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THE EFFECT OF SOCIAL SPENDING ON INCOME INEQUALITY: AN ANALYSIS FOR LATIN AMERICAN COUNTRIES.

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Abstract

Using a panel dataset from 1980 to 2000 this paper analyzes the determinants of income inequality in Latin American countries with special attention paid to education, health, and social security expenditures. I build on previous research by solving for the endogeneity of the social spending variables in the income inequality equation. This study undertakes 2SLS and GMM methods in order to control for the correlation of some of the regressors with the disturbance term. While government expenditure affects inequality, an increase in inequality may be related to social, economic and political changes that can also affect government expenditures. Therefore, social spending is potentially endogenous in the inequality regression and, unless this source of endogeneity is accounted for, the estimated parameters will be not consistent. Results show that social spending variables are endogenous with income inequality index. Once endogeneity is controlled for, education and health expenditures have a negative effect on income inequality, while social security expenditures have no effect on income inequality. I also find that models that do not take into account endogeneity of social spending variables overestimate the effects of education and health spending.

The Effect of Social Spending on Income Inequality:

An Analysis for Latin American Countries.

"Latin America is highly unequal with respect to incomes, and also exhibits unequal access to education, health, water and electricity, as well as huge disparities in voice, assets and opportunities. This inequality slows the pace of poverty reduction, and undermines the development process itself" (World Bank, 2004).

Introduction

There is strong evidence that Latin America and the Caribbean form the region with the highest average level of inequality and particularly with the highest concentration of income at the very top. More specifically, according to the World Bank (2004), the top 10 percent of income earners among Latin Americans earn 48% of total income, while the poorest tenth earn just 1.6%. The equivalent figures for high-income countries are 29.1% and 2.5%. Using the Gini Index of inequality in the distribution of income and consumption, the Economic Commission for Latin America and the Caribbean (ECLAC) found that Latin America and the Caribbean, from the 1970s through the 1990s, measured nearly 10 points more unequal than Asia, 17.5 points more unequal than the 30 countries in the Organization for Economic Cooperation and Development (OECD), and 20.4 points more unequal than Eastern Europe.

The income distribution in Latin America has varied little over recent decades, despite big changes in economic policies. Londoño and Székely (1998) using data from household surveys showed that income inequality across Latin America as a whole declined slightly in the 1970s, increased during the 1980s due the debt-crisis and a sharp increase of inflation in a number of countries, and showed no clear pattern in the 1990s.

The concern about income distribution in Latin America is increasing, and it is not clear if the economic model now being followed in Latin America is making matters better or worse, at least in terms of income inequality (Morley, 2001). On one hand, some reforms such as opening national borders, decentralization efforts, privatization of state enterprises, and shifting away from progressive income tax systems to broad-based taxes on consumption might be expected to shift the distribution of income even

more toward the rich. On the other hand, the considerable increases in social spending and broad coverage of public education in most of Latin American countries might be an effective instrument of distribution of income toward the poor.

Using a panel dataset from 1980 to 2000 this paper analyzes the determinants of income inequality in Latin American countries with special attention paid to education, health, and social security expenditures. I built on previous research by solving for the endogeneity of the social spending variables in the income inequality equation. This study undertakes 2SLS and GMM models in order to control for the correlation of some of the regressors with the disturbance term. While government expenditure affects inequality, an increase in inequality is related to social, economic and political changes that can also affect government expenditures. Therefore, social spending is potentially endogenous in the inequality regression and, unless this source of endogeneity is accounted for, the estimated parameters may be inconsistent. In addition, most of the variables that determine income inequality are also determinants of social expenditure. Results show that social spending variables are endogenous with income inequality index. Once endogeneity is controlled for, education and health expenditures have a negative effect on income inequality, and social security expenditures have no effect on income inequality. Results also show that models that don't take into account endogeneity of the social spending variables overestimate the effects of education and health spending.

The remainder of this paper is organized as follows. I first summarize previous research concerning income inequality in Latin American countries. I then discuss the literature concerning the determinants of income inequality, paying special attention to social spending factors. The data and econometric model are described in the third part of the paper, with an emphasis on endogeneity problems of social spending. Results and conclusions are presented in parts four and five respectively.

Inequality in Latin American Countries

Why is Latin America so unequal? Lloyd-Sherlock's (2000), Morley (2001), the World Bank (De Ferranti et al., 2004) offer the most comprehensive analysis of the determinants of unequal distribution of income in Latin American countries. Surprisingly, to the best of my knowledge, no cross-country econometric models have addressed the

problem of endogeneity of the right hand side variables of the income inequality equation for Latin American countries.

Lloyd-Sherlock's gave a descriptive analysis of the level of inequality in Latin America. He emphasizes that while the overall levels of social spending are much higher than in most of Asia, the patterns of government budget allocations are very different in the two regions: education is the dominant sector in Asia, while social security dominates in Latin America. In addition, low income groups in Latin America are often excluded from many areas of public welfare because of the poor administrative capacity of the government and there are severe problems of access and quality for important social services in Latin America such as education and public healthcare.

According to the World Bank, inequality in Latin America is mainly due to the interlocking effects of four things: access to education is unequal; the earnings of educated people are disproportionately high; the poor have more children with whom they must share their income; and targeting of public spending is ineffective. De Ferranti et al. (2004) evaluate the effect an extensive range of variables including economic, demographic, and political determinants on income equality, but a limitation of this important work is that they do not use present regression analysis. They contend that the correlation across countries between educational and income inequality is clearly positive and significant.

