Indian Journal of Economics & Business, Vol. 14, No. 1, (2015): 143-161

# INCOME INEQUALITY AND ECONOMIC DEVELOPMENT IN LATIN AMERICA: A TEST FOR THE KUZNETS INVERTED-U CURVE

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#### Abstract

Simon Kuznets proposed the theory that the economic growth of developing countries will lead to more unequal distribution of income initially, but will eventually become more equal once the country becomes developed. This pattern of income inequality over time is indicated by an 'Inverted-U Curve.' Using graphical analysis, this paper tests the existence of the Kuznets Curve for eleven Latin American countries and finds that four countries confirm Kuznets' theory. A possible correlation between income distribution and economic growth rates is shown, but further research is needed to better identify the causes income inequality.

Jel Code: D31, O15, O47, O54

Keywords: Income Inequality; Economic Development; Latin America; Kuznets Curve

## **INTRODUCTION**

An explanation to why the distribution of income varies among countries has been a puzzling phenomenon to economists and social scientists for over a century. The reasons for why some countries experience greater unequal distribution of wealth than other countries has been attributed to various factors by various studies, but with no absolute answer. Especially with greater availability of information for more countries, the studies tend to find many different conclusions. This paper seeks to analyze and test one of the most accepted theories on inequality, proposed by Simon Kuznets in 1955.

In Kuznets' [1955] article, "Economic Growth and Income Inequality," he states that the distribution of income is related to economic growth over time. Kuznets proposed the idea that economic growth can never be distributed equally. With the use of income tax records for the United States, Kuznets predicted that the level of inequality would change as a country moves from low aggregate income to high aggregate income in a pattern depicted by an Inverted-U shape. In other words,

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economic growth will lead to more unequal distribution of income initially in the early stages of development, until eventually there will be more equal distribution in the later stages of development. In 1963, Kuznets used cross-sectional and time-series regression analysis to reflect this idea with evidence of an 'Inverted-U Curve' in the distribution of income over time for advanced countries that have undergone the stages of development.

The purpose of this paper is to test for the existence of the Kuznets Inverted-U Curve in Latin American countries for which adequate data is obtainable. Latin American countries have generally been known to have high levels of income inequality. There are different explanations as to why Latin America suffers from high inequality, such as the structure of their political institutions, and uneven access to resources and education [Rattan 2012]. For these reasons, it is interesting to test the emerging economies in this region in order to either verify or disprove Kuznets' hypothesis. If Kuznets' hypothesis is true, then it will tell us that although Latin America may have high levels of inequality in comparison to most advanced countries, overtime as their economies become more developed their income may become more evenly distributed.

This paper will first clearly define the Kuznets Inverted-U Curve, and then review the abundance of literature on the relationship between inequality and economic development. Then, with the use of graphical and statistical analysis, an empirical test will be provided in order to show the existence of a Kuznets Curve applying to some Latin American countries.

## **DEFINING KUZNETS' INVERTED-U CURVE**

Before we can begin the analysis of the Kuznets Inverted-U Curve, we must identify how income inequality and economic growth are defined. First, we can say that economic development can be measured as the increase in Gross Domestic Product (GDP) per capita over time. GDP per capita is the Gross Domestic Product of a country (often used as a measure of total national income) divided by its population. It is well known that developing countries have lower GDP per capitas than developed countries. This tells us that as the national income of a developing country increases with greater proportion to the increases in population (thereby creating higher per capita income), then the country will eventually become developed.

Second, in order to measure the distribution of income for any country, the Gini Coefficient is used in order to quantify the Lorenz Curve. Similar to an Edgeworth Box, Max Lorenz created the Lorenz Curve in 1905 in order to show the percentage of income (the y-axis in Figure 1) held by a certain percentage of the population (the x-axis in Figure 1). The 'Equality' Line is along a 45-degree angle line, and shows that if there is perfectly equal distribution of income, then there is a one-toone ratio of a certain percentage of population sharing an equivalent percentage of income in a nation. The 'Lorenz Curve' depicts the actual distribution of income in a country. The closer that the Lorenz Curve is to the Equality Line, the more equal is the distribution of income. Similarly, the more concave the Lorenz Curve is to the 45-degree angle line, the less equal is the distribution of income.



