**On Measuring the Impact of Various Income Sources**

**on the Link between Inequality and Development.**

**Implications for the Kuznets Curve.**

by

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Abstract

To understand the process described by the Kuznets curve a decomposition of the Gini Index by income sources is used that emphasizes the role of three components measuring the impact of the shares of the sources, the degree to which they are unequally distributed and their correlation with total income. The rising section of the Kuznets curve is mainly the consequence of the increasing share of wages while the declining section is related to the declining share of entrepreneurial income and the negative correlation between transfers and total income. The data sources were provided by the International Labour Office.

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## 1. Introduction

More than forty years ago, in his Presidential Address to the American Economic Association, Kuznets (1955) suggested that income inequality was generally rising in the early stages of economic development. In the latter phases of the development process, inequality declines, he argued, and this hypothesis of an inverted-U relationship between inequality and development has since been known as the Kuznets Curve. There have been numerous empirical investigations testing Kuznets' conjecture and in recent years an abundant literature has appeared which tries to give theoretical foundations to Kuznets' proposition.

Kuznets' conjecture stressed the impact of migration from rural to urban areas on overall inequality and may be therefore related to the attempts that are often made to explain changes in overall inequality on the basis changes in inequality between and within population subgroups. It is however also possible to link variations in total inequality to changes that occur at the level of the various income sources, whether one refers to modifications in the shares of these sources on in the inequality of their distribution. Such an alternative approach emphasizes thus the link that exists between the functional and the personal distributions of incomes. Ricardo (1917) was probably the first to introduce the concept of functional distribution of income and to analyze the determinants of the various factor shares. Pareto (1895) is usually considered to be the first economist who attempted to analyze and estimate a model of personal income distribution. There have not been many attempts to link the theories of functional and personal distribution of incomes (see, however the interesting survey of Dagum, 1999, on this topic), among other reasons because of the scarcity of relevant data.

This study represents somehow an attempt to derive the size distribution of incomes from the functional distribution of income, assuming that the income categories provided by the data sources provide information on the functional distribution of income. The approach adopted allows us also in a certain way to check the validity of Kuznets' thesis but the originality of the present paper is essentially methodological. A decomposition technique is suggested that makes it possible to determine the exact effect of each income source on overall income inequality, in the different stages of the development process. As will later be shown, such an impact is related not only to the weight of the income source in total income but also to the degree to which it is unequally distributed as well as to the extent to which it is correlated with total income. Each of these specific effects will be identified and its magnitude during the development process estimated. An empirical illustration is then presented that is based on data recently published by the International Labour Office and giving for various countries the distribution by income classes of the different income sources.

The paper is organized as followed. We first review the literature devoted to empirical studies related to the Kuznets Curve. Then we recall how inequality, when measured by the Gini Index, may be decomposed by income source and we suggest a way to break down the difference between the income inequality observed in a given country and the average degree of inequality observed in the sample of countries into three components: the contributions of differences between the shares of the various income sources in this country and in the sample, between the extent to which the various income sources are unequally distributed in this country and in the overall sample and finally between the degree to which total income and the various income sources are correlated in this country and in the total sample of countries. Thereafter, we apply the technique summarized earlier to the ILO data which have been used, and check whether a Kuznets Curve may be derived from these data and analyze the link which exists for each income source between the three contributions derived previously and the level of per capita GDP. We are thus able to shed some new light on the link between the functional and the personal distributions of incomes as well as on the so-called Kuznets process, that is on the relationship between inequality and development.

## 2. Previous Empirical Studies of the Relationship between Inequality and Development

Although there exists a very important theoretical literature on the Kuznets curve[1], we concentrate our attention on empirical studies of relationship between inequality and development Most of this literature has been based on cross-country estimations of the relationship between inequality and per capita national income (e.g., Adelman and Morris, 1973; Paukert, 1973; Ahluwalia , 1974, 1976a, 1976b; Ahluwalia et al, 1979; Anand and Kanbur, 1973a, 1973b; Tabatabai, 1974). Several measures of income inequality have been used in these empirical investigations (the percentage income share of the poorest 40%, Theil's two entropy indices, the squared coefficient of variation, the Gini Index or its logit transform, the Atkinson Index or one of its decomposable transforms, the variance of the logarithm of income). The present section will mainly emphasize studies based on the Gini Index as it is the measure we have used in our investigation.

These empirical studies have also used various kinds of functional forms to test for the Kuznets hypothesis, the inequality measure being regressed on per capita income and its inverse or on per capita income and the inverse of the logarithm of income, etc. In a recent study Anand and Kanbur (1993a) have shown that each inequality index generally had a corresponding functional form of the inequality-development relationship. These functional forms were derived on the basis of the two-sectors model which originally inspired Kuznets (1955). Anand and Kanbur (1993a) also stressed that the functional form they derived for the Gini Index was valid only in the case of non-overlapping sectoral income distributions. In such a case they proposed regressing the Gini Index on per capita GDP and on its inverse[2]. More precisely:

$$G = a + b\mu + c(1/\mu) \quad )1($$

where $G$ is the Gini Index and $\mu$ the per capita GDP. It is easily observed that when there is a turning point, the per capita GDP, $\mu*$ at the turning point is such that

$$\mu^* = \sqrt{c/b} \quad )2($$

The empirical investigation of Anand and Kanbur (1973a) gave $\mu*$ a value of \$421 (1970 US dollars) when they used a sample of 60 countries including both developing and developed counties. In 1985 this turning point would correspond to a per capita GDP of \$1168, on the basis of the US consumer price index.

Tabatabai (1994) used as dependent variable the logit transform of the Gini Index and his results give, at the turning point, a per capita GDP at 1985 international prices of \$1,565 when the Gini Index measures the inequality between households and of \$2,422 when it measures the inequality between persons. The first case is based on 98 observations, the second on 52.

Fields and Jakubson (1994) use a combination of cross-section and panel data which includes 35 countries with one to nine observations per country. They first present a "pooled model" where all the data are treated as a single cross-section, while in a second stage they present a "fixed effects model", the idea being that different countries may lie on Kuznets curves which have the same shape but different intercepts.

They find that in the pooled model inequality rises in the early stages of economic development while the fixed effects model always shows a negative relationship between income inequality and the level of development. These results remain robust enough not to be affected by changes in the definitions of the level of development or of the recipient unit (households versus individuals), by the addition of other countries or by several modifications of the econometric specifications. Fields and Jakubson (1994) believe that their findings may be related to the fact that in Latin American countries inequality is usually high while their per capita GDP lies in the middle of the range of countries usually included in such studies. This might explain why the inverted $U$ curve does not show up in their fixed-effects model.

Bruno, Ravallion and Squire (1996) present a careful review of the empirical evidence on the link between inequality and growth. They argue that it is an error to rely on cross-country data sets to draw conclusions concerning the existence of the Kuznets Curve. First, such data ignore country-level determinants of inequality. For example, past inequality is likely to be correlated with current inequality and this in itself is a source of biased estimates. Bias could also arise from differences in the type of data. Some studies, for example, combine income and consumption data.

