# Inequality in World GDP Distribution

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## 1. Introduction

Economic inequality is the analysis of differences across the population in relation to the control over economic resources, and it has always been one of the central issues of any political system. The vast majority of the world community, living in the developing countries, has only a little share in the world's wealth. The developed countries (DCs), constituting 24 percent of the world population, control 86 percent of world income, while less developed countries (LDCs), constituting 76 percent of world population have access to only 14 percent of world income in 1990 (Table 1).

**Table 1**
Shares of GDP and population by regions, in percentage

|  | DCs | LDCs | Africa | Asia | Europe | the Americas |
|---|---|---|---|---|---|---|
| Year | GDP | GDP | GDP | GDP | GDP | GDP |
| 1960 | 89.70 | 10.30 | 2.27 | 13.75 | 39.22 | 44.76 |
| 1965 | 89.40 | 10.60 | 2.12 | 16.03 | 38.45 | 43.40 |
| 1970 | 89.00 | 11.00 | 2.07 | 19.95 | 37.76 | 40.22 |
| 1975 | 86.44 | 13.56 | 2.17 | 22.44 | 36.58 | 38.81 |
| 1980 | 85.93 | 14.07 | 2.30 | 23.15 | 35.75 | 38.80 |
| 1985 | 85.81 | 14.19 | 2.37 | 24.77 | 34.24 | 38.62 |
| 1990 | 85.73 | 14.27 | 2.25 | 26.30 | 34.10 | 37.35 |
|  | Pop | Pop | Pop | pop | pop | pop |
| 1960 | 34.58 | 65.42 | 11.38 | 47.60 | 19.15 | 21.87 |
| 1965 | 32.75 | 67.25 | 11.78 | 48.13 | 18.03 | 22.06 |
| 1970 | 30.98 | 69.02 | 12.18 | 48.86 | 16.98 | 21.98 |
| 1975 | 28.88 | 71.12 | 12.40 | 50.34 | 15.72 | 21.53 |
| 1980 | 27.00 | 73.00 | 13.34 | 50.82 | 14.57 | 21.27 |
| 1985 | 25.17 | 74.83 | 14.44 | 51.12 | 13.51 | 20.93 |
| 1990 | 23.60 | 76.40 | 15.26 | 51.53 | 12.66 | 20.55 |

Shares of GDP and population are calculated from total of 108 countries

Higher rates of economic growth are critical to bridge the gap between the living standard of rich and poor countries. Some rich countries and the international community generally have felt to relieve the poverty pressure by generating development in LDCs through different ways. Exports, investment, population are considered as three of the crucial elements in economic growth of the LDCs. While investment increases employment opportunities, transformation from demographic conditions of high fertility and mortality to low fertility and mortality helps to achieve progress in socio-economic conditions (Oshima, 1983). Higher earning from exports helps to pay for the imports that are required to develop a sound economic base in developing countries.

Research in income inequality has mostly been country specific due to lack of comparable data, and also because the policies adopted to address the poverty problems are mostly national in scope. The technology of computerized data banks has provided the opportunity to have data in comparable form, and advances in communication and transportation has made the whole world very small and integrated through increased international trade. Economic policies of both big and rich countries, and world institutions have strong effects on the economic growth and its distribution among countries. With these developments research emphasis in income inequality has shifted to international level.

Several studies have attempted to explain the behavior of income inequality over time. Ram (1989), Theil (1989), Levy and Chowdhury (LC), 1994, and James et al. (1995) conducted studies applying Theil's index measure of income inequality. Theil found substantial increase in international inequality. The inequality in the North declined sharply from 1960-1985 whereas it increased substantially in Tropical Africa and Asia.

Ram also found the increasing trend in world income inequality between 1960-1980 due to increase in intercountry inequality. LC using Theil's index of income inequality for 115 countries between 1960 and 1985 found that global level of intercountry inequality declined by 16.75 percent. They also found inequality among regions, a major constituent of intercountry inequality.

Seale et al. (1995) divided the non-communist world into four regions. Their results show that whereas GDP increased 180 and 240 percent in the North and South East Asia respectively, inequality decreased 80 percent in the former and increased 183 percent in the latter. Inequality is very low in South Central Asia with no clear trend but on the other hand it is higher in Sub-Saharan Africa and increased over time until late 1970s.

Geographical and historical aspects other than economic aspects have their own effects on the distribution of income. None of the above studies divided the world on the continent level and did not include Newly Industrialized Countries (NICs) and Organization of Petroleum Exporting Countries (OPEC) as separate groups in their analysis. These two groups of countries have emerged as very important economic powers during the 1970s and 1980s. Their higher GDP with smaller population seem to have affected the distribution of income in a substantial way. Among the LDCs again OPEC are comparatively the richer which may have affected the levels of inter-country inequality over time. For the purpose of present work the world was divided into different regions and groups of countries on the basis of these different aspects to estimate population weighted income inequality. The objective of this study is to extend the work already done by the above-mentioned authors and to examine the relationship between

international income inequality on the one hand and the effects of world investment, population and exports on the other.

## 2. METHODOLOGY

For inequality measure Theil's information theoretic measure is the most useful one, especially when we use grouped data and want to decompose the over all inequality into its constituent parts. Following Theil (1989) when the measure is applied to the GDP of sample countries it can be defined as:

$$J = \sum_{i=1}^{n} p_i \log \frac{p_i}{y_i} \qquad (1)$$

where $p_i$ is the population share and $y_i$ is income share (GDP) of country i in world population and world income (GDP) respectively and n is the number of countries. If we combine countries into regions $R_1...R_G$ so that each country is in one region and $P_g$ and $Y_g$ be the population and income shares of region g then

$$P_g = \sum_i p_i \qquad \text{and} \qquad Y_g = \sum_i y_i$$

where the summations are over i ε $R_g$. The extension of (1) to regions is

$$\overline{J}_R = \sum_{g=1}^{G} P_g \log \frac{P_g}{Y_g} \qquad (2)$$

that measures the inequality among regions and

$$J_g = \sum_{i \epsilon R_g} p_i / P_g \log \frac{p_i / P_g}{y_i / Y_g} \qquad (3)$$

measures the inequality among the counties of the regions $R_g$. The additive form of the decomposition is

$$J = J_R + \overline{J} \quad where \quad \overline{J} = \sum_{g=1}^{G} P_g J_g \qquad (4)$$

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Total inequality among the sample countries equals regional inequality plus the average within regions inequality, the average being a weighted average with the population shares $p_1,....,p_g$ as weights.

