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Impact of Inequalities on Economic Growth: Case of the Developing Countries

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Abstract: Our work deals with the relationship between inequality and economic growth. In particular, we are interested in the impact of income inequality on growth rates. Moreover, this impact can be positive or negative and this through multiple channels of transmission. Econometrically, we verified the nature of the relationship between inequality and growth based on the technique of unbalanced panel data. An estimate by the method of dynamic panel seems more relevant and a negative relationship ranging from inequality to growth seems to be confirmed for 59 developing countries.

Keywords: Inequality, Economic growth, Developing Countries.

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1. Introduction

There is now a large amount of literature that addresses the relationship between income, inequality and economic growth. The analysis of the impacts of growth and income distribution on the standard of living has worried many economic trends. The traditional theory of growth establishes a direct relationship between economic growth and living standards. The first thesis, developed by Kuznets, indicates that the relationship between GDP per capita and inequality is in the form of an inverted U. Kuznets' hypothesis is accomplished through a non-linear relationship between income and inequality. In fact per capita income is taken as an explanatory variable and a measure of inequality of income distribution as a dependent variable. This relationship is represented by a curve in the shape of an inverted U, called the Kuznets curve. In 1955, Kuznets granted, for the first time, the judgment for which income inequality increases during the early stages of growth, before stabilizing and then declining over the following phases. Indeed, during the development process, particularly in the transition from a rural economy to an urban, industrialized economy, income inequality starts to rise and then to decline.

In more recent years, a new approach has emerged on the issue of inequality. The latter is no longer seen as solely the consequence of the development process, but as one of the variables that explain it. While according to Kaldor (1978), it was often believed that inequality could increase growth by promoting capital build up, the new theories and empirical studies published since the 90s emphasize, on the contrary, the undoubtedly adverse role of inequality on growth. Several ideas have been put forward to explain this potentially negative role. For Halter, Oechslin and Zweimüller (2009), the empirical relationship between inequality and growth provides conflicting assessments: The estimators based on the change of chronological series indicate a strong positive link while the estimators based on cross-sectional variation suggest a negative relationship. Inequality can therefore influence economic growth positively and negatively (Galor, 2009).What is then the nature of the relationship between growth and inequality in our sample of developing countries?

To answer this question, we present a review of the empirical literature on this issue. After that, we outline our specified model and the data that we have used for the empirical validation. Finally, we compare some of the theoretical hypotheses using econometric tests on panel data to verify the impact of inequality on the growth for our sample of countries.

2. Literature review

In the 1950s and 1960s, some economists such as Kaldor (1956) and Kuznets (1955) agreed that there is an exchange between the reduction of inequality and the increase of growth. During the period of the World War, many Asian economies have relatively low levels of inequality (for countries with comparable income levels) and unprecedented rates. In sharp contrast to this experience, several countries in Latin America have significantly higher levels of inequality. These trends give rise to a great interest in the relationship between growth and inequality, and in particular, how the level of income inequality in a country affects its growth rate. During the 90s, several economists are encouraged to measure this relationship by introducing inequality as an independent variable in a few different growth regressions across countries. These studies have generally found a negative and just significant coefficient of inequality, which leads most economists to conclude that inequality has a negative impact on growth. This line of research has received such widespread support that a survey of this study concluded that: "These regressions, covering a variety of databases and periods with several different measures of income distribution, deliver a consistent message: an initial inequality is detrimental to the long-term growth." (Benabou, 1996).This message has been widely accepted and has recently motivated a series of papers explaining the specific channels through which inequality can affect economic growth.

Although these papers are concerned with theories that establish a negative impact of inequality on growth, a careful reading of this literature suggests that this negative relationship is not final as it has generally been believed. In several models, the negative relationship depends on exogenous factors, such as the health aggregates, the political institutions or the level of development. Most of these papers predicted multiple equilibriums; this way and under certain initial conditions, inequality can have a positive relationship with economic growth (Forbes, 2000). In addition, several papers have developed models that claim a positive relationship between inequality and growth (Gilles and Thierry 1993).

