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Income Inequality in Developing Countries

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Income Inequality in Developing Countries

Abstract

Education is important because it allows people to contribute effectively towards the growth of the economy.

Baindu Banya '95 graduated after January term with a major in economics. She wrote the following paper as part of her Senior Project and Research Honors classes. Baindu is a native of Sierra Leone.

Income Inequality in Developing Countries

by Baindu Banya

I. INTRODUCTION

Economic growth refers to a rise in national per capita income and product (PCY). However, economic growth does not mean that there is improvement in mass living standards. It can be a result of increase of wealth for the rich while the poor have less or no improvement in their living standards (Gillis 1992, p. 70). This uneven distribution of income is referred to as income inequality. There is much income inequality existing in individual countries as well as globally. Globally, it is reported that the top 1 percent of income recipients receive about 15 percent of worldwide income, and the top 5 percent receive 40 percent of all income. Meanwhile, the poorest 20 percent receive only 1 percent of the global income (Braun 1991, p. 49). In this paper, I intend to unlock significant factors that affect the level of income inequality in developing nations.

There was much interest in income inequality in developing countries in the 1960's which diminished as these countries became

faced with greater problems including declining growth rates and the debt problem (Gillis 1992, p. 72). Today, income inequality remains an important issue because it concerns human welfare. Measures of income inequality give insights into the extent of poverty in countries and are guides for both local and international organizations concerned about the improvement of living standards of the very poor.

II. THEORETICAL CONSIDERATIONS AND HYPOTHESIS

A. ECONOMIC GROWTH AND INCOME INEQUALITY

Kuznets' Inverted U hypothesis

The foundation of most works on income inequality is provided by Simon Kuznets. In 1963, Kuznets suggested that the relationship between economic growth and income inequality takes the form of an inverted U. In his study, Kuznets used cross-section data of 18 countries. Using his data, he derived the inverted U hypothesis from which he inferred that through the course of development, as PCY increases, initially income inequality worsens until it reaches a peak, P, after which income inequality improves (Fields 1980, p. 61). Diagram 1 (see next page) illustrates this inverted U pattern. According to the pattern, moving from low-income economies (\$0-500, World Bank (W.B.) 1988) to lower-middle economies (\$500-2200, W. B 1988), income inequality should increase. Starting from about upper middle-income (\$2200-6000, W. B 1988) onwards, income inequality should

decrease (Poulson 1994, p. 150). Kuznets' inverted U is a development pattern and not a theory. Chenery and Syrquin define development patterns to be changes in the structure of the economy associated with rising level of income (Chenery 1975, p. 4). The main difference between a pattern and a theory is that a theory asserts causality and a pattern does not. A theory asserts that changes in one variable cause a change in another variable. A pattern on the other hand would show a relationship between variables but does not assert that a change in one variable is the cause of a change in another variable. Since every country develops in a unique way, patterns are often used in development economics, because they provide a basis for comparative analysis in order to make generalizations about the development process of a single country (Chenery, p. 3).

Since Kuznets inverted U is a pattern; it does not explain income inequality. That is, rising PCY does not cause the inverted U trend. Rather, there is a relationship between PCY and income inequality which is illustrated by the inverted U pattern. Thus the question becomes what factors affect the level of income inequality in a country. The rest of this paper attempts to disclose the explanatory variables of income inequality. It is found that two explanatory variables, the shares of labor in industry and in education support the inverted U. A third explanatory variable, population growth rate, is expected to affect the level of income inequality at any stage of development.

Kuznet's Inverted U Pattern

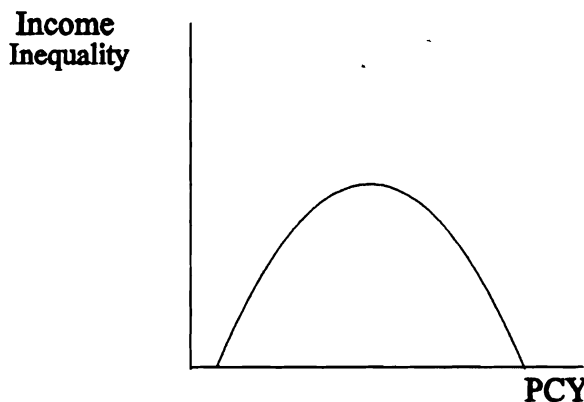


DIAGRAM 1

B. EFFECT OF INCREASING SHARE OF LABOR IN THE INDUSTRIAL SECTOR

The emigration of labor from the agricultural (rural) sector to the industrial (urban) sector plays an important role in the development of a country. Often when industrialization begins in a country, the industries require a significant amount of labor which must come from the rural sector. When labor emigrates to the urban sector, production in this sector increases and the economy grows. Moreover, the urban sector has other benefits for workers who emigrate, including access to services like public schools and health services, which enhance human capital and facilitate higher income. As will be

discussed below, this rural to urban emigration also affects income inequality. In this study, the share of labor in the industrial sector is used to account for the effect of rural to urban emigration on income inequality.

