INCOME DISTRIBUTION AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES:

AN EMPIRICAL ANALYSIS

BY

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Abstract:

Since the 1950's and 1960's, income inequality and its impact on the economy has frequently been studied using by numerous authors. Even though numerous studies on many aspects of the effects of income inequality have been completed, there are still many questions that remain. One of the lingering questions involves the nature of the relationship between income inequality and economic growth. Studies indicate conflicting conclusions about the relationship between income inequality and growth. This paper attempts to reevaluate income inequality data from particular countries and shed new light on the complex relationship between inequality and growth. The particular countries used in this study are classified as less developed countries or developing countries. Based on panel data estimation over the 1966 – 1990 time period, the empirical evidence will show that developing countries with higher income inequality do not grow at a slower rate than developing countries with a more equal income distribution. With a one point increase in income inequality, there is an associated .3% annual increase in real GDP per capita growth over the next five year period.

CHAPTER 1: Introduction

Over the last half century, a hot topic among economic analysts has been the possible impact of income inequality on the economy. One of the most important factors believed to be related to income inequality is the rate of economic growth. Understanding the relationship between these two economic variables is important because higher income inequality is often found in lower developed countries. If there is a clearer understanding about the relationship between income inequality and the rate of economic growth, particular economic policies could be employed in the less developed countries in the appropriate manner to deal with income inequality and encourage economic growth. This paper does not provide the definitive answer

on the relationship between income inequality and economic growth; however, it is an attempt to contribute additional relevant evidence in the search for the answer.

The focus on income inequality and economic growth began in the 1950's when Simon Kuznets presented his idea to the American Economic Association of an inverted *U* relationship between per capita GNP and inequality in the distribution of income. Based upon income distribution data available at that time, Kuznets suggested that as per capita income rose in lesser developed countries, income inequality also rose, reached a maximum, and then declined as income levels rose to further. Kuznets developed this theory by studying data estimating income distribution in a few rich and a few poor countries and by studying trends in distribution in a few European countries over time (Perkins et al, 129). His findings were later described as an "inverted-U hypothesis." Following this ground breaking theory, many developing countries tolerated rising income inequality arguing that income would become more equally distributed with advanced development, as Kuznets observed.

If Kuznets was correct in his original hypothesis and income inequality reduces with economic development, developing countries facing high income inequality need not to be concerned with rising inequality. If, however, income inequality did no reverse itself with advanced development, it is important to understand the possible effects of income inequality on the economy. Whatever may be the theoretical justification of the Kuznets hypothesis, the empirical validity of this phenomenon still remains open to question.

A prominent case study displaying a possible relationship between income inequality and economic growth is that of South Korea and the Philippines. As discussed by Benabou (1996) South Korea and the Philippines looked similar in the early 1960's as indicated by many macroeconomic factors, including GDP per capita, populations, urbanization, and primary and secondary school enrollment. They differed, however, in their distribution of income. In 1965,

South Korea's Gini coefficient was 34.3 while the Philippines' Gini coefficient was 51.3. During the next thirty years, South Korea averaged 6% growth annually while the Philippines stagnated at 2%. South Korea's output level increased fivefold while the Philippines output level barely doubled (Aghion et al, 1999). This result by no means *proved* a negative relationship between income inequality and economic growth, but it did invigorate the interest in the relationship between inequality and growth.

It is important to understand the relationship between income distribution and economic growth for a number of reasons. Many of the nations experiencing high rates of income inequality are less developed countries and developing countries. It has been argued that income inequality and the accumulation of wealth in a small proportion of individuals would result in higher growth in the future. From this 'trickle down' theory, the mass poor are told to just wait and they will receive transfers of the accumulated wealth through redistribution. The redistribution of wealth eventually puts everyone in a better position then they were before and income inequality it acceptable (Clark 1995). However, there could be a negative impact of inequality on growth as argued others. If a country experiences high income inequality, there is great pressure from the poor masses to redistribute the wealth accumulation. The high taxes levied to redistribute the wealth lower the rate of return on private assets, which restricts capital accumulation and slows growth (Clark 1995). These theoretical claims were supported by Alesina and Rodrik (1991) and Persson and Tabellini (1990) through cross country growth regression analysis. The purpose of this paper is to provide additional empirical evidence of the relationship between income inequality and an economy's rate of growth in developing countries.