However, because of consumption smoothing, income inequality is usually higher than consumption inequality. Since for Latin American countries one usually had income data while for Asian countries, in the sixties, one had consumption data, one should not be surprised to derive an inverted U-curve linking inequality and per capita income. Bruno, Ravallion and Squire (1996) indeed stress that, when using cross-section data covering the 1980s, that is, once Asian countries had, on average, a much higher per capita income, there was no more evidence of an inverted U-curve.

Concerning the evidence from time series, Bruno, Ravallion and Squire (1996) argue that no clear trend emerged from a careful analysis of Indian data which included 33 household surveys covering the period 1951 to 1991. There was, eventually, a downward trend until the mid-1960s. When running the Anand and Kanbur (1993) test equation appropriate to the Gini Index, they derived even an ordinary U-curve, although one which declines most of the time.

Finally, when combining time series and cross-section data, Bruno, Ravallion and Squire (1996) found that 92 percent of the variance in Gini indices by country and date is a consequence of cross-section variations while only 7 percent is accounted for by variation over time.

More recently Ram (1997) used data on income distribution obtained from the compilation prepared by Deininger and Squire (1996). His database corresponds in fact to the " high quality" subset of 19 developed countries identified by Deininger and Squire and includes observations which are comparable over time and across countries. Using a fairly standard Kuznets-type quadratic, Ram handled the cross-country heterogeneity problem by estimating fixed-effects panel-data models that included country-specific dummy variables. His major conclusion is that the pattern observed in the developed world is quite similar to that noted for the U.S. Income inequality shows an uninverted U-pattern insofar as inequality declined during the 1950s and 1960s but started to increase in the 1970s.

Though limited to the US, Tribble's (1999) study covered the 1947-1990 period and concluded that the GNP-inequality relationship is better explained by a S-curve hypothesis than by Kuznets' inverted U-curve or by the U-curve proposed by others. Tribble's S-curve identifies therefore two critical turning points in the per capita GNP-inequality relationship. Prior to the first turning point the story is that of an agriculture-to-manufacturing transition with the level of intrasectoral inequality in manufacturing exceeding that in agriculture. In addition the per capita income growth is also higher in the manufacturing sector. Once the surplus of agricultural labor is absorbed into the manufacturing sector, the first turning point is achieved with wages growing in both sectors and inequality declining. Similarly the second critical turning point is reached when the level of intrasectoral inequality in the newly emergent service sector begins to exceed the level of intrasectoral inequality in the manufacturing sector which can now be considered as the traditional sector. Beyond this second critical turning the per capita income growth in the service sector exceeds that in the manufacturing sector.

List and Gallet (1999) used a broader database, a panel dataset of 71 countries which included a mix of lower-developed and higher-developed countries, over the 1961-92 period. They found that for lower-developed to middle-developed countries, the Kuznets curve is indeed an inverted U-curve. For higher developed countries, however, the relationship between income inequality and per capita income becomes positive again, findings that confirm Tribble's (1999) results. List and Gallet (1999) suggested that this renewed positive relationship might rest on the shift away from a manufacturing base towards a service base in these countries. Since Bishop, Formby and Thistle (1991) had argued that the service sector is characterized by bimodal pay scales, a consequence of the premium placed on education, a shift towards a service base is likely to generate a greater dispersion in incomes.

Whereas all these studies looked at the link between the Gini Index of total income and per capita GDP or income, it might be worthwhile to see whether collecting information on sources of income reveals some interesting patterns. The next sections will show how such information may be used[3].

## 3. The Decomposition of Income Inequality by Income Source in a Given Country: The Methodology

Let $X_{ji}$ denote the value of income $i$ to individual $j$ and let $X_{.i}$ and $X_{j.}$ be respectively defined as

$$X_{.i}=\sum_{j=1 \text{ to } n} X_{ji} \qquad (3)$$

and

$$X_{j.}=\sum_{i=1 \text{ to } I} X_{ji} \qquad (4)$$

where $I$ represents the total number of income sources and n the number of individuals.

Let also $S_{ji}$, $S_{.i}$ and $S_{j.}$ be defined as

$$S_{ji}=X_{ji}/X \qquad (5)$$

$$S_{.i}=X_{.i}/X \quad (6)$$

$$S_{j.}=X_{j.}/X \quad (7)$$

where $X$ represents the total income of the population (all sources combined). $S_{.i}$ represents therefore the weight of income source $i$ in total income $X$ while $S_{j.}$ denotes the share of individual $j$ in total income.

Following Silber's (1989) analysis of the decomposition of income inequality, it is possible to define the Gini Index $I_G$ of overall income inequality as:

$$I_G=[e']G[S] \quad (8)$$

where $[e']$ is a $1$ by $n$ row vector of population shares, each equal to $(1/n)$, $[S]$ is the $n$ by $1$ column vector of the income shares $S_{j.}$ and $G$ is a n by n square matrix whose typical element $g_{hk}$ is equal to $0$ if $h = k$, to $-1$ if $h < k$ and to $+1$ if $h > k$. Notice that in (7) the income shares $S_{j.}$ are ranked by decreasing value of the total income (all sources combined) of the various individuals.

Combining (7) and (8) we then derive that

$$I_G = e'\ G\ \{\ [\ S_{j1}\ ]\ +\ [\ S_{j2}\ ]\ +\ \ldots\ +\ [\ S_{ji}\ ]\ +\ \ldots\ +\ [\ S_{jI}\ ]\ \}$$

(9)

Note that in (9) the terms $[\ S_{ji}\ ]$ on the R.H.S. of the $G$-matrix represent, in fact, column vectors whose typical element is equal to $S_{ji}$. In other words, (9) may be written as

$$I_G=e'G\{\Sigma_{i=1\,\text{to}\,I}[S_{ji}]\} \quad (10)$$

where $[\ S_{ji}]$ is a n by $1$ column vector containing the $n$ shares $S_{ji}$ of the income source $i$.

