Linkages between Income Inequality, International Remittances and Economic Growth in Pakistan

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3 March 2013

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Abstract:
This paper explores the dynamic linkages between income inequality, international remittances and economic growth using time series data over the period of 1976-2006 in case of Pakistan. The cointegration analysis based on the bounds test confirms the existence of a long-run relationship between income inequality, international remittances and economic growth. Our results reveal that income inequality and international remittances enhance economic growth. The causality analysis based on innovative accounting approach shows bidirectional causality between income inequality and economic growth and same is true for international remittances and income inequality. International remittances are cause of economic growth but not vice versa.

Although we find support for Kuznets hypothesis but Pakistan is yet to benefit, in terms of reducing the gaps of income inequality, from the international flow of remittances and economic growth. The paper argues that, from a policy perspective, there is an urgent need for policy makers in Pakistan to reduce the widening gap of income inequality by focusing on income redistribution policies and to go beyond the traditional factors in balancing income inequality.
JEL Classification Numbers: O11, O15, D13
Key Words: Income Inequality, International Remittances, Economic Growth

I. Introduction

In this era of globalization and with the labor mobilization, the link between income inequality, international remittance and economic growth has been a major issue of concern among policy makers and development economists. Despite having better economic growth, poverty and the gap between the rich and poor still prevail (Easterly, 2001) not only in the less developed countries but also in the developed world (Gaston and Rajaguru, 2009). Although multiple factors are likely to impact income inequality, the globalization process continues to receive increasing attention (Gaston and Rajaguru, 2009; Dreher et al. 2008). The proponents of globalization perceive the stage of economic development and international mobility of worker force (labor markets) as one of the most important channels influencing income inequality (Yabuuchi and Chaudhuri, 2007). However, a more recent concern has been the limited evidence on the analysis of the impact of economic development and international remittance on income inequality from a single country.

International remittances[1] inflows are a key and stable source of foreign capital and revenue in developing economies that reduces the dependence on external factors like foreign loans and aids. In literature, the relationship between foreign migrants' remittances and income inequality is scarce and incongruous. Some empirical evidences showed that international remittances have positive impact on income inequality (Milanovic, 1987; Stark et al. 1988; Taylor, 1992; Taylor and Wyatt, 1996; Adams, 1989; Rodriguez, 1998; Lerman and Feldman, 1998; Adger, 1999) while others argued that international remittances actually decreases the income inequality (Barham and Boucher, 1998; Ahlburg, 1996; Handa and King, 1997). In contrast, Knowles and Anker, (1981) found lack of support on the linkage between international remittance and income

distribution. Adams, (1992) found no significant impact of international remittances on rural income distribution in case of Pakistan. Despite the fact that a wide strand of economic research has investigated the effects of international remittances on income inequality but the results remain inconclusive. Likewise, there are also considerable studies examining the effects of economic growth on income inequality (Bahmani-Oskooee et al. 2008; Meschi and Vivarelli, 2009; Roine et al. 2009; Shahbaz, 2010). In theory, better economic growth contributes to declining income inequality. As such globalization is seen as a catalyst to promote economic growth that will eventually equalize income inequality. This has also interested scholars to examine the Kuznets hypothesis, the inverted U-shaped hypothesis. Kuznets (1955) describes that per capita income, at first, may increase income inequality and subsequently further income increase to reduce the level of income inequality. However, at the macro level, studies examining the Kuznets hypothesis are limited although there have been considerable developments in estimating procedures to analyze its impact.

The main goal of this paper is to examine the dynamic relationship between international remittance, economic growth and income inequality using time series data. In this context, we further extend and advance the literature on income inequality in a number of important ways. First, we contribute to understand the dynamic link between the variables by mitigating some of the methodological problems of the previous studies. Although previous studies provide valuable insights on the relationship between the variables, these studies suffer some limitations. One common limitation is the assumption that causality runs from one direction and lack of serious attempts to investigate the dynamic interrelationship between the variables. Indeed, Bénabou, (2005) is of the opinion that controversy results exist in the literature due to the problem of

endogeneity of income inequality in economic growth regressions. Majority of the scholars takes the Kuznets view that economic growth influence income inequality, while others examines the effects of income inequality on economic growth. In many of these studies, less attention is given to the problem of endogeneity[2] as well as the direction of causality. In this paper, we attempt to investigate the neglected issues by examining the dynamic link between income inequality, international remittances and economic growth. We used a more robust estimation – bounds test and the ARDL technique (Pesaran et al. 2001) to mitigate the problem of endogeneity. The problem of serious multicollinearity involving income inequality, international remittances and economic growth can be mitigated as the ARDL is known to yield consistent long-run estimates even when the right hand side variables are endogenous (Inder, 1993). Pesaran and Shin, (1999) proved that it is possible to correct for serial correlation in residuals and the problem of endogenous regressors using appropriate order of the ARDL model. Indeed, the problem of multicollinearity is further examined using the correlation matrices and the variance inflation factors (VIF). Similarly, the direction of causality is further examined using innovative accounting approach (IAA) [3]. We believe that by unpacking the complex relationship between the variables, we will be able to provide some additional insights and help establish some answers to the fundamental question of whether and how international remittance, income inequality and economic growth relate to each other.

Second, our contribution lies in that the analysis is country specific. At the macro level, the availability of limited long span of time series data prevents individual country analysis, allowing scholars (Deininger and Squire, 1998; Anand and Kanbur, 1993; Ram, 1998; Ravallion, 2001; Adams and Page, 2005; Koechlin and León, 2007; Meschi and Vivarelli, 2009; Roine et al. 2009)

to only use panel and cross-sectional estimation methods[4]. However, studies using homogeneous panel estimators produce inconsistent and misleading estimates of the average values of the parameters in dynamic models (Herzer and Vollmer, 2012). Similarly, the cross-country results failed to address the issues of how changes in income inequality of a country effect economic growth within the same country (Forbes, 2000). Since the impact of income inequality and international remittances on economic growth could differ, depending on the complexity of economic environment and histories (e.g. stage of development) of a country (Bahmani-Oskooee et al. 2008; Qureshi and Wan, 2008), the panel approach may only be able to provide a general policy implication that may not be suitable to form a specific policy lessons for certain countries[5]. Moreover, due to data comparability problems on income inequality between countries, the panel estimate may lead to biasness (Knowles, 2001; Ravallion, 2001). Sotomayor, (2004) argued that results inconsistency were due to data comparability problems and the use of cross-sectional analysis. In a similar vein, Adams (2004) strongly proposed the need to understand impact of income inequality and international remittances on economic growth within a country using time-series data due to the limits of cross-country studies. In this aspect, studies quantifying the linkages between income inequality, international remittance and economic growth are scarce and limited (Qureshi and Wan, 2008) except for the evidence of cross-country analysis. As such, empirical studies relying on cross-country panel data analysis showed mixed results. The preferred country specific analysis of this paper provides more country specific policy implications. And, with the bounds test and availability of critical values for 30 sample size, robust estimation is still possible for countries that have short span of time series data (Mah, 2000; Narayan, 2005). Hence, interference drawn from this paper provides general understanding and guidance for policy formulation specifically for Pakistan. Past studies also ignored the issues