Benabou (1996) developed a model based on heterogeneous individuals and the model shows that if the degree of complementarity between individual human capitals is stronger in local interactions than in global ones, then the societies in conflict or having more inequality may have high rates of growth. The mechanisms of local externality and population distribution were also explored by Durlauf (1994, 1996). Murphy, Shleifer and Vishny (1989) offered an original explanation of the effects of market size in the presence of increasing returns of scale. The impact of inequality on fertility was also considered later in the model of Becker, Murphy and Tamura (1990). Perotti (1996) finds a positive relationship between inequality and fertility, which could explain how inequalities weigh on growth, delaying the demographic transition.

Oded and Tsidon (1997) developed two theories to explain how inequality and growth can be positively related. In the first model, externality of the environment helps determine an individual level of human capital and when this externality is quite sufficient, a high level of inequality may be necessary for growth to spread in less developed economies. In a second model, Oded and Tsidon argue that inequality increases during periods of major technological innovations, which, by improving the mobility and concentration of well qualified employees in technologically advanced sectors, will generate high levels of technological progress and growth.

These theoretical papers claiming a positive relationship between inequality and growth had less importance in this branch of literature because all the recent empirical studies have reported a negative relationship between these variables. Often, it is the basic questions of the economy that are the hardest to answer and the most provocative answers are eventually the bravest and most suspect. So it is with the empirical literature dealing with the effect of inequality on growth that many have felt the constraints to talk about the topic and about this very important issue, braving above all the lack of reliable data and the obvious problems related to identification.

Banerjee and Duflo (2003) use non-parametric methods to test Kuznets (1955)'s hypothesis and its inverted-U relationship between the growth rate and net changes in inequality. Changes in inequalities (in all directions) are associated with the reduction in growth of the next period. Indeed, when they review the data without imposing a linear structure, it is quickly clear that the data do not support the linear structure that was imposed by that data. There is therefore a non-linear relationship between inequality and the magnitude of the changes in inequality. Finally, they end up saying that there is a negative relationship between growth and inequality lag in a given period. These factors taken together, particularly the non-linearity of these reports, explain why the various variables of the basic linear model generated several very different conclusions.

As for Persson and Tabellini (1994), they test the hypothesis that inequality in income distribution reduces growth rates using a cross-sectional regression for 56 countries and a time panel for 9 highly industrialized countries. They obtain a negative relationship between two variables, a result which is confirmed by Alesina and Rodrik (1994) who also use a variable for the land distribution. Bourguignon (1994) aligns exclusively 35 developing countries and compares their growth rate in five explanatory variables, one of which is inequality. His estimates show a negative relationship between the initial unequal income distribution and the subsequent macroeconomic performance.

In many econometric validations, Clarke (1995) obtains the same result, and the same is true for Birdsall, Ross and Sabot (1995).In cross-sectional regressions in 35 to 70 countries, Perotti (1996) shows that the correlation between inequality and growth is higher for rich countries than for poor countries. Two other studies focus on the impact that inequality manifests on savings (Venieris and Gupta, 1986) or investment (Alesina and Perotti, 1996) and lead to the same conclusion: the unequal distribution of income seems to have a detrimental impact on savings as well as investment, thus slowing growth indirectly. Several other economists prove that inequality affects growth through the credit market imperfection (Banerjee and Newman, 1991; Galor and Zeira, 1993; Perotti, 1993). The initial distribution of income determines the ability of an individual to invest in physical or human capital. High inequality slows growth. Credit constraints prevent poor people from making investments although they have higher marginal returns than those of individuals with more capital (Benabou, 1996). This mode of functioning of the credit market distorts the allocation of resources.

Alesina and Rodrik (1994) use a different set of models centered on political economics. This seemed all the more justified that the negative effect of inequality on growth seemed to persist despite the inclusion of the physical and human investment in the tested econometric equations. Alesina and Rodrik postulate a mechanism by which inequalities which are too high induce a demand for redistribution which generates tax distortions. This mechanism is empirically disputed by Benabou (1996) and Perotti (1993 and 1996) who find no significant relationship between inequality and transfers for the purpose of redistribution. Another more fuzzy mechanism postulates that a high level of inequality fosters political instability. This correlation is tested by Perotti (1994 and 1996).

