Macroeconomic determinants of income inequality in India and Pakistan

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Abstract. *The objective of this study is to determine the macroeconomic determinants of income inequality in India and Pakistan. The study uses panel data from 1973 to 2015 and utilizes FEM model to estimate the parameter. Following general to specific methodology macroeconomic determinants of income inequality are found. The study finds the following macroeconomic variables as determinants of income inequality i.e. per capita GDP, government consumption expenditure, fertility rate, value addition by agricultural sector, per capita arable land, urban population, and globalization. Special attention must be given to reduce high fertility rate, especially in the lower class of the society.*

Keywords: income inequality, macroeconomic determinants, panel data, India, Pakistan.

JEL Classification: C23, E66, I38.

1. Introduction

Poverty and inequality are interrelated, in many countries poverty is due to the inequitable distribution of resources. The society in which there is no equality in distribution of resources then the poor becomes poorer and leads to worsening condition of that society. Development in developing countries increases inequality as the population shifts from lower income and less unequal sector to higher income sector of the economy. It is generally believed that income distribution has strong relationship with redistribution policies and effect the investment and working conditions of a country. Concentration of income in few hands effects the development of human capital and physical assets.

Two important issues that have been addressed in the literature are factor responsible for income inequality and existence of Kuznet (1955) inverted U-shaped relationship. A number of studies are conducted on cross-country to find the relationship between inequality and growth (Barro, 2000; Forbes, 2000; Azzoni, 2001; Beckfield, 2009; Bandelj and Mahutga, 2010). However, few studies have explored the relationship of income inequality with macroeconomic variables (Feenberg and Poterba, 1993; Mocan, 1999). The decomposition of income inequality into different income groups or sector of economy (e.g. agricultural or industrial sector) is another dimension of research (Cowell, 1988; Shorrocks, 1982a; 1982b; Bourguignon and Morrisson, 1998).

India and Pakistan share a long social, economic and political history before partition. Since, independence both the countries are facing similar socioeconomic challenges, while income inequality is the major challenge faced by both the countries. The gains from growth are spread unevenly in India and Pakistan, some segments of the population left behind in absolute as well as in relative terms (Chaudhuri and Ravallion, 2006). Monetary measures of income inequality in India and Pakistan shows Gini coefficient of 0.34 and 0.29 respectively. However, nonmonetary indicators of well-being show much darker picture of both the countries. Both the countries have worst human development outcomes worldwide. India and Pakistan have some of the highest infant mortality rates and under-five child mortality rates (Rama et al., 2015).

Therefore, in order to tackle income inequality, it is necessary to find the determinants that contribute towards income inequality. The objective of this study is to determine the macroeconomic determinants of income inequality in India and Pakistan. This study will shed light on different macroeconomic factors that are contributing towards income inequality positively and negatively in both the countries. The results of the study will indicate those sectors of the economy which are needed to invest in order to eradicate income inequality.

The remainder of the paper is organized in the following manner. Previous literature is discussed in Section 2. Methodology and data are described in section 3. The empirical results on the determinants of inequality are analyzed in section 4. Section 5 contains concluding remarks and policy recommendation.

2. Literature review

A large number of studies have been conducted to explain the income inequality relation with different macroeconomic variables.

Milanovic (2000) investigated the level of income inequality among 80 countries for 1980. He estimated the standard Kuznet's curve by incorporating economic policies, regional heterogeneity and level of per capita income and then augmented it by incorporating social-choice factors. He found that in rich countries income inequality decreases due to their economic factors and their ability to grow rich.

Odedokun and Round (2004) investigated the relationship between growth and inequality as well as determinants of income inequality in African countries. They found that share of labor force in agricultural sector, regional factors, level of economic development, size of government budget as well as land and human resource endowments are main determinants of income inequality. They also found the negative relation between inequality and growth.

Okatch (2013) explored the determinants of income inequality in Botswana. Firstly, the study has used Field (2003) methodology of decomposing income inequality to find the channels of income inequality at household level. The study adopted the methodology proposed by Shorrocks (1982a) to further decompose inequality by using different income sources. The results of former methodology concluded that primary education level and age have negative relation with income inequality, while secondary education level, number of children and working adults have positive relation with income inequality. The results of latter methodology indicated that wages are vital determinant of income inequality in Botswana.

