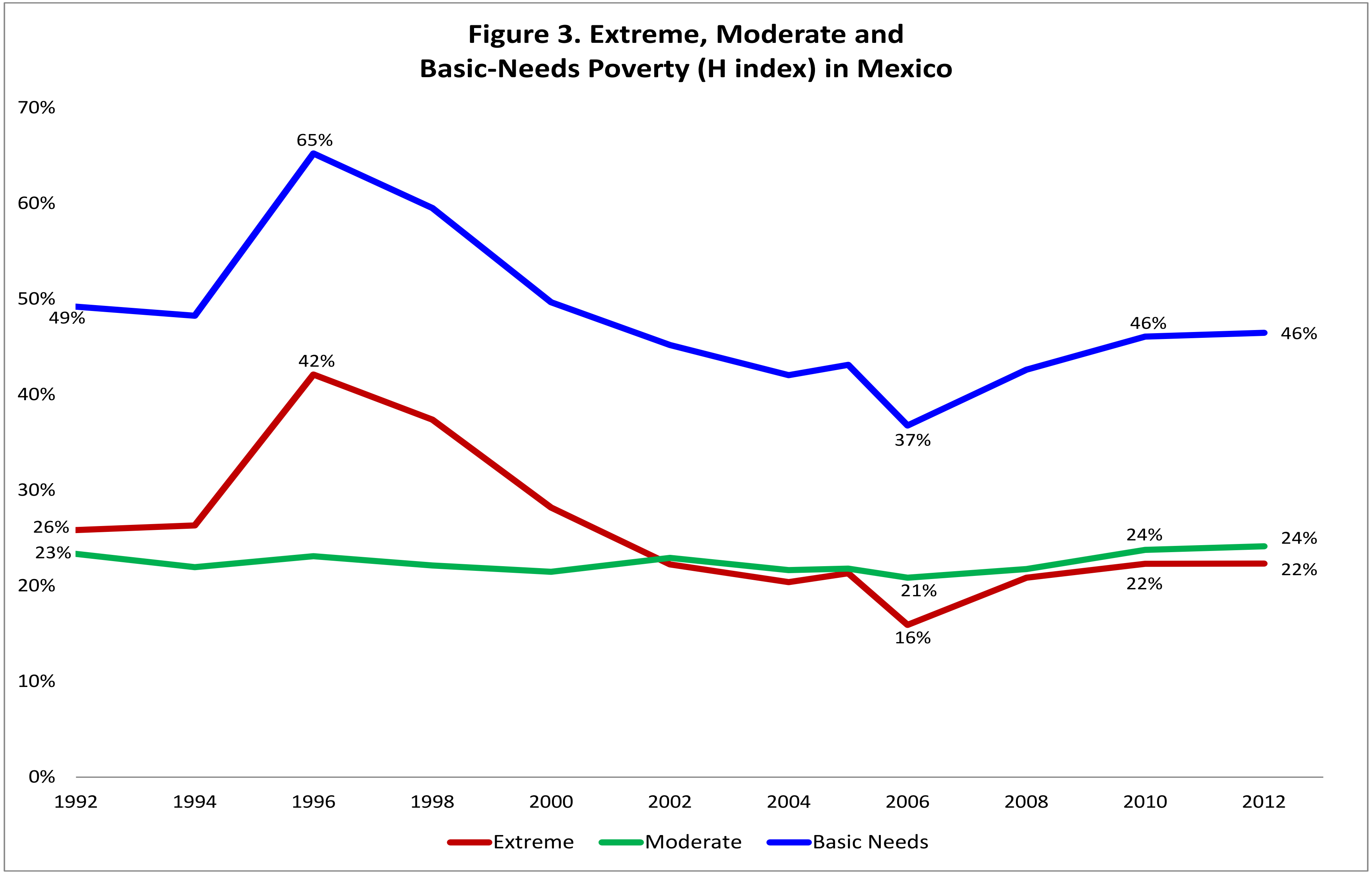
Figure 3. Extreme, Moderate and
Basic-Needs Poverty (H index) in Mexico
70%
60%
50%
40%
30%
20%
10%
0%
65%
49%
46%
46%
42%
37%
26%
23%
24%
24%
22%
21%
22%
16%
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Extreme
Moderate
Basic Needs