Alesina and Perotti (1996) propose to measure political instability based on a series of indicators of social tensions and political violence, from which they build a variable of socio-political instability. This variable is constructed using an analysis into principal components applied to the following indicators: number of political assassinations, violent deaths, number of successful or failed coups and indicator of dictatorship. The authors consider that these variables can isolate forms of socio-political instability that pose a direct threat to proprietary rights: mass violence and illegal forms of political expression; violent and illegal transfers of executive power; the dictatorial regime indicator is included to monitor the bad information supplied by dictatorships on their internal social problems.

Rather than economic growth itself, Alesina and Perotti prefer to use investment in physical capital. In the model of social conflict, social inequality in fact leads to a conflicting suboptimal balance which cancels growth by preventing the accumulation of physical capital: so it is preferable to test directly the impact of socio-political instability on investment. The investment equation is identified through investment deflators (supposed to measure the distortion of relative prices) while the equation of socio-political instability is identified with the level of GDP in 1960. They find that socio-political instability depresses investment and less inequality reduces socio-political instability.

3. The model and the data

Our work considers the growth (the dependent variable) as a function of Initial Inequality, Revenue, Human Capital and Market Distortions (these are the explanatory variables).This model resembles the model of Perotti (1996) and also that of Forbes (2000). This model is also based on the work of Chambers (2007). In conclusion, the central model of our work is:

(1) $\text{Growth}_{i,t} = \alpha_i + \beta_1 \text{Inequality}_{i,t-1} + \beta_2 \text{Income}_{i,t-1} + \beta_3 \text{Primary Education}_{i,t-1} + \beta_4 \text{Secondary Education}_{i,t-1} + \beta_5 \text{Higher Education}_{i,t-1} + \beta_6 \text{PL}_{i,t-1} + \mu_{it}$

where "i" represents each country and "t" represents each time period (t = 1, 2...T); $\text{Growth}_{i,t}$ is the growth rate of the real GDP per capita for country i at time t; $\text{Inequality}_{i,t-1}$; $\text{Income}_{i,t-1}$; $\text{Primary Education}_{i,t-1}$; $\text{Secondary Education}_{i,t-1}$; $\text{Higher Education}_{i,t-1}$ and

$PL_{i,t-1}$ are respectively Inequality, Income, Primary Education, Secondary Education, Higher Education and the Market Distortions for country i in time t-1 and μ_{it} is the error term.

The data used to estimate our model come from several sources. Inequality is taken from the World Institute for Development Economics Research (WIDER, 2008) (those that are available and refer to gross income, the entire population, household and total geographic coverage).This variable is measured with the Gini coefficient. Income is drawn from the data of the Penn World Tables (Heston and Summers, 2009) Version 6.3, knowing that it is measured with the log of real GDP per capita. The resulting annual growth rates are also taken from the Penn World Tables. The statistics of human capital are represented by the average years of Primary, Secondary and Higher Education derived from the database "International Data on Educational Attainment: Updates and Implications" (Barro and Lee, 2010).The Market Distortions are also withdrawn from the Penn World Tables and represent the price level of investment. The detailed definitions and sources for each of these variables are shown in Table 1.

Our model focuses on Growth for a sample of 59 homogeneous developing countries chosen according to the availability of data and 660 observations. Our panel is unbalanced; that is to say, it does not have the same number of observations in the time dimension for all countries. Our databases with the means, standard deviations, minimums and maximums are shown in Table 1. A list of included sample countries and years is shown in Table 2.