The argument here is that initially the share of labor in the industrial sector would be positively related to the level of income inequality, and after some point in development, the share of labor in the industrial sector will be negatively related to the level of income inequality. Thus, this argument is consistent with the inverted U pattern. The support for this argument is provided by the two-sector labor surplus model. The two sectors in this model are the agricultural and industrial sectors. In this paper it is assumed that if wages are rising, then income inequality is improving. This is because when workers earn higher wages, they take away more income from the wealthy and reduce wage differentials in the economy, causing the level of income inequality to decrease.

The Two-Sector Labor Surplus Model

It is assumed that before development takes place a nation is primarily agrarian and that surplus labor exists. Because land is fixed in supply and the supply of agricultural labor varies, as labor increases, initially agricultural productivity will increase until diminishing returns set in. Then, additional labor will not increase output, and the marginal productivity of labor will be zero. This situation indicates the existence of surplus

Supply of Labor in the Industrial Sector
Using the Labor Surplus Model

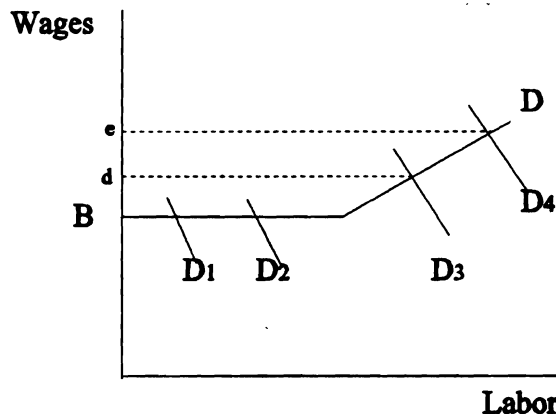


DIAGRAM 2

labor. Since wage is a function of marginal productivity, wages will be constant whenever there is surplus labor. In a country that is at its early stages of development, this constant wage is the subsistence wage (Gillis 1992 , pp. 54-59).

According to the two-sector model, the start of industrialization marks the start of development. Industries need workers, and given the initial surplus of labor in the agricultural sector, the industries attract workers from the agricultural sector by paying a constant wage which is slightly higher than the subsistence wage. The horizontal part of the labor supply curve, BC, in diagram 2 represents the period when there is excessive labor in agriculture, and the constant wage paid in the industrial sector is B.

As long as there is surplus labor in the

agricultural sector, the labor surplus model suggests that there will be rising income inequality in the economy as workers move to the industrial sector. This is because the increasing amount and low-cost of labor in the industrial sector raises output in that sector, causing the owners of industries to realize huge profits, while wages cannot rise above point B (diagram 2) until labor becomes a scarce factor (Gillis, p. 93). As illustrated in diagram 2, when there is surplus labor, an increase in demand for labor in the industrial sector from D_1 to D_2 does not force wages to rise. Thus, although workers earn more than subsistence wage by moving to the industrial sector which should decrease the overall level of income inequality, the huge profit of capitalists rises faster and dominates the level of income inequality so that overall income inequality increases.

When surplus labor ceases to exist in agriculture, further increases in demand for labor by industries will lead to higher wages in the industrial sector and at the same time workers in the agricultural sector become better off since the supply of agricultural labor is decreasing. Thus there will be an improvement in the overall level of income inequality. The point at which labor becomes scarce is point C, and marks the start of a trend towards income equality. The supply curve facing the industrial sector becomes CD, an upward sloping curve, which indicates that labor is in scarce supply. Those remaining in agriculture are better off for the following reasons. Workers in the industrial sector are no longer producing their own food, causing the demand for agricultural products to increase and consequently the price of these products to be higher. Moreover, the available land per worker in the agricultural sector is

rising and thus the marginal productivity of labor in the agricultural sector also rises. Increasing marginal productivity in the agricultural sector implies that wages in this sector are also rising. Thus to attract more workers from agriculture, industries must offer even higher wages than those existing in the agricultural sector (Gillis, p. 53). Thus in diagram 2, an increase in demand for labor in the industrial sector from D_3 to D_4 raises wages from d to e, which would mean a decrease in the overall level of income inequality.