During the last fifty years, many statisticians and economists researched the relationship between income inequality and economic growth with varying results. Some of studies

conducted resulted in a negative relationship between income inequality and economic growth while other studies indicated a positive relationship between the two factors. Typically, long run data for developed countries support Kuznets' proposition while studies of the third world countries have produced conflicting results. Part of the problem may be econometric estimation. Typically reliable long term or time series data was not available for developing countries previously. Therefore, economic analysis came to rely on short run data to make inferences which is time oriented.

Another major issue with the studies conducted was the quality of the data available at the time the study was performed. To rectify this problem, the World Bank sponsored a project to evaluate the available data estimates of income distribution and rated the available data by degree of reliability (Perkins et al 129). Published in 1996 by Klaus Deininger and Lyn Squire, the data set contains reliability ratings for Gini concentration ratios and quantile data for hundreds of countries from the 1950's to the early 1990's (Deininger and Squire). This data set provides acceptable and reliable statistics on income distribution which can be used to conduct reliable panel-data analysis.

CHAPTER 2: Review of Literature

Studies conducted by Roberto Perotti (1996), Robert Barro (2000), and Roland Benabou (1996) all contribute analysis and discussions concerning income distribution and economic growth. A majority of these studies have measured this relationship with inequality as an independent variable to some variant of Robert J. Barro's cross-country growth model (Forbes 2000). In his paper published in 1996, Roland Benabou compiled the results of 23 studies completed on associations between income inequality to growth or investment (1996). From summarizing the data presented in these studies, Benabou stated "…initial inequality is

detrimental to long-run growth" (p 13). The summarized data also indicated a consistent one standard deviation decrease in inequality raises the annual growth rate of GDP per capita by .5 to .8 percentage points (Benabou 1996).

The summarized evidence indicated a significant negative correlation between income inequality and GDP growth; however a majority of the information was compiled prior to the work of Deininger and Squire (1996). Deininger and Squire's data set labels income distribution observations by their quality. To be acceptable in the high quality data set, data was required to be: based on household surveys, representative of the entire country's population, and a comprehensive measure of income, including self-employment income, non-wage earnings, and non-monetary income (Deininger and Squire 1998).

It is important to contribute analysis using only the high quality data set. A majority of the prior studies used unrepresentative statistics. Of the 2,600 Gini coefficient observations Deininger and Squire originally complied, only 682 met the three requirements stated above. This 'acceptable' data set can minimize measurement error and any resulting coefficient bias and can also increase the efficiency of estimates (Forbes 2000).

Many different models and many different variables have been studied using income distribution to determine if there is a significant relationship between different variables. Most of these models far surpass the expertise of this paper, but it is worth noting the different variables believed to be related to income distribution. Alesina and Rodrik (1994) examined the relationship between politics and economic growth. They have found that income inequality and land distribution is negatively associated with subsequent growth. This result is related to the conflicts over redistribution of productive resources.

Robert J. Barro (2000) presents empirical evidence that indicates higher inequality to be a hindrance to growth in poor countries and promote growth in richer countries. Additionally,

Roberto Perotti presented empirical evidence as well as analytical theories as to how income distribution, democratic institutions, and economic growth are related. Perotti indicates that political instability as well as the education/fertility decision explains the negative relationship between income distribution and economic growth.

Along with his empirical analysis, Barro (2000) also presented theoretical analysis of the macroeconomic mechanisms in which income inequality relates to economic growth. To he states that: credit market imperfections, the political economy, sociopolitical unrest, and savings rates are all interrelated between income distribution and economic growth. Barro explains situations where all of the mechanisms could have either positive or negative effects on growth. The uncertain effect of all of these interrelated factors can be seen through the empirical work completed. While Perotti (1996) and Benabou (1996) find a negative relationship between income distribution and economic growth, Li and Zou (1998) and Forbes (2000) indicate a positive relationship between the factors (Barro 2000).