Morley identifies three central factors that help explain Latin America's high level of inequality. First, Latin America has a highly unequal distribution of education and the highest skill differentials for university graduates in the world. That is, Latin America let most of its young cohorts drop out after primary school, using the money saved at the secondary school level to expand university education. Since it is mainly the poor who drop out of school, educational inequality rose in the 1990s in every country in the region, except Brazil. Second, the combination of a highly skewed distribution of land and an increase in the growth rate of the labor force in recent decades has driven down the relative wage of the unskilled. Rural-urban migration in the twentieth century reduced the pressure in the countryside, but at the cost of transferring inequality and low wages for the unskilled to the urban sector. The combination of an unequal distribution of land, rising population growth rates and a failure of the education system to absorb and educate the young has left the region with an oversupply of poorly educated workers.

Third, the unusually large gap between the average incomes of the rich and those further down the income pyramid adds to inequality.

Morley used data for sixteen countries in Latin America from 1960 to 1997, including national income, inflation, education, economic reform indices, and land distribution as determinants of income distribution. He used two different samples, one for levels and the other for changes in the distribution, and estimated both fixed and random effects model. He found that income is significant and has the inverted U-shape that Kuznets predicted, but that this relation has been shifting in a regressive direction over time. He concludes that giving new entrants to the labor force more education at any level is progressive, but countries will get a much bigger reduction in inequality if they start at the bottom, universalizing the coverage of primary education and then broadening the coverage of secondary and university education. Finally, he found that tax reform is unambiguously regressive, and opening up the capital account is unambiguously progressive. However, this study does not include social expenditures, a measure of democratization, and effect of openness to international trade, which are presumably important policies that may influence income inequality.

Huber et al (2005) examines the determinants of inequality using a panel dataset for 18 Latin American and Caribbean countries for the period 1970 to 1995. They use the Gini Index of income equality as the dependent variable for multiple regressions. They find that health and education spending has a negative impact on inequality, meaning that such spending reduces income inequality, while social security and welfare spending (transfers, primarily pensions) has a strong positive impact on inequality. They use robust-cluster standard errors in order to control for correlation among errors of observations for the same country. The problem with this method is that it requires the errors to be uncorrelated between countries, which could be violated if unmeasured factors affect the dependent variable in all units at the same point in time.

Literature Review: Determinants of Inequality

There is a substantial literature that examines demographic and economic determinants of income inequality. Economic development, globalization, economic freedom, government expenditure, education inequality, and democracy are variables that have been regularly associated with inequality.

The association between **economic development** and income inequality was first analyzed by Kuznets (1955) who found an upside down U-shaped curve. That is, increased economic development is associated with increased inequality at lower levels of development, but then shifts at some point beyond which increased development is associated with decreasing inequality. Therefore, we would expect a positive relationship between economic development and inequality since most of the Latin American countries are at low or medium levels of industrialization and only few have passed the highest point of the curve.

It is of interest to see whether various indicators of globalization have a direct impact on inequality. **Openness** by both capital and trade flows have been examined in the empirical literature for their effects on income inequality but with inconclusive results. Barro (2000) finds that in developing countries openness to trade, non-protectionist policies, and smaller government are associated with greater income inequality. In contrast, Dollar and Kraay (2002) find evidence that free trade and open economic policies lead to increased equality in a sample of eighty countries that covers over 40 decades. Milanovic (2002) finds a more complex relationship whereby openness in low-income countries tends to benefit only the rich, but openness in higher-income countries largely benefits the poor and middle class.

Alderson and Neilsen (1999) consider the role of foreign investment in income inequality using an unbalanced cross-national data set for 1967 through 1994. They improve upon previous studies by estimating random-effects regression models that control for unmeasured country specific heterogeneity to investigate the effects of foreign capital penetration on inequality (measured as the Gini coefficient) against the background of an internal-developmental model of inequality. They conclude that the relationship between income inequality and investment dependence should be revised in light of an investment-development path relating the inflow and outflow of foreign capital to economic development.

Rudra (2004) also investigates the relationship between openness, government expenditures, and income distribution using a panel data set for 35 less developed countries from 1972-1996. She finds that openness has a much more severe impact on inequality in developing nations. Only education spending helps mitigate the adverse effect of openness on income inequality in poorer countries, while spending on

healthcare, social security and welfare do not. She also finds that income distribution tends to be much more sensitive to trade flows in developing countries than in more industrialized nations. Her results indicate that increasing amounts of trade worsen income distribution in the developing world if the government does not engage in certain types of pro-poor social spending to alleviate it. Capital flows, in contrast to trade flows, have a minimal effect on inequality in both sets of countries.

Population growth and population under 15 years of age are generally expected to push up the level of inequality. The oversupply of unskilled young workers depresses lower incomes and increase wage differentials (Alderson and Nielsen, 1999). Aged population is also expected to have a positive impact on inequality. The argument is that higher elderly population suggests lower productivity, lower savings rates, and smaller intergenerational transfer of income (Deaton and Paxson, 1997).

Urbanization can also affect income distribution. Growth of the urban population contributes to a higher middle class, and more employment (Boschi, 1987). Similarly, the larger the proportion of the labor force in agriculture, the higher the degree of inequality. As the movement of the labor force shifts from agriculture to the urban sector, low-paid rural jobs become less important and inequality is expected to decrease. Deininger and Squire (1996) showed that inequality in the rural samples in Latin America is generally higher.