of data stationary and long-run cointegration. Granger and Newbold, (1974) and Phillips, (1986) showed that series need to induce stationary process for the estimation to be reliable and unbiased so as to avoid spurious regression. Similarly; Engle and Granger, (1987) and Toda and Phillips, (1993) have shown that ignoring the existence of cointegration in the series could have led to serious model mis-specifications. In this paper we tested for data stationary and cointegration (accommodating structural breaks stemming in the variables) prior to testing the impact of income inequality and international remittance on economic growth, thus avoiding the spurious regression problems. In addition, in this paper, the issues of endogeneity in the model were examined resulting in more reliable estimates than the previous studies (Bahmani-Oskooee et al. 2008) that have ignored this issue. The paper also complements and reassessed evidence of the limited micro and macro level studies in case of Pakistan. Furthermore, since reducing income inequality is important for any poverty reduction efforts (Bruno et al. 1998), understanding the link between income inequality, international remittance and economic growth is vital.

We find from above discussion that all the above studies ignored the role of structural breaks stemming in the series. These breaks are outcomes of implementing the economic, social and trade policies such as economic, trade reforms and structural adjustment program especially in case of Pakistan. The appropriate information about the outcome (by pointing out break year) of economic policy would be help for policy makers in designing a comprehensive economic, social and trade policy to sustain economic growth and improve income distribution. This is a rational for researchers to investigate the linkages between income inequality, international remittances and economic growth in case of Pakistan. Our findings show that income inequality and international remittances stimulate economic growth. The feedback hypothesis is confirmed

between income inequality and economic growth and, international remittances and income inequality. The unidirectional causality exists from economic growth to international remittances.

The rest of the paper is organized as follows. Section-II discusses the issues of income inequality and international remittance in the context of Pakistan. Section-III reviews the existing literature on international remittance, income inequality and economic growth. Section-IV describes the data, model, estimation procedures and the methodology. Section-V reports the empirical results while section-VI presents the policy implications and conclusions.

II. Remittances, Economic Growth and Inequality in Pakistan

Pakistan recorded an impressive economic growth since the 1951 recession especially during the 1980's. The average real GDP growth rates were 4.8% and 6.5% in 1970s and 1980s respectively. In the 1990s, the growth rate subsequently fell to 4.6% with significant lower growth rates during the second half of that decade (see Table-1). In general, it is expected that high rates of economic growth have played an important role in reducing poverty during the 1970s and 80s. However, as shown in Table-1, poverty reduction was not accompanied by improvements in the overall trend of income inequality (measured by Gini-coefficient). There is a general consensus that poverty in Pakistan has increased in the 1990s along with income distribution (measured by Gini-coefficient) deteriorating over the years. On average, income distribution has worsened over the last half decade from 34.5 in 1971-72 to 42 in 2001-02 (see Table-1). In respect to income distribution by income category (share of household income – lowest 20%; Middle 60% and Highest 20%), it indicates that income distribution of share of the lowest 20% households has declined from 7.9 to 7.0 in 1972 and 2002 respectively. The same trend is observed for the middle income households.

However, the share of the highest 20% household income the trend increases. Likewise, the ratio of highest 20% to lowest 20% (also known as Kuznets Ratio) shows increasing disparity between the two groups.

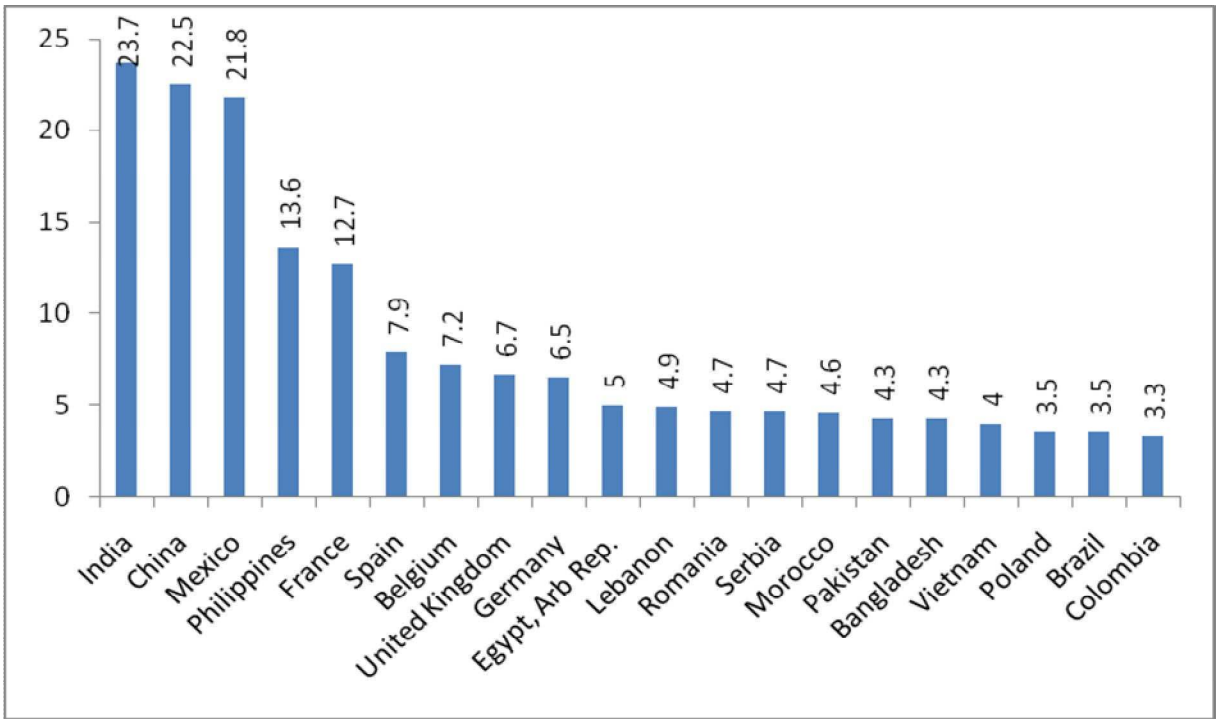
Table-1: Income Distribution in Pakistan, 1971-2002

Years	Household Gini-coefficient	Household Lowest 20%	Income Middle 60%	Share of Highest 20%	Ratio of Highest 20% to Lowest 20%	GDP Growth rate
1971-72	34.5	7.9	49.1	43.0	5.4	2.3
1979-80	37.3	7.4	47.6	45.0	6.1	5.5
1984-85	36.9	7.3	47.7	45.0	6.2	8.7
1985-86	35.5	7.6	48.4	44.0	5.8	6.4
1986-87	34.6	7.9	48.5	43.6	5.5	5.8
1987-88	34.8	8.8	45.3	43.7	5.0	6.4
1990-91	40.7	5.7	45.0	49.3	8.6	5.6
1992-93	41.0	6.2	45.6	48.2	7.8	2.3
1993-94	40.0	6.5	46.3	47.2	7.3	4.5
1996-97	40.0	7.0	43.6	49.4	7.1	1.9
1998-99	41.0	7.8	48.9	42.3	5.4	4.2
2001-02	42.0	7.0	44.4	47.6	6.8	3.6