As mentioned earlier exports, investment and population are important contributors to economic growth and affect the distribution of income within as well as among nations. To examine the relationship between inter-country inequality and the three factors namely, exports, investment, and population, the proportions of these three factors calculated are as follows:

$$Index\ of\ World\ Exports = \frac{Total\ World\ Exports}{Total\ World\ GDP}$$

$$Index\ of\ L'DCs\ Investment = \frac{Total\ L'DCs\ Investment}{Total\ World\ Investment}$$

$$Index\ of L'DCs\ Exports = \frac{Total\ L'DCs\ Exports}{Total\ World\ Exports}$$

$$Index\ of\ World\ Investment = \frac{Total\ World\ Investment}{Total\ World\ GDP}$$

$$Population\ Share\ of\ LDCs = \frac{Total\ LDCs\ population}{Total\ World\ Population}$$

The most appropriate model to define the relationship among these variables on the basis of the econometric criteria turned out to be:

$$WTPI = \alpha_0 + \alpha_1 \ln WEXP + \alpha_2 \ln WIN + \alpha_3 \ln L'DCs\ EXP + \alpha_4 \ln L'DCsPOP + \alpha_5 l'nLDCsINV$$
(5)

where $\alpha_0$ = Constant; WPTI = International Income Inequality (Population Weighted); ln WEXP = Log of Index of World Exports;

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ln WIN = Log of Index of World Investment; ln LDCs' EXP = Log of Index of LDC 's Exports; ln LDCs' POP = Log of population share of LDCs; ln LDCs' INV = Log of index of LDC 's Investment

Using this regression, the effects of World Export, World Investment, LDCs' Exports, LDCs' Investment, and LDCs' Population on International Income Inequality during 1960-92 will be examined. The data used for this study are from the World Bank (1994).

## 3. International Income Inequality During 1960-1992

Decomposition based on the Theil's population weighted measure helps to identify the various components that affect world inequality. There are two pairs of opposite forces that affect world inequality. The slow growing economies with high population, in particular the countries of the Indian subcontinent and China increase inequality. On the other hand the richest countries like United States and Japan do the opposite. In addition, NICs and OPEC with usually small population and higher GDP affect world inequality substantially.

In a long span of time many economic incidents help some countries at the cost of others. During 1960-1992 trade agreements, oil price shocks of 1973 and 1979, international debt crises of the 1980s altered the distribution of income among as well as within different regions of the world.

### 3.1. International Inequality in Terms of Continents

Table 2 presents the international income inequality and its constituents Africa, Asia, Europe, and the Americas computed by the Theil's population weighted index measure for the period 1960-1992. Income inequality increased substantially during this period. There is almost continuous increase in inequality during the 1960s and 1980s with lots of

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fluctuations during the 1970s. In 1973 and 1979 income inequality increased abruptly and then decreased. This pattern may have emerged due to the oil price shocks. These results are in contrast to L and C, who found that inequality decreased by 16.75 percent during 1960-85; but are in line with Ram and Theil. These studies show 20.30 %and 19.65 % increase in inequality for the period of 1960-80 and 1960-85 respectively, and our study shows an increase of 13.92 percent during 1960-92.

Over time regional income inequality seem to have decreased noticeably in contrast to inequality within regions that shows a substantial increase. The share of regional inequality in international inequality decreased consistently from 42.19 percent in 1960 to 28.96 percent, but since 1976 it had mixed pattern. Within region inequality is dominant in total inequality in contrast to results of LC, and Theil, who found regional inequality as dominant. During 1980s, countries and continents experienced great differences in their economic performance. DCs experienced continuous growth for several years after the 1982 recession. Economic growth has been faster in parts of Asia in the 1980s. But Africa and Latin America have seen economic decline rather than growth and development. Export growth contributes directly to economic growth and a rapid modernization of production. High export growth among Asia' newly industrializing countries and low export growth in Latin America and Africa have significantly changed the regional distribution of developing country exports during the 1980s (World Bank, 1989). Which may also have affected the distribution of income among them.

**Table 2**

Table 2: International Income Inequality, and Income Inequality in the Americas

| | International | Regional | Average within | 3 as a %age | Inequality in | Subregional | Average within | 7 as a percentage |
|---|---|---|---|---|---|---|---|---|