Let now $V_{ji}$ represent the share $(X_{ji}/X_{.i})$ of individual $j$ in income source $i$. Expression (10) may then be written as:

$$I_G=e'G\{\Sigma_{i=1\,\text{to}\,I}S_{.i}[V_{ji}]\} \quad (11)$$

$$I_G = \sum_{i=1 \text{ to } I} S_{.i} \{ [e'] \, G [V_{ji}] \} \qquad (12)$$

where $[\ V_{ji}]$ represents the $n$ by $1$ vector of the shares $V_{ji}$. Remember, however, that in the vector $[\ V_{ji}\ ]$ the shares $V_{ji}$ are ranked not by decreasing value of the shares $(X_{ji} / X_{.i})$ but by decreasing values of the shares $S_{j.} = (X_{j.} / X)$. The shares $V_{ji}$ may therefore not be monotonically decreasing so that the product $[e']\ G\ [\ V_{ji}\ ]$ is known as the Pseudo-Gini of income source $i$. Let $[y_{ji}\ ]$ represent the vector of the shares $(X_{ji} / X_{.i})$ when the latter are ranked by decreasing values. The product $[e']\ G\ [y_{ji}\ ]$ represents then the Gini Index of inequality of income source $i$ among the various individuals. Following Silber (1993) and using (12), we may then define the index $I_G$ of overall income inequality as:

$$I_G = \sum_{i=1 \text{ to } I} S_{.i} \{ [e'] \ G \ [\ y_{ji}\ ] \} + \sum_{i=1 \text{ to } I} S_{.i} \{ [e'] \ G \ [\ V_{ji} - y_{ji}\ ] \}$$

(13)

The first term on the R.H.S. of (13) is the weighted sum of the values of the Gini index for the various income sources, the weights $S_{.i}$ being equal to the share of income source i in the total income in the population. The second term on the R.H.S. of (13) is a permutation component which is equal to the weighted sum of the difference between the values of the Pseudo-Gini and the actual Gini index for the various income sources. This permutation component is therefore a consequence of the fact that the ranking of the different individuals may vary from one income source to the other.

## 4. The Breakdown of the Difference in Income Inequality in a Given Country and in the Overall Sample of Countries

Using the notations of Section 4, let us call $PG_i$ and $AG_i$ the Pseudo-Gini and actual Gini Index for source $i$ where, using (12) and (13),

$$PG_i=[e'] G [V_{ji}] \quad (14)$$

$$AG_i=[e'] G [y_{ji}] \quad (15)$$

respectively.

Let $A$ and $M$ be additional subscripts referring, respectively, to country $A$ and to the overall sample of countries[4], and for simplicity let $S_i$ (instead of $S_{.i}$) represent the share of income source $i$ in total income.

Using (13) we then derive (see, Flückiger and Silber, 1995):

$$I_{G,A}=\sum_i S_{i,A}[AG_{i,A}+(PG_{i,A}-AG_{i,A})] \quad (16)$$

$$I_{G,M}=\sum_i S_{i,M}[AG_{i,M}+(PG_{i,M}-AG_{i,M})] \quad (17)$$

Combining (16) and (17) we may write[5], after some algebraic manipulation, that

$$I_{G,A} - I_{G,M} = \sum_i [ ((S_{i,A} + S_{i,M})/2) (PG_{i,A} - PG_{i,M}) ] + \sum_i [ ((PG_{i,A} +PG_{i,M})/2) (S_{i,A} - S_{i,M}) ] \quad (18)$$

Calling, respectively $\Delta_{i,A}$ and $\Delta_{i,M}$ the differences $(PG_{i,A} - AG_{i,A})$ and $(PG_{i,M} - AG_{i,M})$, we derive that

$$(PG_{i,A} - PG_{i,M}) = (AG_{i,A} - AG_{i,M}) + (\Delta_{i,A} - \Delta_{i,M}) \quad (19)$$

Combining (18) and (19), we conclude, after some additional algebraic manipulations, that

$$I_{G,A}-I_{G,M} = u + v + w \quad (20)$$

where

$$u = \sum_i[((PG_{i,A}+PG_{i,M})/2)(S_{i,A}-S_{i,M})] \quad (21)$$

$$v = \sum_i[((S_{i,A}+S_{i,M})/2)(AG_{i,A}-AG_{i,M})] \quad (22)$$

$$w = \sum_i[((S_{i,A}+S_{i,M})/2)(\Delta_{i,A}-\Delta_{i,M})] \quad (23)$$

It may be observed that *u*, *v* and *w* in equations (21) to (23) give, respectively, the contribution to the total difference between the inequality in country A and in the overall sample, of the differences which exist between country A and the overall sample of countries in the shares of the various income sources, in the inequality within each income source and in the correlation between the Pseudo-Gini and the actual Gini Index of the various income sources.

**5. The Contribution of Different Income Sources to Total Inequality**

The sample of observations for which we had data on the various income sources included 23 countries[6] whose GDP per capita (see Table 1 ) varied from $661 (Rwanda) to $12,604 (Federal Republic of Germany), the evaluation being made at 1985 international prices (see Summers and Heston, 1991) There was only one country (Rwanda) with a GDP per capita smaller than $1,000 and there were five countries (Germany, Japan, Denmark, The United Kingdom and the Netherlands) with a GDP per capita greater than $10,000. The data on income inequality and the contribution of various income sources were all collected during the period 1983-1990.

Table 1 gives also the value of the overall (all income sources combined) Gini Index for the various countries. Germany (Gini = 0.128) and Denmark (Gini = 0.166) have the lowest level of income inequality while the highest levels are observed in Brazil (Gini = 0.530) and Vanuatu (Gini = 0.564).

In Table 1 we also present the value of the Gini index for the various income sources, in the different countries. Concerning wages the index is highest in Swaziland (0.566) and

Brazil (0.536) and lowest in Turkey (0.188) and Germany (0.201). For entrepreneurial income the Gini index is highest in Vanuatu (0.894) and the Netherlands (0.660) and lowest in Greece (0.106) and the Philippines (0.224). For property incomes the extreme values for the Gini index are observed in Panama (0.924) and Mexico (0.721) one one hand, in Spain (0.183) and Denmark (0.218) on the other.

Concerning the inequality of transfers the highest values of the Gini index are observed in Yugoslavia (0.573) and the Philippines (0.510) and the lowest in Japan (0.078) and Spain (0.133).

Finally, for the other sources of income the extreme values of the Gini index concern Vanuatu (0.880) and Brazil (0.786) for the upper bound and Germany (0.118) and Israel (0.121) for the lower bound.

It appears, therefore, that, whatever the source of income considered, the range of the Gini index is quite wide, high values being observed generally in relatively poor countries and low values in rather rich countries.

In Table 2 we give the share in total income of the different income sources for the various countries. The share of wages varies between 10 to 20% (10.5 in Rwanda and 22% in Pakistan) and 85 to 95% (86% in South Korea and 94% in Japan)[7]. The lowest shares of entrepreneurial income are observed in Japan and Yugoslavia (1%) and the highest in Turkey (50%) and Pakistan (54%). For property income the lowest share is found in Japan (0.3%) and the highest in Greece (34%). For transfers the lower bound is around 1% (0.9% in Vanuatu and 1.7% in Pakistan) and the upper bound 36% (Yugoslavia). Finally, for other income sources the lowest values are observed in the Philippines (0.03%) and Cyprus (0.08%) and the highest in Mexico (21%) .

Thus, on the whole, it appears that in rich countries the share of wages is high and that of entrepreneurial income low, the reverse being rather true for poor countries. For the three other sources of income the picture is not as clear.