The initial worsening followed by an improvement in the level of income inequality is consistent with Kuznets' inverted U hypothesis. That is, the labor surplus model supports the inverted U. Because the labor surplus model is based on the emigration of labor to the industrial sector, it supports the argument that the share of labor in industry should first increase then decrease the level of income inequality.

C. EFFECT OF POPULATION GROWTH RATES

It is stated that one reason why developing countries have high degrees of income inequality at relatively high levels of industrialization is because of rapid population growth in these countries (Dovring 1991, p. 91). Countries like South Korea and Taiwan that have succeeded in improving income distribution adopted measures to control population growth as one of the necessary tools. Moreover, other studies have shown a positive relationship between high population growth rates and income inequality (Chenery, p. 17).

These observations support the argument

Upward Shift of the Inverted U Curve

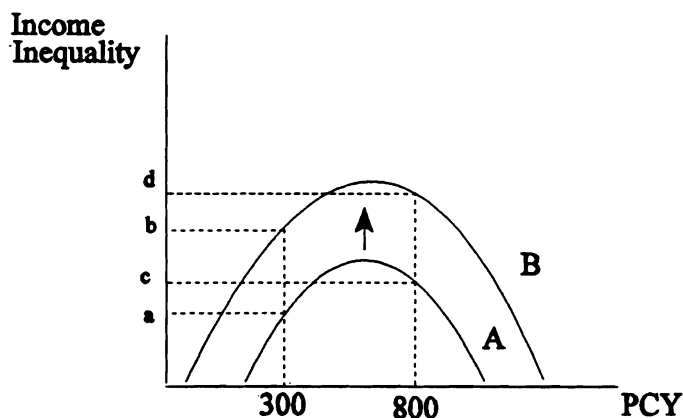


DIAGRAM 3

that high population growth rates will cause the level of income inequality to increase for any given level of PCY. Given that a country does not have perfect income equality at the start of its development process, the country's inverted U curve will intercept the income inequality axis at a point other than zero.

The argument given here is that high population growth rates will shift the country's inverted U curve upward so that the curve intercepts the income inequality axis at a higher point than before, indicating an increase in the level of income inequality for any given PCY. This argument is illustrated in diagram 3. Higher population growth rates causes the curve to shift from A to B and the intercept of the curve to rise from 0.2 to 0.5 for example. Thus at PCY of 300, the level of income

inequality also rises from 0.4 to 0.6. Therefore, population growth rates can be said to determine the intercept of the inverted U. An economy with a low population growth rate will have a lower intercept than a country with high population growth rates. That is, the higher the intercept of the inverted U curve of a country, the higher the level of income inequality for any given PCY.

Strong support for the argument that high population growth rates are positively related to the level of income inequality is provided by the two-sector labor surplus model and the theory of supply and demand. As previously discussed, the labor surplus model suggests that a country first has a period of worsening income inequality followed by a period of improvements in the level of income inequality. During the period of worsening income inequality, there is surplus labor in the agricultural sector and income inequality improves when labor becomes scarce. Using the labor surplus model and the theory of supply and demand, it will be shown that high population growth rates are positively related to the level of income inequality during the periods of abundant and scarce supplies of labor.

Diagram 4 (see next page) shows the effect of rising population growth rates when there is surplus labor in agriculture. As discussed before, BC indicates the period when income inequality rises, because the owners of industries are realizing huge profits due to the growth of industries and low labor costs. At

point C income inequality will take a downturn and further demand for labor by industries will cause wages to rise. If the population growth rate is not high, then the supply curve of labor S_{ind} should remain BCD.

However, if the supply of labor is increasing because of high population growth rates, then S_{ind} will be ABCD. The amount of surplus labor will become ABC which is greater than BC that represents surplus labor when population growth rates are very low. Therefore, when population growth rates are high, it will take a longer time for the economy to reach point C, where all surplus labor is absorbed by industries and the economy tends towards income equality. Also, labor costs will remain low for a longer time, causing the owners of industries to make greater profits than when population growth rates are low. This is because if population growth rates are relatively stable, then the time when labor becomes scarce comes sooner so that the owners of industries must cut profits at an earlier stage to increase wages in order to hire more workers.

