HOW MUCH INEQUALITY IS HARMFUL FOR GROWTH? THE GROWTH MAXIMIZING RATE OF INEQUALITY IN THE CONTEXT OF THE MEXICAN ECONOMY

ABSTRACT

This paper contributes to the debate over the relationship between inequality and growth by testing in a country specific context, the proposition in Charles-Coll (2015) of a nonlinear relationship between income inequality and economic growth. The model is tested for the Mexican economy using a highly disaggregated dataset at the municipal level for the period of 2000-2005. An inverted “U” shaped relationship is demonstrated, showing that low levels of inequality exert a positive correlation with economic growth while high levels have a negative one. Additionally, the findings demonstrate the existence of a growth maximizing rate of inequality (GMRI) that optimizes growth rates and releases the economy from the distortions generated by elevated inequality or taxation.

Keywords: Income Inequality, Economic Growth, Mexico
JEL Classification: O40, O15, O11

RIASSUNTO

Quanta disuguaglianza danneggia la crescita? Il tasso di disuguaglianza che massimizza la crescita nell’economia messicana

disuguaglianza ed una relazione negativa ad alti livelli di disuguaglianza. Inoltre i risultati dimostrano l’esistenza di un tasso di disuguaglianza che massimizza la crescita economica.

1. **INTRODUCTION**

While most of the debate over the relationship between income inequality and economic growth during the largest part of the last century was focused on the effects of growth and development over inequality levels, the last two decades have seen the development of a new debate oriented to understand the other side of the relationship, namely the effects that income inequality might have over economic growth. Perhaps the enormous disparities between countries, or the inconsistencies found with the expected inequality among countries and their level of development have motivated this new approach in an effort to better understand this phenomenon.

The results of the many studies developed over the last 20 years have not yet come to converge into one generalized position over the sign of the inequality-growth relationship. Furthermore, the remarkable disparities in the results, both in theoretical and empirical studies, have derived into a complex debate, with four main positions: the studies which affirm a positive relationship (Partridge, 1997; Li and Zou, 1998; Forbes, 2000; Nahum, 2005), a negative one (Perotti, 1993; Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Clarke, 1995; Alesina and Perotti, 1996; Ahituv and Moav, 2003; De la Croix and Doepke, 2003; Josten, 2003; Viaene and Zilcha, 2003; Castelló-Climent, 2004; Josten, 2004; Knowles, 2005; Davis, 2007; Pede et al., 2009; Berg and Ostry, 2011; Herzer and Vollmer, 2012; Malinen, 2013). The ones that suggest a sign changing non linear relationship (Barro, 2000; Banerjee and Duflo, 2003; Pagano, 2004; Voitchovsky, 2005; Bengoa and Sanchez-Robles, 2005; Barro, 2008; Castelló-Climent, 2010; Fawaz, F. et al. 2014; Henderson et al. 2015; Charles-Coll, 2015). And an additional group who find no correlation at all or find inconclusive evidence of one (Lee and Roemer, 1998; Panizza, 2002; Castelló and Doménech, 2002). In addition, the different positions have also generated different methodological and conceptual approaches that try to explain both, the mechanisms by which the relationship works as well as the reasons why other studies have not reached the same conclusions.
Unfortunately, no general consensus has been reached, and the discrepancies in the literature are evidence of this debate to be far from moving towards convergence. While information sources among empirical studies are in many cases the same, authors have incorporated diverse variations in the characteristics of their works in order to find the real relationship between inequality and growth and conciliate the differences in the literature. Either by improving the quality of the data, by using different methodologies in the estimation of such models, decreasing or increasing the time horizon of the expected effects from inequality to growth, testing different transmission mechanisms to explain the relationship, or by including dummies in the estimation. None of them have taken into account the level of inequality as a potential cause for the discrepancy in the results.

Ehrhart (2009) found in his study that omitted variables in the regression specification may result in different results; additionally, he affirms that the possibility of sensibility to the inclusion of regional dummies may change the sign of the relationship. Finally, he states that low quality data or non-comparability due to differences in the calculation methods could potentially affect results. This last result is very similar to the one presented by Knowles (2005) who affirmed that inconsistency in the data distorts the results.