Tableau 1: Summary of Statistics

Variable	Measure	Source	Mean	Standard Deviation	Minimum	Maximum
Growth	Growth rate of real GDP per capita.	Penn World Tables version 6.3 (Heston and Summers 2009).	2,781	5,389	-19,33	56,40
Inequality	Log of Gini coefficient.	World Institute for Development Economics Research (WIDER 2008).	45,154	10,665	17,5	77,60
Income	Log of real GDP per capita.	Penn World Tables version 6.3 (Heston and Summers 2009).	8,297	0,832	5,97	10 ,47
Primary Education	Average years of primary schooling in population aged over 15.	International Data on Educational Attainment: Updates and Implications (Barro and Lee 2010).	4,044	1,787	0,175	8,833
Secondary Education	Average years of secondary schooling in population aged over 15.	International Data on Educational Attainment: Updates and Implications (Barro and Lee 2010).	1,724	1,254	0,030	5,706
Higher Education	Average years of higher schooling in population aged over 15.	International Data on Educational Attainment: Updates and Implications (Barro and Lee 2010).	0,234	0,215	0,007	1,095
PL	Log of price level of investment.	Penn World Tables version 6.3 (Heston and Summers 2009).	1,691	0,180	1,078	2,820

Tableau 2: List of the Countries and the Years in Sample

Nation	Observations	Years
Armenia	7	1996, 1998, 2002-2006.
Bangladesh	16	1963, 1966, 1967, 1969, 1973, 1977, 1978, 1981, 1983, 1986, 1988, 1989, 1992, 1996, 2000, 2005.
Bolivia	6	1968, 1996, 1997, 1999, 2000, 2002.
Bulgaria	35	1971-1990, 1992-2006.
Cambodia	4	1994, 1997, 1999, 2004.
Chile	23	1968, 1971, 1980-1996, 1998-2000, 2003.
China	29	1953, 1964, 1966, 1968, 1970, 1972, 1974, 1975, 1978, 1980, 1982-1992, 1995, 1996, 1998, 2000-2004.
Colombia	18	1964, 1970-1972, 1974, 1978, 1980, 1988, 1991, 1993-2000, 2004.
Costa Rica	27	1961, 1969, 1971, 1974, 1977, 1979, 1981-1983, 1986, 1989-1998, 2000-2006.
Côte d'Ivoire	8	1985-1988, 1993, 1995, 1998, 2002.
Croatia	4	1998, 2001, 2003, 2005.
Cyprus	4	1997, 2003, 2005, 2006.
Czech Republic	16	1991-2006.
Dominican Republic	16	1976, 1984, 1986, 1989, 1992, 1995-1998, 2000-2006.
Ecuador	11	1968, 1988, 1994, 1995, 1998-2000, 2003-2006.
Egypt	10	1958, 1959, 1965, 1975, 1991, 1995-1997, 2000, 2004.
El Salvador	16	1965, 1967, 1969, 1977, 1991, 1994-1997, 1999-2004.
Estonia	15	1992-2006.
Gambia	4	1992-1994, 1998.
Ghana	6	1987, 1989, 1992, 1993, 1998, 1999.
Guatemala	8	1979, 1987, 1989, 1998, 2000, 2002-2004.
Haiti	3	1987, 2000, 2001.
Honduras	16	1968, 1989-1999, 2003-2006.
India	34	1951-1970, 1973-1975, 1977, 1983, 1986-1992, 1999, 2004.
Indonesia	14	1967, 1970, 1976, 1978, 1980, 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005.
		1969-1972, 1974, 1998, 2005.
Iran	7	1992, 1997, 2003.
Jordan	3	1996, 2001, 2003-2006.
Kazakhstan	6	1961, 1976, 1977, 1981-1983, 1992, 1994, 1999.
Kenya	9	1996-2006.
Kyrgyz Republic	11	1986, 1987, 1993, 1995, 1999.
Lesotho	5	1969, 1977, 1983, 1985, 1993, 1997, 2004.
Malawi	7	1958, 1960, 1968, 1970, 1973, 1976, 1979, 1984, 1987, 1989, 1990, 1992, 1995, 1997,
Malaysia	16	1999, 2004.