In summary, when surplus labor exists and a country finds itself along the upside of the inverted U when its level of income inequality is rising, high population growth rates would further increase the level of income inequality for each PCY along this part of the inverted U curve. This is due to the widening of income differentials between industrial owners and workers.

If the country is at the stage when labor is in scarce supply, then the supply curve facing

Effect of High Population Growth Rates with Surplus Labor in the Economy

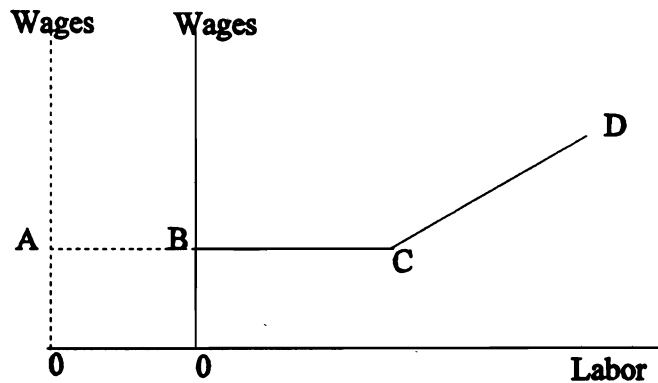


DIAGRAM 4

industries will be upward sloping. Thus, there will be improvements in the level of income inequality because wages will increase whenever the demand for labor by industries increases. This is illustrated in diagram 5, where S_1 is the supply curve of labor facing industries and an increase in their demand for labor raises wages.

An increase in the supply of labor at the stage of development when there is scarcity of labor causes labor to be less scarce and reduces wages. As shown in diagram 5, an increase in the supply of labor due to high population growth rates will cause the supply curve to shift from S_1 to S_2 , causing wages to fall. Since falling wages are linked with higher profits for industrial owners, there would be an increase in the level of income inequality. Thus, when labor is scarce and a country finds itself along the downside of the

inverted U, high population growth rates will retard improvements in the level of income inequality. That is, the level of income inequality will increase for every PCY along the downside of the inverted U.

Since it has been shown that high population growth rates shift both the upside and downside of the inverted U curve upward, it is clear that high population growth rates shift the inverted U curve upward. When this upward shift occurs, the inverted U will intercept the income inequality axis at a higher point, implying that the level of income inequality will rise for any given level of PCY.

D. EFFECT OF EDUCATION

Education is important because it allows people to contribute effectively towards the growth of the economy. Education also improves the level of income inequality by eliminating skill differentials which reduce wage differentials. This is because education facilitates higher labor productivity which leads to higher labor income.

The effect of education on income

Effect of High Population Growth Rates with Scarce Supply of Labor in the Economy

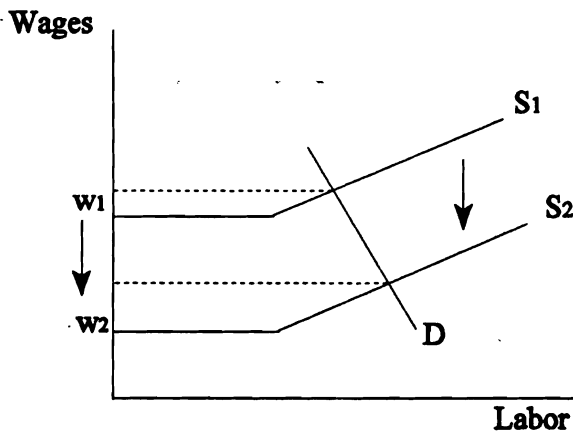


DIAGRAM 5

inequality is given by Lewis who focuses on the differentials between skilled and unskilled labor. As an economy grows, industries expand and they demand more skilled and unskilled labor. But at the early stages of development, there will be a scarce amount of literate people to carry out, for

example, supervisory and administrative tasks. Because of this scarcity of skilled workers compared to the abundant supply of unskilled workers, wage differentials between the two groups of workers will widen. Skilled workers will see increases in their wages, while the wages of unskilled workers may even fall if the supply of unskilled workers increases (Lewis, pp. 180-181). The initial widening of wage differentials that results between the two groups of workers causes a worsening of the level of income inequality in the economy.