**Figure 1: The Lorenz Curve** 

Source: Theodorakis & Mantzavinis (2005)

The Gini Coefficient, founded by Corrado Gini in 1912, is a quantitative representation of the Lorenz Curve. Looking at Figure 1, we can see that Area A is the area between the actual income distribution and the perfect equality line; and Area B is equal to half the box minus Area A. The Gini Coefficient can now be derived as equaling Area A, divided by the sum of Area A and Area B:

## Gini Coefficient = A/(A+B)

Therefore the Gini Coefficient must be between zero and one because the equation tells us that perfect equality would give a coefficient of zero, and perfect inequality would give a coefficient of one. Thus higher values of the Gini Coefficient (the closer it is to one) means more unequal income distribution. Usually the Gini Coefficient is expressed as a percentage (between 0-100%) for the purpose of easier interpretation, and is calculated simply by multiplying the Gini Coefficient equation above by 100%.

Using the Gini Coefficient, Kuznets was able to show that as soon as economic development begins income will become more unequally distributed (a rise in the Gini Coefficient), and that only eventually will there be a 'Turning Point' when a country reaches development and the income distribution will become more equal.

Thus the results of Kuznets' hypothesis show an Inverted-U Curve, shown by Figure 2, with 'Income Inequality' quantified by the Gini Coefficient on the y-axis, and economic development quantified by gains in 'Per Capita Income' on the x-axis. We should note, however, that the Kuznets Inverted-U Curve has also been shown with 'Time' along the x-axis, showing that economic growth will occur over time.

Figure 2: The Kuznets Inverted-U Curve



Source: fakirana.blogspot.com

## LITERATURE REVIEW

Kuznets' Inverted-U Curve hypothesis has initiated an abundance of further research on the relationship between income inequality and growth. Economists have been re-testing the existence of the Kuznets Curve since 1955, and continue to do so today as more reliable data becomes available. Kuznets [1955] even said in his study, "This paper is perhaps 5 per cent empirical information and 95 per cent speculation, some of it possibly tainted by wishful thinking,"thereby suggesting further analysis. Economists have been able to not only test the existence of the Kuznets Curve for larger sample sizes over longer periods of time than Kuznets was able to, but they have been able to adapt the approach from a reduced-form concept to including more extensive analysis by testing for other contributing factors that affect both economic growth and inequality. These studies have concluded varying results, ranging from completely zero evidence for the Kuznets hypothesis, to total proof of the Kuznets Curve. Furthermore, some studies have researched further into the relationship between inequality and economic development by methods of testing for reverse causality, as well as examining the inequality patterns of very advanced countries after the stages of development. This Literature Review seeks to provide an overview for some of these studies.

To start, we can examine the studies that support Kuznets' hypothesis and provide evidence for an Inverted-U Curve across countries using regression analysis. For example, Barro [2008] confirmed the Kuznets Curve by using international data from the 1960's through the 2000's. He also measures the effect that trade openness has on income inequality and finds a positive relationship (although at a very small magnitude), suggesting that, "for a given per capita GDP, more trade creates more inequality" [Barro 2008]. However, Barro [2008] also addresses the fact that greater trade can raise per capita GDP, and thus although trade *may* increase inequality, it will also simultaneously reduce poverty.

Higgins and Williamson [1999] test evidence for the Kuznets Curve for panels of countries worldwide between the 1960's and the 1990's, depending on age cohorts and trade openness. They find strong evidence for Kuznets' hypothesis when age cohorts are controlled for. Large older age cohorts have lower aggregate income inequality, and large young adult age cohorts have higher aggregate inequality [Higgins &Williamson 1999]. We can note here that developed nations tend to have larger older age cohorts than developing nations, thus supporting Kuznets' hypothesis. Also, Higgins and Williamson [1999] find limited impact of globalization on inequality, similar to the results of Barro [2008].

Interestingly, there are also numerous studies that show the Kuznets Curve does not exist and is actually a poor predictor of changes in inequality for developing countries. Deininger and Squire [1996; 1998] provide some evidence against Kuznets' hypothesis. In 1996, Deininger and Squire put together a comprehensive new data set on income inequality and economic growth across countries worldwide for which these measurements were available. In analyzing the cross-country dataset, they find that Latin America, the Caribbean, and Sub-Saharan Africa have the highest levels of income inequality, with average Gini Coefficients being almost 50%. Furthermore, they find that income inequality is on average the lowest (in the low 30's) for highly developed countries (with increasing inequality in the United Kingdom and the United States in the 1990's being offset by decreasing inequality in countries such as Canada and Finland) [Deininger & Squire 1996]. However, a large conclusion from Deininger and Squire's [1996] new data set is that there appears to be no systematic relationship between growing aggregate income and changes in the Gini coefficient when comparing changes in inequality during a decade of economic growth [per entity] across nearly 100 countries. They find that half the time inequality increases and half the time inequality decreases. They conclude that the changes in the Gini coefficients are often modest, but on the other hand, long-run reduction in poverty does seem to occur due to periods of economic growth [Deininger & Squire 1996].