| Year | Inequality | Inequality | Regions | of 2 | The Americas | Inequality | Subregions | of 6 |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1960 | 1.1394 | 0.4807 | 0.6587 | 42.19 | 0.6059 | 0.3280 | 0.2779 | 54.13 |
| 1961 | 1.1486 | 0.4730 | 0.6756 | 41.18 | 0.5978 | 0.3205 | 0.2773 | 53.61 |
| 1962 | 1.1656 | 0.4653 | 0.7003 | 39.92 | 0.5643 | 0.3285 | 0.2358 | 58.21 |
| 1963 | 1.1680 | 0.4503 | 0.7177 | 38.55 | 0.6199 | 0.3443 | 0.2756 | 55.54 |
| 1964 | 1.1799 | 0.4428 | 0.7371 | 37.53 | 0.6259 | 0.3457 | 0.2802 | 55.23 |
| 1965 | 1.2092 | 0.4456 | 0.7636 | 36.85 | 0.6504 | 0.3611 | 0.2893 | 55.52 |
| 1966 | 1.2362 | 0.4426 | 0.7936 | 35.80 | 0.6621 | 0.3721 | 0.2900 | 56.20 |
| 1967 | 1.2451 | 0.4306 | 0.8145 | 34.58 | 0.6643 | 0.3736 | 0.2907 | 56.24 |
| 1968 | 1.2560 | 0.6692 | 0.5868 | 53.28 | 0.6585 | 0.3685 | 0.2900 | 55.96 |
| 1969 | 1.2593 | 0.9652 | 0.2941 | 76.65 | 0.6508 | 0.3600 | 0.2908 | 55.32 |
| 1970 | 1.2525 | 0.3851 | 0.8674 | 30.75 | 0.6281 | 0.3415 | 0.2866 | 54.37 |
| 1971 | 1.2583 | 0.3848 | 0.8735 | 30.58 | 0.6175 | 0.3338 | 0.2837 | 54.06 |
| 1972 | 1.2861 | 0.3818 | 0.9043 | 29.69 | 0.6118 | 0.3330 | 0.2788 | 54.43 |
| 1973 | 1.3017 | 0.3842 | 0.9175 | 29.52 | 0.6042 | 0.3277 | 0.2765 | 54.24 |
| 1974 | 1.2718 | 0.3732 | 0.8986 | 29.34 | 0.5815 | 0.3106 | 0.2709 | 53.41 |
| 1975 | 1.2483 | 0.3637 | 0.8846 | 29.14 | 0.5704 | 0.3043 | 0.2661 | 53.35 |
| 1976 | 1.2599 | 0.3649 | 0.895 | 28.96 | 0.5727 | 0.3049 | 0.2678 | 53.24 |
| 1977 | 1.2574 | 0.3670 | 0.8904 | 29.19 | 0.5801 | 0.3061 | 0.2740 | 52.77 |
| 1978 | 1.2612 | 0.3719 | 0.8893 | 29.49 | 0.5885 | 0.3181 | 0.2704 | 54.05 |
| 1979 | 1.2884 | 0.3742 | 0.9142 | 29.04 | 0.5803 | 0.3119 | 0.2684 | 53.75 |
| 1980 | 1.2784 | 0.3756 | 0.9028 | 29.38 | 0.5584 | 0.2986 | 0.2598 | 53.47 |
| 1981 | 1.2723 | 0.3720 | 0.9003 | 29.24 | 0.5722 | 0.3177 | 0.2545 | 55.52 |
| 1982 | 1.2646 | 0.3631 | 0.9015 | 28.71 | 0.5728 | 0.3177 | 0.2551 | 55.46 |
| 1983 | 1.2685 | 0.3694 | 0.8991 | 29.12 | 0.6076 | 0.3377 | 0.2699 | 55.58 |
| 1984 | 1.2853 | 0.3764 | 0.9089 | 29.28 | 0.6264 | 0.3486 | 0.2778 | 55.65 |
| 1985 | 1.2904 | 0.3779 | 0.9125 | 29.29 | 0.6313 | 0.3522 | 0.2791 | 55.79 |
| 1986 | 1.2934 | 0.3869 | 0.9065 | 29.91 | 0.6318 | 0.3408 | 0.2910 | 53.94 |
| 1987 | 1.2997 | 0.3911 | 0.9086 | 30.09 | 0.6371 | 0.3427 | 0.2944 | 53.79 |
| 1988 | 1.2995 | 0.3911 | 0.9084 | 30.10 | 0.6573 | 0.3564 | 0.3009 | 54.22 |
| 1989 | 1.3023 | 0.3907 | 0.9116 | 30.00 | 0.6704 | 0.3685 | 0.3019 | 54.97 |
| 1990 | 1.3014 | 0.3904 | 0.911 | 30.00 | 0.6805 | 0.3790 | 0.3015 | 55.69 |
| 1991 | 1.2981 | 0.3815 | 0.9166 | 29.39 | 0.6670 | 0.3661 | 0.3009 | 54.89 |
| 1992 | 1.2980 | 0.3849 | 0.9131 | 29.65 | 0.6733 | 0.3664 | 0.3069 | 54.42 |

## 3.2. Income Inequality at Continent Level

### 3.2.1. Africa and Regions within Africa

The levels of income inequality in Africa and its constituents, North Africa and Sub-Saharan Africa are given in Table 3. Though income inequality increased by 13.65 percent in 1992 from its 1960 level there does not seem to be any consistent trend except from 1977 to 1984. Inequality during the 1980s was higher because after reasonable growth in the 1960s and 1970s, the region 's economic performance deteriorated and varied a lot among countries ( World Bank, 1994). Inequality within subregions has a major share in over all inequality in Africa. According to the World Bank (1994), most

countries in Africa that improved their policies started enjoying positive rates of GDP per capita growth. Out of 29 African countries, six with the most improved macroeconomic policies had a median increase in GDP per capita growth of almost 2 percentage points between 1981-86 and 1987-91 compared with an increase of 1.5 percentage points for those countries with less improved policies and a decline of 2.6 percentage points for those with a deterioration in policies. That may be the reason of higher inequality within regions.

Subregional inequality as a share of total inequality although was initially very small, increased from 2.56 percent in 1960 to 18.88 percent in 1992 which shows that distribution of income among regions within Africa is getting more skewed. It increased more during the 1980s. Most of the African countries are in Sub-Saharan Africa and this part of African continent has a faster growing population and slower GDP. It has been the site of the worst episode of famine and starvation in the 1980s.

### 3.2.2. Asia and Regions within Asia

Table 3 shows the results of income inequality analysis for Asia and its regions (South and West Asia and East and Pacific Asia). As shown the inequality worsened substantially during the period of analysis. There is 40.44 percent increase in total inequality, most of which is caused by inequality within sub regions. Total inequality shows a consistent increase from

**Table 3**

Income Inequality among African and Asian Countries

| Year | Inequality in Africa | Subregional inequality | Average Within Subregions | 3 as a % age of 2 | Inequality in Asia | Subregional inequality | Average within subregions | 7 as a % age of 6 |
|------|------|------|------|------|------|------|------|------|