However, as the economy grows and educational facilities spread to a larger proportion of the population, in the long run, skilled workers in the country will increase, causing the wages of skilled workers to fall (Lewis, pp. 180-181). Thus, wage differentials between the skilled and unskilled workers will reduce, causing the level of

income inequality to improve. The initial worsening followed by improvements in the level of income inequality that is caused by the widening and narrowing of wage differentials, is consistent with the inverted U pattern. Thus, it is argued here that initially education is likely to be positively related, before it becomes negatively related to the level of income inequality.

Education is important because it allows people to contribute effectively towards the growth of the economy.

More support for the fact that education affects the level of income inequality is shown by the need for expansion of education systems worldwide and in the studies of many economists. Compulsory education is widely accepted as an important public service, and every country has some form of compulsory education (Eckstein, 1992). Eckstein and Zilcha show empirically that human capital affects the quality of labor and that compulsory education will improve the distribution of income through generations (Eckstein). If education improves labor and causes higher wages, then compulsory education should improve the level of income inequality. Also, Chenery and Syrquin found that education removes income away from the richest 20% and increases income of the lowest 40% (Chenery, p. 63). More interestingly, where primary and secondary schooling were found to be positively related to income shares obtained by individuals, it

was also shown that primarily schooling significantly explained variations in income for the lowest 40% and secondary education significantly explained these of the middle 40% (Chenery, p. 17). This finding helps explain why emphasis is often placed at least on compulsory primary schooling in many developing nations. It can be said that the aim is to improve the lot of the very poor.

E. HYPOTHESES

The discussions above generate four hypothesis:

- I. The inverted U exists, supported by the fact that the labor surplus model predicts the inverted U pattern.
- II. The share of labor in industry is initially positively related then negatively related to the level of income inequality.
- III. Population growth rates are positively related to the level of income inequality at any stage of development. Higher population growth rates are associated with higher income inequality.
- IV. It is likely that education is initially positively related before it becomes negatively related to the level of income inequality.

III. RESEARCH DESIGN

Data on 61 countries, mainly low-income and middle-income countries, are used in this study. The measure of income inequality used is the gini coefficient calculated from a Lorenz curve constructed using data on income distribution of a given country. I created a program in Pascal to calculate this coefficient based on the Lorenz curve, the formula for the area of trapezoids, and the formula for the coefficient.

Data on income distribution, share of labor in industry and population growth rates were obtained from the World Bank's publication Social Indicators of Development 1991-92. Primary and secondary school enrollments are used as a measure of the expansion of education. The data for these variables were also obtained from the Social Indicators of Development. Data for all variables are not given annually but for periods of time. This is possibly due to the fact that data on variables such as the income distribution in a country are collected less frequently. The periods for which data are reported are 25-30 years ago, 15-20 years ago, and the most recent period.

A. PCY GROUPS

When I plotted calculated gini coefficients for the countries used in this study, all the

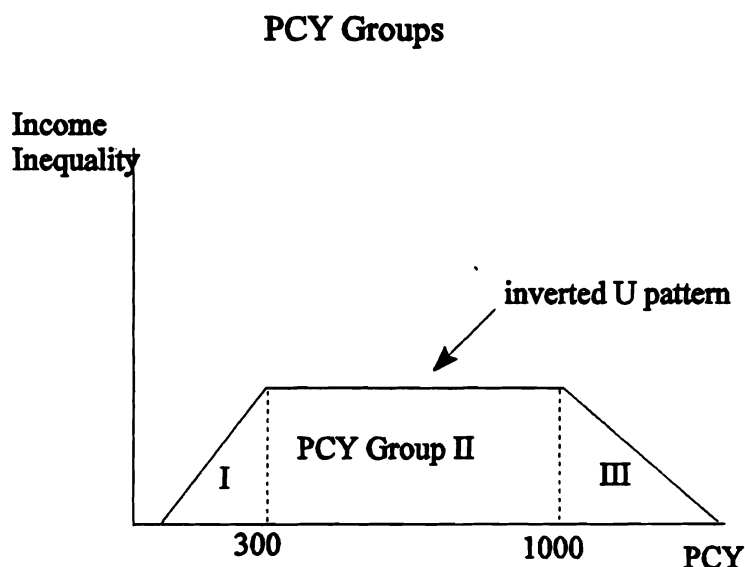


DIAGRAM 6

points were crowded so that no pattern was observed. When I tried to observe patterns using PCY groups, it was found that the upside of the inverted U existed for countries with PCY up to \$300. There was no clear trend for countries with PCY between \$300 and \$1000, but there was evidence of the downside of the inverted U starting with countries with PCY about \$1000 and higher. Diagram 6 illustrates the inverted U pattern that I found using plotted graphs. **PCY Group I** will refer to countries with PCY less than or equal to \$300. **PCY Group II** will refer to countries with PCY between \$300 and \$1000, and **PCY Group III** will refer to countries with PCY greater than \$1000.