It is expected that **democratic** nations will exhibit a more favorable distribution of income. Some studies contend that more authoritarian regimes cause income distribution to be skewed because income will be concentrated in the hands of a few elites who hold political power (Muller, 1988; Burkhart, 1997; and Huber et al., 2005). Muller and Buckhard measure the presence of immediate presence of democracy in the year of observation. Instead, Huber et al. measure the strength of the democratic tradition and find a positive correlation with income inequality, meaning that the stronger the democratic tradition of country the more unequal the distribution of income.

Research also examines the link between income inequality and various **measures of education.** Most studies find a negative relationship between income inequality and a country's average or median educational attainment. Enrollments also are examined for their effects on income inequality. Barro (2000) finds a negative

relationship between primary and secondary school enrollments and income inequality but a positive relationship between higher education enrollments and income inequality. The relationship between secondary enrollments and income inequality may be thought of as one which is inherently connected to development. That is, an increase in the supply of educated workers tends to diminish the gap in wages and, thereby, decreases income inequality. Morley (2001) finds that in Latin America the spread of education over the last 30 years coincides with a trend towards increasing income inequality. This is a direct result of the tendency to support only primary education rather than both primary and secondary education. In contrast, Shanahan (1994) finds no relationship between an expanded educational system and a country's degree of income inequality.

The direct relationship between **educational inequality** (unequal distribution of human capital) and income inequality yields mixed results. Checchi (2000) concludes that when the distribution of educational attainment is accounted for, the relationship between attainment and income inequality is actually U-shaped. De Gregorio and Lee (2002) find a positive relationship between the two; whereas, O'Neil (1995) finds a negative relationship: "incomes have diverged despite substantial convergence in education levels".

The relationship between inequality and overall **government spending** as well as government spending for particular services have been studied but the results are not consistent across these various studies. Moene and Wallerstein (2001) use data for 18 OECD countries between 1980 and 1990. Controlling the unemployment rate, voter turnout, rightist government, percent elderly and a lagged measure of expenditure, higher inequality is associated with lower social spending. However, Moene and Wallerstein omit differences across nations that could be correlated with both inequality and social spending, which could lead to seriously biased estimates of the effect of inequality. Sylwester (2002) considers how education expenditures are associated with subsequent changes in income inequality within a cross-section of countries. After dividing the sample into OECD and less-developed-country subsamples, he finds that education expenditures are more strongly associated with falling income inequality in the former group. Rudra (2004) finds that while all categories of social spending help reduce income inequality in richer countries, the effects of social spending are much less favorable in LDCs. In LDCs, only spending on education reduces income inequality in

the face of globalization. Rudra contends that education spending mitigates the adverse effects on openness in inequality.

In Latin America the evidence for the distributive impact of social spending is more mixed and tends to vary for different kinds of expenditures. Ferrati et al. (2004) indicates that education spending is progressive, health spending is slightly progressive or neutral, and that social security spending tends to be regressive.[1] Deininger and Squire (1998) find that educational expenditures are positively associated with inequality, though causal relationships are ambiguous. Finally, Huber et al (2005) find that health and education spending has a negative impact on inequality, while social security and welfare spending has a strong positive impact on inequality.

Data

Using data from the World Income Inequality Database (WIID), the World Bank's World Development Indicators (WDI), International Monetary Fund's Government Finance Statistics (GFS), and the Polity IV dataset measure of democracy, this paper estimates the effects government spending, and selected educational and economic factors on income inequality. I use an unbalanced panel data set with 200 observations from 19 Latin American and Caribbean countries, specifically Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. The data span the period 1980 to 2000. With only a few exceptions, the observations are annual.

The dependent variable for this study is *income inequality*, measured using the Gini coefficient, which was obtained from the World Income Inequality Database (WIID). This data set includes the often used GINI data developed by Deininger and Squire (1996). Using their data has the following advantages: it is possible to compare results with prior research, has an intuitive interpretation[2], and satisfies particular standards of quality. Only "high quality" observations are included in the analysis. The drawback of

[1] Social security expenditures tend to favor the formal labor sector and benefits are unequally distributed since they are tied with earnings.

[2] The Gini coefficient has an intuitive interpretation: is a measure between 0 and 100, where 0 means perfect equality and 100 represent perfect inequality in household and individual based distribution of incomes.

using this data is that there are several missing values which result in an unbalanced dataset. There are a minimum of 2 and a maximum of 20 observations per country. I use yearly data in order to make use of every observation and to capture the effects of annual changes. Table 1 presents summary statistics for the Gini coefficients of Latin American countries in the sample.

Independent Variables

I use the natural log of GDP per capita (in constant 2000 US dollars) as the variable for *economic development*, which is commonly used in the literature. This variable was retrieved from the World Bank's World Development Indicators (WDI). As is also common in the literature, I include the squared value of this term as another variable, to allow for the Kuznet's hypothesis of a non-linear relationship.

Two variables encompass the measures of globalization in this study: capital and trade flows. These variables were retrieved from the WDI. Trade openness is measured by exports and imports as a percentage of GDP. Foreign direct investment (FDI) measures net inflows of investment as a percentage of GDP. We can expect that the openness coefficients will be positive and significant.