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| 1960 | 0.3435 | 0.0088 | 0.3347 | 2.56 | 0.9466 | 0.5676 | 0.3790 | 59.96 |
| 1961 | 0.3320 | 0.0041 | 0.3279 | 1.23 | 0.9887 | 0.5957 | 0.3930 | 60.25 |
| 1962 | 0.3007 | 0.0005 | 0.3002 | 0.17 | 1.0416 | 0.5536 | 0.4880 | 53.15 |
| 1963 | 0.3155 | 0.0030 | 0.3125 | 0.95 | 1.0645 | 0.5174 | 0.5471 | 48.60 |
| 1964 | 0.3233 | 0.0033 | 0.3200 | 1.02 | 1.0957 | 0.5311 | 0.5646 | 48.47 |
| 1965 | 0.3323 | 0.0040 | 0.3283 | 1.20 | 1.1348 | 0.5542 | 0.5806 | 48.84 |
| 1966 | 0.3269 | 0.0026 | 0.3243 | 0.80 | 1.1921 | 0.5851 | 0.6070 | 49.08 |
| 1967 | 0.3598 | 0.0043 | 0.3555 | 1.20 | 1.2229 | 0.6005 | 0.6224 | 49.10 |
| 1968 | 0.3675 | 0.0061 | 0.3614 | 1.66 | 1.2711 | 0.6301 | 0.6410 | 49.57 |
| 1969 | 0.3552 | 0.0072 | 0.3480 | 2.03 | 1.3091 | 0.6537 | 0.6554 | 49.94 |
| 1970 | 0.3484 | 0.0075 | 0.3409 | 2.15 | 1.3384 | 0.6740 | 0.6644 | 50.36 |
| 1971 | 0.3228 | 0.0039 | 0.3189 | 1.21 | 1.3592 | 0.6760 | 0.6832 | 49.74 |
| 1972 | 0.3365 | 0.0090 | 0.3275 | 2.67 | 1.4176 | 0.6977 | 0.7199 | 49.22 |
| 1973 | 0.3325 | 0.0093 | 0.3232 | 2.80 | 1.4438 | 0.7122 | 0.7316 | 49.33 |
| 1974 | 0.3407 | 0.0090 | 0.3317 | 2.64 | 1.3961 | 0.5207 | 0.8754 | 37.30 |
| 1975 | 0.3466 | 0.0127 | 0.3339 | 3.66 | 1.3689 | 0.5143 | 0.8546 | 37.57 |
| 1976 | 0.3532 | 0.0166 | 0.3366 | 4.70 | 1.3830 | 0.5016 | 0.8814 | 36.27 |
| 1977 | 0.3392 | 0.0203 | 0.3189 | 5.98 | 1.3701 | 0.5070 | 0.8631 | 37.00 |
| 1978 | 0.3507 | 0.0276 | 0.3231 | 7.87 | 1.3576 | 0.5347 | 0.8229 | 39.39 |
| 1979 | 0.3559 | 0.0322 | 0.3237 | 9.05 | 1.4025 | 0.5731 | 0.8294 | 40.86 |
| 1980 | 0.3775 | 0.0359 | 0.3416 | 9.51 | 1.3832 | 0.5961 | 0.7871 | 43.10 |
| 1981 | 0.3978 | 0.0367 | 0.3611 | 9.23 | 1.3637 | 0.6034 | 0.7603 | 44.25 |
| 1982 | 0.4060 | 0.0446 | 0.3614 | 10.99 | 1.3608 | 0.6006 | 0.7602 | 44.14 |
| 1983 | 0.4170 | 0.0553 | 0.3617 | 13.26 | 1.3393 | 0.5928 | 0.7465 | 44.26 |
| 1984 | 0.4346 | 0.0615 | 0.3731 | 14.15 | 1.3427 | 0.6124 | 0.7303 | 45.61 |
| 1985 | 0.4290 | 0.0697 | 0.3593 | 16.25 | 1.3462 | 0.6235 | 0.7227 | 46.32 |
| 1986 | 0.4177 | 0.0692 | 0.3485 | 16.57 | 1.3368 | 0.6387 | 0.6981 | 47.78 |
| 1987 | 0.4130 | 0.0689 | 0.3441 | 16.68 | 1.3385 | 0.6532 | 0.6853 | 48.80 |
| 1988 | 0.4005 | 0.0661 | 0.3344 | 16.50 | 1.3300 | 0.6659 | 0.6641 | 50.07 |
| 1989 | 0.4016 | 0.0667 | 0.3349 | 16.61 | 1.3275 | 0.6932 | 0.6343 | 52.22 |
| 1990 | 0.3939 | 0.0690 | 0.3249 | 17.52 | 1.3245 | 0.6862 | 0.6383 | 51.81 |
| 1991 | 0.3837 | 0.0705 | 0.3132 | 18.37 | 1.3391 | 0.6854 | 0.6537 | 51.18 |
| 1992 | 0.3904 | 0.0737 | 0.3167 | 18.88 | 1.3294 | 0.6789 | 0.6505 | 51.07 |

1960 to 1973 and there after a mixed trend; in contrast inequality within subregions increased consistently from 1960 to 1974 and then decreased consistently from 1976 to 1990 except in 1979 which increased slightly from the previous year. There is no consistency in subregional inequality as a percentage share of total inequality. According to the World Bank (1991), there are disparities within groups of countries that are growing among the less advanced economies as a whole, and especially in East and South Asia. Despite the crises of 1991 Gulf war for Bangladesh, India, Pakistan, Philippines and Sri Lanka such as higher interest rates  on debt services and less trade and service contract and worker's remittance,  inequality went down slightly in 1991 and 1992.

### 3.2.3 Europe

Europe although has the best distribution among all the four continents analyzed, saw it's inequality increased 19.24 percent from 1960 to 1992. Though the over all trend is mixed, there is some consistent increase from 1975 to onward.

### 3.2.4. The Americas

Like other continents the Americas and its sub regions (North and Central America and South America) show a considerable increase of 11.12 percent in inequality without any consistency, (Table 2). In contrast to the African continent the subregional inequality in the Americas is dominant, which has above 50 percent share in total inequality throughout the 33 years of analysis. Subregional inequality increased over time but its share as a percentage of total inequality is somewhat constant as compared to other continents. The inequality within subregions also increased without any consistent pattern over time.

North and Central America almost has 90 percent or above share in GDP, while population share never increased more than 65 percent. On the other hand South America with population share of 35 percent has only less than 10 percent share in GDP.