Lee, Kim and Cin (2013) identified the determinants of income inequality in Korea. The time period for testing both Kuznet's inverted U-shaped and Barro's U-shaped relationship between inequality and economic growth is from 1980 to 2012. They found neither Kuznet's nor Barro's hypothesis hold in Korean economy. The most important and crucial determinant of income inequality in Korea is aging population while share of investment in GDP has negative relation with income inequality.

Skare and Stjepanovic (2014) examined the determinants of income distribution and income inequality in 200 countries. They found that many macroeconomic variables like exports, unemployment, labor force and population have strong impact on income distribution regardless of difference in their income level.

Few researchers examined the impact of selected macroeconomic variables on income inequality. However, Gini index has been used to measure the income inequality and regressed against different micro and macroeconomic variables.

Li and Zou (2002) examined the relationship between inflation, income inequality and economic growth. They conducted a panel data analysis for 46 countries and covered a time period from 1952 to 1992. The inflation causes more unequal distribution of income and support the concentration of income in the hands of rich people. The study found negative relation of inflation with economic growth.

Yue (2011) analyzed the relationship between income inequality, economic growth and inflation. He conducted the analysis on Korea for the period of 1980 to 2002. The error-correction model of the study indicates that there exist long run relationship between income inequality and economic growth. He also found that there is no relation between inequality and inflation in long run.

Thalassinos, Ugurlu and Muratoglu (2012) examined the paradox of inflation and income inequality nexus. They conducted the analysis for 13 European countries for the period 2000 to 2009. By adopting panel data techniques, they confirmed positive and significant impact of inflation on income inequality.

Rehman, Khan and Ahmed (2008) explored the determinants of income inequality in 51 countries for the period 1975 to 2002. The study confirmed the existence of inverted U-shaped relationship between income inequality and growth in these countries. They concluded that government consumption, financial development, per capita GDP and population growth rate are the main determinants of income inequality.

Sarkar (2008) worked on persistent income inequality in different income groups. He used child mortality and fertility in overlapping generation model. The study found that interaction of differential child mortality with child fertility led to a trap of income inequality in low income countries that prevents poor people to spend on education of their offspring's. He also concluded that one important factor that transmit income inequality is differential child mortality.

Khuhro et al. (2012) analyzed the impact of foreign aid on income inequality. They found that foreign aid contributes to income inequality in middle and lower income regions.

Herzer and Nunnenkamp (2012) examined the relationship between foreign aid and income inequality in 21 countries for the period 1970 to 1995. They used panel co-integration technique and used FMOLS and DOLS to check the existence of endogeneity and serial correlation in data. The study concluded that foreign aid increases income inequality among selected countries.

Meschi and Vivarelli (2007) examined the relationship between globalization and income distribution. They used a dynamic model consisting of 70 developing countries to examine the impact of trade liberalization on income inequality for the period of 1980 to 1999. The study found weak relation between trade and income inequality.

They conclude that trade with high income countries leads to high income inequality in developing countries.

Velde and Morrissey (2004) worked on FDI and wage inequality. They conduct the analysis on five East Asian countries over the period 1985 to 1998. The panel regression analysis confirmed that FDI is not reducing wage inequality. They found inequality increasing effects of FDI in Thailand because FDI increasing the wages for both skilled and unskilled workers. They suggested that countries should effectively utilize FDI especially they promote investment in human capital.

Herzer and Nunnenkamp (2011) examined the relationship between foreign direct investment and income inequality. They used a sample of 10 European countries for the time period ranging from 1980 to 2000. The study used causality and panel co-integration techniques and found that income inequality is directly affected by FDI in short run, while in long run FDI has negative relationship with income inequality.

Franco and Gerussi (2013) examined the effect of inward FDI and trade openness on income inequality. Their analysis was based on 18 transition economies for the period 1990 to 2006. They found insignificant impact of FDI on inequality. They concluded that trade openness has positive relation with inequality in short run and negative in long run.