Table 1 (see next page) which shows regression results for the PCY groups identified above verifies the inverted U pattern that was observed using plotted graphs. The PCY^2 term is included since the inverted U pattern is quadratic. According to Table 1, there is an initial worsening of income inequality for PCY Group I judging from the positive significant sign of the PCY variable. The results for PCY Group II does not indicate any significant pattern which confirms that a horizontal line best represents the trend of income inequality for this PCY group. For PCY Group III, there is strong evidence of decreasing income inequality which is indicated by the negative significant sign of the PCY variable. Thus the results shown in this table, partially confirm that the inverted U pattern exists. Later on we will see whether the labor surplus model

Table 1: INVERTED U PATTERN

VARIABLES	PCY <= 300	300<PCY<= 1000	PCY >1000
PCY	(+) +0.00262*	-0.00012	(-) -0.00003*
PCY ²	(-) -0.00001*	+0.00000	(+) +0.00000

* = significant at the 90% confidence level.
signs in parentheses are the hypothesized signs.

supports that this inverted U pattern exists.

As previously mentioned, according to the inverted U pattern, it is expected that for low-income economies (\$0-- \$500) to lower middle-income economies (\$500-- \$2200), the upside of the inverted U will be evident. Starting from about upper middle-income economies (\$2200--\$6000) to high-income economies, the downside of the inverted U should be evident (Poulson, p. 150). Thus, my findings using plotted graphs and regression models discussed above are good findings since they posit that the phase of worsening income inequality ends earlier than expected at PCY of about \$300. Also, my findings predict that the point at which income inequality starts its downward trend also occurs earlier at PCY of about \$1000.

B. MODELS

To test the hypothesis in this paper, several models are created and tested for each PCY group. On an aggregate level, the results for all three PCY groups will test the four hypothesis. In these models, **Industry** represents the share of labor in industry variable, **PopRate** represents population

growth rates, and **Primary and Secondary** represent primary and secondary school enrollments respectively. Table 2 (see next page) clearly presents the variables used in this study and their definitions. OLS regressions were used to test the models.

For each PCY group, Model 1 includes all the variables and tests all four hypothesis. Models 2, 3 and 4 attempt to improve Model 1. The equation for Model 1 is:

$$Gini = PCY + PCY^2 + Industry + Industry^2 + PopRate + Primary + Primary^2 + Secondary + Secondary^2$$

Again, the squared terms are included since the inverted U pattern is a quadratic curve. These squared terms indicate whether a curve is concave or convex. **PopRate** is not included in the equation above because **PopRate** is hypothesized to be always positively related to the level of income inequality.

According to the hypothesis, using data for PCY Group I, it is expected that in the regression result for Model 1, the PCY term will be positive and significant, which will confirm the upside of the inverted U. Industry is expected to be positive and significant to imply that as labor emigrates from agriculture

Table 2: DEFINITION OF VARIABLES

VARIABLES	DEFINITIONS
PCY	<i>GNP per capita.</i> Estimates are for 1990 at current market prices in U.S dollars.
INDUSTRY	Labor force in mining, manufacturing, construction, electricity, water and gas, as a percentage of the total labor force.
POP RATE	<i>Population growth rate.</i> Annual growth rate calculated from mid year total and urban population.
PRIMARY	<i>Primary school enrollment.</i> Gross enrollment of all ages at primary level as a percentage of school age children as defined by each country and reported to UNESCO.
SECONDARY	<i>Secondary school enrollment.</i> Computed in the same manner as the primary school ratio.

Source = Social Indicators of Development 1991 -92

to industry at the early stages of development, the economy experiences a worsening of income inequality. High population growth rates should always worsen the level of income inequality and therefore a positive and significant sign is expected for PopRate. Primary and Secondary are expected to be positive and significant since education has its effects in the long run, and a country at its early stage of development is likely to have few literate people and thus large wage differentials.

For PCY Group II, the regression result for Model 1 is likely to indicate nothing significant as is implicated by the results presented in Table 1.