### 3.3. International Income Inequality by Regions

Table 4 shows the results of analysis of international income inequality with its constituents as DCs and LDCs. Overall inequality increased substantially during the period of analysis with a consistent increase in inequality during the 1960s; with fluctuations during the1970s with its level being highest in 1973, the year of first oil price shock and an over all increase during the 1980s with slight fluctuations.

Despite the protectionism since the1970s, the world economy remained highly integrated. This exposed countries to external shocks. The shocks of the 1970s and the 1980s have been severe. The collapse of Bretton Woods System, sharp rise in food and other commodity prices, and soaring oil prices in 1973-74 and 1979-80 affected nearly every economy.

Regional inequality increased during the 1960s and the early 1970s. During this period LDCs share in world GDP increased only slightly from 10.30 percent to 11 percent though their population share increased from 65.42 percent to 69.02 percent. In contrast DCs share in world GDP decreased slightly from 89.70 percent to 89 percent with a big drop in population share from 34.58 percent to 30.98 percent.

**Table 4**
International Income Inequality by Groups of Countries

| | LDCs, NICs, OECD, and OPEC | | | | LDCs and DCs | | | |
|---|---|---|---|---|---|---|---|---|
| Year | International Inequality | Sub-regional Inequality | Average Within Regions | 3 as a % age of 2 | International Inequality | Regional Inequality | Average within Regions | 7 as a % age of 6 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1960 | 1.1394 | 0.9164 | 0.2230 | 80.43 | 1.1394 | 0.8795 | 0.2599 | 77.19 |
| 1961 | 1.1486 | 0.9293 | 0.2193 | 80.91 | 1.1486 | 0.8913 | 0.2573 | 77.60 |
| 1962 | 1.1656 | 0.9298 | 0.2358 | 79.77 | 1.1656 | 0.8929 | 0.2727 | 76.60 |
| 1963 | 1.1680 | 0.9250 | 0.2430 | 79.20 | 1.1680 | 0.8901 | 0.2779 | 76.21 |
| 1964 | 1.1799 | 0.9355 | 0.2444 | 79.29 | 1.1799 | 0.8987 | 0.2812 | 76.17 |
| 1965 | 1.2092 | 0.9530 | 0.2562 | 78.81 | 1.2092 | 0.9138 | 0.2954 | 75.57 |
| 1966 | 1.2362 | 0.9744 | 0.2618 | 78.82 | 1.2362 | 0.9332 | 0.303 | 75.49 |
| 1967 | 1.2451 | 0.9810 | 0.2641 | 78.79 | 1.2451 | 0.9409 | 0.3042 | 75.57 |
| 1968 | 1.2560 | 0.9915 | 0.2645 | 78.94 | 1.2560 | 0.9459 | 0.3101 | 75.31 |
| 1969 | 1.2593 | 0.9973 | 0.2620 | 79.19 | 1.2593 | 0.9488 | 0.3105 | 75.34 |
| 1970 | 1.2525 | 0.9923 | 0.2602 | 79.23 | 1.2525 | 0.9408 | 0.3117 | 75.11 |
| 1971 | 1.2583 | 0.9932 | 0.2651 | 78.93 | 1.2583 | 0.9377 | 0.3206 | 74.52 |
| 1972 | 1.2861 | 1.0087 | 0.2774 | 78.43 | 1.2861 | 0.9452 | 0.3409 | 73.49 |
| 1973 | 1.3017 | 1.0248 | 0.2769 | 78.73 | 1.3017 | 0.9512 | 0.3505 | 73.07 |
| 1974 | 1.2718 | 0.9260 | 0.3458 | 72.81 | 1.2718 | 0.8766 | 0.3952 | 68.93 |
| 1975 | 1.2483 | 0.9634 | 0.2849 | 77.18 | 1.2483 | 0.8617 | 0.3866 | 69.03 |
| 1976 | 1.2599 | 0.9681 | 0.2918 | 76.84 | 1.2599 | 0.8576 | 0.4023 | 68.07 |
| 1977 | 1.2574 | 0.9703 | 0.2871 | 77.17 | 1.2574 | 0.8604 | 0.397 | 68.43 |
| 1978 | 1.2612 | 0.9788 | 0.2824 | 77.61 | 1.2612 | 0.8775 | 0.3837 | 69.58 |
| 1979 | 1.2884 | 0.9961 | 0.2923 | 77.31 | 1.2884 | 0.8890 | 0.3994 | 69.00 |
| 1980 | 1.2784 | 0.9926 | 0.2858 | 77.64 | 1.2784 | 0.8892 | 0.3892 | 69.56 |
| 1981 | 1.2723 | 0.9900 | 0.2823 | 77.81 | 1.2723 | 0.8965 | 0.3758 | 70.46 |

| | | | | | | | |
|------|--------|--------|--------|-------|--------|--------|--------|-------|
| 1982 | 1.2646 | 0.9865 | 0.2781 | 78.01 | 1.2646 | 0.8940 | 0.3706 | 70.69 |
| 1983 | 1.2685 | 0.9983 | 0.2702 | 78.70 | 1.2685 | 0.9080 | 0.3605 | 71.58 |
| 1984 | 1.2853 | 1.0165 | 0.2688 | 79.09 | 1.2853 | 0.9249 | 0.3604 | 71.96 |
| 1985 | 1.2904 | 1.0287 | 0.2617 | 79.72 | 1.2904 | 0.9357 | 0.3547 | 72.51 |
| 1986 | 1.2934 | 1.0359 | 0.2575 | 80.09 | 1.2934 | 0.9413 | 0.3521 | 72.78 |
| 1987 | 1.2997 | 1.0430 | 0.2567 | 80.25 | 1.2997 | 0.9487 | 0.351  | 72.99 |
| 1988 | 1.2995 | 1.0496 | 0.2499 | 80.77 | 1.2995 | 0.9627 | 0.3368 | 74.08 |
| 1989 | 1.3023 | 1.0588 | 0.2435 | 81.30 | 1.3023 | 0.9770 | 0.3253 | 75.02 |
| 1990 | 1.3014 | 1.0578 | 0.2436 | 81.28 | 1.3014 | 0.9773 | 0.3241 | 75.10 |
| 1991 | 1.2981 | 1.0490 | 0.2491 | 80.81 | 1.2981 | 0.9641 | 0.334  | 74.27 |
| 1992 | 1.2980 | 1.0473 | 0.2507 | 80.69 | 1.2980 | 0.9601 | 0.3379 | 73.97 |