3. Methodology and data

The study uses the following simple model in order to determine the determinants of income inequality:

$$GINI = f(PCGDP, GCON, FER, AGR, LND, KOF, UPOP, FDI, GFCF, ENR, INF) \quad (1)$$

Where, GINI is Gini index used to measure income inequality, PCGDP is per capita GDP a proxy for economic development, GCON is government consumption expenditure used as proxy for fiscal action on inequality, AGR is value addition by agricultural sector, LND is per capita arable land a proxy for natural resource endowment, FER is fertility rate, KOF index is used as a proxy to measure globalization, UPOP is urban population a proxy for urbanization, FDI is foreign direct investment, GFCF is gross fixed capital formation used as proxy for investment, INF is inflation rate, ENR is gross enrolment ratio of secondary education a proxy for human capital.

This study is utilizing the panel data because it provides better estimates than cross-sectional and time series data. Panel data estimates are more efficient as it decreases collinearity among explanatory variables by using large degree of freedom and control individual country heterogeneity and minimizing misspecifications. Two most famous techniques used in panel data estimation are Fixed Effect Model (FEM) and Random Effect model (REM). Hausman specification test is applied to check whether FEM or

REF is suitable for estimation. However, if number of cross sections is less than time period then FEM is better than REF.

3.1. Data

Panel Data is collected for India and Pakistan from 1973 to 2015 at annual frequency. Income inequality is measured by Gini index (GINI). The data for Gini index is collected from World Income Inequality Database (WIID). However, Gini index includes various missing values, to encounter this issue the data is interpolated through exponential smoothing for both the countries. Data for per capita GDP (PCGDP), government consumption expenditure (GCON), value addition by agricultural sector (AGR), per capita arable land (LND), fertility rate (FER), urban population (UPOP), foreign direct investment (FDI), gross fixed capital formation (GFCF), gross enrolment ratio of secondary education (ENR), and inflation rate (INF) are taken from World Development Indicator (WDI). The data for KOF index (KOF) is taken from KOF index of Globalization.

4. Results

The study has estimated five models through FEM by adopting general to specific methodology. Starting from Model-I, insignificant variables are excluded one by one, while Model-V is the final model. Model-V indicates the macroeconomic determinants of income inequality in India and Pakistan. The results of all the models are given in table1.

Table 1. *Determinants of income inequality*

Variable	Model - I	Model - II	Model - III	Model - IV	Model - V
C	-4.2931 (5.111)	-5.0554* (2.6419)	-2.2331 (5.3648)	-6.6103*** (0.5497)	-15.2316*** (2.5731)
PCGDP	0.0026*** (0.0007)	0.0022* (0.0013)	0.0016 (0.0023)	0.0029*** (0.0005)	0.0036*** (0.0002)
GCON	-0.2132 (0.2121)	-0.2024 (0.2330)	-0.3390** (0.1515)	-0.3531** (0.1479)	-0.5508*** (0.0266)
FER	4.2914* (2.2996)	4.3450** (2.0549)	3.8120* (2.0979)	4.6506*** (1.2021)	6.6928*** (0.0073)
AGR	-0.0178 (0.0300)	-0.0237* (0.0123)	-0.0245 (0.0284)	-0.0262 (0.0253)	-0.0366** (0.0167)
LND	4.1028 (6.7772)	2.3946 (3.3357)	3.0621*** (0.6886)	4.4224 (3.1984)	-2.2247*** (0.1866)
UPOP	1.4696 (1.7059)	1.6156 (1.9773)	1.9831 (1.7869)	1.4321 (1.1061)	1.1317** (0.5009)
KOF	0.3569*** (0.0569)	0.3710*** (0.0156)	0.3306*** (0.0684)	0.3754*** (0.0615)	0.4791*** (0.0199)
FDI	0.3395*** (0.0327)	0.3030** (0.1228)	0.0790 (0.0915)	0.0879 (0.0615)	----
GFCF	0.0019 (0.0028)	0.0026 (0.0042)	0.0027 (0.0035)	----	----
ENR	-0.0388 (0.0453)	-0.0481 (0.0638)	----	----	----
INF	-0.0283 (0.0598)	----	----	----	----
R^2	0.6741	0.6702	0.6410	0.6387	0.6979

Note: ***, ** and * indicates 1, 5 and 10% level of significance respectively Parenthesis shows standard errors.