García-Peñalosa and Turnovsky (2006) found that the endogeneity of both inequality and growth variables may result in ambiguous results due to movements in their common determinants. This relates partially to the results of García-Peñalosa (2008) who found that inequality affects most growth determinants (human capital, physical capital, technology, labor, etc.) so “anything goes”.

Other results related to methodology or model specifications are the ones provided by De Dominicis et al. (2008) who found that controlling for fixed effects and estimating via GMM reported higher coefficients. Additionally, controlling for fixed effects or incorporating regional dummies reduces the negative impact of inequality over growth in cross section datasets. They also found that as the length of the growth period gets bigger, the coefficient decreases.

Regarding data, they affirm that if the quality of the data is low, the magnitude of the effect is also lower (regardless of the sign) in comparison to high quality data. Garbis (2005) found instead that the time horizon is determinant in the sign of the relationship.
Finally, Lee and Roemer (1998) affirm that different assumptions in the model may provide different outcomes. In their model, the assumption that private investment is more efficient than public investment results in a negative effect of inequality on growth. The opposite effect results from assuming public investment to be more efficient than private investment.

The previous arguments lead to believe that the relationship between income inequality and economic growth may still be far from being understood. The very existence of a debate with three contrasting views (positive, negative and non-linear) might strengthen that idea even more. It seems that a general consensus may be distant from being reached and even though the nonlinear propositions could act as a conciliatory argument, a complete framework for understanding both the causal relationship as well as the embedded mechanisms by which the relationship takes place is still missing.

Charles-Coll (2015) proposes that there is a tradeoff between the negative effects of too much redistribution (and the associated high levels of taxation) and the negative effects of high inequality (and low redistribution) on economic growth. High levels of inequality affect directly and indirectly the determinants of growth through its effects on investment, human capital, fertility and other variables that distort the potential of the economy. On the opposite side, high levels of redistribution and the associated high levels of taxation also affect economic growth by discouraging economic agents to pursue productive activities, by limiting the accumulation of productive capital, by restraining investment due to elevated taxation and by "preventing individuals from the appropriation of the returns of their productive activities", Persson and Tabellini (1994).

According to the author, the previous arguments derive into three possible scenarios: the first with an economy with high levels of inequality and low redistribution that are negatively correlated with economic growth; an economy with low levels of inequality and high redistribution and taxation that are positively correlated with growth rates, and finally an economy with a certain level of inequality and redistribution in which both effects are minimized and economic performance is released from any distortion to its growth potential. The author names this as the Growth Maximizing Rate of Inequality (GMRI), where the growth rate of the economy will be optimized in comparison to any other level of inequality.
At the GMRI, any movement in the rates of redistribution and inequality, positive or negative, will lead to a lower rate of growth. However, if a country is at the GMRI and its levels of inequality rise, the empirical relationship between inequality and growth will turn negative, meaning that a reduction in the level of inequality (a rise in redistribution) will be needed in order to maximize the growth rate.

**Source:** Charles-Coll (2015).

Accordingly, lowering inequality will result in a positive relationship between inequality and growth, as it will mean that in order to increase the growth rate to its maximum (and return it to the GMRI) more inequality, and less redistribution/taxation, which is the one affecting growth,
will be needed. Hence when a country reaches the GMRI (the maximum in the kinked relationship) the correlation between inequality and growth will become insignificant. Charles-Coll, (2015) tests for the kinked non-linear relationship between inequality and economic growth with a large panel of 112 countries over a 40-year period and finds the breakpoint to be at a Gini level of 0.39 when estimating via 3SLS and at 0.40 when estimating by System GMM developed by Arellano and Bover (1995) and Blundell and Bond (1998).

In the following section, a series of validity tests are developed in order to assess the existence of the previously described kinked non-linear relationship between income inequality and economic growth as well as to the existence of a rate of inequality that maximizes growth in relation to any other inequality level.