Per capita spending on health, education, social security and welfare are reported in the International Monetary Fund's Government Finance Statistics (GFS). An alternative measure of percentage of a country's public expenditures for each category above is used in order to test for robustness of the spending effect on inequality. One limitation of the expenditure data is it is not disaggregated for different levels of education or health. Therefore, it is not straightforward to predict a sign for this variable. We would expect a negative overall effect of government expenditure on inequality index. Table 2 present the means for the spending variables by country.

I also include the following educational variables: gross elementary, secondary and tertiary enrollment ratio. According to the World Bank this variable is defined as "the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown". These variables were also obtained from the WDI. We expect education attainment to reduce inequality and promote economic growth. In Latin America, primary education has been universalized since 1970 for primary education, but not for secondary education, and so large

proportion of students drop out at that point. This explains the fact that educational attainment has coincided with increasing inequality in Latin American countries in the last 30 years. Consequently, we would expect a negative coefficient for higher education but a positive coefficient for primary education.

The Polity IV data set is used to derive both measures. Democracy is scored on a scale of 0 to 10 (10 being the highest) and rated by: (1) regulation, competitiveness, and openness of executive recruitment, (2) executive constraints, and (3) regulation and competitiveness of political competition. For this analysis I apply both measures of democracy. Following Segura and Kaufman (2004), a democracy dummy variable is constructed by coding any country scoring at least 7 as democratic; otherwise, they are coded authoritarian. We expect the countries with the longer democratic traditions to have less income inequality.

A measure of urbanization, the percentage of the population which live in urban areas, is included in the model as determinant of inequality. We expect that more urban countries have less income inequality. I finally test for the effect of the percentage of the population which is 65 and older for the model predicting social security and welfare spending and of the percentage of the population which is under 15 years of age for the model predicting spending on health and education.

Other variables are included in the empirical model such as inflation, unemployment, debt, deficit, among others in order to control for economic effects. However, the estimates for these variables are either insignificant and with very small coefficients in the inequality equation. Therefore, these variables are dropped from the analysis.

Model

I apply the fixed effect method using time dummies and a decade dummy variable to control for economic shocks or other time specific effects. The decade dummy variable is particularly important to check the effects of the 1980s crisis on the model, particularly since social spending fell during that decade. Decade dummies are preferred to year dummies due to the small size of the sample.[3] Fixed effects are useful

[3] Regressions are also estimated using year dummy variables however the results don't change significantively.

for controlling for idiosyncratic differences across countries with regard to inequality. Country specific effects are important in this model since most of the variation occur across units rather than over time. The intercept of the fixed effects model estimates the differences in inequality between countries and time dummy variables capture variation within them through time.

The general regression model for the level of distribution can be written as follows:

$$Gini_{it} = \sum \alpha_o + \sum \beta_j EconomicDevelopment_{it-1} + \sum \beta_k \overline{SocialSpending}_{it-1} + \sum \beta_l Openess_{it-1} + \sum \beta_m Education_{it-1} + \sum \beta_n X_{it-1} + \sum \delta_p decade_t + \sum \lambda_q sample_t + \mu_{it}$$

Where:

- α_o is a vector of intercepts that capture unobservable country specific effects such as: historical experiences, initial conditions, and cultural differences.
- β_j is a vector of slope coefficients for per capita GDP and per capita GDP square.
- β_k is a vector of slope coefficients for per capita education, health and social security spending.
- β_l is a vector of slope coefficients for trade and foreign direct investment
- β_m is a vector of slope coefficients for gross enrollment ratio for primary, secondary and tertiary education.
- X_{it} is a vector of observable country characteristics which are hypothesized to have an effect on the income distribution such as population > 65 years old, democracy, urbanization, and level of decentralization.
- δ_p is a vector of intercepts that capture time specific effects.
- λ_q is a vector of dummies which reflect the variance in methodology to estimate the Gini index (e.g., urban versus national surveys, household income versus income per capita, expenditure versus income).
- μ_{it} is the error term which is assumed to be normally distributed .

In order to control for the causal relationship between social spending and income distribution, a 2SLS estimation procedure is used for the empirical analysis. Higher order moments of the spending variables are used as instruments for social

expenditure variables. This procedure was proposed by Lewbel (1997) due to the difficulty of finding data for exogenous instrumental variables. However, the validity of this technique relies on, among other things, the skewness of the data.

A random effect model (REM) is also estimated. REM requires equal correlations among errors within units. Such an error structure would arise if unmeasured unit-specific causes, such as methodical measurement differences or other unobserved aspects of the social structure of a country, affect the dependent variable in the same way at each point in time over the period of the data. Since this is reasonable assumption for Latin American countries, the REM strategy is a feasible method of estimation.

Finally, a first differenced GMM panel data model is estimated because of its potential for obtaining consistent parameter estimates even in the presence of measurement error and endogenous right-hand side variable. Different assumptions about the presence of measurement errors and the endogeneity of right-hand-side variables will have implications for the validity of specific instruments. These assumptions can be tested in the GMM framework by the use of the Sargan test of over-identifying restrictions.

Table 3 presents the descriptive statistics for the determinants of social spending and inequality. Results of the social spending regression are presented in Table 4 for education, health and social security expenditures respectively. Table 5 presents the results for the determinants of inequality controlling for the potential endogeneity of the social spending variables. Three alternative models are estimated using different econometric methods: fixed effects, random effects, and fist differenced GMM model. Model 1 includes only socioeconomic[4] and social spending variables. Model 2 represents socioeconomic, social spending, and educational variables. Model 3 is a combined model utilizing socioeconomic, social spending, educational variables and sample dummy variables.