In 1998, Deininger and Squire further support their case from 1996 for evidence against Kuznets' hypothesis. They show that for low-income countries, the coefficient

on income in relation to reductions in inequality is only positive for two countries, but that even this disappears when they add a dummy variable for Latin America [Deininger & Squire 1998]. For high-income countries, the coefficient is generally negative, but also disappears when the dummy for Latin America is added. These results show that there is little proof of any Kuznets Curve, and that cross-sectional studies may be affected by middle-income countries in Latin America that have generally high income inequality [Deininger & Squire 1998].

A different study, by Fields [1989], also provides evidence to show that the Kuznets Curve is not always the case. Fields [1989] finds that nearly just as frequently did inequality increase in low-income countries that experience economic growth as it did in high-income countries that also experience growth. The only evidence of changes in wealth distribution due to economic growth comes from evidence of a reduction in poverty due to higher national income [Fields 1989]. Fields also discusses the differences in inequality for growing Latin American and Asian economies. He finds that Latin American countries appear to have larger rates of growth in inequality during economic growth spells than Asian countries, but that the results do not statistically differs significantly [Fields 1989].

As we can see, Latin America seems to be a popular topic discussed by Kuznets' critics. Some economists criticize Kuznets' results of an Inverted-U Curve because Kuznets did not consider the 'Latin American Effect.' The 'Latin American Effect' can be defined as the combination of high income and high inequality in Latin America [Rattan 2012]. Rattan [2012] shows that income inequality has a linear negative correlation with GNI per capita for 17 Latin America countries. However, Rattan [2012] shows that when a comparison of GDP *ranks* and GINI [coefficient] *ranks* is used for the Latin American countries, the Kuznets Curve exists when controlling for outliers (Nicaragua, Uruguay, and Venezuela). Thereby, Rattan [2012] concludes that trends in inequality will differ, depending on how you define the measurements.

One interesting study, by Prados de la Escosura [2008], was an extensive individual case study of the Kuznets curve that provided an in depth analysis of the different reasons for changes in income inequality over time. Prados de la Escosura [2008] studied the existence of the Kuznets Curve in Spain from 1850 to 2000. He finds that during periods of political and economic instability, there was an increase in inequality, whereas during periods of economic growth there was a decrease in inequality [Prados de la Escosura 2008]. Since the colonial times up through the 1950's, Spain was following a similar pattern as Latin America (in that its inequality was showing a growing and plateauing trend over time), but then converged to fit similar patterns as advanced countries' inequality levels (declining Gini coefficients). In contrast to Latin America, because Spain had an initially lower income inequality, Spain's economic growth since the 1950's largely contributed to the alleviation of its absolute poverty levels and income inequality [Prados de la Escosura 2008].

Due to the fact that many studies had already been done in order to prove or disprove the Kuznets Curve, List and Gallet [1999] extend the research by studying the relationship between inequality and economic growth after countries have already completed the Inverted-U Curve (which applies to advanced countries). List and Gallet [1999] discover that less developed countries and middle-income countries follow the pattern of the Kuznets Curve as their per capita income rises. However, they find that the most advanced countries have a positive relationship between inequality and per capita income, similar to less developed countries in the beginning stages of the Inverted-U Curve [List & Gallet 1999]. They suggest that this positive slope could have to do with the move from a manufacturing-based to a service-oriented economy for the advanced countries; but because they used a reduced-form approach, they cannot make any assumptions on the causality of this relationship, and therefore further research in order to find how incomes are affected by technology, industrial composition, and trade patterns is needed [List & Gallet 1999].