Source: Federal Bureau of Statistics (2003-04)

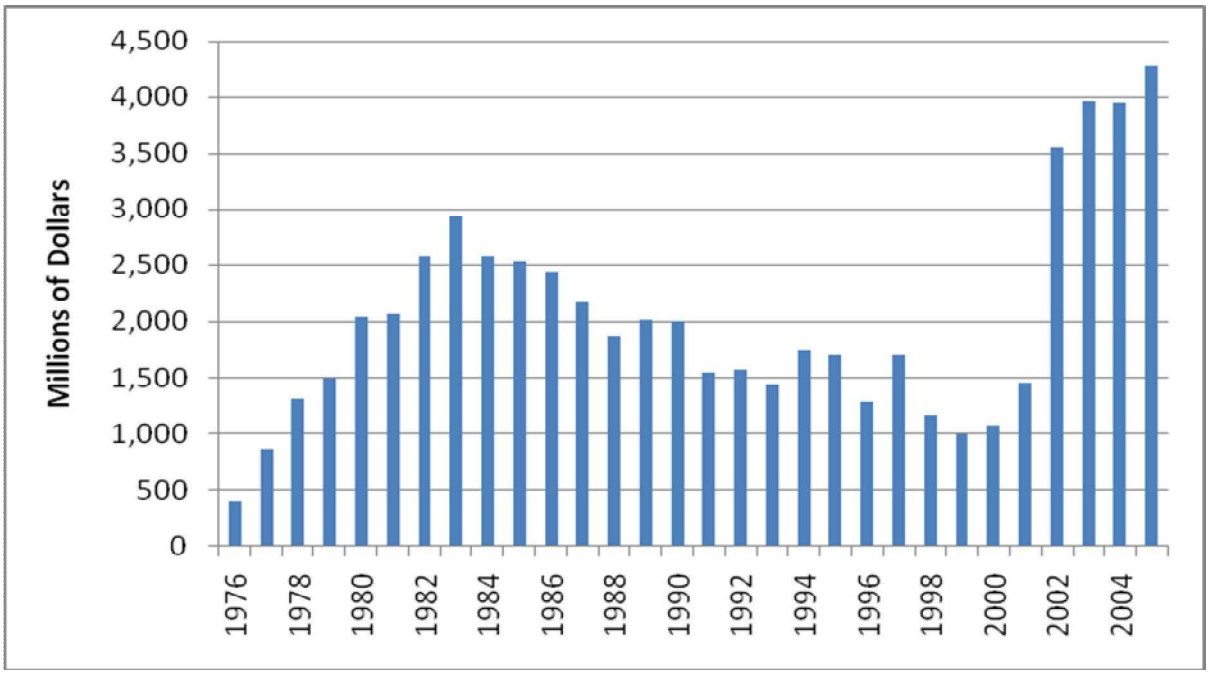
Social and development economics often viewed international remittances in the context of the migration-development nexus where the main arguments lie on poverty-reduction dimensions of remittances (Datta et al. 2007). However, the biggest concern is on the misplaced link between international remittances and income inequality in the sense that benefits of international remittances rarely involves all segments of society. Identifying whether there is any misplaced links require a time series analysis over a substantially period of time for a specific country that has important consequences to the development policy. Since 2000, on average, international remittance to developing countries increased by 16% while regions like Latin America, the Caribbean, East Asia and Pacific recorded growth greater than the average for developing countries (Gupta et al. 2009). In the year 2005, among the South Asia countries, Pakistan stands out as the second largest (in par with Bangladesh) recipient of remittance after India with a remittance inflow of 4.3 billion dollars (see Figure-1). This amount is about 1.65 percent of the share of total world remittances. In addition, the amount is expected to be greater if the informal channels were considered. Historical trends indicate that foreign remittances started to increase from the late seventies and peaked in 1983 that was about 10 percent of GDP (see Figure-2). This influx of foreign worker remittances helped to finance 96.6 % of trade deficit and 84.8 % of current account balance (Siddiqui and Kemal, 2006). Beginning 1983, the trend seems to slow down with lower remittance inflows until 2002, after which the inflow rose rapidly. Although, the overall trend of GDP growth and remittance inflows shows an increasing trend, the overall income distribution remained high. This may indicate that economic growth and international remittance may have benefited certain groups of the population leading to a higher income inequality.

Figure-1: Top 20 Remittance-recipient Countries, 2005 (Billions, USD).



Source: World Bank, 2007

Figure-2: Flow of International Remittance, Pakistan, 1976-2005.



Source: World Bank, 2007

III. Literature Review

III.I International Remittances and Income Inequality

Lipton, (1980) in his pioneer work viewed that migrant's remittances generate negative externalities which is responsible for an increase in income inequality. It is viewed that remittances have undesirable impacts because migrants' remittances are either very small or go disproportionately to those who are better off. In case of Egypt and Philippines, respectively; Adams, (1991) and Rodriquez, (1998) showed that international remittances tend to have a positive impact on income inequality. Similarly, Lerman and Feldman, (1998) found that international remittances tend to increase income inequality. A study by Stark et al. (1986), found that the distributional impacts of international remittances depended on migration history. They found that initially remittances worsen income inequality as only the richest household had the opportunity and information to migrate. Once the cost and information becomes cheaper and widely available, international remittance is likely to have a reducing impact on income inequality. This supports the inverse U-shaped relationship between international remittance and income inequality.

Among others, Acosta et al. (2006) showed that international remittances do reduce income inequality – although in a smaller magnitude-in case of Latin America and Caribbean. Stark et al. (1986), Stark et al. (1988) and Taylor, (1992) observed that international remittances reduce income inequality when international remittances are viewed as an exogenous source of income. Nguyen, (2008) applied fixed effect regression to examine the impact of international remittances on income inequality. The empirical exercise indicated that international remittances have improved income and consumption of remittances-receiving households in Vietnam but overall

income inequality is increased. Ebeke and Goff, (2009) investigated the relationship between international remittances and income distribution using the data of 80 developing countries over the period of 1970-2000. They pointed out that international remittances improve income distribution in countries where the cost of passport and detachment is low as well as less skilled labour is abundant. Giannetti et al. (2009) visited the impact of international remittances on income distribution using data of Slovenia, Poland, the Czech Republic and Hungary. Their findings unveiled that international remittances reduce income inequality and hence reduce poverty. Waheed and Shittu, (2012) examined the impact international (domestic) remittances on income distribution using data of Nigerian economy. They found that international remittance lower income inequality but domestic remittances improve income distribution due to education enhancing-effect. Acharya and Leon-Gonzalez, (2012) investigated the relationship between international remittances and income inequality in Nepal conducting panel of living standard measurement survey (LSMS). Their findings revealed that international remittances reduce poverty but worsens income distribution.