[4] Socioeconomic variables include economic development, openness and specific socioeconomic country characteristics.

Results

The general regression model fits the data well, explaining anywhere from 45% to 67% of the total variance in the Gini coefficient over time and across countries. In addition, the estimates and significance of the coefficient appear to be robust and consistent across different specifications.

Descriptive results from this research support the assertions that there has been a general trend toward increased within-country inequality in recent history (Graph 1). For instance, the average within-country Gini index increased from 46.83 in 1983 to 54.80 in 1999. Descriptive statistics also reveal that there has been a trend toward greater social spending per capita in Latin American countries in the last two decades (Graph 2). Likewise, primary and secondary enrollments have increased over the decades being studied. The average gross enrollment ratio increased from 52.25 in 1980, to 56.48 in 1990, to 71.67 in 2000.

Statistic analysis suggests a negative correlation between social spending and inequality, and a positive correlation between education enrollment and inequality. However, these correlations don't control for other factors that affect income inequality, so multiple regressions analysis yield more reliable effects of social spending on income inequality. Table 3 shows the correlations among these variables.

The fixed effects model provides the preferred estimates among the different econometric methods used for the analysis. Random effects model gives inconsistent estimates which could be the result of the strong assumption about constant correlation among errors within counties. It is very probable that the unobserved effects affect the dependent variable in different scale over the time period of the data. First differenced GMM estimators are very limited due to the small sample that results once the dependent variable and right hand side variables are lagged[5].

Social spending estimates are consistent for every model specification. Education and health spending estimates are positive, statistically significant, and almost equal. On average estimates indicate that an increase of one dollar in education spending reduces index inequality by about 0.6 percentage points, while an increase of

[5] A small sample results because I am using unbalanced panel dataset, and there are a lot of missing values in the dependent variable.

one dollar in health spending decreases index inequality by about 0.4 percentage points. Social security spending seems to have no effect on income inequality. These results provide evidence that education and health spending are slightly progressive in income. This result by itself is not surprising. In fact, this is the same outcome of most of the studies that have analyzed the effect of social spending in income inequality. However, estimates from this study differ from previous ones in that the size of the effect is lower when we control for endogeneity of the social spending variables. I consider this statement the most important result of this study.

Economic development variables support for Kuznets' hypothesis: increased economic development tends to increase inequality before a threshold of income is reached. After this point the curve turns, so increased development lessens inequality. The estimated parameters are almost equal for model 1 and model 2. In model 3, the estimated parameters for log of GDP per capita and its square hold the same signs as in model 1 and model 2, but they are not statistically significant at conventional levels. That is, controlling for the methodology and data used to estimate the Gini index reduces the effect of income per capita in income inequality. This result makes sense since income is in fact the most important variable to estimate the Gini index. That is, the significative effect of income per capital on Gini index is due to the fact that income per capita is used to estimate the index and not because the data support Kuznets' hypothesis.

Trade seems to have a negative effect in income inequality, while foreign direct investment has a positive but not statistically significant effect. The negative effect of trade is significant at conventional levels and support the hypothesis that education spending helps mitigate the adverse effect of openness on income inequality in poorer countries, while social security and welfare do not.

Urbanization has a positive and significant effect on income inequality. This effect goes against the hypothesis that growth of the urban population contributes to a higher middle class, more employment, and less inequality. It would be interesting to find some explanation for this atypical effect. One hypothesis is that the process of urbanization on most Latin American countries could be a consequence of total absence of government, bad economic conditions, and violence in rural areas, rather than a consequence of better economic opportunities of large cities. That is, forced displacement from rural to urban areas could generate higher levels of inequality in urban areas.

Aged population estimates are negative but not statistically significant on all specifications. Unless we expect a positive coefficient for aged population, a positive coefficient makes sense given that Latin America countries are all developing countries with a large young population. Hence, the adverse effect of aged population in income distribution could not be applicable for these countries.

When educational variables are considered in Model 2 and 3, secondary and tertiary enrollments are significant at conventional levels, yet they have opposite effects on income inequality. Secondary enrollments have a negative effect on income distribution while tertiary enrollments have a positive effect. These findings support the premise that secondary enrollments increase the supply of educated workers and, thereby, decrease income inequality. In contrast, higher education increases income inequality since it creates a large gap in wages, and it is available only for a small percentage of the young population.

The dummy variables for the variance in methodologies are quite large. In the case of the income vs. expenditure dummy, our results indicate that the income based studies result in a Gini index that is 11points higher than is the case of expenditure based studies. The national dummy suggests that a Gini index based on a national sample is 6points higher than one based on urban sample. Finally, the household income dummy suggests that a Gini index based on a household income is 2 points lower than one based on income per capita.

Democracy doesn't have consistent estimates among specifications, yet it is not statistically significant.

Conclusions

Many problems arrive when cross country sample are used to analyze determinants of income inequality. First, as Huber argued, common estimators of inequality such a Gini coefficient don't capture the positive benefits of education and health spending in the short run. In general, the effect that health and education spending has on improving human capital in the bottom half of the income distribution would appear only with a considerable lag. Second, there is causality for some of the variables that determine income inequality such as social expenditure and income.

Third, cross-country data scarcity would not allow to control for most of the endogeneity problems that arrive for this specific model.