Table 3 combines the results of the two previous tables in so far as it gives the contribution of each income source to total income inequality. Recall (see section 4) that this contribution may be expressed as the weighted sum of the Pseudo-Ginis (see the values of the Pseudo-Ginis of the different income sources in the various countries in Table A-1) or as the sum of two expressions: the weighted sum of the Gini Indices of the income sources and the weighted sum of expressions which measure somehow the degree of correlation between the ranking of the countries for a given income source and their ranking for total income. As indicated in section 4 this correlation term, for each income source, is, in fact, equal to the difference between the Pseudo-Gini and the actual Gini.

Table 4 presents the results of Table 3 in percentage terms, that is, it gives the relative contribution of each income source to total inequality. For wages it turns out that the highest relative contribution is observed for Denmark (111%)[8] and Cyprus (99%) and the lowest for Turkey (11.6%) and Rwanda (13.9%). For entrepreneurial income the highest (relative) contribution is observed in Turkey (65.3%) and Vanuatu (55.7%) and the lowest in Japan (1.2%) and Yugoslavia (1.3%).

The extreme values for property incomes are, respectively, 45.4% (Greece) and 0.6% (Japan) and for other sources 19.2% (Mexico) and the Philippines and Israel (0%). For transfers the strongest contributions are observed in Germany (42.1%) with a negative sign (indicating that transfers decrease total income inequality) and Yugoslavia (51.3%) with a positive sign (indicating that there transfers increase total inequality).

On the whole, the picture is not very clear: most of the time there does not seem to be a clear link between the contribution of a given income source to total income inequality and the level of per capita GDP. One of the reasons is, clearly, the fact that, as indicated earlier, the contribution of a given source is the consequence of several factors: the impact of the share of the sources, the effect of the level of inequality in the distribution of this income source and finally the role of the correlation term defined previously.

In addition, country-specific institutional characteristics (e.g., the relative importance of wages versus entrepreneurial income in a country like Turkey) or problems of definition (the inclusion in one category of private and public transfers) may also blur the link between the contribution of an income source to total inequality and the level of per capita GDP.

## 6. The HIES Data on Income Sources and the Link Between Overall Inequality and Development

In order to be able to implement the decomposition given by (20) we ran a regression derived from the computation of the first differences corresponding to equation (1). Calling $G_h$ , $\mu_h$ and $(1/\mu)_h$ the Gini Index, the per capita GDP and the inverse of the per capita GDP for country $h$ and $G_M$ , $\mu_M$ and $(1/\mu)_M$ the arithmetic means of $G_h$ , $\mu_h$ and $(1/\mu_h)$ in the whole sample of countries, we derive

$$(G_h - G_M) = b\ (\mu_h - \mu_M) + c\ [(1/\mu_h) - (1/\mu)_M] \quad (24)$$

Expression (24) is a regression which may be estimated on the basis of 23 observations (the 23 countries for which data are available) where the dependent variable is $(G_h - G_M)$ and the exogenous variables $(\mu_h - \mu_M)$ and $[(1/\mu_h) - (1/\mu)_M]$. The estimates $b^*$ and $c^*$ obtained are by definition equal to those that would be derived from a simple regressions of $G_h$ on $\mu_h$ and $(1/\mu_h)$. The results of the latter regression are presented in Table 5. It appears that the value $\sqrt{c/b}$ of the per capita GDP at the turning point is \$2,244. The asymptotic standard error of the turning point[9] was found to be equal to \$770 so that a 95% confidence interval for the per capita GDP at the turning point will range between \$642 to \$3,845. In Figure 1 we plotted the actual and the predicted Gini indices for each county.

Finally, when the dependent variable was the logit transform of the Gini Index rather than the Gini Index itself (see Table 5), the turning point was found to correspond to a per capita GDP of \$2,202, a result quite similar to that observed when the Gini Index is the dependent variable.

Having observed how inequality varies with the level of per capita GDP we will attempt in the next section to understand the impact of the various income sources on this relationship and, eventually, be able to shed some additional light on the process underlying the existence of the Kuznets Curve.

## 7. The Breakdown of Changes in the Gini Index and the Impact of Various Income Sources on the Relationship between Inequality and Development

In this section we apply the methodology developed in section 5 to analyze the impact of the different income sources on the Kuznets Curve as well as the respective role played by the shares of these sources in total income, the inequality of the distribution of these income sources and, finally, the correlation residual derived earlier in section 5. The basic idea is to combine expressions (20) to (24). In (20), as was just indicated, the differences between the values taken by the Gini Index in a given country and on average is broken down in the sum of three components (impact of the shares and of the Gini Index of the sources as well as of this correlation term), each component being itself the sum of different elements corresponding to the various income sources. In (24) the difference between the Gini Index of a given country and the average value of the Gini index is regressed on the difference between the per capita GDP of the country and the average per capita GDP and on the difference between the inverse value of the per capita GDP of the country and the average of the inverse values of these per capita GDP. Using (24) we have therefore regressed each of the three components on the R.H.S. of expressions (21) to (23) on these two exogenous variables as well as regressed the constituents (corresponding to the various income sources) of each of these three components on the same two exogenous variables[10].

Table 6 summarizes the results of these different regressions by giving in each case the value of the coefficient $b$ (of the difference between the per capita GDP of a country and the average per capita GDP) and $c$ (of the difference between the inverse of the per capita GDP and the arithmetic mean of the inverse values of the per capita GDP), the $t$ -values of these coefficients, and finally, the value of the per capita GDP which would correspond to a turning point, when there was such a point, and the asymptotic standard error of this turning point. Given that in the regression describing the overall Kuznets Curve, the coefficient $b$ dominated, in so far as the greater part of the curve was downward sloping (so that the Kuznets Curve is an inverted-*J* rather than an inverted-*U*-curve), we first concentrate on the coefficients $b$ (in Table 6). It appears that the inequality in the distribution of the income sources explains 45% of the coefficient $b$ corresponding to the Kuznets curve ($-1.248\times10^{-5}$

out of $-2.728\times10^{-5}$) whereas the relative contributions of the shares of the incomes sources and of the correlation component are respectively equal to 19% and 35%. For the coefficient *c* the story is relatively similar: the inequality in the distribution of the income sources explain 58% of its value while the shares of the sources and the "correlation" component contribute respectively 15% and 27% to the value of *c*. Note however that, although the coefficient *c* is significant, the contribution of the three components that have just been mentioned have a low *t*-value so that not too much importance should be given to the differences observed in the value taken by these proportions. Since the coefficient *c* is responsible for the rising section of the Kuznets Curve, we may conclude, at this stage, that, although it is clear that inequality first rises with development, the exact role played by the income shares, the degree of inequality of the various income sources and the correlation between these sources and total income cannot be specified precisely. The second phase of the Kuznets process where inequality decreases with development seems however to be easier to understand: inequality decreases mainly because of what happens to the inequality in the distribution of the various sources, though the shares and the correlation residuals play also a role.[11]

Let us now get some additional insights by looking into more details at the respective impact of the various income sources during each of the two phases. During the first phase (corresponding to the rising part of the Kuznets Curve), we observe in Table 6 when looking at the determinants of the coefficient *c*, that wages is the only income source whose effect is significant effect. This impact is essentially a consequence of what happens to the share of wages and since the coefficient of the share of wages is negative, the explanation for the rising section of the Kuznets Curve could be as follows: during this phase inequality increases because the share of wages in total income increases and that of other sources (in particular entrepreneurial income) decreases. Since the wages are more prevalent in the urban sector and since (see Table 3) wages are usually more unequally distributed than other income sources, we here have part of the explanation originally proposed by Kuznets: "First, all other conditions being equal, the increasing weight of urban population means an increasing share for the more unequal of the two component distributions ..." (Kuznets, 1955, p. 708).