Similarly; Ahlburg, (1996) also supported that international remittances have reducing effects on income inequality. Other studies (Oberai and Singh, 1980; Stark and Levhari, 1982; Lucas, 1987) found that the marginal impacts of international remittances on household incomes to be greater than unitary. Docquier et al. (2007) developed a dynamic migration model to investigate the impact of international remittances on income distribution. Their findings suggested that income inequality to be monotonically reducing, along with the history of migration. Short and long-run impacts on income inequality may be of opposite signs indicating a dynamic relationship between international remittances and income inequality in an inverted U-shaped pattern. Koechlin and

Leon, (2007) provided support that at the initial stages of migration history international remittances increase inequality. As the opportunity cost of migration lowers, international remittances sent to those households reduce income inequality. This is a clear indication of an inverted U-shaped relationship between international remittances and income inequality.

Based on the discussions above, past studies highlighted two important issues. Firstly, the evidence on the effects of international remittances on income inequality remains ambiguous and inconclusive. Secondly, besides theories suggesting the direct relationship between international remittance and income inequality, the evidence also indicated an inverted U-shaped relationship. However, at the macro level, only few studies examined the relationship between international remittances and income inequality (Adams and Page, 2005; Acosta et al. 2008) and only limited evidence is available on the inverted U-shaped relationship. It is clear that it is imperative to explore both the relationships to provide informed insights for national and international policy purposes. Therefore, this paper tends to fill the existing gaps in the literature in case of Pakistan.

III.II Economic Growth and Income Inequality

Two competing theories exist in explaining the direction of influence between economic growth and income inequality. One view is the effect of income inequality on economic growth[6] which can be either negative or positive. However, large number of studies tends to support the notion that income inequality has negative effects on economic growth (see Benabou, 1996; Forbes, 2000). The argument lies in that higher income inequality may not allow the poor to carry out more efficient investment that would otherwise have increased economic growth. In other words, for a more efficient allocation of investment, equality is a requirement. Similarly, if higher

income inequality leads to rent-seeking behavior by the rich, resources devoted to those rent-seeking activities would have lower economic growth that otherwise could have invested to capital investment (Rodriquez, 1999). Hsing, (2005) examined the relationship between income inequality and economic growth by incorporating investment and human capital in economic growth function in case of US. The empirical results showed that income inequality retards economic growth while investment and human capital stimulate it. Likewise; Jong, (2010) conducted a study to probe the effect of income inequality on economic growth using data set of Forbes, (2000) by applying dynamic panel technique such as system GMM to lessen endogenous problem and cross-sectional analysis. The empirical showed that long term economic growth is inversely affected by income inequality. In short to medium term, income inequality affects economic growth but impact is uncertain and same is true from sub-group analysis. Later on, Herzer and Vollmer's (2012) study on 46 countries using a panel cointegration analysis found that, on average, income inequality has a negative long-run influence on economic growth. They also found that the effect of income inequality on per-capita income to be about half as large as the effect of an increase in investment. Apart from that Castelló-Climent, (2010) investigated the impact of income and human inequality on economic growth by applying GMM approach on the data of advanced countries. The empirical results revealed that income inequality leads human capital inequality that in turn retards economic growth. This reveals that income inequality and human capital inequality inversely affect economic growth. Similarly; Binatli, (2012) probed the relationship between income inequality and per capita income over the periods of 1970–1985 and 1985–1999 respectively. The results are ambiguous showing positive impact of income inequality on economic growth in nineties and negative affect of income inequality is seventies. Likewise; Zouheir and Imen, (2012) examined the nexus between income inequality and economic growth

using data of North African countries such as Tunisia, Morocco and Egypt by applying panel regression. They reported that high income inequality is harmful for economic growth but trade openness and, physical and human capital investment enhance economic growth and hence in resulting poverty is recued.

In contrast, based on the post-Keynesian literature, some authors argue that income inequality have a positive effect on economic growth. This theory assumes that higher income inequality to increases the incentives for the rich to generate additional income causing greater economic growth. The view is that resource transfer from workers to capitalist would raise the saving rate and therefore economic growth. It is postulated that income inequality to increase incomes of the rich whose marginal propensity to save is the highest (Malinen, 2010). Studies supporting the positive effect of income inequality on economic growth include Forbes, (1997) and Li and Zou, (1998). Similarly; Barro, (1999) suggested that income inequality to have positive effects for high level income but negative for low income per capita. In other words, the effect of income inequality on economic growth in developed countries can be positive while for developing countries the effect seems to be negative. Likewise, a study by Galor and Moav, (2004) and Chambers and Krause, (2010) on the long run impact of income inequality on economic growth development suggest that inequality stimulates economic growth at the early stage of development. Frank, (2008) using a new comprehensive panel of annual state-level income inequality measures over the period of 1945-2004 probed the relationship between income inequality and economic growth. The empirical evidence exposed positive effect of income inequality on economic growth but concentration of income is linked to upper segment of population[7]. Hasanov and Izraeli, (2011) reinvestigated the relationship between income

distribution and economic growth using data of U.S. states. Their empirical evidence found inverted U-shaped relationship between income inequality and economic growth. Further, they unveiled that economic growth is declined by lowering or increasing income inequality. Pede et al. (2012) visited the inequality-growth nexus over the period of 1991-2000 in case of Philippines using Thiel index as measure of income inequality. They found that income inequality has positive impact on economic growth although relationship varies i.e. 0.72-3.36 across the regions implying that provincial economic growth seems to contribute to income inequality.

Another view is on the effect of economic growth on income inequality. Majority of the studies, as Kuznets hypothesis suggests, view that changes in inequality may be a consequence of economic growth. This relationship has also been extensively studied in the literature at the micro and macro level. Conversely, these studies have also arrived at mixed results. Adams, (2004) examined the effects of economic growth on income inequality using two different measures of income namely per capita GDP and the survey mean income – consumption for 60 developing countries. The results suggested that per capita GDP decreases income inequality for the full sample but not when Eastern Europe and Central Asia were excluded from the sample. However, the survey mean income as a proxy for income level does not show any significant impact on income inequality. The study concludes that there is no tendency for income to increase inequality in the sample. Meschi and Vivarelli, (2009); using a dynamic specifications, examined the relationship between trade openness and income inequality in 65 developing countries over the 1980–1999 period. As one of the explanatory variables, GDP and GDP square were used to capture the effects of income and Kuznets hypothesis, respectively. Their study indicated that both the variables were insignificant in influencing income inequality. Roine et al. (2009) to

examine the long-run determinants of income inequality, conducted in a similar study. The study suggested that GDP increases income inequality in the sample countries. Likewise, Manasse and Turrini, (2001) argued that economic growth increases the disparity among elites. In addition, studies also focus on testing the validity of the Kuznets hypothesis, which postulates that the relationship between economic growth and income inequality takes an inverted-U curve. This is known as "inverted-U" hypothesis. However, the results produce mixed evidences. Bahmani-Oskooee and Gelan, (2008) found support for the inverted Kuznets effects in case of US. However, increased income may not necessarily or always follow the Kuznets inverted U-curve effects. Bahmani-Oskooee et al. (2008) showed that the effects are country specific and in some countries the effect is an un-inverted U-shaped. Among others, studies by Anand and Kanbur, (1993); Deininger and Squire, (1998) and Matyas et al. (1998) did not find support of the hypothesis. In case of Pakistan; Shahbaz, (2010) investigated the impact of economic growth on income inequality including other determinants of income inequality such as urbanisation, unemployment, human development and foreign direct investment. The empirical exercise exposed that urbanisation improves income distribution while unemployment, human development and foreign direct investment worsen income inequality. The relationship between economic growth and income inequality is inverted U-shaped and later on inverted S-effect also exists.