		1989, 1994, 2001.
Mali	3	1988, 1989, 1993, 1995, 2000.
Mauritania	5	1993, 2000-2002.
Moldova	4	1995, 1998, 2002.
Mongolia	3	1955, 1965, 1970, 1985, 1991, 1995, 1999.
Morocco	7	1976, 1977, 1984, 1996, 2004.
Nepal	5	1993, 1998, 2001, 2005.
Nicaragua	4	1992, 1994, 1995.
Niger	3	1963, 1964, 1966-1972, 1979, 1984-1988, 1990-1993, 1996, 2002, 2004, 2005.
Pakistan	23	1969, 1970, 1979, 1980, 1989, 1991, 1995-2004.
Panama	16	1995, 1997, 1999, 2001-2005.
Paraguay	8	1961, 1962, 1971, 1972, 1981, 1986, 1991, 1994, 1997-2005.
Peru	17	1957, 1961, 1965, 1971, 1975, 1981, 1985, 1988, 1991, 1997, 2000, 2003.
Philippines	12	1989-2006.
Romania	18	1970, 1971, 1991, 1994, 2001.
Senegal	5	1972, 1977, 1982, 1990, 1993, 1995, 1997-2000.
Singapore	10	1953, 1963, 1970, 1973, 1979, 1980, 1982, 1986, 1987, 2000, 2002.
Sri Lanka	11	1999, 2003, 2004.
Tajikistan	3	1962, 1963, 1969, 1971, 1975, 1976, 1981, 1986, 1988, 1990, 1992, 1994, 1996, 1998-
Thailand	18	2002.
		1958, 1965, 1971, 1976, 1981, 1986, 1988, 1992.
Trinidad and Tobago	8	1965, 1975, 1980, 1985, 1990, 2000.
Tunisia	6	1995-1997, 1999-2002, 2005.
Ukraine	8	1962, 1976-2005.
Venezuela	31	1992, 1998, 2005.
Yemen	3	1959, 1970, 1972, 1975, 1976, 1991, 1993, 1996, 1998, 2003, 2004.
Zambia	11	1969, 1990, 1995.
Zimbabwe	3	

The database of Deininger and Squire (1996) and according to the World Institute for Development Economics Research (WIDER, 2008), despite significant improvements, still has several problems. First, the Gini coefficients are not all based on the same estimation units. For example, some are based on expenditures, others on income and others on consumption. To try to overcome this problem, we added 6.6 points to the Gini coefficients based on expenditure and consumption (Deininger and Squire, 1996).Second, it shows the limited number of observations available for many countries and for several periods of time. This prompted us to work with an unbalanced panel.

4. The methodology

There are a variety of techniques that can be used to estimate our equation. The standard methods for the estimation of the Panel are the fixed effects or the random effects. The estimated coefficients are significantly different in both cases. When it comes to a model with fixed individual effect, we must retain the Within estimator (unbiased estimator) and when it is a model with an individual random effect, we must retain the estimator of the GCMs (BLUE estimator).

The Hausman specification test (1978) may be a means of evaluation. It tests the correlation between the individual effects (αi) and the explanatory variables. For the sample in question, when choosing between the fixed effects estimates and those of the random effects, the Hausman specification test rejects the assumption required for the random effects. Indeed, the realization of the Hausman test statistic is 46,76. Since the model includes six explanatory variables (K = 6), this statistic follows a Chi-squared with six degrees of freedom. The threshold is 12,592, so we reject the null hypothesis of no correlation between individual effects and explanatory variables. So here we favor the adoption of a fixed effects model and retain the Within estimator (unbiased estimator). Then there is a commonality between the country and the error term, which is not broken. This estimate shows that inequality has a negative and significant effect on economic growth.

But despite the convergent nature of the estimator (Within), it is not efficient because of the presence of a lagged endogenous variable in the equation: it is the term of Income. This is immediately apparent when the equation is rewritten with the expression of growth as the difference between the levels of $Income_{i,t}$ and then $Income_{i,t-1}$ is added in the two directions:

(2) $Income_{it} = \alpha_i + \beta_1 Inequality_{i,t-1} + \gamma_2 Income_{i,t-1} + \beta_3 Primary Education_{i,t-1} + \beta_4 Secondary Education_{i,t-1} + \beta_5 Higher Education_{i,t-1} + \beta_6 PL_{it-1} + \mu_{it}$

With $\gamma_2 = \beta_2 + 1$.