CHAPTER 3: **The Model and Data**

Numerous studies have examined the relationship between income distribution and economic growth. However, much of the work was completed prior to the publication of Deininger and Squire's data set in 1996. This paper intends to present an analysis of growth as a function of inequality, income, and human capital statistics and market distortions. The model for this paper is:

GROWTH = f (INEQUALITY, INCOME, EDU, PLI)

The dependent variable is GROWTH, which is real GDP per capita growth from the previous year. Real GDP per capita growth is represented in terms of 1995 US dollars. INEQUALITY is the Gini coefficient for a country. The Gini coefficient, also known as the Gini

concentration ratio, is the area between the Lorenz curve and a 45^o line. The Lorenz curve displays the share of total income received by any cumulative percentage of recipients (Perkins et al). As previously stated, only high quality data (labeled as acceptable) were used. INCOME is real GDP per capita for a country based on 1995 US dollars. A higher Gini coefficient represents higher inequality in the distribution of income in country. GDP is included in the equation to represent conditional convergence (Perotti 1996). EDU is a measure of human capital statistics. This variable represent the average years of secondary schooling for males and females collectively, over the age of 25. This information serves as a proxy for the human capital stock in each country. The final explanatory variable is price level of investment (PLI). This statistic is represented by the PPP (purchasing price parity) of GDP divided by the exchange rate with the United States. PLI serves as a numerical representation of market distortions that affect the cost of investment, such as tariffs, government regulations, corruption, and the cost of foreign exchange (Forbes 2000). The information collected spans from 1961 to 1995.

Information for real GDP per capita growth (GROWTH) and real GDP capita (INCOME) was collected from the World Bank STARS data set, as published on-line available to subscribers or on the purchased CD. Data on inequality (INEQUALITY) was drawn from Deininger and Squire (1996) and is represented by the Gini coefficient. The human capital statistics (MALEedu and FEMALEedu) were collected from the Barro and Lee data set (1996) and is available on-line. The information on market distortions (PLI) are drawn from the Penn World Table, complied by Alan Heston, R. Summers and B. Aten.

The econometric model for this study is:

$$y_{i\,t} = \beta_0 + \beta_1 x_{1i\,t} + \beta_2 x_{2i\,t} + \beta_3 x_{3i\,t} + \beta_4 x_{4i\,t} + \varepsilon_{i\,t}$$

í = 1, 2,…20
and t = 1, 2, 3, 4, 5
where:
y = the rate of growth of real per capita GDP

x_1 = income inequality as measured by the Gini coefficient
x_2 = income as measured by real GDP per capita in 1995 US dollars
x_3 = education measured by average years of secondary schooling for males and females
x_4 = price level of investment measured by PPP of investment/exchange rate relative US

The expected signs for these variables are: INEQUALITY could be positive or negative, INCOME should be negative, EDU should be positive and PLI should be negative. This model is similar to the model used by Perotti (1996) and Forbes (2000). Perotti (1996) found a negative correlation between Gini and growth while Forbes (2000) found a positive correlation. This study is different because the only countries included are less developed countries and only high quality INEQUALITY statistics are used. All of the countries included have a per capita GDP of less than $10,000 (US 1995) and include only high quality Gini coefficients.

Despite the advances made in data collection and qualification, it is impossible to create a balanced data set using developing countries. First, there are gaps in the years of available data for different countries. To rectify this, it was necessary to estimate data over periods of five years. The lack of consistent information for 1961-1965 and 1990-1995 resulted in the exclusion of these periods in the analysis. This creates 5 periods of time: 1966 -1970, 1971 - 1975, 1976 – 1980, 1981 – 1985, and 1986 – 1990. Real GDP per capita growth during these periods was averaged for the countries. As well as creating a more balanced data set (although not completely balanced), this grouping also reduces yearly serial correlation associated with business cycles and short run disturbances (Forbes 2000). The available Gini coefficients are averaged when more than one statistic is available in one period. The human capital and market distortion statistics were provided annually from 1960 to 1990. These statistics were also averaged through the five year time periods.

For this paper, certain criteria were applied for countries to be used in the regression. First, the country must have a per capita GDP of less than 10,000 (US$ 1995). There must also

be at least 3 time periods where a high quality Gini coefficient was reported. These criteria allowed only information on 20 lesser developed countries to be included. These countries are : Bangladesh, Brazil, Chile, China, Colombia, Costa Rica, Dominican Republic, Hungary, Indonesia, Korea (South), Malaysia, Mexico, Pakistan, Peru, Philippines, Sri Lanka, Thailand, Tunisia, Turkey, and Venezuela.

