The Relationship between Inequality and Economic Growth: Evidence from Latin America

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Abstract:

This paper investigates the complex relationship between income inequality and economic growth in the Latin American region. This study conducts an empirical analysis using economic growth as the dependent variable, to determine the impact inequality has on economic growth. This study uses panel data from countries in Latin America over the time period of 1994-2009. The empirical results show a negative relationship between inequality and economic growth in the Latin American region. In addition, the level of government expenditure and taxation in the countries impact economic growth.

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1.0 INTRODUCTION

A great deal of research has aimed at understanding the relationship between income inequality and economic growth. To date, there is a lack of consensus surrounding the issue of inequality and its impact on economic growth. For the most part, there is an understanding that inequality negatively impacts economic growth; however the reasons behind this relationship are widely debated.

This study aims to enhance understanding on the issue of inequality and economic growth by performing an empirical analysis of Latin American countries. Next, by specifically focusing on the political economy model of endogenous growth, this study sheds light on how redistributive policies such as the level of taxation in a country that is plagued by inequality can impact economic growth. Focusing on one model of endogenous growth, this study provides an addition to the current work by developing a comprehensive understanding of redistributive policies in a specific region. The region of Latin America is helpful in understanding this relationship due to the fact that on average, it is a region of high inequality and low growth.

The study provides important information for understanding the complex relationship between inequality and growth by using the most recent data available, dynamic panel data of twelve countries in one specific region, Latin America, to better quantify this relationship and improve upon previous studies. Whereas many studies have been performed on a global scale, this study uses one specific region, which controls for any possible issues with cross country differences in measurements of data.

The rest of the paper is organized as follows: section 2 demonstrates trends in inequality and growth; section 3 provides a brief literature review. Section 4 outlines the empirical model. Data and estimation methodology are discussed in section 5. Finally, section 6 presents and discusses the empirical results. This is followed by a conclusion in section 7.