It is important to point out that the U.S. is a good example of the Kuznets Curve from 1800 to about 1970. Starting around 1970, however, the income inequality has been growing in the U.S., in the same way as List and Gallet [1999] had discussed. Nielsen and Alderson [1997] test the reasons for the "Great U-Turn" in inequality in the U.S. from 1970-1990. Nielson and Alderson [1997] show that since 1800, the trend of the Gini Coefficient in the U.S. followed the pattern predicted by Kuznets' Inverted-U Curve, with a declining slope showing the tail end of the Kuznets Curve from the 1920's to the 1970's. The Great U-Turn is the trend of the Gini coefficients of the U.S. to start reversing its pattern in 1970, surprisingly showing rising income inequality in a highly developed country. Nielsen and Alderson [1997] measure the effect of economic development (median family income) on income inequality (Gini coefficient) for the years 1970, 1980, and 1990 in the U.S., and control for variables such as population density, sector dualism, educational heterogeneity, racial dualism, and female labor force participation. They find that many variables that traditionally impact income inequality due to industrial development (such as sector dualism and population growth) have a declining significance, whereas as new variables may be contributing to the greater income inequality in some advanced countries (such as the positive effect of female-headed households, and the negative effect of female work force participation) [Nielsen & Alderson 1997].

Some economists furthered the study of Kuznets' hypothesis by testing for reverse causality. For example, Benabou [1996] reversed the dependent and independent variables used in Kuznets' hypothesis, thereby testing the effect that inequality has on economic growth. He finds that income inequality will limit the economic growth rates, given certain amounts of political power and expropriation [Benabou 1996]. He suggests that when deviations come from the poor, it is perhaps necessary to transfer wealth to the poor through land and education subsidies, or minimum wages, etc. One interesting conclusion by Benabou [1996] is that the income disparities tend to have a greater impact on the economic growth of leftwing populist regimes and a lesser impact on right-wing wealth-biased regimes. Following Benabou's [1996] work, Aghion, Caroli, and Garcia-Penalosa [1999] also took on this reverse causality approach to the Kuznets Curve. Using crosscountry regressions, they find that there is a negative effect of inequality on growth, and a positive impact of redistribution on growth [Aghion, Caroli, & Garcia-Penalosa 1999]. They also test the effect of growth on inequality, and find a surge in wage inequality across and within education cohorts due to economic growth, largely explained by technological changes [Aghion, Caroli, & Garcia-Penalosa 1999].

In summary, studies of the Kuznets Inverted-U Curve givea variety of conclusions, but the extensive research and data collection has brought together valuable information on the relationship between economic growth and income inequality across countries worldwide. Studies demonstrate that varying factors other than economic growth can contribute to inequality levels; such as trade openness, population density, access to resources and education, female labor force participation, and political regime type. Although not all of the studies provide evidence for the Kuznets Curve, many do show that greater economic growth will at least reduce poverty levels. Also, studies of the Kuznets Curve tend to show that the Latin American region is a special case and deserves consideration as an outlier. Furthermore, there is evidence of inequality itself having a negative effect on economic growth, thereby encouraging more deliberate measures to equalize distribution of income in order to achieve economic development.

Although economists often use regression analysis to study Kuznets' hypothesis, it is still useful to test for the existence of the Kuznets Curve simply by graphing an income inequality trend over time. In simple terms of the matter, when the Kuznets Inverted-U Curve is evident, it will be graphically apparent by the systematic pattern of inequality of a country over time (if they go from a developing to a developed economy). Due to the fact that many studies have shown that there is some evidence of the Kuznets Curve on an individual country basis, this paper will test the evidence of a simple Kuznets Curve through evidence of patterns in the Gini Coefficients of individual Latin American countries over time.

#### **EMPIRICAL SECTION**

From the literature review, we can see that Latin America is a special case for inequality and economic growth patterns. The Latin American countries have generally held higher levels of inequality, even during periods of high economic growth, and have yet to converge to the lower levels of inequality held in some advanced economies. From this observation, one could form a conjecture considering the differences between Latin American countries and more advanced economies in order to explain the reason for Latin America's higher levels of inequality. For example, in comparison to advanced economies, differences in political regimes, levels of political corruption, access to education and capital, and technological differences may be considered as the causes for the higher inequality of Latin America. We realize that there may be worldwide regional differences, which is why this paper seeks to focus on only the region of Latin America to test for evidence of Kuznets' hypothesis. From there we can consider some of the factors that may cause differences in outcomes within Latin America.