Despite the averaging of statistics, there are still certain time periods which have missing values for some of the countries. The countries with the missing Gini values are (with the time periods they are missing following): Chile (1981-1985), China (1966-1970, 1971-1975), Colombia (1981-1985), Costa Rica (1966-1970), Dominican Republic (1966-1970, 1971-1975), Indonesia (1971-1975), Malaysia (1961-1965), Peru (1966-1970, 1976-1980), Philippines (1966-1970, 1975-1980), Thailand (1976-1980) , Tunisia (1966-1970), Venezuela (1966-1970). Also, China is missing EDU data for time period 1966-1971.

Regardless of the improvements in the quality of data (as provided by Deininger and Squire), there are some obvious problems with the data set. These problems include: only 20 developing countries have at least three time periods of data available, the countries included do not represent any African or Middle Eastern countries, and some of the Gini coefficients were calculated from income while others were based on expenditures. To fix this last problem, Deininger and Squire (1996) suggested adding 6.6 to Gini coefficients calculated from expenditure. This was also done to this data set. The former issues with the data could only be rectified with a more complete data set for Gini coefficients.

The subsequent data set includes observations for 20 countries for each 5 year time period over 1966 to 1990. The variables for these time periods have been averaged. During one time period, the average growth a country experienced varied greatly from growth in other countries. For example, during the 1971 – 1975 period, one country, Brazil, experienced over a

10% increase in real GDP while another country, Chile, experienced a 1.12 % reduction in real GDP per capita. Table 1 displays the mean, standard deviation, minimum and maximum for each variable used in the regression during the specified time periods.

CHAPTER 4: **Analysis of the Statistical Results**

As previously stated, initial review of the subsequent data set required the time periods 1961-1965 and 1991-1995 to be dropped from the analysis. For time period 1961-1966, 9 out of the 20 countries were missing Gini coefficient data. For the 1990-1995 time period, there was no information available for human capital statistics and 6 out of the 20 countries were missing Gini coefficients. The common methods to estimate panel data models are the fixed effects models and the random effects model. The random effects technique can only be used if the country-specific effects are uncorrelated with explanatory variables (Forbes 2000). To test this assumption, a Hausmen test has been conducted. Based on the Hausman test where the null hypothesis is the random effects model is appropriate, I was able to reject the null hypothesis and conclude that the random effects technique is not an appropriate model. Therefore, the fixed effects model is used. In the fixed effects model, the unobserved effect is fixed over time. Therefore, the difference in data across time can be estimated (Wooldridge 2003). The fixed effects estimates are calculated from differences within each country across time (Forbes 2000).

A cross-section regression analysis was performed using the fixed effects technique. The country cross section data for Gini coefficient (INEQUALITY), real GDP per capita (INCOME), human capital statistics (EDU) and investment (PLI) are used in the regressions on the real GDP growth. The empirical result is reported in Table 2. As Table 2 reports, the R-square is .5883 and income inequality (INEQUALITY) is the only significant statistic. The coefficient shows a strong positive correlation between income inequality and real GDP growth.

There are certain countries which significantly contribute to the rate of growth of their GDP. These countries are China, Hungary, Indonesia, India, Korea (South), Pakistan, Sri Lanka, Thailand, and Venezuela. They have significant individual effects on the growth rate. Venezuela is the only country with a significant negative relationship with real GDP growth. Income level, education level and market distortions do not have any significant effect.

A second fixed effects regression was estimated including both country effect and time effect. The results are shown in Table 3. Similar to the previous results in Table 2, only income inequality (INEQUALITY) is significantly related to real GDP growth (GROWTH). The R-Squared value is .6436. Again, inequality is positively related to GROWTH. Accordingly, a 1 point increase in income inequality is associated with a .31% increase in average annual growth over the following five years. If, however, income inequality were to increase by 5 points, a correlation of 1.5% increase in average annual growth over the next five year period is indicated. And if the income inequality increased by 9 points (which is the one standard deviation for income inequality), a 2.79 % increase in average annual growth over the next five year period would be expected. Again, the level of income, education and market distortions do not have any significant effect on the growth rate.

For the country and time effect equation, all of the same countries (with the exception of the previously significant Sri Lanka) are significant contributors to the positive correlation between income inequality and real GDP per capita growth.