This analysis contributes to the literature on the determinants of cross-country income inequality and offers new insights into the complex relationships between social spending and income inequality. Estimated parameters are consistent and unbiased when we control for the endogeneity of social spending in the income inequality equation. Results show that models that don't take into account endogeneity of the social spending variables overestimate the effects of education and health spending.

From a policy perspective, this research leads valuable insights on the distributive effects of expenditures on education and health. On one hand, I found evidence that education and health expenditures reduce income inequality in developing countries, being more effective education than health spending. On the other hand, I found that analogous estimates of the effect of social expenditures on income inequality were overestimated because inappropriate econometric methods have been used in previous studies.

Nevertheless, results from this study are not conclusive. The overall estimates of social spending found in this study are limited in the sense that the effect of social expenditures on income distribution depend on the allocation of these expenditures. That is, spending on primary education will be distributive and spending on university education regressive, so the greater the share of education spending going to primary education, the more progressive the overall impact. The same argument holds for different assignments of health expenditures. Problem is that there is not data that disaggregate for lower levels of expenditures. Therefore, the overall estimate could be misleading.

Even with the limitations of the data, this research is still able to produce results that are valuable on their own, and which also serve as the foundation for more robust studies in the future.

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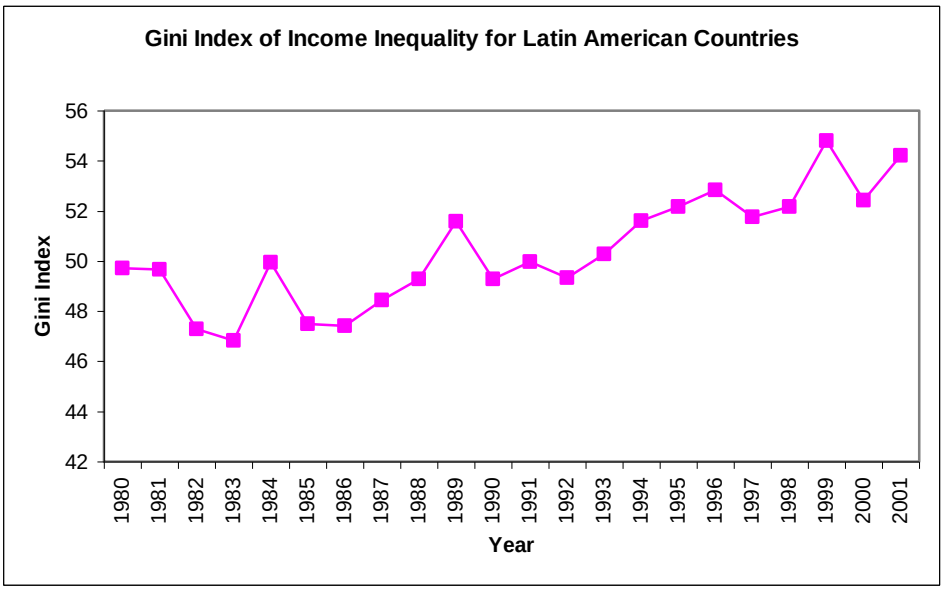
Tables

Table 1. Summary of Gini coefficients

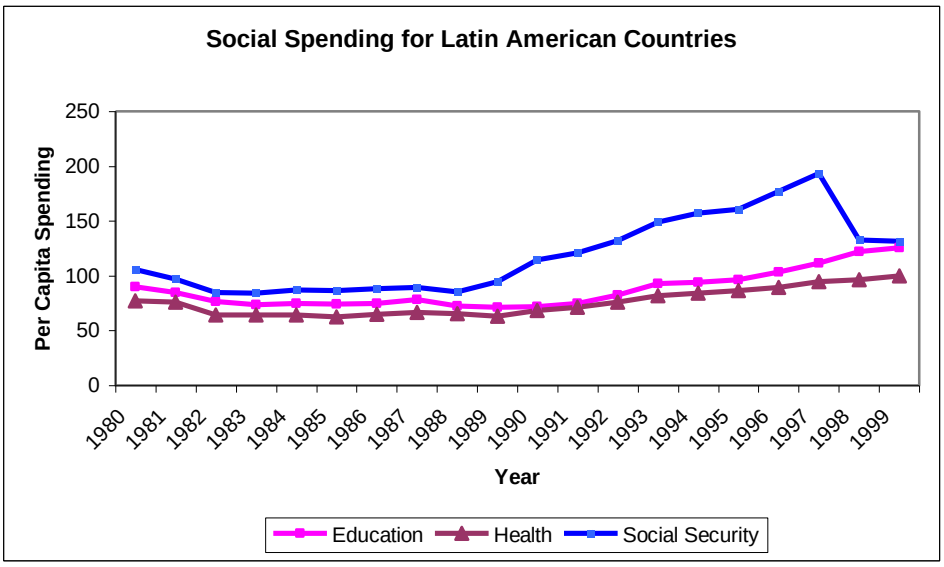
Country	Mean	Std. Dev.	Freq.	Min	Max
Argentina	44.53	3.00	16	39.8	49.5
Bolivia	54.70	3.53	10	49.4	60.2
Brazil	59.19	2.24	17	52.6	64
Chile	54.86	1.95	19	48.9	57.67
Colombia	53.35	5.91	15	43.4	63.7
Costa Rica	46.47	2.05	14	42	48.9
Dominican Rep.	48.65	2.70	8	43.4	51.6
Ecuador	51.96	6.00	7	43.7	58.8
El Salvador	51.91	3.28	8	44.7	56
Guatemala	55.10	1.01	3	54	56
Honduras	54.86	2.45	12	50	59.1
Jamaica	44.96	7.30	12	38.3	65.5
Mexico	53.57	1.87	6	50.6	55.7
Nicaragua	55.60	0.14	2	55.5	55.7
Panama	55.89	3.72	7	47.6	58.4
Paraguay	51.23	8.18	6	39.8	62.1
Peru	44.79	9.43	5	31	57
Uruguay	42.02	1.92	13	38.73	45.62
Venezuela	45.25	3.17	20	37.52	51.2
Total	50.48	6.49	200	31	65.5

Graph 1.