2.0 TREND (OF THE GIVEN TOPIC)

Despite the world economic downturn in 2008, Latin American countries have continued to experience increased rates of growth. In the past few years, inequality is still a major issue for Latin America but 73 million people were alleviated from poverty, which has contributed to a growing middle class (World Bank Group , 2013). Figure 1 shows that GINI index in Latin America has remained high and relatively stagnant despite political efforts to improve inequality. Despite the recent economic success of many Latin American nations, inequality is still high across the region. The graph depicts GINI rates from 1974-2009. Over a 35 year period there is very little change in the GINI index across the region.
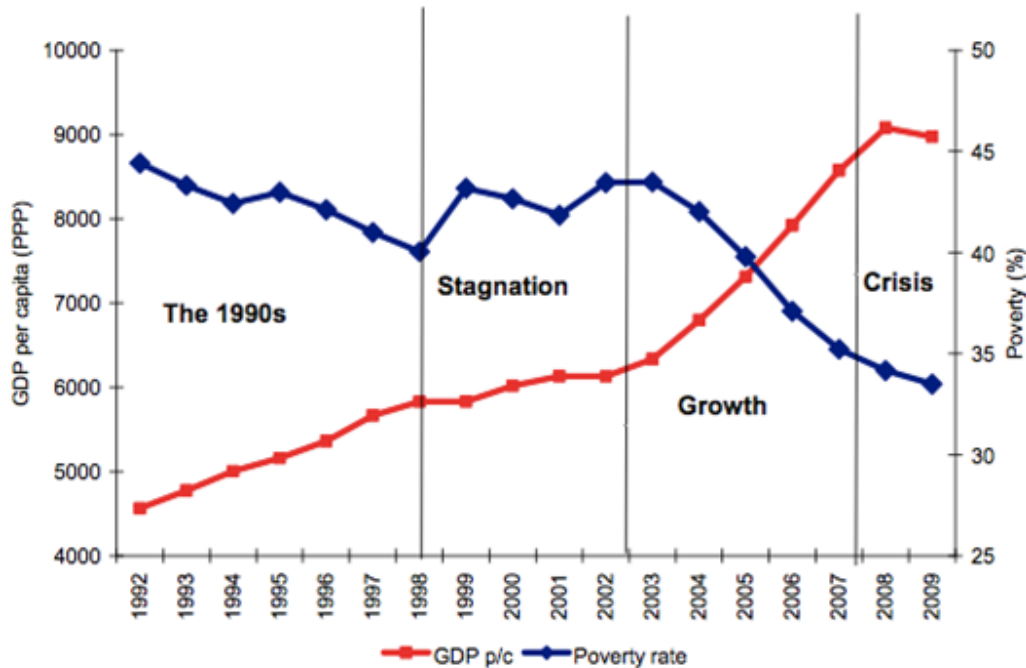
Figure 1: GINI Index: Latin American Countries
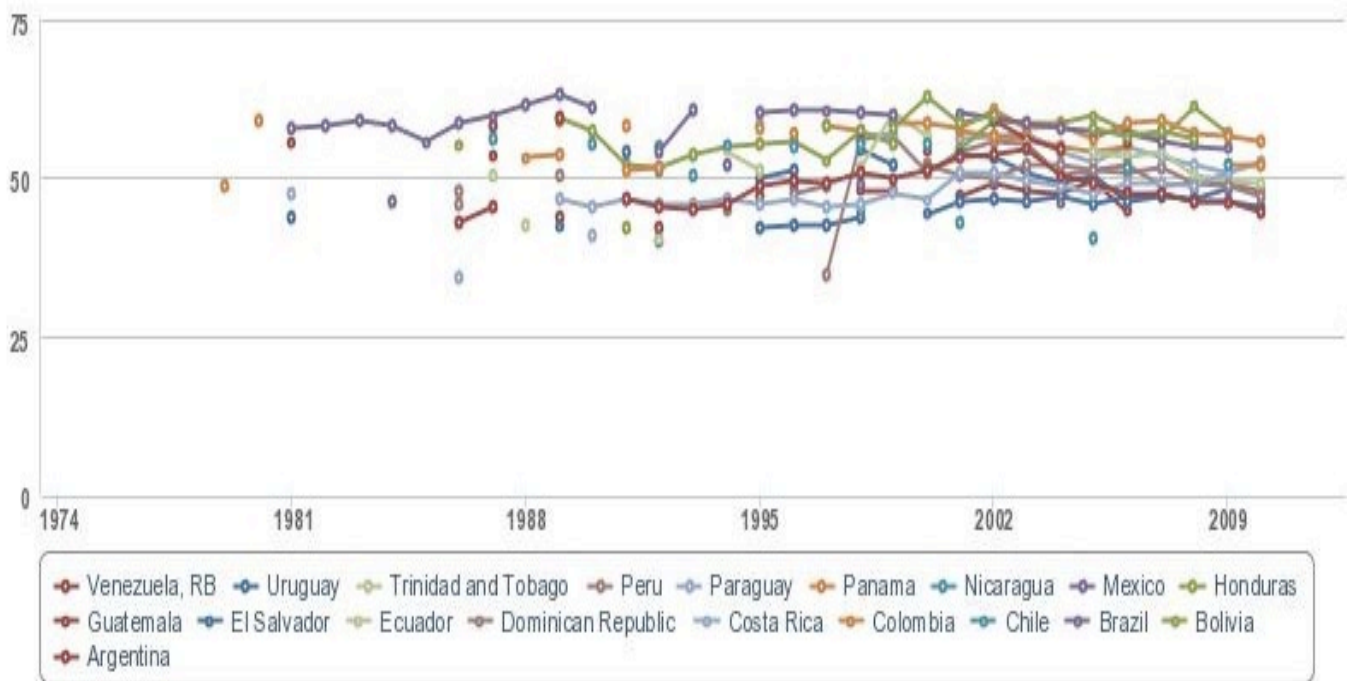
Source: World Data Bank

Currently, in Latin America there is a growing trend towards an emerging middle class:

Figure 2: Poverty and per capita GDP in Latin America, 1992-2009

Figure 2 demonstrates that from 1992 to 2009 a clear trend exists that depicts poverty rates decreasing, while GDP per capita simultaneously increases. This is a positive trend taking place in Latin America. Due to the high economic success of countries such as Brazil, many people have experienced a better quality life.