Income inequality (INEQUALITY) is the only variable that is significant with respect to real GDP growth. Real GDP per capita (INCOME) has neither a positive or negative effect on economic growth, as shown in Table 2 and Table 3. The coefficients for the two remaining independent variables are not significant. The signs of these variables in the time and country effects model (Table 3) are consistent with what is expected. An increase in average secondary

schooling years for males and females increases real GDP per capita growth. Also, the estimate for the market distortions is negative, as expected.

To summarize, both regression results indicates that income inequality (and other insignificant independent variables) does not slow or hamper growth in lesser developed countries (countries with per capita GDP of less than $10,000 US 1995). Rather, higher coefficients of income inequality are associated with higher real GDP growth. In a sense, it corroborates the so call "trickle down theory" in economic literature.

CHAPTER 5: Conclusions

The rate of economic growth can vary considerably between different countries during the same time period, as is evident from the experience of the last few decades. Some countries experience long spans of sustained increasing growth while other countries stagnate at little to zero growth. This paper does not contend that income inequality is the only factor that affects economic growth; however it does provide empirical evidence that there is a relationship between the factors. The evidence indicates that an increase in a country's income inequality is significantly correlated with economic growth. The positive relationship observed is opposite to many previous empirical works conducted on income inequality and economic growth.

There are some differences between the study completed here and previous studies. First, this study focuses exclusively only less developed or developing countries. Second, this study utilizes income inequality coefficients (Gini coefficients) which are of higher quality than the Gini coefficients available for previous studies (Perotti 1996 and Benabou). Also, the time periods used are 5 year periods as opposed to the 10 year periods often employed in previous studies (see Deininger and Squire 1998).

There are some ways to improve this study for future studies. It is probable that there is a

delay between the changes in income inequality and the subsequent effect on real GDP per capita growth. A test could be done with GDP growth as a lagged dependent variable. To do this, the variables should not be averaged over the time periods. Rather the initial value for the time period is sufficient. However, the fixed-effects estimation is not consistent and a different estimation technique must be employed. Another improvement for this estimation would be to test for additional types of correlation between the independent variables and the dependent and the independent variable. Since this data is not balanced, the other estimation method taking into account the possibility of autocorrelation was not successful.

This study uses a small number of variables to estimate the possible effects on economic growth. The inclusion of other variables could change the outcome of income inequality's effect. Some of these variables include (but are not limited to): government expenditures, black market premium, type of government, or the amount of political instability. A different estimation of income inequality could also affect the relationship between economic growth and inequality. A different estimation of income inequality is the access to assets, specifically land distribution. Including these variables into the study could alter the effect of the relationship between income inequality and economic growth.

This paper in no way ends the search for the actual relationship between income inequality and economic growth. However, it does provide empirical evidence that income inequality could have a positive effect on economic growth in lesser developed countries. A one point increase in income inequality has a .3 % increase on economic growth over the next 5 years in lesser developed countries. The positive relationship is a contrary result to the recent empirical findings but indicates that more investigation is necessary to fully understand the complex relationship between income inequality and economic growth.

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Table 1. Means, Standard Deviations, Minimum and Maximum by time period

Variable		Mean	Std. Dev.	Minimum	Maximum
GROWTH	1966-1970	3.40	1.92	0.65	8.13
	1971-1975	2.69	2.85	-3.09	7.72
	1976-1980	3.52	2.10	-0.89	6.47
	1981-1985	1.13	3.45	-3.74	9.27
	1986-1990	2.53	3.18	-3.49	8.51
INCOME	1966-1970	1356.43	1089.31	94.27	4173.63
	1971-1975	1609.19	1234.93	120.56	4211.02
	1976-1980	1878.69	1428.36	146.17	4307.80
	1981-1985	1989.71	1484.87	210.67	4905.89
	1986-1990	2219.29	1807.21	270.42	7235.30
INEQUALITY	1966-1970	41.90	10.33	22.91	57.70
	1971-1975	44.42	9.71	22.80	61.47
	1976-1980	43.24	9.15	21.54	58.38
	1981-1985	41.98	7.95	20.97	57.09
	1986-1990	43.83	8.75	23.75	57.88
EDU	1966-1970	1.21	0.70	0.44	2.78
	1971-1975	1.46	0.77	0.54	3.43
	1976-1980	1.96	0.94	0.89	4.43
	1981-1985	2.20	1.09	1.02	5.69
	1986-1990	2.54	1.28	1.16	6.97
PLI	1966-1970	55.25	19.58	28.57	92.01
	1971-1975	60.46	21.19	30.09	113.01
	1976-1980	68.13	21.39	35.04	111.69
	1981-1985	59.62	19.00	34.33	102.13
	1986-1990	53.49	10.98	34.48	69.66