Table 6 indicates also that the only other impact whose effect is significant and important is that of the Gini index of property income. The inequality of its distribution seems to increase during this first phase and this effect increases the overall inequality.

The declining section of the Kuznets Curve, as indicated earlier, is mainly explained by the coefficient b in expression (24) and Table 6. Since, as mentioned previously, the negative sign of *b* is essentially a consequence of what happens to the Gini Index of the various income sources, Table 6 indicates that here the main role is played by property income and other sources (the coefficients of wages, entrepreneurial income and transfers are not significant). In other words, during this second phase, as per capita GDP increases, property income and other income sources become less unequally distributed. For the other two elements determining inequality one may note the important role played entrepreneurial income as far as the role of the shares of the sources is concerned and by transfers whose contribution to the Gini-correlation is essential (and significant). These findings may hence be summarized by saying that, during the second phase of the Kuznets curve story, overall inequality decreases because property income and other sources become less unequally distributed but also because the share of entrepreneurial income decreases. Finally transfers however play also a role because they are negatively correlated with total income, hence the additional negative impact on overall inequality.

The overall effect of each source of income shows up in the lower part ("Total") of Table 6. There it is clear that transfers play the most important role as far as the declining section of the Kuznets curve is concerned (see the impact of transfers on the coefficient *b*). For the rising section of the Kuznets curve, the main role is played by wages (see the impact of wages on the coefficient *b*) which are the principal cause for the increasing inequality in the first stages of the development process.

**8. Concluding Comments**

This paper represents an attempt to link the functional and the personal distribution of incomes in the development process and to check the validity of Kuznets' (1955) conjecture according to which income inequality first rises but then declines as the per capita GDP increases. The approach taken here was based on the decomposition of the Gini Index by income sources. More precisely a new methodology was proposed in which the difference between the Gini Indices of each country and the average value of the Gini indices was broken down into three components measuring, respectively, the impact of the shares and of the degree of inequality of the distribution of the various income sources as well as the role of the extent of the correlation between these sources and overall income. These three constituents were then regressed on the differences between the per capita GDP and the average per capita GDP as well as on the difference between the inverse of the per capita GDP and the average value of the inverse of the per capita GDP.

This approach allowed us to shed some new light on the inverted-J curve[12] linking per capita GDP and inequality, what is usually called the Kuznets Curve. The rising section of this curve was found to be mainly the consequence of the increasing share of wages (as originally argued by Kuznets), although the increasing inequality of the distribution of property income played also a role. The declining section of the Kuznets Curve observed during the second phase was the consequence of three factors: the rising inequality of property income and other sources, the decreasing share of entrepreneurial income and the important role played by transfers, an income source negatively correlated with total income. These conclusions were based on data recently collected by the International Labour Office. The sample of countries was however quite small so that it might be worthwhile in future work, as more data become available, to apply the same methodology to a time series or even to a panel of countries, in order to test the robustness of our findings.

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**Notes**

1. For a (non exhaustive) survey of the theoretical literature on the Kuznets curve, see Deutsch and Silber (2001).

2. Regressing the Gini index on per capita GDP and on its inverse allows us to easily determine the turning point of the Kuznets curve, when there is one. One simply has to derive the Gini index with respect to per capita GDP and find out when this derivative is equal to zero. We could have also used a quadratic specification but as mentioned previously, we adopted the functional form suggested by Anand and Kanbur (1993a) when using the Gini index.

3. Instead of using a decomposition by income source based on the Gini index, one could have used one based for example on one of the two inequality indices originally proposed by Theil (1967). Shorrocks (1982;1983) has indeed shown that such decompositions are simple to derive. As stressed by Lerman (1999) "an income component's influence on the overall distribution will depend not only on its own inequality, but also on its relationship with other sources of income, and on its size". We have chosen to adopt a decomposition based on the Gini index, because we believe that it stresses in a simple way the role played by the three factors mentioned bv Lerman.

3. M stands here for the mean value of the variable analyzed.

4. We use here the well-known identity $(ab - cd) = 0.5\,(a+c)(b-d) + 0.5\,(b+d)(a-c)$

5. We also had data on the income sources of five additional countries: Bulgaria, Macao, Mainland China, Tanzania and the United States. However the estimations of Summers and Heston (1991) we used for the 1988 GDP per capita did not give any information on Bulgaria and Macao. We also decided to exclude Tanzania because the data on income

inequality referred to 1976, China because the data did not refer to the whole country and the United States because it was an outlier (its per capita GDP was 50% higher than that of the second richest country).

6. Such a big difference between the share of wages in Rwanda (10.5%) and in Japan (94%) may be the consequence of the presence of a "huge" informal sector in a country like Rwanda. Naturally strong institutional dissimilarities and differences in the historical experience between the various countries are also likely to explain the presence of unusually high or low factor shares.

7. The fact that wages contribute to more than 100% to overall inequality is due to the fact that in Denmark transfers have an important negative contribution (-39.4%, see table 4) on overall inequality. This negative contribution is evidently related to the fact that in this country transfers are strongly negatively correlated with total income.

8. See the note in Table 6 for more details on the computation of the asymptotic standard error of the turning point.

9. This is really the original methodological contribution of this paper. Whereas Silber (1989) introduced the use of the G-matrix in the definition of the Gini index while Silber (1993) extended this use to the case where the population weights vary with the income source, Flückiger and Silber (1993) derived the decomposition of the difference in income inequality between two countries, as it is appears in section 5. The novelty of the present paper is that it shows how such a breakdown allows one to estimate the precise impact on the link between inequality and development not only of each income source but also of each of the three components distinguished: the share of each income source, the degree to

which it is unequally distributed and the "correlation" between this source and overall income.

10. Given that the Kuznets curve is a reduced-form empirical model, one should really refrain from making causality conjectures. We thank an anonymous referee for stressing this. Our approach is however more complex. As indicated earlier, we derive the size distribution of income from the functional distribution of income. Moreover we decompose the change in each income source into the sum of three elements measuring respectively the variations in the share of the source, in the inequality of its distribution and in the correlation between the source and total income. We then analyze the impact of economic development, measured by the per capita G.D.P., for each source, on each of these three elements. Although this impact of the per capita G.D.P. should not be given an interpretation in terms of causality, our story is rich enough to allow us to draw some inferences on the impact of development on inequality.