This graph depicts the poverty headcount at the international poverty line (US$ 2.5 a day) in 1992 and 2008. An overall trend towards decreasing poverty is occurring in Latin America:

Figure 3: Poverty in Latin America, Poverty Headcount
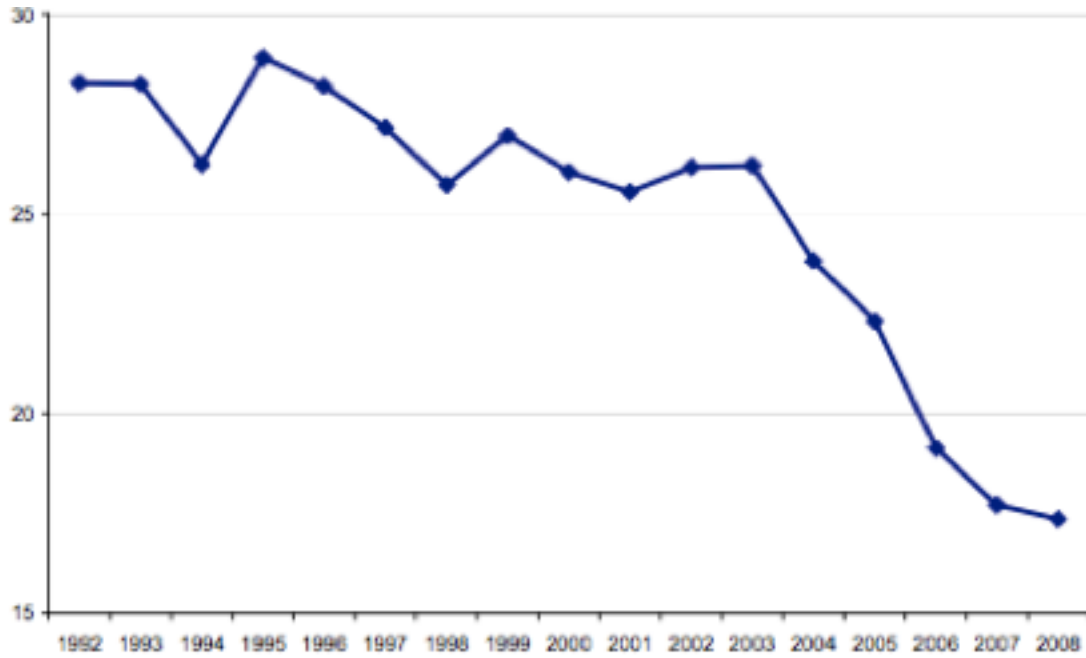
Source: CEDLAS and World Bank

This graph is the poverty headcount at international poverty line (US$ 2.5 a day) for all of Latin America. One clear trend portrayed in this graph is the decreasing percentage of people living under the international poverty line. Figure 4 shows that it is clear this trend is not apparent in all regions throughout Latin America:

Figure 4: Poverty in Latin American regions
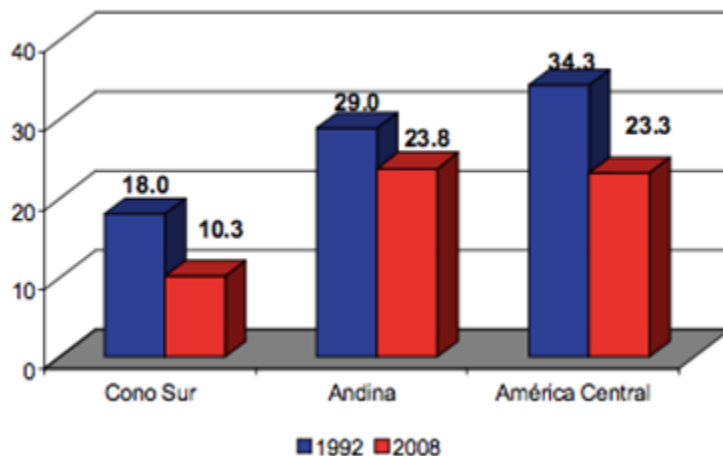
This graph depicts the poverty headcount at the international poverty line (US $2.5 a day) in 1992 and 2008. It demonstrates in spite of major socioeconomic gains in Latin America, many regions are still plagued by poverty. Unequal development is currently occurring in Latin America. Despite much development progress, Latin America is still a very unequal region, with 82 million people living on less than 2.50 a day (World Bank, 2013). In order to construct policies that will lower inequality levels throughout the region, it is first necessary to fully understand this economic relationship.

3.0 LITERATURE REVIEW

The impact of inequality on growth has been widely explored in economic studies. According to Figini (1998), most studies have found that inequality is harmful for growth; almost all of the prior empirical research done shows a negative and significant coefficient of inequality on growth. To begin, the study this paper models is Figni (1998). The author provides a reduced form of the growth-inequality model, clearly demonstrating the relationship of inequality on growth, which produces a negative, significant coefficient for inequality.

Figini (1998) distinguishes himself from previous studies on inequality and growth by using a new database on inequality collected by Deininger and Squire for the World Bank in order to improve measurement accuracy. The author finds that the index used to measure inequality will alter the size of the coefficient of inequality on growth. In an effort to decipher the reason behind this effect, the author creates detailed studies of six different models of the channels of

transmission from inequality to growth. In one such model, the political economy model, he assumes that in an unequal society, the median voter decides the level of taxation, which would assume greater levels of redistribution in the nation. Therefore, he formulates the hypothesis that high inequality leads to more redistribution, and less growth.

Persson and Tabellini (1994) examine the relationship between income inequality and economic growth by focusing on the impacts of redistribution. They argue that in a democratic society, political decisions create economic policies that tax investment and growth-promoting activities in an effort to redistribute income. The authors create models on two sets of data, one set is comprised of developed nations (the United States and eight European countries), the second set is comprised of cross section of countries (developed and less developed), both data sets lead them to the conclusion that there is a negative relationship between high income inequality at the start of the period and lower levels of growth at the end of the period. After conducting a regression for growth, the independent variable inequality produces striking results. The authors find that the coefficient on inequality is economically significant; an increase of one standard deviation in the sample of the income share of the top 20% lowers the average annual growth rate by below half a percentage point. Due to this finding, and taking into consideration the fact that no other variable explains more than a tenth of the variance in growth, it displays a clear relationship of inequality on growth. The authors assume that economic growth is determined by the accumulation of capital, human capital and knowledge. The authors argue that economic growth will not occur when redistributive policies prevent individuals from privately accumulating and using their capital, human capital and knowledge. In conclusion, they find that income inequality is harmful for growth because it leads to policies that do not protect property rights or allow full private appropriation of returns from investment.

Also focusing on the politics of inequality and growth, Alesina and Rodrik (1994) find that the greater the inequality of wealth and income, the higher the rate of taxation, and the lower growth. The authors use empirical evidence to conclude that inequalities in land and income ownership are negatively correlated with subsequent economic growth. Focusing on long run growth, they find that inequality is conducive to growth-retarding policies. Ultimately, their main finding concludes that strong demand for redistribution in societies where a large portion of the

population does not have access to resources causing conflict over distribution of resources, essentially halting economic growth.

Perotti (1993) investigates the impact of income distribution on economic growth; assuming investment in human capital is the driving factor of economic growth and that individual's vote on redistribution policies. He focuses on the effects of redistribution on investment in human capital. Assuming, redistribution determines the amount by which different groups of people are capable of investing in human capital; he formulates an argument about how redistribution affects growth. The study finds that economic growth differs between sets of income distribution and the respected levels of per capita income, investment in human capital raises productivity across different groups of individuals, and that the initial pattern of income distribution and political atmosphere will determine if investment in human capital leads to increased or decreased growth.