Regional inequality increased consistently during 1976-90 with the exception of 1982. It has a dominant share in international inequality that stayed above 68 percent for the whole period of analysis. According to World Bank (1991), in the 1980s international capital remained mainly in the industrialized countries. Many large countries, even the United States, became the net capital importer. International lenders and investors bypassed the developing countries mainly because of their high external debts and deteriorating economic and political conditions. This may also have increased the inequality in the distribution of income among developed and less developed countries.

### 3.4. International Inequality by Groups of Countries

Table 4 also shows the results of international inequality with LDCs, NICs, OECD, and OPEC as its constitutients. Subregional inequality increased noticeably from 0.9164 to 1.0473. It increased almost consistently during the 1960s and 1980s with mixed trend during the 1970s. As a percentage share of international inequality it remained higher than 72 percent for the entire period. Average inequality within regions did not change much as compared to subregions inequality. LDCs as a group have a big share in total inequality and OECD having the minimum.

### 3.5. LDCs and Subregions

According to table 5 inequality in LDCs (with OPEC) increased significantly (22.91%) with a noticeable difference after the first oil price shock; but after the second oil price shock it started decreasing though it remained higher than the initial period of the analysis. There is a remarkable change in the subregional inequality as a percentage share of total inequality that decreased from 60 to 18 percent. The major decrease occurred after the first oil price shock.

As the World Bank development report (1989) mentioned "Some developing countries have taken advantage of the favorable world environment after the world wide recession of 1982. Most countries in Asia did well and their Gross National Product (GNP) grew at an annual rate of 10 percent whereas growth rate of many African nations remained zero. The heavily indebted economies continued to stagnate."

**Table 5**

Income Inequality among the LDCs

| | WITH OPEC | | | | WITHOUT OPEC | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Inequality in the LDCs | Subregional Inequality | Average within Subregions | 3 as a % age of 2 | Inequality in the LDCs | Subregional Inequality | Average within Subregions | 7 as a % age of 6 | Excluding India |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1960 | 0.3479 | 0.2101 | 0.1378 | 60.39 | 0.2512 | 0.1190 | 0.1322 | 47.37 | 0.3757 |
| 1961 | 0.3479 | 0.2094 | 0.1385 | 60.19 | 0.2552 | 0.1172 | 0.1380 | 45.92 | 0.3765 |
| 1962 | 0.3717 | 0.1843 | 0.1874 | 49.58 | 0.2617 | 0.1219 | 0.1398 | 46.58 | 0.4002 |
| 1963 | 0.3803 | 0.1561 | 0.2242 | 41.05 | 0.2621 | 0.1159 | 0.1462 | 44.22 | 0.4103 |
| 1964 | 0.3849 | 0.1560 | 0.2289 | 40.53 | 0.2593 | 0.1123 | 0.1470 | 43.31 | 0.4216 |
| 1965 | 0.4047 | 0.1623 | 0.2424 | 40.10 | 0.2754 | 0.1201 | 0.1553 | 43.61 | 0.4278 |
| 1966 | 0.4150 | 0.1619 | 0.2531 | 39.01 | 0.2840 | 0.1276 | 0.1564 | 44.93 | 0.4303 |
| 1967 | 0.4167 | 0.1581 | 0.2586 | 37.94 | 0.2805 | 0.1224 | 0.1581 | 43.64 | 0.4458 |
| 1968 | 0.4251 | 0.1585 | 0.2666 | 37.29 | 0.2838 | 0.1198 | 0.1640 | 42.21 | 0.4469 |
| 1969 | 0.4262 | 0.1579 | 0.2683 | 37.05 | 0.2847 | 0.1164 | 0.1683 | 40.89 | 0.4482 |
| 1970 | 0.4286 | 0.1602 | 0.2684 | 37.38 | 0.2852 | 0.1164 | 0.1688 | 40.81 | 0.4466 |
| 1971 | 0.4407 | 0.1623 | 0.2784 | 36.83 | 0.3005 | 0.1231 | 0.1774 | 40.97 | 0.4518 |
| 1972 | 0.4688 | 0.1679 | 0.3009 | 35.81 | 0.3207 | 0.1272 | 0.1935 | 39.66 | 0.4728 |
| 1973 | 0.4813 | 0.1703 | 0.3110 | 35.38 | 0.3230 | 0.1248 | 0.1982 | 38.64 | 0.4804 |
| 1974 | 0.5411 | 0.1160 | 0.4251 | 21.44 | 0.3313 | 0.1279 | 0.2034 | 38.61 | 0.5193 |
| 1975 | 0.5266 | 0.1132 | 0.4134 | 21.50 | 0.3178 | 0.1180 | 0.1998 | 37.13 | 0.5175 |
| 1976 | 0.5461 | 0.1077 | 0.4384 | 19.72 | 0.3252 | 0.1200 | 0.2052 | 36.90 | 0.5272 |
| 1977 | 0.5359 | 0.1073 | 0.4286 | 20.02 | 0.3183 | 0.1172 | 0.2011 | 36.82 | 0.5209 |
| 1978 | 0.5150 | 0.1093 | 0.4057 | 21.22 | 0.3160 | 0.1135 | 0.2025 | 35.92 | 0.5012 |