For simplicity, we can write:

(3) $Y_{it} = \alpha_i + \gamma Y_{i,t-1} + X'_{i,t-1} B + \mu_{it}$

Arellano and Bond (1991) suggest an alternative estimation technique which not only corrects the effect of introducing lagged endogenous variables, but also allows a degree of endogeneity in other variables. The estimator of the generalized moments' method (GMM) consists in orchestrating the primary differences of the variables with the lagged levels of these variables. The estimate will be based on the dynamic Panel. Arellano and Bond rewrite Equation (3) as follows:

(4) $Y_{it} - Y_{i,t-1} = \gamma (Y_{i,t-1} - Y_{i,t-2}) + (X'_{i,t-1} - X'_{i,t2}) B + (\mu_{it} - \mu_{i,t-1})$

All variables are now expressed as deviations from the average of the period. For period 3, Arellano and Bond use $Y_{i,1}$ as an instrument for $(Y_{i,2} - Y_{i,1})$; for the period 4, they use $Y_{i,1}$ and $Y_{i,2}$ as a tool for $(Y_{i,3} - Y_{i,2})$; and they follow the same procedure to create instruments for each differential period. But the validity of the GMM estimator is based on the lack of a second order correlation: Error terms should not be correlated, $E(\mu_{it}\mu_{its}) = 0$ for any $s \geq 1$. We therefore use a Sargan test of over-identification: the statistics of this test is 18,816 and follows Chi-squared to [p - (k + 1) degrees of freedom (where p is the number of instruments).The threshold is 20,867, so we accept the null hypothesis that the instrumental variables are not asymptotically correlated with the disturbances of the estimated model and the selected instruments are valid. We note that the estimated coefficients vary significantly depending on the technique used (see Table 3). These estimates are corrected for heteroscedasticity according to the method proposed by White (1982).

We will examine the concomitant determination of the most fundamental variables of development: the level of income, physical and human capital and inequality. Not only should most of the estimated coefficients be consistent with those traditionally reported in the literature, but most of them must be significant.

The coefficient of Income is positive and highly significant: an increase in Income leads to an increase in growth. This result is not consistent with that found by Forbes (2000) and Perotti (1996). We have decomposed down human capital into Primary Education, Secondary Education and Higher Education as in the method of Chambers (2007) and Barro (2000). We have found a negative and highly significant effect of Primary Education, a positive and highly significant effect of Secondary Education. As for Higher Education, it practices a negative and insignificant impact on economic growth.

Chambers (2007) found a negative effect of Primary Education, a negative effect of Secondary Education of and a positive effect of Higher Education. Barro (2000) found a positive effect of Primary Education, a negative effect of Secondary Education and a positive effect of Higher Education. As for Forbes and Perotti, they decomposed human capital into male and female education. For Forbes, the coefficient of masculine education is negative although not significant, and concerning the education of women, it is positive and significant.

Concerning Perotti, the coefficient for male education is positive but not significant and that for female education is negative and highly significant. Although this model of signs cannot bear the traditional human capital theory, these coefficients are congruent with those found in other models of estimated growth where the same technique was used (Caselli, Esquivel and Lefort 1996). Dollar and Gatti (1999) find a positive and significant relationship between female education and growth for a sample of rich countries, similar to the results of Klasen (2002), who found a positive relationship between female education and growth either directly or by passing through the reduction of population growth. The specification of the Model, with this separation of Primary, Secondary and Higher Education, suffers problematically from a high correlation. The negative sign of the coefficient on Higher Education is surprising; it can be explained by the fact that higher education is not highly developed in developing countries. This education does not positively influence the economic growth of these countries.