Bertola (1993) argues when the median voter is capital-poor relative to the economies representative agent, redistributive policies slow growth if they are focused on income share and thereby accelerating growth through investment subsidies. The author basis this argument off of the assumption that in cases of investment driven growth, savings depends on how much income is from accumulated factors of production, rather than non-accumulated factors. By focusing on the source of income, rather than the level of income held by an individual, the study is able to determine distribution policies and their impact on economic growth.

Diaz (2005) also estimates the channels through which income inequality affects growth. The author finds that the fiscal effects, such as government expenditure, greatly influence inequality on growth. The author analyzes the determinants of income inequality and finds that political stability highly influences equality. The author determines that inequality and economic growth are positively related.

4.0 DATA AND EMPIRICAL METHODOLOGY

4.1 Data

The study uses panel data from 1994 to 2009. Data were obtained from the World Bank World Development Indicators. The data is compromised into five year averages. The first period is 1990-

1994, the second period is 1995-1999, the third period is 2000-2004, and the last period is 2005-2009. Initially, this analysis aimed to collect data for every country in the Latin American region; however quality data was only available for 12 countries. The countries used in this analysis are:

- Argentina
- Chile
- Colombia
- Costa Rica
- Dominican Republic
- Ecuador
- El Salvador
- Mexico
- Panama
- Paraguay
- Peru
- Uruguay

A panel data analysis was chosen to help account for problems associated with omitted variable bias. Summary statistics for the data are provided in Table 1.

Table 1 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Growth	48.00	3.10	1.83	-1.25	7.17
INEQ	48.00	51.15	4.27	40.62	58.70
INEQSQ	48.00	2633.82	432.64	1649.98	3445.69
L_INCPC	48.00	8.02	0.57	7.15	9.00
INVEST	48.00	20.39	3.15	14.84	27.14
HUMCAP	48.00	70.20	15.45	34.22	104.53
GOVEXPEND	48.00	11.25	2.79	4.08	19.54
TAXREV	48.00	14.11	3.62	9.65	24.61

4.2 Empirical Model

Following Figini (2008) this study adopted his econometric model which is commonly used in empirical papers studies on cross country endogenous growth. The model is a reduced-from

growth model in which, inequality is added to determine its influence on economic growth. The model could be written as follows:

GROWTH = $\beta1$ + $\beta2$ L_INCPC + $\beta3$ INEQ + $\beta4$ $INEQSQ$ + $\beta5$ $INVEST$ + $\beta6$ $HUMCAP$ + $\beta7$ $GOVEXPEND$ + $\beta8$ $TAXREV$ + $\varepsilon..$

Dependent Variable:

Growth is the annual growth rate of GDP for country i at year t. Growth is the dependent variable in this econometric analysis used to determine the amount that economic growth is affected by each independent variable. The author compromised the growth rate (r) for each country at each period by using the growth rate function where:

r = ((FV/PV)^(1/t))-1

- r = economic growth rate (%) for each period
- FV = GDP measured in constant US$ 2000, the GDP at the end of each five year period
- PV = GDP measured in constant US$ 2000, the GDP at the beginning of each five year period
- t = time period, for this analysis the growth rate was found for five year periods

Independent Variables:

Seven independent variables in this study affect economic growth:

1. L_INCPC: is the measure of income per capita at the beginning of the period, to test for convergence. If the variable is negative, the results will indicate convergence across time. The natural log of INCPC is used in this analysis.

2. INEQ: is the measure of inequality in country i at year t. The estimate of inequality in each country is measured by the GINI index.

3. INEQSQ: is the variable INEQ squared to reflect the estimated quadratic relationship between growth and inequality.

4. INVEST: is the ratio of investment to GDP, measured by Gross Capital Formation (% of GDP).

5. HUMCAP: is the level of investment in human capital, measured by average schooling years in the adult population.

6. GOVEXPEND: is the measure of government expenditure.

7. TAXREV: is the variable that measures the rate of taxation in country i at year t, as compromised by tax revenue as a percentage of GDP.