Table 1. Decomposition of Changes in National Poverty in Mexico into its Growth, Distribution and Inflation Components (1992-2012)

Effect	Poverty measures (% point change)								
	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	-2.0	-0.7	-0.3	-1.9	-0.9	-0.4	-5.7	-0.9	-0.8
(contribution)	-80%	-53%	-42%	-87%	-63%	-50%	-536%	-58%	-68%
Distribution	-3.9	-1.6	-0.8	-3.6	-2.0	-1.1	-5.2	-2.1	-1.8
(contribution)	-157%	-133%	-122%	-163%	-142%	-130%	-490%	-141%	-146%
Inflation	3.6	1.3	0.6	3.4	1.7	0.9	9.8	1.5	1.6
(contribution)	145%	105%	89%	157%	121%	102%	918%	105%	128%
Residual	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2	0.1	-0.1	-0.2
(contribution)	-7%	-20%	-25%	-6%	-16%	-22%	7%	-6%	-14%
Total change	-2.49	-1.24	-0.66	-2.2	-1.41	-0.86	-1.07	-1.47	-1.22

Relative roles of Growth & Redistribution to the Reduction of Poverty in Mexico (1992-2012)

	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	34%	28%	26%	35%	31%	28%	52%	29%	32%
Distribution	66%	72%	74%	65%	69%	72%	48%	71%	68%

Note: The applied decomposition methodology was proposed by Günther and Grimm (2007) in the Journal of Development Economics.

Table 2. Decomposition of Changes in Rural and Urban Poverty in Mexico into its Growth, Distribution and Inflation Components (1992-2012)

Effect	Poverty measures (% point change)																	
	Rural sector									Urban sector								
	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line			Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	-2.4	-1.1	-0.6	-2.7	-1.3	-0.8	-3.3	-1.9	-1.3	-1.8	-0.4	-0.1	-2.1	-0.7	-0.2	-2.7	-1.4	-0.8
(contribution)	-52%	-39%	-36%	-61%	-43%	-38%	-99%	-58%	-47%	-185%	-139%	-126%	-346%	-182%	-151%	-487%	-598%	-288%
Distribution	-6.4	-3.4	-1.9	-6.5	-3.9	-2.4	-5.8	-4.7	-3.6	-2.3	-0.5	-0.1	-2.1	-0.8	-0.3	-1.4	-1.2	-0.8
(contribution)	-137%	-125%	-119%	-145%	-128%	-122%	-174%	-141%	-131%	-233%	-186%	-166%	-348%	-222%	-194%	-248%	-521%	-297%
Inflation	4.4	2.0	1.2	4.9	2.4	1.5	5.6	3.5	2.4	3.2	0.8	0.2	3.7	1.3	0.5	4.6	2.5	1.4
(contribution)	95%	75%	71%	110%	81%	74%	168%	104%	88%	330%	305%	346%	611%	358%	334%	836%	1083%	546%
Residual	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3	0.2	-0.2	-0.3	-0.1	-0.2	-0.1	-0.1	-0.2	-0.1	-0.003	-0.1	-0.2
(contribution)	-6%	-11%	-16%	-5%	-9%	-13%	5%	-6%	-9%	-12%	-80%	-154%	-17%	-54%	-90%	-1%	-64%	-61%
Total change	-4.63	-2.74	-1.62	-4.47	-3.02	-1.98	-3.34	-3.34	-2.72	-1.0	-0.3	-0.1	-0.6	-0.37	-0.16	0.55	-0.23	-0.26

Relative roles of Growth & Redistribution to the Reduction of Poverty in Mexico (1992-2012)

	Rural sector									Urban sector								
	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line			Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	27%	24%	23%	30%	25%	24%	36%	29%	26%	44%	43%	43%	50%	45%	44%	66%	53%	49%
Distribution	73%	76%	77%	70%	75%	76%	64%	71%	74%	56%	57%	57%	50%	55%	56%	34%	47%	51%

Note: The applied decomposition methodology was proposed by Günther and Grimm (2007) in the Journal of Development Economics.