11. The fact that we find an inverted-J curve does not imply that we reject the kind of S-curve stressed by Tribble (1999) and List and Gallet (1999). One should remember that most of the countries in our sample had not very high per capita GDP. Moreover we worked with a cross-section and not with a time series covering a long period, like Tribble, or panel data allowing to take into account fixed effects, like List and Gallet. Our data simply did not include the type of observations that would have allowed us to detect the second critical turning point stressed by Tribble, where manufacturing is considered as the traditional sector and services the emerging sector.

*Table 1. Per Capita GDP and the Gini Index of Total Income and of the Various Sources*

| | | | | Gini of Income Source: | | | | |
|---|---|---|---|---|---|---|---|---|
| *Country* | *Year* | *GDP per capita* | *Gini for Total Income* | *Wages* | *Entrep. Income* | *Proper. Income* | *Transf.* | *Other Sources* |
| ARG | 86 | 4030 | 0.3754 | 0.3550 | 0.4405 | 0.6215 | 0.2659 | 0.3020 |
| BRA | 87 | 4441 | 0.5299 | 0.5360 | 0.4547 | 0.6094 | 0.3829 | 0.7863 |
| CHL | 88 | 4099 | 0.5144 | 0.4728 | 0.5914 | 0.5239 | 0.4856 | 0.6967 |
| COS | 88 | 3800 | 0.3707 | 0.3716 | 0.3523 | 0.5904 | 0.2941 | 0.5608 |
| CYP | 90 | 7858 | 0.2519 | 0.3384 | 0.2252 | 0.6112 | 0.2617 | 0.6697 |
| GER | 83 | 12604 | 0.1277 | 0.2011 | 0.4863 | 0.2486 | 0.2589 | 0.1180 |
| SPA | 89 | 7406 | 0.2258 | 0.3959 | 0.2549 | 0.1833 | 0.1331 | 0.2610 |
| UNK | 89 | 11982 | 0.4093 | 0.5193 | 0.6149 | 0.3552 | 0.1697 | 0.2781 |
| GRE | 88 | 5857 | 0.2530 | 0.3348 | 0.1056 | 0.3374 | 0.1348 | 0.7425 |
| ISR | 86 | 9412 | 0.3032 | 0.4126 | 0.5715 | 0.2419 | 0.2816 | 0.1206 |
| JAP | 90 | 12209 | 0.2058 | 0.2110 | 0.2560 | 0.4145 | 0.0777 | 0.1827 |
| KOR | 90 | 5156 | 0.3022 | 0.2828 | 0.4077 | 0.4737 | 0.3723 | 0.4220 |
| MEX | 83 | 4996 | 0.4250 | 0.4529 | 0.4025 | 0.7207 | 0.2754 | 0.3847 |
| PHI | 88 | 1947 | 0.3907 | 0.4601 | 0.2235 | 0.5157 | 0.5102 | 0.6268 |
| PAK | 86 | 1567 | 0.3559 | 0.3708 | 0.3126 | 0.4416 | 0.4824 | 0.4340 |
| RWA | 83 | 661 | 0.3127 | 0.4403 | 0.2892 | 0.2518 | 0.3169 | 0.5171 |
| SWI | 85 | 2113 | 0.4779 | 0.5664 | 0.4183 | 0.4100 | 0.2284 | 0.4960 |
| TUR | 87 | 3598 | 0.3994 | 0.1878 | 0.5193 | 0.4790 | 0.2596 | 0.1887 |
| VAN | 85 | 1973 | 0.5636 | 0.3626 | 0.8944 | 0.6512 | 0.2338 | 0.8797 |
| YUG | 90 | 4628 | 0.3985 | 0.3158 | 0.6457 | 0.3596 | 0.5727 | 0.1359 |
| DEN | 87 | 12089 | 0.1660 | 0.3030 | 0.5040 | 0.2177 | 0.4148 | 0.1982 |
| NET | 88 | 11468 | 0.2538 | 0.3425 | 0.6600 | 0.3824 | 0.4877 | 0.3939 |
| PAN | 84 | 3569 | 0.4110 | 0.4086 | 0.3557 | 0.9236 | 0.2968 | 0.4546 |

*Table 2. Weights of Income Sources in Total Income*

| *Country* | *Year* | *Wages* | *Entrep. Income* | *Property Income* | *Transfers* | *Other Sources* |
|---|---|---|---|---|---|---|
| ARG | 86 | 0.5359 | 0.3210 | 0.0156 | 0.1234 | 0.0042 |
| BRA | 87 | 0.6188 | 0.1517 | 0.0236 | 0.1158 | 0.0900 |
| CHL | 88 | 0.4477 | 0.2273 | 0.1834 | 0.1253 | 0.0163 |
| COS | 88 | 0.6113 | 0.2272 | 0.0303 | 0.0998 | 0.0314 |
| CYP | 90 | 0.7336 | 0.0598 | 0.0286 | 0.1772 | 0.0008 |
| GER | 83 | 0.5869 | 0.0831 | 0.0954 | 0.2201 | 0.0145 |
| SPA | 89 | 0.4984 | 0.1347 | 0.1275 | 0.2296 | 0.0097 |
| UNK | 89 | 0.6232 | 0.1067 | 0.1005 | 0.1655 | 0.0040 |
| GRE | 88 | 0.3357 | 0.1026 | 0.3401 | 0.2193 | 0.0023 |
| ISR | 86 | 0.5622 | 0.1231 | 0.1460 | 0.1224 | 0.0464 |
| JAP | 90 | 0.9400 | 0.0100 | 0.0030 | 0.0388 | 0.0082 |
| KOR | 90 | 0.8571 | 0.0260 | 0.0277 | 0.0303 | 0.0589 |
| MEX | 83 | 0.4902 | 0.2103 | 0.0305 | 0.0561 | 0.2129 |
| PHI | 88 | 0.4923 | 0.3198 | 0.0431 | 0.1445 | 0.0003 |
| PAK | 86 | 0.2194 | 0.5415 | 0.1285 | 0.0171 | 0.0935 |
| RWA | 83 | 0.1052 | 0.4739 | 0.1923 | 0.1392 | 0.0894 |
| SWI | 85 | 0.5365 | 0.2227 | 0.0765 | 0.1128 | 0.0515 |
| TUR | 87 | 0.2517 | 0.5020 | 0.1346 | 0.1009 | 0.0108 |
| VAN | 85 | 0.5679 | 0.3508 | 0.0689 | 0.0090 | 0.0035 |
| YUG | 90 | 0.4869 | 0.0084 | 0.0678 | 0.3572 | 0.0797 |
| DEN | 87 | 0.6357 | 0.0707 | 0.0366 | 0.1741 | 0.0829 |
| NET | 88 | 0.6994 | 0.0931 | 0.0378 | 0.1594 | 0.0103 |
| PAN | 84 | 0.6109 | 0.1280 | 0.0525 | 0.1276 | 0.0810 |