2. EMPIRICAL EVIDENCE

The following section is intended to provide a validity test to the theoretical model proposed in this research, specifically, to the proposal of a kinked non-linear relationship between income inequality and economic growth that is positive at low levels of inequality and that changes sign as it is increased, as well as to the existence of a certain rate of inequality that maximizes growth in relation to the potentially distortive effects of high inequality or high taxation. This specific inequality level, at which the economy reaches the growth maximizing rate of inequality (GMRI), is expected to be subject to the particular context of the economy and its dynamics. This way, a country specific study can illustrate how in an economy there is a defined inequality level at which growth rates are optimized. Because of this, the ORI is not expected to correspond with the one found in the panel study.

The policy oriented attractive of this kind of tests is evident due to its potential for determining the direction and intensity that redistributive efforts should follow in a specific country. Additionally, the higher the geographical disaggregation of the data is, the more reliable will be the diagnostic on the inequality-growth relationship. In this sense, the following country specific test on the Mexican economy presents a detailed test at the municipality level for the inequality-growth relationship.
2.1 Country Specific Validity Test: The Case of Mexico

The evolution of income distribution in Mexico has been characterized by persistent high levels of income inequality that have determined the socioeconomic structure of the country, with millions of persons living in poverty conditions, a scarce but growing medium income class and a minority of families that concentrate enormous amounts of wealth.

To describe the status of the income distribution from a municipality level of disaggregation allows appreciating better the heterogeneities among regions. From the developed northern states, who develop most of the activities related to manufacturing; the industrial and service oriented center; the Gulf region which performs most of the Oil industry related activities; to the poor and rural south and south east, that depend mainly on agriculture and touristic activities. This closer look provides a more disaggregated analysis and allows seeing how, even within those specific regions, there are differences in the way income is distributed among the populations.

Figure 1 illustrates this, depicting the distribution of inequality, measured by the Gini coefficient, across the Mexican municipalities\(^1\). The first of the five colors ranges show, with a lighter blue, the municipalities with lower levels of inequality, the following ranges show, consequently, the places according to their level of inequality, in an increasing order. The fifth range, in brown, corresponds to the most unequal places in the country.

With this information and a broad dataset of socio economic variables, it is possible to evaluate the inequality-growth relationship in the context of the Mexican economy, in order to find if the propositions of the model are consistent in a country specific context. We start with the description of the data and follow with the model specifications, the results of the estimations and finally the inference and conclusions.

2.2 Data

The inequality data consists in Gini coefficient estimations developed through the income imputation methodology proposed by Elbers \textit{et al.} (2003) consisting in the association of a welfare indicator, defined as a distribution function of a relevant income or expenditure variable, with a set of explanatory variables from statistical sources. In this case using the 2000 census from the Instituto Nacional de Estadistica y Geografia (INEGI) and the 2005 income and

\(^1\) See Székely \textit{Pardo et al.} (2007) for a better description of income distribution and poverty at the municipal level.
expenditure household survey (ENIGH) also developed by the INEGI. This data was obtained from the United Nations Development Program (UNDP) in Mexico, and complemented from the estimations of the Consejo Nacional de Población (CONAPO) and from Yúnez et al. (2009).

Table 3 reports the descriptive statistics of the main variables employed in this test, as well as their description, sources and periods. Most of the dataset was constructed with variables gathered from the INEGI, the rest were obtained from the UNDP and in some cases, enhanced from other datasets found in literature.

**FIGURE 2 - Inequality in México at the Municipal Level. Gini (2010)**

The test is developed by estimating the effects of income inequality over a five-year growth period of 2000 to 2005. As seen above, inequality is measured by the Gini coefficient, and the dependent variable is the average yearly per capita GDP growth rate of the period. One of the main disadvantages of the income imputation methodology for estimating inequality levels is that it is subject to the specification of a set of criterions that can vary according to data availability and preferences of the researcher. This creates difficulties when trying to compare inequality datasets from different sources. For this reason, and even though there is available data on inequality for up to 1990, this empirical test limits to the use a single five-year growth period, sacrificing, to some degree, potential robustness of a broader study.
### Table 1 - Descriptive Statistics of Main Variables (Mexico Sample)