| 1979 | 0.5343 | 0.1202 | 0.4141 | 22.50 | 0.3382 | 0.1218 | 0.2164 | 36.01 | 0.4975 |
|------|--------|--------|--------|-------|--------|--------|--------|-------|--------|
| 1980 | 0.5177 | 0.1303 | 0.3874 | 25.17 | 0.3381 | 0.1138 | 0.2243 | 33.66 | 0.4887 |
| 1981 | 0.4966 | 0.1214 | 0.3752 | 24.45 | 0.3319 | 0.1072 | 0.2247 | 32.30 | 0.4742 |
| 1982 | 0.4881 | 0.1107 | 0.3774 | 22.68 | 0.3209 | 0.0978 | 0.2231 | 30.48 | 0.4688 |
| 1983 | 0.4715 | 0.0941 | 0.3774 | 19.96 | 0.3026 | 0.0822 | 0.2204 | 27.16 | 0.4650 |
| 1984 | 0.4686 | 0.0961 | 0.3725 | 20.51 | 0.3009 | 0.0821 | 0.2188 | 27.28 | 0.4634 |
| 1985 | 0.4588 | 0.0968 | 0.3620 | 21.10 | 0.2920 | 0.0799 | 0.2121 | 27.36 | 0.4579 |
| 1986 | 0.4537 | 0.1012 | 0.3525 | 22.31 | 0.2887 | 0.0793 | 0.2094 | 27.47 | 0.4558 |
| 1987 | 0.4509 | 0.1008 | 0.3501 | 22.36 | 0.2894 | 0.0772 | 0.2122 | 26.68 | 0.4564 |
| 1988 | 0.4307 | 0.0919 | 0.3388 | 21.34 | 0.2815 | 0.0674 | 0.2141 | 23.94 | 0.4482 |
| 1989 | 0.4146 | 0.0878 | 0.3268 | 21.18 | 0.2796 | 0.0633 | 0.2163 | 22.64 | 0.4344 |
| 1990 | 0.4115 | 0.0784 | 0.3331 | 19.05 | 0.2783 | 0.0567 | 0.2216 | 20.37 | 0.4364 |
| 1991 | 0.4233 | 0.0760 | 0.3473 | 17.95 | 0.2840 | 0.0560 | 0.2280 | 19.72 | 0.4445 |
| 1992 | 0.4276 | 0.0752 | 0.3524 | 17.59 | 0.2858 | 0.0539 | 0.2319 | 18.86 | 0.4538 |

Among the LDCs, OPEC are rich relative to other countries. Their per capita income is far distant from the LDCs mean income and therefore supposed to affect inequality in a substantial way. Table 5 also shows inequality results after excluding OPEC countries. This results in somewhat higher inequality. There is no consistency in the increase but the inequality remained high during the 1970s and first half of the 1980s. Subregional inequality decreased substantially and its share in total inequality went down from 47 percent to 19 percent, which shows that inequality in individual countries is on the rise. Though the inequality in LDCs without OPEC is lower than with OPEC but its movement over time is the similar except for few years during the late 1970s.

After China, India is the largest sovereign state among LDCs with population share 24.99 percent and GDP only 1.95 percent in 1990 and this affected inequality substantially. When India was excluded from LDCs, inequality values went up reasonably and increased (20.79%) over time. The increase is consistent from 1960 to 1974 except 1970 when it slightly decreased. During the late 1970s and in the 1980s it decreased continuously. Despite the exclusion of India the trend of income inequality is the same as with including India.

**3.6. DCs and Subregions**

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Table 6 shows the inequality in DCs and subregions. Inequality in the DCs dropped more than 50% during the observed period. After the first oil price shock it's decline was arrested with slight fluctuations. Inequality within subregion has major share in total inequality that increased noticeably over time from around 54 percent to 72 percent. Fast growing Asia's newly industrializing countries contributed mostly to lower the subregional

**Table 6**

Income Inequality among the DCs and in Europe

| Year | Inequality in the DCs | Subregional inequality | Average Within subregions | 3 as a %age of 2 | Inequality in Europe |
|------|------|------|------|------|------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1960 | 0.0935 | 0.0435 | 0.0500 | 46.52 | 0.1913 |
| 1961 | 0.0831 | 0.0363 | 0.0468 | 43.68 | 0.1923 |
| 1962 | 0.0798 | 0.0346 | 0.0452 | 43.36 | 0.1914 |
| 1963 | 0.0746 | 0.0320 | 0.0426 | 42.90 | 0.1864 |
| 1964 | 0.0721 | 0.0102 | 0.0619 | 14.15 | 0.1912 |
| 1965 | 0.0711 | 0.0297 | 0.0414 | 41.77 | 0.1931 |
| 1966 | 0.0694 | 0.0296 | 0.0398 | 42.65 | 0.1877 |
| 1967 | 0.0656 | 0.0267 | 0.0389 | 40.70 | 0.1879 |
| 1968 | 0.0617 | 0.0237 | 0.0380 | 38.41 | 0.1880 |
| 1969 | 0.0569 | 0.0196 | 0.0373 | 34.45 | 0.1914 |
| 1970 | 0.0514 | 0.0147 | 0.0367 | 28.60 | 0.1946 |
| 1971 | 0.0488 | 0.0140 | 0.0348 | 28.69 | 0.1915 |
| 1972 | 0.0473 | 0.0142 | 0.0331 | 30.02 | 0.1907 |
| 1973 | 0.0448 | 0.0136 | 0.0312 | 30.36 | 0.1931 |
| 1974 | 0.0421 | 0.0113 | 0.0308 | 26.84 | 0.1924 |
| 1975 | 0.0419 | 0.0110 | 0.0309 | 26.25 | 0.1888 |
| 1976 | 0.0414 | 0.0109 | 0.0305 | 26.33 | 0.1890 |
| 1977 | 0.0421 | 0.0116 | 0.0305 | 27.55 | 0.1906 |
| 1978 | 0.0428 | 0.0124 | 0.0304 | 28.97 | 0.1936 |
| 1979 | 0.0428 | 0.0113 | 0.0315 | 26.40 | 0.2033 |
| 1980 | 0.0416 | 0.0098 | 0.0318 | 23.56 | 0.2109 |
| 1981 | 0.0433 | 0.0111 | 0.0322 | 25.64 | 0.2129 |
| 1982 | 0.0417 | 0.0094 | 0.0323 | 22.54 | 0.2137 |
| 1983 | 0.0419 | 0.0100 | 0.0319 | 23.87 | 0.2174 |
| 1984 | 0.0443 | 0.0119 | 0.0324 | 26.86 | 0.2210 |
| 1985 | 0.0452 | 0.0123 | 0.0329 | 27.21 | 0.2238 |
| 1986 | 0.0440 | 0.0118 | 0.0322 | 26.82 | 0.2226 |
| 1987 | 0.0428 | 0.0120 | 0.0308 | 28.04 | 0.2204 |
| 1988 | 0.0424 | 0.0122 | 0.0302 | 28.77 | 0.2238 |
| 1989 | 0.0412 | 0.0120 | 0.0292 | 29.13 | 0.2277 |
| 1990 | 0.0412 | 0.0115 | 0.0297 | 27.91 | 0.2255 |
| 1991 | 0.0415 | 0.0115 | 0.0300 | 27.71 | 0.2294 |
| 1992 | 0.0417 | 0.0120 | 0.0297 | 28.78 | 0.2281 |