5.0 EMPIRICAL RESULTS

The empirical estimation shows the negative relationship between inequality and economic growth. However, like other previous empirical studies this analysis finds the coefficient on inequality to be statistically insignificant. While it holds a negative coefficient, INEQ has a t-statistic of 1.29, which makes it insignificant at a 95% confidence level. However if we lower our confidence level, to roughly 79%, the variable would be statistically significant. In this case, a one-point increase in inequality reduces growth by 2.016%, holding all other economic factors constant. For the nations used in this analysis, this implies a one-point increase in GINI index will lower growth rates considerably.

This study uses two separate regression methods, the fixed effect method and the random effect method. In order to determine which is more appropriate for this empirical model, a Hausman Test is used to test if random effects will produce accurate estimates for this data set.

Hausman Test:

Hypothesis Testing:

Ho: Random Effects Method
Ha: Fixed Effects Method

After conducting a Hausman test, this analysis rejects the null hypothesis that random effects should be used. At a 5% significance level, the p-value of 0.0079 [where .05>.0079] leads

the author to reject the null hypothesis. Therefore, this empirical analysis will base its conclusions off the results obtained by a fixed effects method regression.

In this study, the sample may not be accurate reflection of the whole population as the cross section units of observations are large geographical units. Due to this, it is necessary to include a separate intercept for each cross sectional unit.

Table 2: Regression results

	Fixed Effects
	Growth
L_INCPC	-4.291*
	(-2.11)
INEQ	-2.016
	(-1.27)
INEQSQ	0.0196
	-1.24
INVEST	0.104
	-1.03
HUMCAP	0.0247
	-0.84
GOVEXPEND	-0.607**
	(-3.15)
TAXREV	0.679*
	-2.71
_cons	82.28*
	-2.26
N	48
R-sq:	within = .5218

	between = .0273
	overall = .0101
t statistics in parentheses:	
* p<0.05, **p<0.01, *** p<0.001	

Fixed Effects Method:

To begin, this analysis finds the variable, L_INCPC that is measured as the natural log of GDP per capita at the start of each five-year time period interval, to be statistically significant at the 5% level. The results indicate that a one percent increase of GDP per capita at the beginning of the period, leads to 4.29% less economic growth at the end of the period, ceteris paribus.

As predicted, this indicates some convergence over time. Persson and Tabellini (1994) found similar results in their empirical analysis. The authors used the variable, GDPGAP, which is a measure of the ratio between GDP per capita and the highest levels of GDP per capita, at the beginning of the respected time period. In their empirical analysis, they find the coefficient on this variable to be negative and significant

As this paper was focused on determining the impact of inequality on growth, the next variable must be discussed in detail. The regression software finds the variable to be just slightly statistically insignificant. The author does find a negative relationship between inequality and growth, but due to the fact that it is not significant, this analysis must conclude there is an inconclusive relationship between inequality and growth.

However, if a 21% confidence level were accepted, the variable would be significant. In this case, inequality is detrimental to economic growth. A one-unit increase in inequality, as measured by the GINI coefficient, leads to a 2.0% reduction in economic growth, ceteris paribus.

The variables, INEQSQ, INVEST, HUMCAP are all found to be statistically insignificant. INEQSQ is insignificant, as its square root variable was also found to be insignificant. Similar to INEQ, the variable INEQSQ is significant if a lower confidence level is accepted. The variable INVEST was a measure of Gross Capital Formation, which focuses specifically on the economic value added to the fixed assets of a country. The variable may have been insignificant because of

a measurement error, in which the zero conditional mean assumption is violated, through omitted variable bias. As the assumption states; given any value of x, the error term, u, has the expected value of 0. It is highly likely that the variable INVEST is correlated with other unobserved variables such as construction, interest rates or other variables that affect levels of investment. The variable HUMCAP is found to be insignificant as well. This variable may have been insignificant because structural issues present in a nation such as; poor government policies, lack of resources, and slow economic development, will lead to insufficient conditions for an educated population to increase economic growth.