IV. Model Specification, Data and Methodology

The above argument provides the theoretical guide on the relationship between income inequality, international remittances and economic growth. Therefore, in this paper, we model economic growth as a log-linear function of income inequality and international remittances. The model

includes income inequality as interest variable of present paper and international remittances as a control variable since bivariate models are subject to omitted variable biasness[8] (Yuan et al. 2008). International remittance is considered as the exogenous source of income that promotes economic growth as well ass impacts income distribution (Shahbaz and Rahman, 2012). This approach is consistent in examining the impact of income inequality on economic growth (Chambers and Krause, 2010). The model also allows us to estimate impact of international remittances by considering other sources of economic growth remaining constant. The model specification follows that of Herzer and Vollmer, (2012); Binatli, (2012); Hasanov, F., Izraeli, (2011) and Castelló-Climent's (2010) log-linear model specification. The relationship can be modeled as:

$$InY_t = a_\circ + b_i InI_t + c_i InR_t + \mu_t \qquad (1)$$

where, InY_t, InI_t *and* InR_t measure the natural logarithm of real per capita income as a measure of economic growth, income inequality proxied by Gini-coefficient and real international per capita remittances, respectively. Except for income inequality, all the data (including population and GDP deflator-1990 as base year) for this paper comes from World Development Indicators (CD-ROM, 2011). Data on income inequality (Gini-coefficient) is obtained from various issues of the Economic Survey of Pakistan. Since remittance can be part of GDP and can pose a problem of double counting, we use GDP after subtracting remittance value. This paper covers for the period 1976-2006[9]. In theory, income inequality can affect economic growth either positive or negative. We expect $b_i > 0$ or $b_i < 0$. Similarly, international remittances promote economic growth and we expect $c_i > 0$.

The estimation procedures involve three steps. First, three different unit root test namely augmented Dickey-Fuller (ADF), Phillip-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) is applied to examine the data stationary. Literature reveals that ADF and PP test are having low power especially for small sample sizes, shifting the focus on the use of KPSS**.** To avoid problem of structural break, we have applied Clemente et al. (1998) with single and two structural breaks arising in the series. Clemente et al. (1998) augmented the statistics of Perron and Volgelsang, (1992) to the case two structural breaks in the mean. Therefore, we hypothesize that:

$$H_0 : x_t = x_{t-1} + a_1 DTB_{1t} + a_2 DTB_{2t} + \mu_t \qquad (2)$$

$$H_a : x_t = u + b_1 DU_{1t} + b_2 DU_{2t} + \mu_t \qquad (3)$$

DTB_{it} denotes the pulse variable equal to one if $t = TB_i + 1$ and zero otherwise. Moreover, $DU_{it} = 1$ if $TB_i < t (i = 1,2)$ and zero otherwise. μ_t is error term assumed to be normally distributed. Modified mean is represented by TB_1 and TB_2 time periods when the mean is being modified. Further, it is simplified with assumption that $TB_i = \delta_i T (i = 1,2)$ where $1 > \delta_i > 0$ while $\delta_1 < \delta_2$ (see Clemente et al. 1998). If innovative outlier contains two structural breaks, then unit root hypothesis can be tested by estimating the following equation-4:

$$x_t = u + \rho x_{t-1} + d_1 TB_{1t} + a_2 TB_{2t} + d_3 DU_{1t} + d_4 DU_{2t} + \sum_{i=1}^{k} c_j \Delta x_{t-1} + \mu_t \qquad (4)$$

From this equation, we can estimate the minimum value of t-ratio through simulations. The value of simulated t-ratio can be used for testing if the value of autoregressive parameter is constrained to 1 for all break points. To derive the asymptotic distribution of said statistics, it is assumed that $\delta_2 > \delta_1 > 0, 1 > \delta_2 - 1 > \delta_0$. δ_1 and δ_2 obtain the values in interval i.e. $[(t+2)/T, (T-1)/T]$ by appointing largest window size. Additionally, assuming $\delta_1 < \delta_2 + 1$ help us to eliminate cases where break points exist in repeated periods (see Clemente et al. 1998). Two steps approach is used to test unit root hypothesis, if shifts are in better position to explain additive outliers. In first step, we exclude deterministic part of the variable by following equation-5 for estimation:

$$x_t = u + d_5 DU_{1t} + d_6 DU_{2t} + \hat{x} \qquad (5)$$

The second step is related to search the minimum t-ratio by a test to test the hypothesis that $\rho = 1$:

$$\hat{x}_t = \sum_{i=1}^{k} \phi_{1i} TB_{1t-1} + \sum_{i=1}^{k} \phi_{2i} TB_{2t-1} + \rho \hat{x}_{t-1} + \sum_{i=1}^{k} c_i \Delta \hat{x}_{t-1} + \mu_t \qquad (6)$$

We have included the dummy variable DTB_{it} in the estimated equation so as to make sure that $\min t_{\rho\ t}^{IO}(\delta_1, \delta_2)$ congregates i.e. converges to distribution:

$$\min t_{\rho\ t}^{IO}(\delta_1, \delta_2) \to \inf_{\gamma} = \wedge \frac{H}{[\delta_1(\delta_2 - \delta_1)]^{1/2} K^{1/2}} \qquad (7)$$