*Table 3. Contribution of Each Income Source to Total Inequality*

| *Country* | *Year* | *Wages* | *Entrep. Income* | *Propert y Income* | *Transfer s* | *Other Sources* | *Total )Gini(* |
|---|---|---|---|---|---|---|---|
| ARG | 86 | 0.1903 | 0.1414 | 0.0097 | 0.0328 | 0.0013 | 0.3754 |
| BRA | 87 | 0.3317 | 0.0690 | 0.0144 | 0.0440 | 0.0707 | 0.5299 |
| CHL | 88 | 0.2117 | 0.1344 | 0.0961 | 0.0608 | 0.0114 | 0.5144 |
| COS | 88 | 0.2272 | 0.0800 | 0.0177 | 0.0282 | 0.0176 | 0.3707 |
| CYP | 90 | 0.2483 | 0.0127 | 0.0174 | 0.0269- | 0.0004 | 0.2519 |
| GER | 83 | 0.1161 | 0.0402 | 0.0236 | 0.0538- | 0.0015 | 0.1277 |
| SPA | 89 | 0.1973 | 0.0318 | 0.0228 | 0.0272- | 0.0011 | 0.2258 |
| UNK | 89 | 0.3237 | 0.0655 | 0.0357 | 0.0162- | 0.0006 | 0.4093 |
| GRE | 88 | 0.1124 | 0.0108 | 0.1147 | 0.0134 | 0.0017 | 0.2530 |
| ISR | 86 | 0.2319 | 0.0703 | 0.0353 | 0.0343- | 0.0001- | 0.3032 |
| JAP | 90 | 0.1983 | 0.0025 | 0.0012 | 0.0023 | 0.0014 | 0.2058 |
| KOR | 90 | 0.2424 | 0.0106 | 0.0131 | 0.0113 | 0.0249 | 0.3022 |
| MEX | 83 | 0.2220 | 0.0846 | 0.0220 | 0.0147 | 0.0817 | 0.4250 |
| PHI | 88 | 0.2265 | 0.0715 | 0.0218 | 0.0710 | 0.0001- | 0.3907 |
| PAK | 86 | 0.0814 | 0.1693 | 0.0567 | 0.0079 | 0.0406 | 0.3559 |
| RWA | 83 | 0.0435 | 0.1323 | 0.0477 | 0.0438 | 0.0454 | 0.3127 |
| SWI | 85 | 0.3038 | 0.0929 | 0.0313 | 0.0243 | 0.0255 | 0.4779 |
| TUR | 87 | 0.0465 | 0.2607 | 0.0645 | 0.0260 | 0.0017 | 0.3994 |
| VAN | 85 | 0.2054 | 0.3137 | 0.0442 | 0.0014- | 0.0017 | 0.5636 |
| YUG | 90 | 0.1538 | 0.0054 | 0.0242 | 0.2046 | 0.0106 | 0.3985 |
| DEN | 87 | 0.1848 | 0.0342 | 0.0029 | 0.0654- | 0.0094 | 0.1660 |
| NET | 88 | 0.2314 | 0.0600 | 0.0140 | 0.0550- | 0.0035 | 0.2538 |
| PAN | 84 | 0.2495 | 0.0444 | 0.0482 | 0.0324 | 0.0366 | 0.4110 |
| **MEAN** | | 0.1991 | 0.0843 | 0.0339 | 0.0147 | 0.0169 | 0.3489 |

*Table 4. Contribution of Each Income Source to Total Inequality ( in percent(*

| *Country* | *Year* | *Wages* | *Entrep. Income* | *Property Income* | *Transfers* | *Other Sources* | *Total* |
|---|---|---|---|---|---|---|---|
| ARG | 86 | 50.7 | 37.7 | 2.6 | 8.7 | 0.3 | 100 |
| BRA | 87 | 62.6 | 13.0 | 2.7 | 8.3 | 13.3 | 100 |
| CHL | 88 | 41.1 | 26.1 | 18.7 | 11.8 | 2.2 | 100 |
| COS | 88 | 61.3 | 21.6 | 4.8 | 7.6 | 4.7 | 100 |
| CYP | 90 | 98.6 | 5.1 | 6.9 | 10.7- | 0.2 | 100 |
| GER | 83 | 90.9 | 31.5 | 18.5 | 42.1- | 1.2 | 100 |
| SPA | 89 | 87.4 | 14.1 | 10.1 | 12.1- | 0.5 | 100 |
| UNK | 89 | 79.1 | 16.0 | 8.7 | 4.0- | 0.1 | 100 |
| GRE | 88 | 44.4 | 4.3 | 45.4 | 5.3 | 0.7 | 100 |
| ISR | 86 | 76.5 | 23.2 | 11.6 | 11.3- | 0.0 | 100 |
| JAP | 90 | 96.4 | 1.2 | 0.6 | 1.1 | 0.7 | 100 |
| KOR | 90 | 80.2 | 3.5 | 4.3 | 3.7 | 8.2 | 100 |
| MEX | 83 | 52.2 | 19.9 | 5.2 | 3.4 | 19.2 | 100 |
| PHI | 88 | 58.0 | 18.3 | 5.6 | 18.2 | 0.0 | 100 |
| PAK | 86 | 22.9 | 47.6 | 15.9 | 2.2 | 11.4 | 100 |
| RWA | 83 | 13.9 | 42.3 | 15.2 | 14.0 | 14.5 | 100 |
| SWI | 85 | 63.6 | 19.4 | 6.5 | 5.1 | 5.3 | 100 |
| TUR | 87 | 11.6 | 65.3 | 16.1 | 6.5 | 0.4 | 100 |
| VAN | 85 | 36.4 | 55.7 | 7.8 | 0.3- | 0.3 | 100 |
| YUG | 90 | 38.6 | 1.3 | 6.1 | 51.3 | 2.7 | 100 |
| DEN | 87 | 111.3 | 20.6 | 1.8 | 39.4- | 5.7 | 100 |
| NET | 88 | 91.2 | 23.6 | 5.5 | 21.7- | 1.4 | 100 |
| PAN | 84 | 60.7 | 10.8 | 11.7 | 7.9 | 8.9 | 100 |

*Table 5. Regression Results for Kuznets Curve*

| | *Dependent Variable* | |
|---|---|---|
| *Explanatory variable* | *Gini Index of Total Income* | *Log of Gini Index over its complement to one* |
| Constant | 0.5522 | 0.3173 |
| | (9.59) | (1.20) |
| GDP per capita | 2.7276-$\times 10^{-5}$ | 1.3341-$\times 10^{-4}$ |
| | (4.48-) | (4.67-) |
| Inverse of GDP per capita | 137.39- | 646.77- |
| | (1.80-) | (1.81-) |
| *N* | 23 | 23 |
| $R^2$ adjusted | 0.4720 | 0.5086 |
| $F$ - statistic | 10.83 | 12.38 |

*Notes*: Figures in parentheses are the associated *t* values of the coefficients.