Source: Author's estimation

Graph 2.



Source: Author's estimation

Table 2. Means of Social Spending per capita for Latin American countries

Country	Social Spending	Education Spending	Health Spending	Social Security Spending
Argentina	17.81	3.71	4.19	7.28
Bolivia	7.59	3.79	2.48	2.00
Brazil	10.52	1.14	2.34	6.18
Chile	16.21	3.54	2.54	7.45
Colombia	9.97	3.68	1.91	3.37
Costa Rica	17.14	4.46	5.48	4.20
Dominican Rep.	5.42	1.96	1.14	0.54
Ecuador	10.02	4.19	1.79	2.50
El Salvador	5.98	2.72	1.66	1.27
Guatemala	4.70	1.79	1.05	1.40
Honduras	7.57	4.21	2.35	0.35
Jamaica	9.67	4.83	2.47	0.73
Mexico	8.15	3.19	2.57	1.25
Nicaragua	11.03	4.76	4.37	0.00
Panama	17.85	5.08	6.33	4.97
Paraguay	4.77	2.09	0.73	1.77
Peru	4.58	2.33	0.98	1.04
Uruguay	18.24	2.77	2.77	12.36
Venezuela	9.63	4.26	1.54	2.41
Total	10.40	3.37	2.57	3.55

Table 3. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Gini	50.48	6.49	31.00	65.50
Education SS	86.83	71.33	8.90	395.00
Health SS	76.22	83.63	3.40	386.00
Social Security SS	122.52	183.85	0.00	943.00
Primary	105.17	10.91	71.34	154.68
Secondary	52.42	17.38	18.59	99.18
Tertiary	19.76	9.38	4.41	48.53
GDP/cap	2789.34	1755.55	675.20	8423.84
Urban	62.14	15.38	34.87	91.64
Democracy	0.60	0.49	0.00	1.00
Pop. <15	37.72	5.54	24.89	47.54
Pop. >65	4.80	2.16	2.50	12.56
FDI	2.27	2.63	0.00	16.79
Trade	40.33	17.60	10.68	95.89
IMF	770.28	1785.05	0.00	15828.20

Table 4. Determinants of Social Spending

Variable	*Education Spending*	*Health Spending*	*Social Security Spending*
Log(GDP/cap)	0.042 (0.003)***	0.040 (0.002)***	0.072 (0.008)***
Trade	-0.130 (0.099)	-0.385 (0.089)***	-1.349 (0.363)***
FDI	-0.900 (0.484)**	-0.115 (0.410)	-2.570 (1.339)**
Debt	0.001 (0.000)***	-0.001 (0.000)***	0.003 (0.001)***
IMF	0.004 (0.001)***	-0.001 (0.001)	0.003 (0.002)
Pop. <15	-1.900 (0.989)**	-0.646 (0.968)	2.346 (3.237)
Democracy	-3.442 (2.554)	-5.761 (2.157)***	-13.361 (6.935)**
Urban	-0.116 (0.587)	1.144 (0.546)**	0.010 (1.832)
Debt	5.884 (0.425)***	4.655 (0.373)***	11.532 (1.230)***
Constant	-4.657 (57.736)	-116.122 (57.205)**	-219.685 (187.479)

The standard errors are in the brackets: * significant at 10% level, ** significant at 5% level, *** significant at 1% level

***Table 5. Determinants of Inequality* - MODEL 1**

Variable	OLS	FE	RE	GMM
Education SS	-0.021 (0.01)	-0.06 (0.02)***	-0.05 (0.02)***	-0.05 (0.02)**
Health SS	0.013 (0.01)	-0.04 (0.02)*	-0.02 (0.02)	-0.05 (0.02)***
Social Security SS	0.015 (0.01)***	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)
Log(GDP/cap)	57.152 (15.29)***	147.00 (69.44)**	63.76 (36.40)*	37.76 (99.71)
Log(GDP/cap)^2	-3.953 (1.02)***	-9.09 (4.32)**	-4.38 (2.34)*	-2.72 (6.22)
Democracy	-1.992 (1.16)*	-0.26 (1.03)	0.75 (0.91)	1.98 (1.53)
Trade	-0.078 (0.03)***	-0.09 (0.05)*	-0.05 (0.04)	-0.09 (0.05)*
FDI	0.597 (0.13)***	0.06 (0.17)	0.28 (0.15)*	0.17 (0.23)
Urban	0.093 (0.05)**	0.42 (0.19)**	0.14 (0.10)	0.35 (0.45)
Pop. >65	-1.711 (0.32)***	-1.51 (1.63)	-1.56 (0.83)*	4.40 (4.66)
Decade	-1.921 (1.08)*	-1.20 (1.04)	-2.28 (0.84)***	2.94 (1.16)***
Constant	-147.508 (56.92)***	-559.35 (274.02)**	-181.14 (140.42)	0.02 (0.47)

The standard errors are in the brackets: * significant at 10% level, ** significant at 5% level, *** significant at 1% level
Model 1 includes socioeconomic and social spending variables. Model 2 represents socioeconomic, social spending, and educational variables. Model 3 is a combined model utilizing socioeconomic, social spending, educational variables and sample dummy variables.