GROWTH = real gross domestic product per capita calculated by the change between the current year's real GDP per capita and the previous year's real GDP per capita, at constant 1995 US dollars, averaged over the 5 year period
INCOME = real gross domestic product per capita calculated at 1995 US dollars, averaged over the 5 year period
INEQUALITY = measured by the Gini coefficient, averaged over the 5 year period
EDU = average years of secondary schooling in the male and female population over the age of 25, averaged
PLI = price level of investment, measured by the PPP of investment/exchange rate relative to the US, averaged over the 5 year period

Table 2: Fixed Effects Regression results for Country Effect

Variable	Estimate	T-value	P-value
INEQUALITY	0.34**	3.15	0.00
INCOME	0.00	-0.34	0.74
EDU	-0.21	-0.35	0.73
PLI	0.00	0.15	0.88

R-Squared = .5901

F test for No Fixed Effects = 3.67

Countries = 20

Country	Estimate	T Value	P-Value
Bangladesh	3.95	1.42	0.16
Brazil	-0.22	-0.10	0.92
Chile	1.67	0.77	0.44
China	11.46***	3.48	0.00
Colombia	1.30	0.59	0.55
Costa Rica	2.00	1.19	0.24
Dominican Republic	1.16	0.53	0.60
Hungary	12.36***	3.77	0.00
Indonesia	4.90*	1.86	0.07
India	6.26***	2.55	0.01
Korea (South)	12.19***	4.65	<.0001
Malaysia	3.17	1.60	0.11
Mexico	-0.27	-0.14	0.89
Pakistan	5.53**	2.03	0.05
Peru	-2.19	-1.03	0.31
Philippines	0.62	0.23	0.82
Sri Lanka	5.48*	1.75	0.09
Thailand	6.06***	2.55	0.01
Tunisia	1.85	0.92	0.36
Venezuela	-15.69***	-2.55	0.01

* indicates the variable is significant at the .1 level
** indicates the variable is significant at the .05 level
*** indicates the variable is significant at the .01 level

Table 3: Fixed Effects Regression results for Country Effect and Time Effect

Variable	Estimate	T-Value	P-Value
INEQUALITY	0.31**	2.69	0.01
INCOME	0.00	-0.18	0.86
EDU	0.33	0.41	0.68
PLI	-0.01	-0.50	0.62

R Squared = .6436

F test for No Fixed Effects = 3.63

Countries = 20

Time Series = 5

Variable	Estimate	T-Value	P-Value
Bangladesh	3.55	1.21	0.23
Brazil	-0.41	-0.19	0.85
Chile	0.93	0.41	0.68
China	10.69***	3.19	0.00
Colombia	0.88	0.41	0.68
Costa Rica	1.95	1.19	0.24
Dominican Republic	1.67	0.78	0.44
Hungary	10.82***	3.11	0.00
Indonesia	4.66*	1.74	0.09
India	6.16**	2.46	0.02
Korea (South)	9.32***	3.02	0.00
Malaysia	2.78	1.43	0.16
Mexico	-0.43	-0.23	0.82
Pakistan	4.97*	1.80	0.08
Peru	-2.22	-1.07	0.29
Philippines	0.27	0.10	0.92
Sri Lanka	4.17	1.30	0.20
Thailand	5.88**	2.41	0.02
Tunisia	1.98	0.96	0.34
Venezuela	-15.69***	-2.55	.01

TIME PERIOD	Estimate	T-Value	P-Value
1966-1970	1.38	1.16	0.25
1971-1975	0.41	0.39	0.70
1976-1980	1.36	1.45	0.15
1981-1985	-0.79	-1.05	0.30
1986-1990	1.52*	3.1	.

* indicates the variable is significant at the .1 level
** indicates the variable is significant at the .05 level
*** indicates the variable is significant at the .01 level