inequality whose GDP share in total DC's GDP rose from 11.51 percent to 22.73 percent where as population share rose only slightly from 11.60 percent to 18.99 percent.

**4. The Determinants of Change in International Inequality**

As mentioned earlier, investment, population and exports are supposed to have significance influence on economic growth and its distribution among countries. Oshima (1983) showed that the unprecedented drop in fertility in East Asia was accompanied by a rapid transformation of agricultural economy to an industrial economy followed by a rapid decline in income inequality.

Investment is another factor that affects inequalities across nations. Investment has two different effects 'own investment ' effects and 'spillover' effects. Productive domestic investment can potentially alters the level of income and its growth rate between countries, and it also provides spillover effects that improve foreign productivity growth and thereby help in decreasing income gap between countries. Increase or decrease in income inequality depends on which effect is stronger.

The theory of comparative advantage is regarded as a compelling argument to reduce legal barriers to international trade, as liberalized trade can provide important benefits to a nation's economy. But the past pattern of trade between DCs and LDCs has led to intense specialization of DCs in manufactures and of LDCs in primary products resulting in unequal distribution of gains from trade between these groups of countries.

To examine the relationship between income inequality and these three factors namely export, investment and population, index of world export, index of world investment, index of LDCs export, index of LDCs investment and share of LDCs population in world population were calculated and international inequality levels were regressed on the log

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values of these variables from 1960 to 1992. The regression was tried in different ways but LDCs exports were found to be insignificant each time. The results of the semi-log model are presented in Table 7.

**Table 7**
Semi-Log Regression Model of International Income Inequality and its Determinants

| Variable | Coefficient[*] | t-stat |
|---|---|---|
| 1. Constant | 0.967783 | |
| | (0.003553) | |
| 2. ln-World Exports | 0.002830 | 3.285134 |
| | (0.000861) | |
| 3. ln-World Investment | -0.002853 | -3.603868 |
| | (0.000792) | |
| 4. ln-LDCs' Export | -0.002189 | -1.492633 |
| | (0.001467) | |
| 5. ln-LDCs' population | 1.238940 | 244.7868 |
| | (0.005061) | |
| 6. ln-LDCs' Investment | -0.001694 | -2.736172 |
| | (0.000619) | |
| R-Squared | 0.999835 | |
| adjusted R-Squared | 0.999799 | |

[*] Figures in parentheses are Std.Errors

World Export, World Investment, and LDCs' population are statistically significant variables at above 99 percent confidence level. LDCs' Investment is statistically significant at 98.82 percent of confidence level.

From the results it can be inferred that when World Export as a proportion of World GDP increases by 1 percent annually, the international inequality increases by 0.0028 percent whereas when World Investment as a share of World GDP increases by 1 percent annually, the inequality decreases by 0.0029 percent. DCs have 86 percent of total World

Export whereas LDCs have only 14 percent. LDCs mainly export demand inelastic primary products to the DCs. Since the terms of trade have deteriorated against LDCs, it caused world inequality to rise. This may also be the explanation as to why the coefficient of LDCs' Export is insignificant, although it has negative sign. The DCs' Investment has stronger spillover effect, which causes inequality to decrease, which is evident from the fact that World Investment Index has larger impact than LDCs own investment index. When LDCs own investment increases by 1 percent per year, the inequality decreases only by 0.0017 percent in contrast to almost twice the impact provided by world investment index. Population has very strong effect on inequality. When share of LDCs' population increases by 1 percent annually, inequality increases by 1.24 percent.

## 5. Conclusions

By using Theil's decomposition measure to the data for 108 countries from 1960-92, we found that inequality at international level increased about 14 percent during this period, which is in line with Ram (1989) and Theil (1989). Decomposition analysis shows that in terms of continents regional inequality has less shares in international inequality, and it decreased considerably over time from 42 to 30 percent. Asia has the highest inequality that increased almost 40 percent during the period of analysis, the Americas next after Asia shows an increase of 11 percent. Africa though has higher inequality than Europe; it increased less (14%) in the former than (19%) in the latter over time. In Asia and the Americas subregional inequality has greater share, while in Africa it has the least.

Subregional inequality is dominant when world is divided into DCs and LDCs and also into LDCs, OPEC, OECD and NICs. Inequality is lower in LDCs, when OPEC countries are excluded. It increased 23 percent over time with OPEC and 14 percent without OPEC. When India was excluded along with OPEC from the LDCs inequality values went up considerably. DCs have more equal distribution both among and within countries that also improved over time.

Exports, investment, and population are important determinants of inequality. When world exports as a proportion of world GDP increased by one percent, inequality increased by 0.003 percent. On the other hand it decreased almost by the same percentage, when world investment as a share of world GDP increased by 1 percent. LDCs exports and investment have inverse effect on inequality, whereas LDCs population has very strong positive effect.

Different data source effects magnitudes of inequality more in developing than developed countries. Comparison of our results with Theil (1989) shows that values of inequality for the North (rich countries) are almost double than values in our study. On the other hand values of inequality in Asia from our study are more than 8 times that in Theil.[1]

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[1]   Countries included in both these regions are not exactly the same in both studies, but they are very close.

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