Table 6. Determinants of Inequality **- MODEL 2**

Variable	OLS	FE	RE	GMM
Education SS	-0.025 (0.01)**	-0.071 (0.02)***	-0.024 (0.02)	-0.042 (0.02)*
Health SS	0.044 (0.02)***	-0.038 (0.02)*	0.008 (0.02)	-0.047 (0.02)**
Social Security SS	0.017 (0.00)***	0.003 (0.01)	0.011 (0.01)	0.008 (0.01)
Log(GDP/cap)	28.649 (19.46)	161.093 (71.03)**	41.119 (27.94)	133.169 (104.95)
$Log(GDP/cap)^2$	-2.164 (1.31)*	-9.996 (4.44)**	-2.959 (1.85)	-8.205 (6.51)
Democracy	-0.164 (1.02)	0.085 (1.02)	0.992 (0.92)	1.257 (1.56)
Trade	-0.066 (0.02)***	-0.103 (0.05)**	-0.072 (0.04)**	-0.128 (0.05)***
FDI	0.754 (0.17)***	0.120 (0.18)	0.440 (0.17)***	0.152 (0.26)
Urban	0.185 (0.07)***	0.553 (0.20)***	0.144 (0.08)*	1.019 (0.59)*
Pop. >65	-2.754 (0.53)***	-0.744 (1.75)	-2.494 (0.70)***	7.487 (4.69)
Primary	-2.483 (0.99)***	-1.284 (1.03)	-2.616 (0.85)***	2.425 (1.15)**
Secondary	-0.147 (0.06)***	-0.263 (0.10)***	-0.158 (0.07)**	-0.244 (0.13)*
Tertiary	0.083 (0.07)	0.160 (0.08)**	0.124 (0.07)*	0.195 (0.11)*
Decade	-0.410 (0.08)***	-0.362 (0.13)***	-0.289 (0.09)***	-0.409 (0.20)**
Constant	-20.966 (73.71)	-601.159 (278.48)**	-71.984 (106.27)	-0.506 (0.59)

The standard errors are in the brackets: * significant at 10% level, ** significant at 5% level, *** significant at 1% level
Model 1 includes socioeconomic and social spending variables. Model 2 represents socioeconomic, social spending, and educational variables. Model 3 is a combined model utilizing socioeconomic, social spending, educational variables and sample dummy variables.

Table 7. Determinants of Inequality - **MODEL 3**

Variable	OLS	FE	RE	GMM
Education SS	-0.010 (0.01)	-0.051 (0.02)***	-0.004 (0.01)	-0.034 (0.02)
Health SS	0.016 (0.01)	-0.045 (0.02)**	0.008 (0.01)	-0.054 (0.02)***
Social Security SS	0.003 (0.00)	0.009 (0.01)	0.005 (0.01)	0.015 (0.01)
Log(GDP/cap)	-15.977 (17.86)	42.277 (64.87)	-14.081 (17.86)	65.188 (106.88)
Log(GDP/cap)^2	0.813 (1.18)	-2.569 (4.06)	0.704 (1.19)	-3.654 (6.67)
Democracy	0.417 (0.71)	0.089 (0.89)	0.509 (0.72)	0.160 (1.57)
Trade	-0.131 (0.02)***	-0.082 (0.04)**	-0.126 (0.02)***	-0.121 (0.05)**
FDI	0.443 (0.15)***	0.114 (0.16)	0.405 (0.14)***	0.261 (0.27)
Urban	0.014 (0.05)	0.335 (0.18)*	-0.005 (0.05)	0.981 (0.58)*
Pop. >65	-0.285 (0.50)	-0.107 (1.52)	-0.388 (0.54)	7.382 (4.68)
Primary	-0.820 (0.67)	0.234 (0.92)	-0.829 (0.72)	2.713 (1.17)**
Secondary	-0.062 (0.04)	-0.199 (0.08)**	-0.062 (0.05)	-0.225 (0.13)*
Tertiary	0.121 (0.05)***	0.121 (0.07)*	0.128 (0.05)***	0.139 (0.11)
Decade	-0.345 (0.07)***	-0.262 (0.11)**	-0.327 (0.06)***	-0.474 (0.20)**
Dummy National	7.931 (1.38)***	6.211 (1.23)***	7.722 (1.13)***	4.126 (2.68)
Dummy Household	-3.273 (1.42)**	-2.512 (1.19)**	-3.147 (1.15)***	-4.450 (1.55)***
Dummy Income	11.639 (1.96)***	11.014 (2.05)***	11.849 (1.59)***	(dropped)
Constant	120.345 (68.91)*	-138.702 (254.69)	112.713 (68.37)*	-0.527 (0.58)

The standard errors are in the brackets: * significant at 10% level, ** significant at 5% level, *** significant at 1% level

Model 1 includes socioeconomic and social spending variables. Model 2 represents socioeconomic, social spending, and educational variables. Model 3 is a combined model utilizing socioeconomic, social spending, educational variables and sample dummy variables.