<table>
<thead>
<tr>
<th>Definition</th>
<th>Source</th>
<th>Year</th>
<th>Mean</th>
<th>Max.</th>
<th>Min.</th>
<th>Std. Dev.</th>
<th>Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Ratio</td>
<td>INEGI*</td>
<td>2000</td>
<td>44.79</td>
<td>81.27</td>
<td>0.00</td>
<td>8.03</td>
<td>2422</td>
</tr>
<tr>
<td>Inequality</td>
<td>UNDP, CONAPO</td>
<td>2000 / 2005</td>
<td>44.79</td>
<td>81.27</td>
<td>0.00</td>
<td>8.03</td>
<td>2422</td>
</tr>
<tr>
<td>Redistribution</td>
<td>INEGI</td>
<td>1999 / 2000</td>
<td>0.30</td>
<td>3.00</td>
<td>0.00</td>
<td>0.52</td>
<td>2039</td>
</tr>
<tr>
<td>Fertility</td>
<td>INEGI</td>
<td>2000</td>
<td>1.11</td>
<td>1.63</td>
<td>0.16</td>
<td>0.15</td>
<td>2423</td>
</tr>
<tr>
<td>Income</td>
<td>UNDP</td>
<td>2000</td>
<td>10.12</td>
<td>12.31</td>
<td>0.00</td>
<td>1.28</td>
<td>2423</td>
</tr>
<tr>
<td>Education</td>
<td>INEGI</td>
<td>2000</td>
<td>5.91</td>
<td>11.76</td>
<td>0.00</td>
<td>1.11</td>
<td>2423</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>Estimated from UNDP data</td>
<td>2000-2005</td>
<td>9.69</td>
<td>59.84</td>
<td>-12.77</td>
<td>9.94</td>
<td>2392</td>
</tr>
<tr>
<td>Expenditure ratio</td>
<td>Estimated from INEGI and UNDP data</td>
<td>2000</td>
<td>0.04</td>
<td>1.36</td>
<td>0.00</td>
<td>0.05</td>
<td>2423</td>
</tr>
</tbody>
</table>
The estimations also include other relevant explanatory variables, standard in this type of growth regression, as educational attainment, total fertility rates, income ratio, expenditure ratio, rule of law (approximated by the amount of convicted criminals per every thousand inhabitants), and the level variable initial GDP.

2.3 Results

The model specification is developed as a growth regression of the following type:

\[ \Delta Y = \beta_1 + \beta_2 \text{Gini}_i + \beta_3 \text{Gini}_i^2 + \beta_4 X_i + \varepsilon \]

where inequality is generally expressed at the initial year, and the rest of the explanatory variables are either averages of the period or also initial period values. Table 4 presents the results of the five estimations developed; see the notes below the table for details on methodology, model specification and instruments.

The overall relationship between income inequality and growth is defined in Equation 1, here the Gini variable is included, as well as most of the previously described explanatory variables. Additionally, dummies for the northern border and center states are included in order to control for specific characteristics of this areas. The results confirm an overall negative (-0.18) and statistically significant relationship between inequality and growth in Mexico showing that, perhaps, the majority of the observations are in fact located on the negative side of the kinked non-linear relationship that will be tested further on in this study.

In this first equation initial per capita GDP and total fertility rates depict a negative and significant value, the first one confirming convergence forces between less and more developed municipalities. The expenditure ratio, school attainment, rule of law and the dummy for the northern states are all positive and significantly related to growth, the last one significant to a 5%. The dummy for the center region is negatively related, possibly capturing also some degree of convergence effect from the highest income region in Mexico. There is, however, one disconcerting result: the investment ratio, which depicts a negative sign and is barely significant to the 10%.
How much inequality is harmful for growth? The growth maximizing rate of inequality in the context of the Mexican economy