Table 3. Decomposition of Changes in National Poverty in Mexico into its Growth, Distribution and Inflation Components (1992-2010)

Effect	Poverty measures (% point change)								
	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	0.6	0.2	0.1	0.5	0.2	0.1	4.1	0.01	0.2
(contribution)	27%	21%	14%	20%	22%	19%	235%	1%	18%
Distribution	-4.2	-1.4	-0.6	-4.2	-1.9	-0.9	-13.3	-2.0	-1.7
(contribution)	-189%	-168%	-154%	-180%	-177%	-165%	-753%	-142%	-172%
Inflation	1.6	0.6	0.3	1.5	0.8	0.4	6.9	0.7	0.7
(contribution)	71%	69%	65%	65%	70%	68%	389%	46%	66%
Residual	-0.2	-0.2	-0.1	-0.1	-0.2	-0.1	0.5	-0.1	-0.1
(contribution)	-9%	-21%	-25%	-5%	-16%	-23%	28%	-4%	-12%
Total change	-2.20	-0.84	-0.40	-2.3	-1.07	-0.57	-1.76	-1.42	-1.00

Poverty-Augmenting Effect of Growth and Inflation in Mexico (1992-2010)

	Food Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	27%	23%	18%	23%	24%	22%	38%	2%	21%
Poverty line	73%	77%	82%	77%	76%	78%	62%	98%	79%

Note: The applied decomposition methodology was proposed by Günther and Grimm (2007) in the Journal of Development Economics.

Table 4. Decomposition of Changes in Rural and Urban Poverty in Mexico into its Growth, Distribution and Inflation Components (1992-2010)

Effect	Poverty measures (% point change)											
	Rural sector						Urban sector					
	Extreme Poverty Line			Basic-Needs Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	0.2	0.1	0.1	0.2	0.1	0.1	1.3	0.4	0.2	1.6	0.8	0.5
(contribution)	4%	4%	5%	4%	4%	4%	201%	181%	184%	578%	343%	230%
Distribution	-6.9	-3.2	-1.8	-7.6	-4.7	-3.1	-3.5	-1.1	-0.4	-3.7	-2.1	-1.2
(contribution)	-146%	-143%	-143%	-161%	-148%	-145%	-560%	-461%	-422%	-1331%	-878%	-590%
Inflation	2.2	1.1	0.6	2.6	1.6	1.1	1.7	0.6	0.2	2.2	1.2	0.7
(contribution)	47%	48%	51%	54%	49%	49%	275%	250%	257%	790%	471%	317%
Residual	-0.2	-0.2	-0.2	0.1	-0.1	-0.17	-0.1	-0.2	-0.1	0.2	-0.1	-0.1
(contribution)	-4%	-9%	-13%	2%	-5%	-8%	-15%	-70%	-119%	63%	-36%	-58%
Total change	-4.73	-2.23	-1.25	-4.73	-3.16	-2.14	-0.6	-0.24	-0.09	0.28	-0.24	-0.21

Poverty-Augmenting Effect of Growth and Inflation in Mexico (1992-2010)

	Rural sector						Urban sector					
	Extreme Poverty Line			Basic-Needs Poverty Line			Extreme Poverty Line			Basic-Needs Poverty Line		
	H	PG	SPG	H	PG	SPG	H	PG	SPG	H	PG	SPG
Growth	7%	8%	9%	8%	7%	7%	42%	42%	42%	42%	42%	42%
Poverty line	93%	92%	91%	92%	93%	93%	58%	58%	58%	58%	58%	58%

Note: The applied decomposition methodology was proposed by Günther and Grimm (2007) in the Journal of Development Economics.