Using data of the Gini Coefficients accumulated from the World Bank's 2014 dataset for the 'GINI Index,' this paper will test eleven Latin American countries for examples of a Kuznets Curve (Argentina, Brazil, Chile, Costa Rica, Honduras, Mexico, Panama, Paraguay, Peru, Venezuela, and Uruguay). The Gini Coefficient is calculated from the formula given earlier in this discussion, but is multiplied by 100 in order to give percentages between zero and 100 rather than decimal point values between zero and one. For simplicity, Figures 3.1-3.11 will show the pattern of income distribution in these countries over time (rather than plotting per capita income on the x-axis) in order to demonstrate Kuznets theory. For the countries whose curves show an Inverted-U shape, we shall then look at the patterns of their growth in GDP per capita over time in order to correlate income distribution patterns with economic growth periods. Not all of the Latin American countries have complete data on income inequality over the same time periods, and therefore the range of years vary slightly per country, but generally include 1980-2013. Furthermore, even for the countries with the largest collection of Gini Coefficients, there may still be some missing data for some years. To account for this, a trending line that calculates the average of the Gini Coefficients over a 2-year time period will be added to Figures 3.1-3.11 in order to get a clearer visual of the trend in income distribution over time.







Given Figures 3.1-3.11 of the Gini coefficients for the eleven Latin American countries over time, we can now discuss a statistical analysis of the Kuznets Curve. The Gini Coefficients vary between 34.78% [Peru (1997)] and 63.3% [Brazil (1989)], and the time periods for which there was available data varies between 1980-2013. Generally, the Gini Coefficients average around 50% for this set of Latin American countries. For comparison, the Gini Coefficients recorded by the World Bank for Sweden, Norway, and Germany have been under 32% since 1980. This indicates that the 'Latin American Effect,' as discussed by Rattan [2012], is true in showing that Latin American countries generally have high levels of income inequality in comparison to more advanced economies.

These figures (3.1-3.11) show that the Kuznets Inverted-U Curve does not exist for all of the eleven Latin American countries being tested. Although it is unclear and not easy to determine why some of the countries, such as Costa Rica, Honduras, and Mexico, show sporadic changes in their income distribution, we can at least use what we know from Kuznets' hypothesis to analyze the graphs of the countries that show an Inverted-U shape. As shown by Figures 3.1 and 3.11, it appears that Argentina and Uruguay have patterns of Gini Coefficients that most closely resemble an Inverted-U Curve. Brazil, Paraguay, and Peru have patterns that somewhat resemble this shape [see Figures 3.2, 3.8, and 3.9], but their Gini Coefficients also seem to irregularly change for some years, thereby lessening the assurance of a clear Kuznets Curve. Upon examining Figures 3.3 and 3.7, we see that Chile and Panama are interesting cases because they both show a pattern of declining income inequality since 1985. It could be that Chile and Panama have in fact experienced the Kuznets Curve, but because of the limited availability of data we are only able to see the declining portion of the Kuznets Curve after its 'Turning Point' in income.

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For Argentina, Uruguay, Chile, and Panamawhose curves either show an Inverted-U shape or potentially the tail end of an Inverted-U Curve, we shall now look at the patterns of their growth in per capita income in order to consider a correlation between income distribution patterns and periods of economic growth. When examining Figures 4.1-4.4 of the GDP per capita over time for these countries, we would hope to see a general rise in per capita income in order to suggest economic development.

From Figures 4.1-4.4, we can clearly see that for Argentina, Uruguay, Chile, and Panama, their GDP per capitas have each increased by at least \$10,000 from 1979-2013. Argentina and Uruguay, whose patterns in Gini Coefficients over time



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most closely resembled the Kuznets Curve, both show relatively stable increases in GDP per capitas up until a quick decline starting around 2000 for both countries [see Figures 4.1 and 4.2]. They reach relative minimums around 2002, with Argentina's GDP per capita declining to \$3285.03, and Uruguay's GDP per capita declining to \$4089.10. However, both Argentina and Uruguay recovered quickly from these recessions as shown by their GDP per capitas accelerating upwards after 2002. The change in GDP per capita for Argentina between 2002-2012 is \$11,394.90 and the change in GDP per capita for Uruguay from 2002-2012 is \$10,638.62. That is a 346% growth rate for Argentina over this ten-year time period, and a 260% growth rate for Uruguay. This is interesting because referring back to Figures 3.1 and 3.11 it appears that the Turning Points for both Argentina and Uruguay occurred around 2002. Argentina's highest Gini Coefficient recorded occurred in 2002, at 53.79%. Although Uruguay's highest level of income inequality occurred in 2007, with a Gini Coefficient of 47.63%, their level of inequality did not change by more than one percent between 2002 and 2007. This suggests that perhaps Uruguay's Turning Point occurred over a longer period of time, but began around the same time period as Argentina's Turning Point in 2002.