Once the order of integration is determined, the second stage involves testing for the existence of cointegration between the series in a multivariate framework in the presence of structural breaks. For this purpose, we adopt the autoregressive distributed lag (ARDL) bounds test (Pesaran et al. 2001) to test the existence of long-run relationship between income inequality, international remittances and economic growth. The Bounds test has several advantages over the widely used cointegration test (e.g. Johansen cointegration test). First, the ARDL bounds test is more robust for small sample studies and availability of critical values for sample size 30 (Narayan, 2005) contributes to the popularity of the method. Second, the method does not require the order of integration to be similar like other cointegration approaches such as Johansen-Juselius or Engle-Granger approach. Third, Pesaran et al. (2001) argued that, based on Monte Carlo results, this procedure is robust even with the presence of endogenous regressors in the model, irrespective of whether the regressors are $I(1)$ or $I(0)$. The bounds test involves the testing of an unrestricted error-correction model (UECM) using Y_t, I_t and R_t which are given by:

$$\Delta InY_t = a_{0F} + \phi t + \phi DUM + \sum_{i=1}^{n} b_{iF}\Delta InY_{t-i} + \sum_{i=0}^{n} c_{iF}\Delta InI_{t-i} + \sum_{i=0}^{n} d_{iF}\Delta InR_{t-i} + e_{1F}InY_{t-1} + e_{2F}InI_{t-1} + e_{3F}InR_{t-1} + \varepsilon_t \quad (8)$$

$$\Delta InI_t = a_{0G} + \delta t + \delta DUM + + \sum_{i=1}^{n} b_{iG}\Delta InI_{t-i} + \sum_{i=0}^{n} c_{iG}\Delta InR_{t-i} + \sum_{i=0}^{n} d_{iG}\Delta InY_{t-i} + e_{1G}InI_{t-1} + e_{2G}InR_{t-1} + e_{3G}InY_{t-1} + \varepsilon_t \quad (9)$$

$$\Delta InR_t = a_{0X} + \gamma t + \gamma DUM + \sum_{i=1}^{n} b_{iX}\Delta InR_{t-i} + \sum_{i=0}^{n} c_{iX}\Delta InY_{t-i} + \sum_{i=1}^{n} d_{iX}\Delta InI_{t-i} + e_{1X}InR_{t-1} + e_{2X}InY_{t-1} + e_{3X}InGI_{t-1} + \varepsilon_t \quad (10)$$

where Δ is the first difference operator. In the model, *b*, *c* and *d* captures the short-run dynamics while the *e*'s captures the long-run effects and DUM is dummy variable to capture the structural break stemming in the series[10]. In order to test the absence of a long run relationship in equation (8), we restrict the coefficient (using F-test or Wald test) of e_{1G}, e_{2G} and e_{3G} to be zero (H_o: e_{1F}= e_{2F}= e_{3F}= 0) against the alternative hypothesis that at least one is not equal to zero. This is denoted as $F_Y(Y|I, R)$.Similarly, for equation (3) and (4) we test the null hypothesis for no cointegration as (H_o: e_{1G}= e_{2G}= e_{3G}=0) and (H_o:e_{1X}=e_{2X}=e_{3X}=0), respectively. This is denoted as $F_I(I|Y, R)$ and $F_R(R|Y, I)$. The asymptotic distributions of the test statistics are non-standard regardless of whether the variables are *I(0)* or *I(1)*. For this purpose, we used Narayan's (2005) computed sets of asymptotic critical values. The first set of asymptotic critical values assume variables to be *I(0)* and the other as *I(1)* which is known as lower bounds (LCB) and upper bounds critical values (UCB), respectively[11]. If the computed *F*-statistic is more than UCB, we can than reject the null hypothesis of no cointegration and vice versa. The results are inconclusive if calculated F-statistic is between upper and lower critical bounds. Since the selection of lags is important, we relied on the Schwarz Bayesian Criterion (SBC) to select the optimal lag length. Additionally, to ensure that the model satisfy all assumption of regression, a series of diagnostic tests namely Lagrange multiplier (LM) test for serial autocorrelation in the presence of lagged variables, Ramsey/RESET test for functional form, Bera-Jarque for residuals normality and Heteroscedasticity test based on the regression of squared residuals on squared fitted values are performed. The CUSUM and CUSUMSQ test is applied to examine the model stability.

IV.I Sensitivity Analysis

Theoretical findings suggest that income inequality affects economic growth and, to an equal extent, economic growth may affect inequality. Hence, both income inequality and economic growth are endogenous and placing either variable on the right hand side violates the exogeneity assumptions. We tackle this issue by carefully specifying an ARDL model with an appropriate lag structure. Pesaran et al. (2000) proved that it is sufficient to simultaneously correct for the residual serial correlation and the endogenous regressors problem using appropriate orders of the ARDL model. The single equation approach of the ARDL also allows us to check the robustness of the estimates. When we use the Vector Autoregressive (VAR) model on a system of variables, we were also able to mitigate the problem because in VAR no such conditional factorisation is made a priori. Instead, variables can be tested for exogeneity later, and restricted to be exogenous then. These considerations motivate our choice of the ARDL and VAR model for studying the interdependencies between income inequality, international remittances and economic growth.

We conduct several sensitivity analyses to tackle the problem of endogeneity. First, we set up three simultaneous equations by treating each variable as endogenous variable. This allows us to identify whether desired changes in their values take place. In doing so, we also vary the lag length of our regression. We also rerun the equations by omitting the income inequality and economic growth, separately, to check the robustness of the regression. This is equivalent to performing reduced form of the equation by expressing each endogenous variable as a function of only the predetermined variables. In all cases, we can only detect significant relationship when economic growth serves as the dependent variable. In other words, in long run, international remittance and income inequality tend to influence economic growth.

Second, the Granger-causality testing methodology seems to be one of an ideal tool to examine the influence of each variable empirically. For the context of this paper this means that if – after lagged economic growth and contemporaneous income inequality are controlled for – Granger-causality running from lagged inequality to GDP growth is found to be significantly positive, then this is evidence in favour of income inequality acting as an endogenous variable. If, however, negative Granger-causality in the medium run and no Granger causality in the long run are found, then this speaks in favour of income inequality being exogenous. Since our Granger causality is performed in a multivariate setting, spurious causality can also arise, when the third variable is introduced in the model. For this purpose, we conclude that no causality found in multivariate setting only when there is also no causality in a bivariate setting. This again allows us to check the robustness of our results.

IV.II Innovative Accounting Approach

Although cointegration test is able to identify the long-run forcing variables of economic growth, the direction of causality will be less clear at this stage. In other words, cointegration does not provide indication about the causality of series interdependencies, which however is an essential enquiry in our study. The evidence of cointegration is only a necessary but not sufficient condition for rejecting Granger non-causality. Therefore, the presence of cointegrating among the variables leads us to perform the Granger causality test. If the series are cointegrated, the causality testing should be based on a Vector Error-Correction Model (ECM) rather than on an unrestricted VAR model (Johansen, 1988; Johansen and Juselius, 1990). Nonetheless, the Granger causality tests do not determine the relative strength of causality effects beyond the selected time span

(Shahbaz et al. 2012). Due to the limitation of the VECM Granger causality test, we include innovative accounting approach (IAA) to investigate the dynamic causal relationships among income inequality, international remittances and economic growth. The uniqueness of the IAA is that it avoids the problem of endogeneity and integration of the series. This approach has an advantage compared to the VECM Granger causality test because the latter only shows a causal relationship between the variables within the sample period while the former illustrates the extent of causal relationship ahead the selected sample period. The IAA includes forecast error variance decomposition and impulse response function. This procedure decomposes forecast error variance for each series following a standard deviation shock to a specific variable and enables us to test which series is strongly impacted and vice versa.