Table 5. Difference generalized method of moments (GMM) estimation results

Left-hand-side variable	Consumption (t)	Gini (t)	Poverty (t)
Specification A: With year effects only			
Consumption (t-1)	0.7972 ***	-0.3669 ***	0.6249 ***
	(0.2343)	(0.0634)	(0.0910)
Gini (t-1)	-2.7834 ***	0.8001 ***	-1.5717 ***
	(0.5862)	(0.1811)	(0.2358)
Poverty (t-1)	1.4442 ***	-0.6706 ***	1.5070 ***
	(0.4511)	(0.1335)	(0.1954)
Intercept	2.6242	3.1878 ***	-4.4087 ***
	(1.7226)	(0.4595)	(0.6748)
Wald X^2-test (Chi2(12))	326.31 ***	83.40 ***	390.05 ***
Specification B: With year effects and controls			
Consumption (t-1)	0.7445 ***	-0.3639 ***	0.6610 ***
	(0.2498)	(0.0718)	(0.0984)
Gini (t-1)	-2.5138 ***	0.7715 ***	-1.5801 ***
	(0.5826)	(0.1944)	(0.2412)
Poverty (t-1)	1.2733 ***	-0.6697 ***	1.5387 ***
	(0.4548)	(0.1431)	(0.2046)
Education (t-1)	-0.4825 *	0.0644	-0.2173
	(0.2852)	(0.0935)	(0.1370)
Urban (t-1)	-0.3127	0.0145	-0.1410
	(0.1930)	(0.0661)	(0.0932)
Tertiary sector (t-1)	-0.0852	-0.0328	-0.0504
	(0.2360)	(0.0798)	(0.1138)
Aged (t-1)	-0.4263	-0.1134	-0.0111
	(0.9009)	(0.3241)	(0.4352)
Intercept	3.2376 *	3.1800 ***	-4.5798 ***
	(1.7923)	(0.5026)	(0.7158)
Wald X^2-test (Chi2(16))	332.51 ***	82.71 ***	391.29 ***

Notes: The number of observations is 288 and the number of groups in the panel is 32.
Robust standard errors are shown in parentheses.
***, ** and * represent significance at the 1, 5 and 10% level respectively.

Table 6. Estimation results for the constrained model

Left-hand-side variable	*System of equations comprising (4), (5) and (6)*			*Fixed effect estimation of Equation (7)*	
	Difference GMM estimation		*Fixed effect est.*		
	Consumption (t)	Gini (t)	Poverty (t)		Poverty (t)
Specification A: With year effects only					
Consumption (t−1)	0.4130 ***	−0.1146 ***	−0.1128 ***	Consumption (t)	−0.4174 ***
	(0.0922)	(0.0266)	(0.0285)		(0.0142)
Gini (t−1)	−1.7882 ***	0.1588 *	0.2655 ***	Gini (t)	1.0622 ***
	(0.2884)	(0.0840)	(0.0948)		(0.0475)
Wald X^2-test (Chi2(11))	331.83 ***	75.92 ***			
R-squared			0.61		0.89
Specification B: With year effects and controls					
Consumption (t−1)	0.4672 ***	−0.1078 ***	−0.1080 ***	Consumption (t)	−0.4384 ***
	(0.1063)	(0.0301)	(0.0319)		(0.0147)
Gini (t−1)	−1.7223 ***	0.1578 *	0.2677 ***	Gini (t)	1.0572 ***
	(0.2923)	(0.0895)	(0.0958)		(0.0449)
Education (t−1)	−0.3959	−0.0398	0.0386	Education (t)	0.1737 ***
	(0.2785)	(0.0839)	(0.1007)		(0.0454)
Urban (t−1)	−0.1244	−0.0317	0.1026 *	Urban (t)	0.1634 ***
	(0.1932)	(0.0574)	(0.0601)		(0.0287)
Tertiary sector (t−1)	−0.3479	−0.0059	−0.1073	Tertiary sector (t)	0.0051
	(0.2451)	(0.0726)	(0.0863)		(0.0396)
Aged (t−1)	−0.8084	0.0746	0.1925	Aged (t)	−0.0041
	(0.9288)	(0.2955)	(0.3000)		(0.1371)
Intercept	5.3734 ***	1.2815 ***	0.9097 ***	Intercept	3.1309 ***
	(0.7418)	(0.2055)	(0.2269)		(0.1048)
Wald X^2-test (Chi2(15))	325.48 ***	75.89 ***			
R-squared			0.62		0.91