Looking at the GDP per capitas over time of Chile and Panama, we can see that they have both experienced steady exponential increases since 1979. The highest Gini Coefficient recorded for Chile is 57.25%, and occurred in 1990, with GDP per capita equaling \$2,388.31. The highest Gini Coefficient recorded for Panama is 58.91% in 1989, with a GDP per capita of \$2,007.22. We cannot make any claims on the values of income inequality in Chile and Panama prior to 1989 due to the unavailability of recorded data, however we can say that for both countries their GDP per capitas increase more quickly following 1989 [see Figures 4.3 and 4.4]. That is to say, their rates of GDP per capitas growth increased. For example, from 1979-1989, Chile's GDP per capita only increased by \$307.47 showing a growth rate of 16% over ten years; but from 1990-2000, their GDP per capita increased by \$2,744.76, which gives a growth rate of 114%. From 2001-2011, Chile's GDP per capita increased by \$9,885.63, which shows a 214% GDP per capita growth rate. Similarly, from 1979-1989, Panama's GDP per capita increased by only \$555.80, giving a 38.3% rate of growth during the ten-year period; whereas from 1990-2000, Panama's GDP per capita increased by \$1,667.42, which shows a growth rate of 78%. From 2001-2011, Panama's GDP per capita increased by \$5,106.36, which gives a 134% growth rate.

Using this information from Argentina, Uruguay, Chile, and Panama, we can suggest that perhaps higher rates of growth in GDP Per Capita will generate larger changes in the income inequality. For each of these countries, when the rate of growth in GDP per capita over a ten-year time period reached over 100%, their Gini Coefficients were declining. This suggests that the rate of growth in GDP per capita may be negatively correlated with income inequality, in that when the GDP grows at a faster rate the development of a country is pushed further in order to create more equal income distribution.

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According to Kuznets' hypothesis, a country will experience lower income inequality once it exits the stage of a being a developing economy and enters into the stage of being developed. In line with his hypothesis, we expect countries with higher GDP per capitas to bemore developed. In order to test our proposition that Argentina, Uruguay, and perhaps Chile and Panama have undergone the Turning Point and are in fact becoming developed with less inequality, it is necessary to compare the GDP per capitas of these eleven Latin American countries in the sample. If Argentina, Uruguay, Chile, and Panama are more developed than the other seven countries, then we expect that their current GDP per capitas will be higher than the others. Table 1 shows that Uruguay, Chile, and Argentina have the top three highest GDP per capitas; Panama is not far behind, ranking the sixth highest. Therefore, these countries seem to fit the assumption of Kuznets' Hypothesis.

Rank of Country by GDP Per Capita		
Rank	Country	GDP Per Capita (\$) in 2013
1	Uruguay	16,350.73
2	Chile	15,732.31
3	Argentina	14,715.18
4	Venezuela	14,414.75
5	Brazil	11,208.08
6	Panama	11,036.81
7	Mexico	10,307.28
8	Costa Rica	10,184.61
9	Peru	6,659.81
10	Paraguay	4,402.76
11	Honduras	2,290.78

Table 1 Cank of Country by GDP Per Capit

Source: World Bank 2014 Data

Another observation to be made from Table 1 is that Venezuela and Brazil also have high GDP per capitas (ranking fourth and fifth), yet did not clearly show a Kuznets Curve. However, upon re-examining Figure 3.2 showing the Gini Coefficients of Brazil over time, we find that the lowest Gini Coefficient recorded is 52.67% and occurred very recently, in 2012. This Gini coefficient is much lower than their average Gini coefficient hovering around 59% from1981-2003. Therefore, it is possible that their level of income inequality will continue to decline as their GDP per capita continues to grow. Furthermore, re-examining the case of Venezuela, there is a small Inverted-U Curve occurring between 1992 and 2006. Unfortunately, there have been no further reports on Venezuela's Gini Coefficient since 2006; therefore it is impossible to accurately make any assertions about their current income distribution. We do however know that according to World Bank Data, from 2006-2013, Venezuela's GDP per capita has increased by \$7,666.99, showing a growth rate of 113.62% over a seven-year time period. Therefore, based on our

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observation that Argentina, Uruguay, Chile, and Panama all experienced large rates of growth in GDP per capita with simultaneous drops in income inequality, we can make the conjecture that it is possible that Venezuela's income inequality has continued to decline below its level of 44.77% in 2006.