**Table 2 - Inequality and Growth Relationship for Mexican Municipalities**

<table>
<thead>
<tr>
<th>Variables / Equations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>159.76</td>
<td>156.73</td>
<td>161.2</td>
<td>135.36</td>
<td>131.82</td>
</tr>
<tr>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Inequality</td>
<td>-0.18</td>
<td>1.03</td>
<td>1.08</td>
<td>-0.88</td>
<td>-0.97</td>
</tr>
<tr>
<td></td>
<td>0.0002</td>
<td>0.0001</td>
<td>0.0003</td>
<td>0.0037</td>
<td>0.0027</td>
</tr>
<tr>
<td>Inequality²</td>
<td>-0.01</td>
<td>-0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0003</td>
<td>0.0007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inequality (SQRT)</td>
<td></td>
<td></td>
<td></td>
<td>12.84</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0017</td>
<td>0.0013</td>
</tr>
<tr>
<td>Ln(per capita GDP)</td>
<td>-15.14</td>
<td>-17.22</td>
<td>-14.54</td>
<td>-17.16</td>
<td>-16.94</td>
</tr>
<tr>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Expenditure ratio</td>
<td>22.91</td>
<td>24.93</td>
<td>25.83</td>
<td>24.99</td>
<td>24.25</td>
</tr>
<tr>
<td></td>
<td>0.0001</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Investment ratio</td>
<td>-3.41</td>
<td>1.79</td>
<td>1.28</td>
<td>1.31</td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>0.0933</td>
<td>0.0009</td>
<td>0.0203</td>
<td>0.005</td>
<td>0.007</td>
</tr>
<tr>
<td>Ln(Total fertility rate)</td>
<td>-7.38</td>
<td>-12.81</td>
<td>-27.01</td>
<td>-12.99</td>
<td>-12.71</td>
</tr>
<tr>
<td></td>
<td>0.0002</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>School attainment</td>
<td>3.32</td>
<td>2.94</td>
<td></td>
<td>2.96</td>
<td>2.99</td>
</tr>
<tr>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Rule of law</td>
<td>0.7</td>
<td>0.4</td>
<td></td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0002</td>
<td>0.0236</td>
<td></td>
<td>0.0579</td>
<td></td>
</tr>
<tr>
<td>Dummy: North</td>
<td>1.46</td>
<td>5.09</td>
<td>5.52</td>
<td>4.46</td>
<td>4.93</td>
</tr>
<tr>
<td></td>
<td>0.0328</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Dummy: Center</td>
<td>-1.5</td>
<td>-1.74</td>
<td>-2.29</td>
<td>-2.36</td>
<td>-2.06</td>
</tr>
<tr>
<td></td>
<td>0.0002</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Dummy: South east</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.099</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>2391</td>
<td>2391</td>
<td>2391</td>
<td>2391</td>
<td>2391</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.33</td>
<td>0.46</td>
<td>0.45</td>
<td>0.49</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Independent variable is average yearly per capita GDP growth for the period 2000-2005. Estimations are made by the Generalized Method of Moments. The instruments are: for the Gini coefficient, in equation 1 employs its lagged value of the previous period; for equations 4 and 5 the instruments are the same variables, plus the income ratio of the richest 10% over the poorest 10% as well as its square root value, these additional variables are meant to address endogeneity issues. For equations 2 and 3 the instruments for the Gini and its square value are the unadjusted values of the year 2005 which were found to adjust better to the expected relationship (it appeared not to generate significant autocorrelation problems), as well as the previously described income ratios. The investment ratio and the total fertility rate have as instruments their initial period values. The remaining instruments coincide with the independent variables.
It is important to point out that, as in most empirical studies of this kind, the intention of these estimations is not to define the determinants of growth, only to evaluate the effects of inequality and its possible non-linearity. Because of this, a high value for the $R^2$ is neither expected nor necessary to achieve the objectives of this test.

Equations 2 and 3 report the results of testing for the kinked non-linear relationship proposed in the model. As in most country panel study, the way to achieve this is to include the squared value of the Gini coefficient.

The results confirm the prediction that at low levels of inequality the relationship between this variable and economic growth is positive, but as the inequality levels increase, a shift in the sign occurs, changing to a negative relationship. In this case, the inequality level turns to be at a Gini value of around .42. These results also confirm that in this non-linear relationship there is a maximum in which growth rates are optimized in relation to the already mentioned negative effects of high inequality or high taxation (see figure 3). In other words, the existence of a Growth maximizing rate of inequality (GMRI) for the Mexican economy is confirmed.