In Model-I all variables are included, while fertility rate (FER), KOF index (KOF) and foreign direct investment (FDI) are statistically significant and having positive signs. All other variables have no impact on income inequality in India and Pakistan. Starting from bottom, the study has excluded one by one insignificant variables from the model. In Model-II, inflation (INF) has been excluded. In this model per capita GDP (PCGDP) variable become significant at 10% level of significance. There is no change on the significance level of other variables. Model-III excludes gross enrolment ratio of secondary education (ENR). Now, foreign direct investment (FDI) and per capita GDP (PCGDP) have become insignificant, while per capita arable land (LND) and government consumption (GCON) have become statistically significant at 1% level of significance. Model-IV excludes gross fixed capital formation (GFCF), and now only per capita GDP (PCGDP) and fertility rate (FER) have significant impact on income inequality. Model-V has excluded foreign direct investment (FDI) from the model. The exclusion of this variable leads to R^2 value of 0.69. All variables are statistically significant and having their respective relationship with income inequality. Thus, the final macroeconomic determinants of income inequality in India and Pakistan are per capita GDP (PCGDP), government consumption (GCON), fertility rate (FER), value addition by agricultural sector (AGR), per capita arable land (LND), globalization (KOF) and urban population (UPOP).

The final estimated model for determinants of income inequality is:

GINI = -15.2316 + 0.0036*(PCGDP) – 0.5508*(GCON) + 6.6928*(FER)

– 0.0366*(AGR) – 2.2247*(LND) + 1.1317*(UPOP) + 0.4791*(KOF).

Many studies in literature have examined the linear relationship between GDP and income inequality in order to prove Kuznet (1955) inverted U-shaped relationship. The existence of inverted U-shaped relationship among GDP and income inequality is subject to controversy. A rich literature is available that has not confirmed this inverted U-shaped relationship between GDP and income inequality (Bussmann et al., 2002; Choi, 2006; Meschi and Vivarelli, 2007; Grimalda and Meschi, 2008).

Model-V indicates positive relationship between income inequality and per capita GDP (PCGDP) which shows that as economic development increases income inequality also increases. This direct relation between PCGDP and income inequality shows that both India and Pakistan are at the initial stages of development. These results are consistent with the findings of Odedokun and Round (2004). The effects of fiscal action on income inequality are accounted by incorporating government final consumption expenditure (GCON). Both positive and negative relation between government consumption and income inequality exist in literature. The estimated coefficient of government consumption expenditure is statistically significant and showing negative relation with income inequality. It means that as the government expenditure increases income inequality will decrease.

The fertility rate (FER) has significant and positive relation with income inequality. In developing countries like India and Pakistan a high fertility rate is a common social issue. The population which is living below poverty line has higher fertility rate which makes them more vulnerable towards poverty. In order to examine the impact of agricultural growth on income inequality the study has included the growth rate of agricultural value addition (AGR). This variable shows negative and significant impact on income inequality. Lee, Kim and Cin (2013) also found negative and significant relation between agricultural growth and income inequality. In agrarian economy where agricultural sector contributes more to GDP as compared to other sector reduces unequal distribution of income due to increase in free trade agreements with many other economies and generate more employment opportunities. These channels automatically decrease income inequality in an economy.

Per capita arable land (LND) is used to check the impact of natural resource endowment on income inequality. The estimated coefficient of this variable indicates significant negative impact on income inequality. In literature there are mixed results regarding natural resources and inequality. Deininger and Squire (1998) reported a positive relationship between inequality and natural resource endowment. Bergh and Nilsson (2010) found negative relation between inequality and natural resource endowment. Income inequality decreases as the availability of land increases because increase in employment opportunities generated by equal distribution of land which in turn increases the tendency of equal distribution of income. These results are consistent with the findings of Bourguignon and Morrison (1998). Urbanization is major issue in developing economies. Results indicate positive and significant relation between income inequality and urban population (UPOP). Urban population creates unequal distribution of income among different classes of society. There are considerable differences in the income of people living below poverty line and those who are living in well-furnished urban areas.