For instance, if a shock in income inequality has significant effects of economic growth but a shock occurring in economic growth only affect very minimum the variations of income inequality. Then, this is inferred as a unidirectional causality runs from income inequality to economic growth. If economic growth explains more of the forecast error variance of income inequality; then we deduce that economic growth causes income inequality. The bidirectional causality exists when shocks in income inequality and economic growth have a strong impact on the variability of income inequality and economic growth respectively. If shocks occur in both series do not have any impact on the economic growth and income inequality then there is no causality between the variables. Impulse response function helps us to trace out the time path of the impacts of shocks of variables in the VAR. One can determine how much income inequality responses due to its own shock and shock in economic growth. We support the hypothesis that economic growth causes income inequality of the impulse response function indicates significant

response of income inequality to shocks in economic growth than other variables. A strong and significant reaction of income inequality to shocks in economic growth implies that income inequality causes economic growth. This study incorporates income inequality, international remittances and economic growth to examine the relationship between economic growth and its determinants in the VAR model. A VAR system takes the following form (Shan, 2005):

$$V_t = \sum_{i=1}^{k} \delta_i V_{t-i} + \eta_t \qquad (11)$$

where, $V_t = (Y_t, I_t, R_t)$ and $\eta_t = (\eta_Y, \eta_I, \eta_R)$

δ_i are the estimated coefficients and η is a vector of error terms.

V. Empirical Results

Although bounds test does not require the knowledge of order of integration, yet, the test is crucial to avoid having series with higher order (e.g. *I*(2)). Table-2 reports the unit root properties of the data series with and without trend term. It is evident that all unit root tests yield similar results. The series are non-stationary in their levels but become stationary after taking the first differences. Although, it can be concluded that all series are *I(1)* at the 1% and 5% significant level but at 10% level some of the series are found to be I(0).

Table-2: Unit Root Analysis

Variables	ADF		PP		KPSS	
	Intercept	Intercept	Intercept	Intercept	Intercept	Intercept

		and Trend		and Trend		and Trend
$\ln Y_t$	-2.226	-2.118	-2.110	-1.508	0.728**	0.179**
$\Delta \ln Y_t$	-3.888*	-4.463*	-4.008*	-4.492*	0.352	0.131
$\ln I_t$	-1.751	-3.283***	-1.501	-3.222***	0.577**	0.181**
$\Delta \ln I_t$	-7.992*	-7.991*	10.331*	15.181*	0.259	0.144
$\ln R_t$	-2.629***	-2.507	-2.757***	-2.718	0.244**	0.169
$\Delta \ln R_t$	-4.559*	-4.384*	-4.559*	-4.378*	0.198	0.102

Note: *, ** and *** denotes significant at 1%, 5% and 10%, respectively. SIC is used to select the lag length for ADF. The bandwidth for PP and KPSS test is selected using Newey-West method using Barlett-Kernel. Null hypothesis for ADF and PP is that series are non-stationary while for KPSS series are stationary, respectively.

The results of ADF, PP and KPSS may be biased and unreliable because these unit root tests do not seem to have information about structural break arising in the series. This is issue is solved by applying the Clemente et al. (1998) accommodating single and two structural breaks. The unit root test by Clemente et al. (1998) uses innovative outlier (IO) and additive outlier (AO) models. The IO model captures the steady changes in mean of the variables. The sudden changes in the mean of the series are plugged out by AO model. The AO model is more reliable and suitable than IO model because it provides information about sudden structural changes. Our results are reported in Table-3 show that economic growth (Y_t), foreign remittances (R_t) and income inequality (I_t) have unit root problem in the presence of structural breaks at level[12]. This implies that series are found to be stationery at first difference i.e. the variables are I(1).

Table-3: Structural Break Unit Root Test

Model: Trend Break Model								
Variable	Innovative outliers				Additive outliers			
	T_{B1}	T_{B2}	Test statistics	K	T_{B1}	T_{B2}	Test statistics	K
$\ln Y_t$	1998	---	-2.464	3	1998	----	-4.581**	2
	1998	2003	-5.286	4	1990	1998	-6.583*	5
$\ln I_t$	1989	---	-3.324	3	2000	----	-4.937**	3
	1989	2000	-5.054	3	1982	2000	-6.659*	2
$\ln R_t$	1981	---	-0.691	2	1982	----	-5.736*	3
	1978	2002	-3.885	4	1991	2003	-6.510*	3

Note: T_{B1} and T_{B2} are the dates of the structural breaks; k is the lag length. * and ** show significant at 1% and 5% levels respectively. T_{B1} and T_{B2} indicate first and second structural breaks.

This justifies the use of ARDL cointegration. The results of the ARDL bounds test are reported in Table-3. In equation (8) with $\ln Y_t$ as dependent variable, we note that the computed *F*-statistic (4.906) is above the upper bound critical value (4.428). It indicates that there is a strong evidence to reject the null hypothesis of no cointegration at 5% significant level once we used income inequality and international remittances as forcing variables. Likewise, for the other two equations, (9) and (10), we fail to reject the null hypothesis of no cointegration.

It should be noted here that linking income inequality, international remittances and economic growth may also lead to a biased estimated coefficient if per capita income is regarded as an

endogenous variable. Yamamura and Shin, (2009) and Jackman et al. (2009) suggested the possible influence of income inequality and international remittances on economic growth respectively. Nevertheless, when income inequality and international remittances served as the dependent variables in equations 9-10, examining the long-run relationship then we failed to establish any cointegration. In other words, in case of Pakistan, we fail to track any long-run convergence in income inequality and international remittances' equations (9-10). This also confirms the problem of endogeneity is less obvious in our case. In addition, we also examine whether there exists an endogenous relationship between international remittance, income inequality and per capita income by applying the Durbin-Wu-Hausman test (the augmented regression test) suggested by Davidson and MacKinnon, (1993). The results suggested that endogeneity is not significant. The regression also passes a series of diagnostic tests and the stability test-CUSUM and CUSUMQ test.

Table-4: Cointegration Analysis: Bounds Tests

Equation	F-statistic	Lag	95% critical value bounds [a]		
$F_Y(Y_t \setminus I_t, R_t)$	4.906**	3	*LCB:* 3.538		*UCB:* 4.428
$F_I(I_t \setminus Y_t, R_t)$	2.261	3			
$F_R(R_t \setminus Y_t, I_t)$	2.105	3			
Diagnostic Tests					
Equation	$\chi^2 SERIAL$	$\chi^2 REMSAY$	$\chi^2 NORMAL$	$\chi^2 ARCH$	CUSUM	CUSUMsq
8	1.079 [0.390]	3.528 [0.448]	1.798 [0.406]	0.387 [0.683]	Stable	Unstable[13]

9	0.706 [0.525]	2.074 [0.187]	1.796 [0.407]	0.034 [0.966]	Stable	Stable
10	2.233 [0.177]	1.928 [0.215]	0.112 [0.945]	0.012 [0.987]	Stable	Stable

Note: [a] Critical values are obtained from Narayan, (2005). The lag selection is based on SBC. [ ] and ** denotes the probability and the significant level at 0.05, respectively. $\chi^2 NORMAL$ is for normality test, $\chi^2 SERIAL$ for LM serial correlation test, $\chi^2 ARCH$ for autoregressive conditional heteroskedasticity and $\chi^2 REMSAY$ for Remsay Reset test.