*Table 6. Regression Results for Components of the Difference of Gini Index from Overall Mean Values*

| | *Coefficient b* | *t value of b* | *Coefficient c* | *t value of c* | *GDP at turning point* | *Asymptotic stand. error of turn. point* |
|---|---|---|---|---|---|---|
| **Shares** | | | | | | |
| Wages | 3.2989 $\times 10^{-6}$ | 0.95 | 123.2570- | 2.84- | 0 | 0 |
| Entrep. | 7.9787-$\times 10^{-6}$ | 2.27- | 70.2054 | 1.60 | 0 | 0 |
| Proper. | 6.6096 $\times 10^{-7}$ | 0.27 | 30.5896 | 1.01 | 0 | 0 |
| Transf. | 4.2738-$\times 10^{-7}$ | 0.29- | 7.2298- | 0.39- | 4113 | 5144 |
| Other | 7.1539-$\times 10^{-7}$ | 0.54- | 9.2609 | 0.55 | 0 | 0 |
| Total | 5.1616-$\times 10^{-6}$ | 2.56- | 20.4308- | 0.81- | 1990 | 1438 |
| **Gini** | | | | | | |
| Wages | 6.1906-$\times 10^{-6}$ | 1.56- | 7.0630- | 0.14- | 1068 | 1886 |
| Entrep. | 6.3494-$\times 10^{-7}$ | 0.23- | 35.8028- | 1.01- | 7509 | 7011 |
| Proper. | 3.1768-$\times 10^{-6}$ | 3.24- | 32.9166- | 2.68- | 3219 | 952 |
| Transf. | 1.3060-$\times 10^{-6}$ | 0.84- | 3.6327- | 0.19- | 1668 | 2838 |
| Other | 1.1677-$\times 10^{-6}$ | 1.91- | 0.1407- | 0.02- | 347 | 975 |
| Total | 1.2476-$\times 10^{-5}$ | 2.21- | 79.5558- | 1.13- | 2525 | 1479 |
| **Correl.** | | | | | | |
| Wages | 5.5436-$\times 10^{-7}$ | 4.06- | 8.5301- | 4.99- | 3923 | 759 |
| Entrep. | 2.3961-$\times 10^{-7}$ | 3.15- | 2.1183- | 2.22- | 2973 | 992 |
| Proper. | 2.0237-$\times 10^{-7}$ | 1.56- | 0.8364- | 0.51- | 2033 | 2332 |
| Transf. | 8.5580-$\times 10^{-6}$ | 4.36- | 25.8415- | 1.05- | 1738 | 922 |
| Other | 8.4588-$\times 10^{-8}$ | 0.20- | 0.0749- | 0.01- | 941 | 504 |
| Total | 9.6389-$\times 10^{-6}$ | 4.26- | 37.4013- | 1.32- | 1970 | 870 |
| **Total** | | | | | | |
| Wages | 3.4461-$\times 10^{-6}$ | 0.66- | 138.8501- | 2.12- | 6348 | 2769 |
| Entrep | 8.8532-$\times 10^{-6}$ | 1.74- | 32.2843 | 0.51 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Proper | $2.7183\text{-}\times 10^{-6}$ | 1.35- | 3.1633- | 0.13- | 1079 | 1508 |
| Transf. | $1.0291\text{-}\times 10^{-5}$ | 3.09- | 36.7040- | 0.88- | 1889 | 1232 |
| Other | $1.9676\text{-}\times 10^{-6}$ | 1.22- | 9.0453 | 0.45 | 0 | 0 |
| Total | $2.7277\text{-}\times 10^{-5}$ | 4.49- | 137.3879- | 1.80- | 2244 | 770 |

*Notes :*The per capita GDP at which a turning point is observed is $\mu = \sqrt{c/b}$ ,which is a function of the regression coefficients. Let **f(b** (be a linear or nonlinear function of the least squares estimators. The estimator of the asymptotic covariance matrix of **f(b)** is given by: Est. Asy. Var[**f(b)**] = $\mathbf{c}[s^2(X'X)^{-1}]\mathbf{c}'$, where **c** is a row vector of the partial derivatives $\partial \mathbf{f(b)}/\partial \mathbf{b}'$, X is the matrix of the explanatory variables and $s^2$ is the mean square error of the regression (Greene, 1997, p. 278.).

*Table A-1. Pseudo Gini by Income Source*

| *Country* | *Year* | *Wages* | *Entrep. Income* | *Property Income* | *Transfers* | *Other Sources* |
|---|---|---|---|---|---|---|
| ARG | 86 | 0.3550 | 0.4405 | 0.6215 | 0.2659 | 0.3020 |
| BRA | 87 | 0.5360 | 0.4547 | 0.6094 | 0.3801 | 0.7863 |
| CHL | 88 | 0.4728 | 0.5914 | 0.5239 | 0.4856 | 0.6960 |
| COS | 88 | 0.3716 | 0.3523 | 0.5844 | 0.2826 | 0.5608 |
| CYP | 90 | 0.3384 | 0.2132 | 0.6077 | 0.1517- | 0.4563 |
| GER | 83 | 0.1978 | 0.4838 | 0.2478 | 0.2444- | 0.1051 |
| SPA | 89 | 0.3959 | 0.2360 | 0.1786 | 0.1185- | 0.1163 |
| UNK | 89 | 0.5193 | 0.6143 | 0.3552 | 0.0979- | 0.1361 |
| GRE | 88 | 0.3348 | 0.1048 | 0.3374 | 0.0610 | 0.7292 |
| ISR | 86 | 0.4126 | 0.5715 | 0.2418 | 0.2800- | 0.0012- |
| JAP | 90 | 0.2110 | 0.2477 | 0.4100 | 0.0591 | 0.1744 |
| KOR | 90 | 0.2828 | 0.4071 | 0.4717 | 0.3723 | 0.4219 |
| MEX | 83 | 0.4529 | 0.4025 | 0.7194 | 0.2611 | 0.3839 |
| PHI | 88 | 0.4601 | 0.2235 | 0.5054 | 0.4914 | 0.2256- |
| PAK | 86 | 0.3708 | 0.3126 | 0.4416 | 0.4644 | 0.4340 |
| RWA | 83 | 0.4136 | 0.2791 | 0.2478 | 0.3150 | 0.5079 |
| SWI | 85 | 0.5664 | 0.4172 | 0.4084 | 0.2156 | 0.4960 |
| TUR | 87 | 0.1848 | 0.5193 | 0.4790 | 0.2580 | 0.1575 |
| VAN | 85 | 0.3617 | 0.8944 | 0.6414 | 0.1574- | 0.4856 |
| YUG | 90 | 0.3158 | 0.6367 | 0.3574 | 0.5727 | 0.1333 |
| DEN | 87 | 0.2907 | 0.4840 | 0.0804 | 0.3759- | 0.1139 |
| NET | 88 | 0.3308 | 0.6443 | 0.3702 | 0.3450- | 0.3360 |
| PAN | 84 | 0.4084 | 0.3467 | 0.9179 | 0.2537 | 0.4519 |