The coefficient on Market Distortions is positive and highly significant. An increase in the price of investment increases growth. This coefficient is negative and insignificant for Perotti and it is negative and highly significant for Forbes. Finally, the coefficient on inequality is negative and highly significant. Therefore, inequality plays a crucial role in determining the average growth rate. A negative relationship between inequality and growth can be confirmed for a sample of developing countries. An increase of 1 point in the Gini coefficient of a country is correlated with a decrease of 11,88% in the rate of annual growth for the coming year. The negative sign is consistent with the evidence found by Perotti (1996) and Chambers (2007) and differs from the sign found by Forbes (2000). This ratio is found to be equal to the inequality coefficient found by Perotti; i.e. the effect is the same. For Lin, Huang, Kim and Yeh (2009), the impact of inequality on growth depends on the degree of wealth of the different countries. A comparison of our results and those found by Perotti and Forbes is reported in Table 3.

Tableau 3: Comparison of estimations

	Perotti (1996)	**Forbes (2000)**	**Result of our work**			
Estimation	OLS	Arellano and Bond (GMM)	**Estimation**	Fixed Effects	Random Effects	Arellano and Bond (GMM)
Constant	-0,018		**Constant**	-15,080 (0,084)	-3,035 (0,536)	
Inequality	-0,118	0,0013	**Inequality**	-0,0764 (0,063)	-0,0397 (0,157)	-0,1188 (0,000)
Income	-0,002	-0,047	**Income**	1,864 (0,047)	0,663 (0,181)	0,5936 (0,0212)
Male Education	0,031	-0,008	**Primary Education**	0,545 (0,361)	-0,0773 (0,758)	-0,6192 (0,000)
Female Education	0,025	0,074	**Secondary Education**	-0,147 (0,891)	1,227 (0,000)	1,225 (0,000)
			Higher Education	-1,167 (0,744)	-4,433 (0,028)	-0,4815 (0,750)
IP	-0,002	-0,0013	**IP**	2,456 (0,179)	0,7269 (0,611)	2,006 (0,0314)
Countries	67	45	**Countries**	59	59	59

Note: The values in parentheses represent probabilities.

It is important to try to find the causes of the differences between the estimated coefficients of our work and the coefficients of Perotti and Forbes: Forbes introduced dummy variables in the estimation. These dummy variables for the countries are introduced to control, for an invariant (fixed) time, the effect of the omitted variables; and the dummy variables for the period are introduced to control the global impacts, which may affect the growth of the growth aggregate in each period and which are not captured by the explanatory variables. The size of the sample is different from that of Forbes. Our sample is homogeneous, unlike Forbes' sample which consists of 45 developed and developing countries. There are some differences in the definitions of the variables. The breakdown of human capital is also different. Indeed, Forbes, alongside Perotti, has decomposed human capital into female education and male education. We have decomposed human capital into Primary Education, Secondary Education and Higher Education, like Chambers (2007).

The databases of the variables are also different. For example, Forbes used Deininger and Squire (1996)'s database which is based on data having a high quality and meeting the requirements. But this base had previously been criticized by Galbaith and Kum (2003). As for the work of Perotti, its data on inequality are of low quality. Indeed, it does not separate the data which meet the requirements and those which do not. Perotti measures inequality not with the Gini coefficient (a measure of inequality), but with the share of the income held by the middle class (a measure of equality). Perotti's sample is heterogeneous (67 developed and developing countries). Finally, Perotti used the OLS technique to estimate his model.

In conclusion, we have confirmed the results of Perotti (1996) for a sample of developing countries, using more improved databases, more advanced estimation techniques and a wider range of time.

5. Conclusion

The problem of inequality attracted the attention of many scientists and sociologists. Also, the recent theoretical literature focuses on examining the concomitant determination of the most fundamental variables of growth: income level, physical and human capital and also income distribution. This research work has enriched the debates by analyzing: (i) theoretically, the once positive and once negative impact of inequality on negative growth, (ii) empirically, the effect of changes in inequality on growth. In other words, we are interested in whether a more or less unequal distribution of income helps explain the growth rate of a given country.

The relationship in question was examined in both space and time. The literature focuses mainly on developed economies. Our work has tried to fill in this deficiency. We have built a Panel over a period of 55 years and a homogeneous sample consisting of 59 developing countries. Although opinions differ as to the theoretical explanation and empirical results, the available data hold the idea of a negative relationship between inequality and economic growth for a set of developing economies.

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