For PCY Group III, a negative significant

sign is expected for the PCY variable to confirm the downside of the inverted U. Industry is also expected to be negative and significant since countries in this group should have competitive labor markets so that higher demands of labor increases wages. Poprate is expected to be positive and significant. Primary and Secondary are expected to be negative and significant since at this stage of development there are more literate people in the labor force which causes wage differentials to reduce and income inequality to decrease.

IV. RESULTS, CONCLUSIONS, AND POLICY IMPLICATIONS

Tables 3, 4, and 5 show the regression

models for the PCY Group I, II and III respectively.

A. PCY GROUP I (THE EARLY STAGE OF DEVELOPMENT)

Results

Table 3 (see next page) shows the results for this group. Model 1 which contains all the variables is a good model judging from its R^2 of 0.80. All the variables are significant except for **Primary** and **Primary**². **Secondary** and **Secondary**² have unexpected signs. In Model 2, where the **Secondary** variables are excluded, the R^2 becomes 0.54 and only **PopRate** is significant. However, the **Primary** variables have the expected signs. Model 3 appears to be the best model in which the **Primary** variables are excluded. All the variables in this model are significant and the model has an R^2 of 0.80. However, the **Secondary** variables have the unexpected signs.

In summary, the labor surplus model does not show that the downside of the inverted U exists in this study.

The models discussed above support that the upside of the inverted U exists at the early stages of development. The positive sign and significance of the PCY variable in the models confirm the initial positive relationship between PCY and income inequality. The negative and significant sign of **Industry** is consistent with what the labor surplus model predicts, that at the initial stages of

development there will be a surplus of labor in agriculture that causes labor to be cheap. Industrial owners take advantage of this cheap surplus labor and are then able to make huge profits causing wage differentials to increase. The results for **PopRate** support that high population growth rates are positively related to the upside of the inverted U. The results are also consistent with the explanation provided by the labor surplus model that high population growth rates will increase the amount of surplus labor in this PCY group and help worsen income inequality. The unexpected results for the **Primary** variables may be due to the fact that this variable is not lagged. **Secondary** can be adopted as a measure of lagged **Primary**, and viewed this way, one may explain the unexpected signs obtained for **Secondary**. **Secondary** may account for when primary school graduates with mere literacy increase the amount of "literate" people in the country which helps reduce wage differentials.

Conclusions and Policy Implications

The results and discussion above posit that when a country begins its development process, as industries grow and surplus labor emigrates from agriculture to industry, the initial worsening of income inequality is inevitable. Thus, for countries with PCY up to about \$300, a worsening trend of income inequality can be accepted as an initial phase that accompanies development. How worse the degree of income inequality is at the early stages of development depends on population growth rates. The higher are population growth rates, the higher the level of income inequality at each PCY. Thus, it is necessary for developing countries to adopt measures to control population growth rates as early as

Table 3: GINI REGRESSIONS FOR PCY ≤300

VARIABLE	MODEL 1	MODEL 2	MODEL 3
PCY	(+) +0.00428*	(+) +0.00110	(+) +0.00191*
PCY ²	(-) -0.00001*	(-) -0.00002	(-) -0.00001*
INDUSTRY	(+) +0.15718*	(+) +0.02127	(+) +0.08700*
INDUSTRY ²	(-) -0.00786*	(-) -0.00092	(-) -0.00414*
POPRATE	(+) +0.17821*	(+) +0.07699*	(+) +0.10363*
PRIMARY	(+) -0.00240	(+) +0.00247	
PRIMARY ²	(-) +0.00000	(-) -0.00002	
SECONDARY	(+) -0.01823*		(+) -0.01467*
SECONDARY ²	(-) +0.00047*		(-) +0.00030*
ADJUSTED R ²	0.80	0.54	0.80

* = significant at 90% confidence level (two-tail test).

Signs in parentheses are the hypothesized signs.

possible in their development process. That way, and according to the labor surplus model, labor in the economy becomes a scarce factor earlier and labor markets are competitive sooner. The results for the education variables are puzzling and is an area for future research.