In order to capture the effects of globalization on income inequality KOF index is utilized. This index capture economic, social and political dimensions of globalization therefore, this is a comprehensive proxy for examining the impact of globalization on income inequality. Most of the studies have used trade openness as a proxy for globalization. The coefficient of KOF indicates positive and significant impact on income inequality. This suggests that globalization has been effective in increasing income inequality. This indicates that as the economies become more open either economically, socially or politically their abilities to access each other's technologies and culture increases and this increase in turn increases income inequality. Because the rich class of a country has more opportunities to develop financially, socially and they can be politically stable as compared to poor class. This situation in a country leads to concentration of money again in few hands. Barro (2000) found that openness

positively affects income inequality in rich nations while decreases inequality in poor economies. Bergh and Nilsson (2010) also found positive relation between income inequality and globalization by using KOF index.

Foreign direct investment (FDI), gross fixed capital formation (GFCF), gross enrolment ratio of secondary education (ENR), and inflation (INF) are proved to be insignificant. FDI is showing positive and significant impact on income inequality in Model-I and Model-II but later on it becomes insignificant. This indicates that in both India and Pakistan FDI is not increasing labor demand, transfer of technology and employment opportunities which lead to unequal distribution of income in the economy. These results are consistent with the findings of Lee, Kim and Cin (2013).

Investment measured by gross fixed capital formation (GFCF) has positive but insignificant impact on inequality. This indicates that in both economies investment is not affecting income inequality. Bourguignon and Morrisson (1998) found negative relation between skilled labor force and income inequality. However, secondary school enrolment ratio (ENR) is used to incorporate human capital but result suggests negative but insignificant impact on income inequality in India and Pakistan. This may be due to the fact that the share of skilled labor in total labor force is not enough which creates inequality in income. The impact of inflation (INF) on income inequality is ambiguous in the literature. Many cross-country studies found insignificant impact of inflation on inequality. Usually, the impact of inflation is considered with wealth distribution rather than income distribution (Lee et al., 2013). Our results suggest negative but insignificant impact of inflation on income inequality in India and Pakistan.

5. Conclusion

The society in which there is no equality in distribution of resources then the poor becomes poorer and leads to worsening condition of that society. India and Pakistan are the two major players of the South Asian region and share a long social, economic and political history before partition. This study explores the macroeconomic determinants of income inequality in India and Pakistan from 1973 to 2015 at annual frequency. FEM is utilized to estimate the parameter because of larger number of periods than the cross section. Following general to specific methodology macroeconomic determinants of income inequality are found. Some variables are suggesting strong positive impact, while others are discouraging income inequality. The study finds the following macroeconomic variables as determinants of income inequality in India and Pakistan i.e. per capita GDP, government consumption expenditure, fertility rate, value addition by agricultural sector, per capita arable land, urban population, and globalization.

Results show positive relationship between income inequality and per capita GDP, which shows that as economic development increases income inequality also increases.

This direct relation between per capita GDP and income inequality shows that both India and Pakistan are at the initial stages of development. Government consumption expenditure shows negative relation with income inequality, which means that as the government expenditure increases income inequality will decrease. The fertility rate has a significant and positive relation with income inequality, while value addition by agricultural sector shows negative and significant impact on income inequality. The estimated coefficient of per capita arable land proxy for natural resource endowment indicates significant negative impact on income inequality. Urbanization indicates positive and significant relation with income inequality. KOF index captures economic, social and political dimensions of globalization. The coefficient of KOF indicates positive and significant impact on income inequality, which suggests that globalization is increasing income inequality. However, foreign direct investment, gross fixed capital formation, gross enrolment ratio of secondary education, and inflation are proved to be insignificant determinants of income inequality in India and Pakistan.

Based on the results, it can be concluded that that per capita GDP, fertility rate, urbanization, and globalization have positive impact, while government consumption expenditure, value addition by agricultural sector, and per capita arable land have negative impact on income inequality. Therefore, government of both the countries must promote the policies which reduce income inequality, especially in the agricultural sector where majority of the unskilled labour force work to increase their employment level which in turn decrease income inequality in the country. Special attention must be given to reduce high fertility rate, especially in the lower class of the society.

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