The next question to consider is, why are these countries experiencing lower income inequality and greater rates of economic development than some of their Latin American neighbors? In other words, what other factors besides high GDP per capita growth rates may be contributing to their declining Gini coefficients? When considering Uruguay, they have been rated as first in South America for democracy, lack of corruption, size of the middle class, quality of living, prosperity measures of income and well-being, security, freedom of the press, peace, and troop contribution for peace keep operations [U.S. Embassy 2013]. These qualities suggest signs of a more advanced economy (in contrast to an emerging economy).

One possible way to determine whether a country's economy is considered to be "developing" or "developed" is to look at the Human Development Index (HDI). The HDI is defined as "A summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living" [United Nations Development Programme]. According to the United Nations 2014 dataset, the scale of HDI from highest to lowest in Latin America shows Chile, Cuba, Argentina, Uruguay, and Panama as the top five countries. Chile ranks the highest, with a "very high" HDI of 0.822; Argentina ranks as third, but is still considered to have a "very high" HDI of 0.808; and then Uruguay and Panama fall into the fourth and fifth ranks, respectively, with HDI's of 0.79 and 0.765. Consequently, when using the Human Development Index as an indication of economic development, the four countries that we have considered to experience the Kuznets Curve are among the top five most developed countries in Latin America. [Note, data was unavailable on the Gini Coefficients for Cuba.]

That being said, Argentina and Uruguay have lower Gini Coefficients in 2013 than either Chile or Panama, and also experienced greater rates of growth between 2001-2012.Therefore, based on the fact that Chile and Panama are among the most developed countries in Latin America, it is sensible to conclude that Chile and Panama's inequality levels will continue to reduce, especially if their GDP per capita growth rates continue to stay high and or even rise to similar levels as the growth rates of Argentina and Uruguay.

However, as a disclaimer, these comparisons are being made without the use of econometrics. Therefore it is difficult to precisely discern why it is that these countries appear to experience the Kuznets Inverted-U Curve, while other Latin American countries do not. Although comparisons can be made based off hypotheses, true correlations between these countries and their economic growth and income distribution changes would be better calculated using panel regression analysis. Furthermore, more sufficient availability of data would be preferred in many respects (such as income tax records for more Latin American countries; as well as data for more variables such as regime type, level of corruption, access to resources and education, etc.) in order to consider why some of the countries prove and some of the countries disprove the existence of the Kuznets Curve. Regardless of the limitations of this paper however, this study is beneficial in that it has identified Kuznets Curves in Argentina, Uruguay, Chile, and Panama and has opened the door for further research.

### A NEW HYPOTHESIS ON INCOME INEQUALITY BY PIKETTY

The topic of income inequality has recently resurged as a popular topic of discussion in economics due to an extensive study written by Thomas Piketty. Piketty provides some of the latest research on income inequality in his book titled, *Capital in the Twenty-first Century*, published in French in 2013, and translated to English in 2014 by Arthur Goldhammer. In this book, Piketty extends the work done by Kuznets in using income tax return data to calculate inequality, by utilizing data for more countries over a longer period of time. In particular, Piketty analyzes the patterns of income and wealth inequality in mainly France, Great Britain, the United States, Germany, Sweden, and Japan. He finds that Kuznets' prediction of lower income inequality in the advanced economies (which have some of the highest levels of GDP in the world) is not always the case. Piketty [2014] shows that there has been a general pattern of growing inequality in highly developed countries since the 1950's due to the re-emergence of concentrated wealth (where wealth is defined by the ownership of capital such as land, machinery, stocks, bonds, etc.).

Different from Kuznets' theory, Piketty [2014] says that the ultimate source of inequality is the fundamental force of divergence: r>g, where r is the average rate of return on capital, and g is the rate of growth in aggregate output (accounting for population growth as well). Thus according to Piketty [2014], the decline in inequality in the United States in the first half of the twentieth century (which was noticed by Kuznets) was not merely due to economic growth and advancement of the U.S., but rather because of the reduction in the rate of return on capital coupled with a simultaneous increase in the rate of economic growth. Piketty [2014] states that this temporary reduction in the r-g gap was due to non-fiscal and fiscal shocks to the worldwide economy such as the World Wars, the Great Depression, and progressive tax reforms. In other words, natural market forces were not the cause of the decline in inequality in advanced economies during the twentieth century. Piketty [2014] concludes his theory by suggesting that the only way for the force of divergence to be contained and for inequality to decline in the future is to put a tax on capital in order to reduce the wealth accumulation of the richest people in the world.