Next, the coefficient on government expenditure has a t statistic of 3.15, making it statistically significant. The coefficient on government expenditure indicates that on average, increases in government expenditure will reduce economic growth, holding other factors constant. The results in this analysis imply that Keynesian economic models, in which government spending is necessary to increase economic growth, may be incorrect. It is possible that in the region of Latin America, spending is better left to the individual agent, rather than the government, to increase economic growth.

The coefficient on tax revenue is statistically significant. The findings on this variable are somewhat contradictory to the conclusion from government expenditure. On average, increases in tax revenue will increase economic growth by .7%, ceteris paribus. This indicates that a higher level of taxation in Latin America is beneficial to economic growth. As this is a widely debated conclusion in growth studies, it is interesting this paper finds a positive relationship between economic growth and taxation.

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6.0 CONCLUSION

This analysis demonstrates the negative relationship between inequality and subsequent economic growth. If a modest confidence level is accepted, the results of this analysis determine that a one-point increase in the GINI index of the following nations: will result in a 2% reduction in economic growth, holding all other economic factors constant. This results show convergence and therefore, the author determines that the poorer countries grow at a faster rate than richer countries used in this study. The levels of investment and human capital proved to be insignificant in determining economic growth. Whereas, the levels of government expenditure and tax revenue to be significant in determining economic growth.

Future studies show use a longer time period to demonstrate long-term growth factors. In addition, countries from other regions will increase the sample size and may provide better estimates.

Due to the fact that this paper found on average, increases in tax revenue lead to higher levels of economic growth, two questions are raised. The first, does a higher level of taxation imply that more government spending will increase growth? Or, does a higher level of taxation imply that nations with stable budgets and government revenues experience higher levels of economic growth? Future studies may look to analyze the relationship between budget surpluses or deficits and economic growth. This study finds that a higher level of government expenditure lowers economic growth. Due to this finding, other empirical studies that determine higher levels of

government spending increases economic growth may be incorrect. On the flip size, the empirical studies that argue in favor of higher levels of taxation to increase economic growth may be justified. However, the contradictor estimates this study finds, between tax revenue and government expenditure, may be attributed to an error by the author such as omitting an important variable, misspecification of the model, or correlation issues between taxation and government spending.

Appendix A: Variable Description and Data Source

Acronym	Description	Data source
GROWTH	GDP per capita % growth (annual %)	World Bank: World Development Indicators
INEQ	GINI Index	World Bank: World Development Indicators
INCPC	GDP per capita, constant 2000 dollars	World Bank: World Development Indicators
INVEST	Average ratio of investment to GDP, measured by Gross Capital Formation % of GDP	World Bank: World Development Indicators
HUMCAP	Average schooling years in adult population, % of secondary school attainment in adult population	World Bank: World Development Indicators
GOVEXPEND	General government final consumption expenditure (% of GDP)	World Bank: World Development Indicators
TAXREV	Tax revenue (% of GDP)	World Bank: World Development Indicators
BIRTHRATE	Birth rate, crude (per 1,000 people)	World Bank: World Development Indicators

LABORPART	Labor participation rate, total (% of total population ages 15+)	World Bank: World Development Indicators

Appendix B- Variables and Expected Signs

Acronym	Variable Description	What it captures	Expected sign
GROWTH	GDP per capita % growth	Economic Growth	dependent
INEQ	Inequality measure	Amount of inequality in region	-
L_INCPC	GDP per capita	GDP per capita level	-
INVEST	Investment ratio to GDP	Measure of level of investment	+/-
HUMCAP	Secondary School Attainment	Level of investment in human capital	+
GOVEXPEND	Government Expenditure	Measure of government expenses	-/+
TAXREV	Tax Revenue	Level of taxation	-
BIRTHRATE	Birthrate	Measure of future population	+
LABORPART	Labor participation rate, total (% of total population ages 15+)	Measure of working population	+

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