**Figure 3 - Inequality and Growth Relationship in Mexico (Eq. 3) Estimated by Coefficients**
Additionally, equation 2 finds similar results on the other explanatory variables, as to the previous estimation, with the feature of having the investment ratio now a more theoretically coherent positive sign and statistical significance: in fact, the overall explanatory power of the equation was also enhanced.

Equation 3 removes the rule of law and the school attainment variables, the last one well known to be an associated effect of income inequality, in order to see if there is any change in the inequality variables. Although the coefficient for the Gini improves marginally (from 1.03 to 1.08) the results are fairly similar and the kinked relationship persists.

Because of the prevailing characteristics in the distribution of income in Mexico, there is a real possibility of having the majority of the observations in the right side of the kinked relationship. In other words, it is possible to think that the immense majority of the municipalities are situated within the negative side of the relationship: this situation might distort the effects of testing for the nonlinear relationship with the squared value of the Gini. To address this situation, an additional set of equations where estimated, this time, testing for the non-linearity by introducing the square root value of the Gini coefficient instead of the square. The idea is to do the opposite and move backwards the value of the Gini instead of forward; this way, if the assumption of a predominant high and negatively related inequality is true, we can evaluate the non-linearity from this perspective. The equation specification is now as follows:

\[ \Delta Y = \beta_1 + \beta_2 Gini_i + \beta_3 \sqrt{Gini_i} + \beta_4 X_i + \epsilon \]

Equations 4 and 5 present the results of this alternative test, the results show that, when introducing the root value of the Gini coefficient, a kinked relationship is also corroborated between inequality levels and economic growth. In this case, the relationship changes sign from a positive to a negative relationship at a Gini level of .45. This inequality level represents also the GMRI, as it is the point at which the economy's growth rate is maximized regarding inequality levels.

Perhaps proof of the validity of this specification are the fact that the overall explanatory power of the regression is even higher than the one of equations 2 and 3 and the consistency in the coefficient signs, intensity and significance of the other explanatory variables, which are basically the same, with the exception of equation 4 which includes a dummy for the south east region of the country, and encounters a negative but barely significant coefficient.
3. DISCUSSION

The previous estimations are an attempt to test the validity of the main propositions of the model developed in this research. Specifically, the ones related to the existence of a kinked non-linear relationship in which low levels of inequality exert a positive relationship with growth, and high levels a negative one, as well as the existence of a growth maximizing rate of inequality. The development of a country specific test additionally offers the possibility of confirming the fact that every country has a specific GMRI according to the particular context and characteristics of the economy and its dynamics. In the case of Mexico, the GMRI was found to be at levels between .42 and .45. These levels are lower than the current levels in the Mexican economy, thus reflecting the necessity for redistributive policies intended to lower the inequality levels, especially at the municipal level. For this, according to the precepts of the model, it is necessary to start by evaluating the efficiency of the redistributive system both on its revenue as in its expenditure side.

The use of a highly disaggregated sample for the Mexican case study provides additional relevance to this test, as it captures not only the inter-state inequality, which implicitly assumes homogeneity in the distribution within each state, but also the intra-state distribution, specifically, at a municipal level. The limitation of this test relates to the impossibility of employing a broader dataset covering more periods (i.e. a panel structured dataset), due to the specific characteristics of the income imputation methodology used for estimating the inequality indicator.

A methodological feature of this test is the alternative estimation for the non-linearity in the relation by introducing the square root value of the Gini coefficient, in order to take the relationship to the left of the relationship and search for the initial positive sign and posterior shift to negative. This specification was successful and demonstrated that the majority of the municipalities in Mexico have inequality levels situated in the negative side of the relationship, in line with the national average.

Finally, the results of this empirical study additionally demonstrate the fact that it is the level of inequality the one determining its effects on growth. This strengthens the proposition that any country, regardless of its income level, can depict a positive or negative relationship between inequality and growth, and, in fact, they do both. Mexican municipalities with lower than .42 inequality levels (measured by the Gini) will have a positive empirical relationship between their
inequality levels and their growth performance, such as the places with inequality levels higher that .45 will have a negative one.

REFERENCES