Notes: The number of observations is 288 for the difference GMM estimation, 320 for Equation (6) and 352 for Equation (7).
Robust standard errors are shown in parentheses.
***, ** and * represent significance at the 1, 5 and 10% level respectively.

Appendix Table 1. Robustness Check, period 1992–2010			
	System of equations comprising (4), (5) and (6)		
Left–hand–side variable	*Difference GMM estimation*		*Fixed effect est.*
	Consumption (t)	Gini (t)	Poverty (t)
Specification A: With year effects only			
Consumption (t–1)	0.4333 ***	–0.1276 ***	–0.0946 ***
	(0.1022)	(0.0283)	(0.0306)
Gini (t–1)	–1.8167 ***	0.2002 **	0.2232 **
	(0.3147)	(0.0914)	(0.1018)
Specification B: With year effects and controls			
Consumption (t–1)	0.4972 ***	–0.1221 ***	–0.0901 **
	(0.1197)	(0.0323)	(0.0348)
Gini (t–1)	–1.7525 ***	0.2001 **	0.2302 **
	(0.3216)	(0.0973)	(0.1033)

Notes: The number of observations is 288 for the difference GMM estimation and 320 for Equation (6).
Robust standard errors are shown in parentheses.
***, ** and * represent significance at the 1, 5 and 10% level respectively.

Appendix Table 2. Robustness Check, using constant poverty lines

Left-hand-side variable	*System of equations comprising (4), (5) and (6)*		
	Difference GMM estimation		*Fixed effect est.*
	Consumption (t)	Gini (t)	Poverty (t)
Specification A: With year effects only			
Consumption (t−1)	0.4130 ***	−0.1146 ***	−0.1171 ***
	(0.0922)	(0.0266)	(0.0280)
Gini (t−1)	−1.7882 ***	0.1588 *	0.2905 ***
	(0.2884)	(0.0840)	(0.0932)
Specification B: With year effects and controls			
Consumption (t−1)	0.4672 ***	−0.1078 ***	−0.1129 ***
	(0.1063)	(0.0301)	(0.0314)
Gini (t−1)	−1.7223 ***	0.1578 *	0.2918 ***
	(0.2923)	(0.0895)	(0.0944)

Notes: The number of observations is 288 for the difference GMM estimation and 320 for Equation (6).
Robust standard errors are shown in parentheses.
***, ** and * represent significance at the 1, 5 and 10% level respectively.

Appendix Table 3. Robustness Check, using income instead of consumption			
	System of equations comprising (4), (5) and (6)		
Left-hand-side variable	*Difference GMM estimation*		*Fixed effect est.*
	Consumption (t)	Gini (t)	Poverty (t)
Specification A: With year effects only			
Consumption (t-1)	0.4433 ***	-0.1726 ***	-0.0905 ***
	(0.1057)	(0.0312)	(0.0269)
Gini (t-1)	-1.6468 ***	0.3092 ***	0.1609 *
	(0.2964)	(0.0924)	(0.0837)
Specification B: With year effects and controls			
Consumption (t-1)	0.4930 ***	-0.1711 ***	-0.0953 ***
	(0.1197)	(0.0354)	(0.0297)
Gini (t-1)	-1.6090 ***	0.3068 ***	0.1614 *
	(0.2996)	(0.0979)	(0.0849)

Notes: The number of observations is 288 for the difference GMM estimation and 320 for Equation (6).
Robust standard errors are shown in parentheses.
***, ** and * represent significance at the 1, 5 and 10% level respectively.