B. PCY GROUP II (THE INTERMEDIATE STAGE OF DEVELOPMENT)

Results

All the models created for this PCY group showed no significant result as noted by their

Table 4: GINI REGRESSIONS FOR 300 < PCY ≤ 1000

<i>VARIABLE</i>	<i>MODEL 1</i>	<i>MODEL 2</i>	<i>MODEL 3</i>
<i>PCY</i>	0.00004	0.00005	0.00008
<i>PCY</i> ²	-0.00000	-0.00000	-0.00000
<i>INDUSTRY</i>	-0.00842	-0.00720	-0.00836
<i>INDUSTRY</i> ²	-0.00000	-0.00004	0.00002
<i>POPRATE</i>	-0.02217	-0.02602	-0.00794
<i>PRIMARY</i>	0.01063	0.01068	
<i>PRIMARY</i> ²	-0.00006	-0.00006	
<i>SECONDARY</i>	0.00171		0.00232
<i>SECONDARY</i> ²	-0.00002		-0.00002
<i>ADJUSTED R</i> ²	-0.07	0.05	0.02

R²s in Table 4. None of the variables were significant. The results confirm that the curve is a straight line for this PCY group.

Conclusions and Policy Implications

The results for this PCY group does not provide any basis for comparative analysis which can be used to make generalizations about countries in this PCY group. The results perhaps suggest that the labor surplus model is insufficient in explaining the trend of income inequality for this PCY group. Maybe conditions in these countries are complex and varied and therefore cannot be easily summarized.

C. PCY GROUP III (THE INDUSTRIALIZED STAGE OF DEVELOPMENT)

Results

Only the education variables have significant coefficients in the models in Table 5. The PCY variables in this table are not significant although they are in Table 1. Thus there is no evidence of the downside of the inverted U as predicted by the labor surplus model. Model 1 is probably the best model judging especially from its R² of 0.50. The significant and expected coefficient for secondary supports Lewis' explanation that as an economy develops education facilities become available to more people so that eventually education has a negative effect on the level of income inequality.

Conclusion

It is likely that because countries in PCY Group III are well industrialized, the

Table 5: GINI REGRESSIONS FOR PCY > 1000

VARIABLES	MODEL 1	MODEL 2	MODEL 3
PCY	(-) -0.00002	(-) -0.00001	(-) -0.00002
PCY ²	(+) +0.00000	(+) +0.00000	(+) +0.00000
INDUSTRY	(-) -0.00460	(-) -0.01577	(-) -0.00720
INDUSTRY ²	(+) 0.00007	(+) +0.00024	(+) 0.00012
POPRATE	(+) -0.01515	(+) +0.00806	(+) -0.01960
PRIMARY	(-) -0.01664	(-) -0.05207*	
PRIMARY ²	(+) +0.00008	(+) +0.00024*	
SECONDARY	(-) -0.00971*		(-) -0.00866*
SECONDARY ²	(+) +0.00006*		(+) +0.00005
ADJUSTED R ²	0.50		0.44

* = significant at the 90% confidence level (two-tail test).

signs in parentheses are the hypothesized signs.

increasing share of labor in industry has little impact on the level of income inequality. Likewise, a similar explanation can be provided for population growth rates which are relatively stable in these countries. Probably, there are other variables that help explain the downward trend of income inequality that is expected for industrialized

countries. A measure of political and social conditions which are often contrasting in developing and developed countries may for instance be a crucial determinant of income inequality that explains the downward trend of income inequality in developed countries. This is because often countries in the early stages of development experience political and social

instabilities, conditions which improve as these countries develop. In summary, the labor surplus model does not show that the downside of the inverted U exists in this study. The fact that the downside of the inverted U pattern is not confirmed may explain the insignificant results for PopRate.

V. GENERAL CONCLUSION

In this paper, the labor surplus model (accounted for by the share of labor in industry) was expected to predict the inverted U pattern. Also, high population growth rates and education were considered as explanatory variables of income inequality. Four hypothesis were generated to confirm that these variables were explanatory variables of income inequality. Although the inverted U pattern was found as presented in Table 1, the labor surplus model failed to predict the inverted U pattern. This is because no evidence of the downside of the inverted U was found for countries with PCY greater than \$1000 as shown in Table 5. The labor surplus model was best able to predict the trend of income inequality for countries with very low PCY. It was found that the share of labor in industry was initially positively related to income inequality but there was no evidence of this variable becoming negatively related to income inequality later on in the process of development. It was shown that high population growth rates significantly increase income inequality in only countries with low PCY. Thus again the support provided by the labor surplus model for the effects of high population on income inequality is confirmed for only countries in the early stages of development. The effects of education are not

clear and this is an area for future research. In summary, this study shows that the labor surplus model predicts an upward trend for countries with very low PCY, and that high population growth rates worsen the level of income inequality for these countries.

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