Piketty's book has become very controversial. Aside from the fact that his policy suggestions to use taxes to redistribute wealth has sparked passionate responses from advocates of free-markets and capitalism, there are also many studies that have found unsettling results after retesting Piketty's data and analysis. For example, Magness and Murphy (2015), McCloskey (2014), and Henderson (2014)

have extensively fact-checked Piketty's historical accounts as well as his data collection and found that not only does Piketty incorrectly state certain "facts" and conclusions in his book, but also there is evidence of Piketty massaging his data in order to support his thesis. These studies bring into question the entire validity of Piketty's argument.

There is much more discussion that could be made on the topic of Piketty's research due to its recent popularity and controversy, but its relevance to Kuznets is of importance to this paper. It should be made clear that for the following reasons, Kuznets' theory has not been proven wrong by Piketty's argument. First, Piketty's research has been shown to be suffering from confirmation bias in several instances. Second, Piketty draws his assumptions from a very small group of advanced economies and therefore does not imply that emerging economies are experiencing any similar 'force of divergence.' Last, this paper has shown the existence of Kuznets Inverted-U Curvesfor some Latin American countries. We have also noted in this study that the rate of growth may be correlated to the rate of decline in inequality. This conclusion is actually *supported* by Piketty's data collection, as well as his observation that when the average annual rate of growth was high for the advanced countries during the twentieth century there were also reductions in inequality.

One of the main differences between Piketty and Kuznets' hypotheses is that Piketty predicts higher worldwide inequality in the twenty-first century, whereas Kuznets would predict lower worldwide inequality as the emerging economies become more advanced. It is not easy to predict future outcomes, but continuing to test the validity of Kuznets and Piketty's hypotheses will prove to be useful in making the best estimations. In either case, there will likely be results that are in favor and in denial of both arguments (as already shown for the case of Kuznets in the Literature Review of this study). Nonetheless, future research on income inequality is necessary in order to better analyze the reasons for changes in inequality. As for now, we can at least state that the recent popular research by Piketty does not sufficiently debunk Kuznets' hypothesis.

## CONCLUSION

The Kuznets Inverted-U Curve has been greatly tested since Simon Kuznets proposed his hypothesis in 1955. Studies show varied results, with some supporting his hypothesis, and others denying the existence of such a curve. This paper shows that when testing for the geometric patterns of income inequality among eleven Latin American countries over time, very few of the country samples show evidence of an Inverted-U Curve. Argentina and Uruguay give the best example of initial rises in income inequality and subsequent falls. Chile and Panama, however, may have also experienced the Kuznets Inverted-U Curve over time, but because of the limitations to data on Gini Coefficients it appears that what we see is only the negative declining slope of the right tail end of the Kuznets Curve. When analyzing reasons for the systematic patterns in income distribution among these countries, it is shown that higher rates of growth in GDP per capita may be positively correlated

with larger and faster changes in declining income inequality. Furthermore, it is shown that due to the fact that Argentina, Uruguay, Chile, and Panama are among the most developed countries in Latin America, then there is strong reason to assert that their Kuznets Curves appeared not by coincidence, but rather due to the process of economic development.

The most difficult aspect of determining explanations for these simplified Kuznets Curves was considering the other potential causes that may be contributing to changes in economic development and income inequality. Without the use of regression analysis we can postulate explanations, but will be unable to determine precisely the biggest omitted components that may have an effect on the relationship between income distribution and economic growth. For example, the recent research put forth by Piketty suggests that income and wealth distribution may be more strongly correlated to the high returns on capital, rather than the greater mobility of labor and access to capital that occurs with economic development. However, due to the fact that other researchers have not yet extensively validated Piketty's hypothesis, we should not be quick to assume that Kuznets' hypothesis does not apply to the case of Latin America. Therefore, although this study shows graphically that the Kuznets Curve exists for a few Latin American countries, we suggest that further statistical analysis may be used to find other possible explanations to the distribution of wealth.

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