Having found cointegration when $\ln Y_t$ serves as dependent variable, we proceed to estimate the long and short-run coefficient. It should also be noted that long-run estimates are reliable due to the fact that we fail to detect any significant endogeneity in the model. Table-4 reports the results of the estimation. In long-run, income inequality is found to be significant at 1% with a positive impact. In other words, in long-run, income inequality increases economic growth in Pakistan. This does not support the claim of Pritchett, (1997) and Stiglitz, (2002) that globalization has contributed to income inequality in the poorest developing countries at least in case of Pakistan. Despite being a middle income economy[14], Pakistan's inequality gap is still widening. In Pakistan, a mild increase in inequality from 0.357 to 0.369 is recorded during 1976-1985 and slight decrease from 1985-1988 (from 0.363-0.348) while from 1989 to 2006 it has continuously increased (from 0.365-0.421). This suggests that income inequality is still on the rise and consequently contributes to growth in per capita income, as a whole.

International remittance is found to be positively significant at 5%. The positive impact of remittances is consistent with the findings of Adams, (1991) in case of Egypt; Rodriguez, (1998) for Philippines and, Iqbal and Sattar, (2005) for Pakistan. Again, in case of remittances, both short and long-run estimates show a positive sign indicating no evidence of U-curve relationship for international remittance. Despite the fact that international remittances are significant, it suggests that availability of remittances is limited to certain groups. Stark et al. (1986) argued that impact of foreign remittances depend on migration history where migrants might not have equal opportunity to migrate. Therefore, migrant who are well informed on foreign labor market are usually those who are in a better income bracket might have more opportunity. This might have contributed to the widening gap in income inequality in case of Pakistan. However, relatively, international remittance has a smaller impact than that of per capita income. This may be due to two reasons. First, the small effect of international remittance may be due to informal transfer of remittances that remain the main limitation in this paper. International remittances are channeled from two possible ways in Pakistan, the formal channel via banking systems and informal way that is known as 'hawala' or 'hundi'. In 2001, it is predicted that 20% of remittances to Pakistan entered through formal channels while vast majority uses the informal system. Second, the small magnitude[15] (size of coefficient) of international remittances also seems to suggest that other factors may have more profound effect on income inequality than international remittance. Perhaps, it is the domestic deregulation and external liberalization that impacted income inequality in Pakistan more than the international remittances themselves.

Table-5: Long and Short Run Error Correction Model Estimates

Pane-A: Long Run Estimates-Dependent Variable: $\ln Y_t$

Variable	Coefficient	Std. Error	T-Statistic
Constant	-3.563**	0.653	-5.458
$\ln I_t$	0.221*	0.061	3.615
$\ln R_t$	0.057**	0.024	1.923
Pane-B: Short Run(Error Correction Model) -Dependent Variable: $\Delta \ln Y_t$			
Constant	-0.007	0.094	-0.070
$\Delta \ln I_t$	0.149**	0.049	2.997
$\ln R_t$	0.038**	0.017	2.243
ECM_{t-1}	-0.675*	0.182	-3.707
Adj-R^2	0.353		
F-statistic	5.263*		
Diagnostic Test	F-statistic	P-value	
$\chi^2 NORMAL$	2.614	0.271	
$\chi^2 SERIAL$	0.018	0.893	
$\chi^2 ARCH$	0.3111	0.778	
$\chi^2 WHITE$	0.544	0.456	
$\chi^2 REMSAY$	0.334	0.563	
Note: * and ** denote the significant at 1% and 5% levels respectively. $\chi^2 NORMAL$ is for normality test, $\chi^2 SERIAL$ for LM serial correlation test, $\chi^2 ARCH$ for autoregressive conditional heteroskedasticity, $\chi^2 WHITE$ for white heteroskedasticity and $\chi^2 REMSAY$ for Resay Reset test. ARDL (1,			

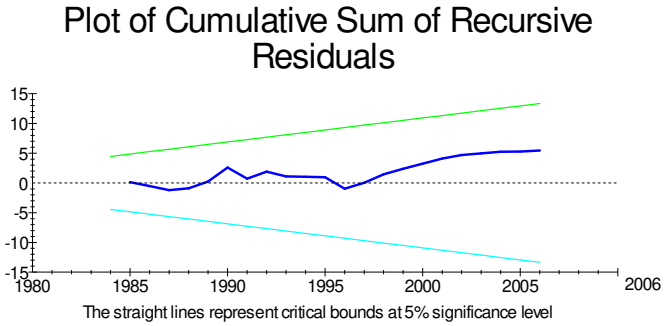
0, 0) selected based on SBC. $ECM = InY_t - 0.221*InI_t - 0.0571*InR_t + 3.563*\text{Constant}$.

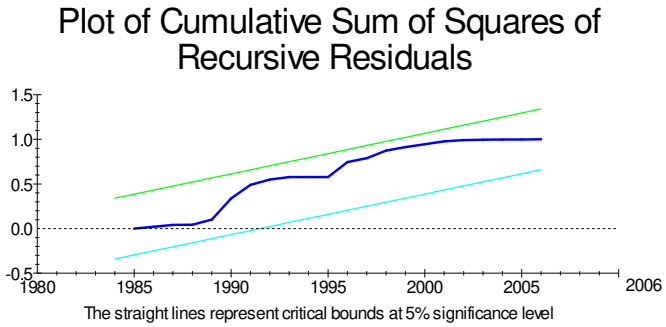
The short-run adjustment process is measured by the error correction term (*ECM*). The significant of *ECM* again gives support to the long-run cointegration test established earlier. If the *ECM* value is between 0 and –1, the correction to $\ln Y_t$ in period *t* is a fraction of the error in period *t*-1. In this case, the *ECM* tends to cause $\ln Y_t$ to converge monotonically to its long-run equilibrium path in relation to changes in the exogenous variables. If the *ECM* is positive or less than –2, this will cause $\ln Y_t$ to diverge. If the *ECM* is between –1 and –2, then the *ECM* will produce a dampened oscillations in the $\ln Y_t$ about its equilibrium path. From Table-5, we see that the *ECM* is between 0 and –1 and is statistically significant at the 1% significance level. This implies that, the error correction process converges monotonically to the equilibrium path relatively quickly. The estimate of lagged error term is -0.68 and was found to be statistically significant at the 1% significance level. The magnitude of the *ECT* term suggests that a deviation from the equilibrium level of $\ln Y_t$ during the current period will be corrected by 68% in each year. This would take 1 year and 5 months to restore to long run equilibrium path for growth in case of Pakistan.

Our short run model has passed all assumptions of classical linear regression model (CLRM) such as non-normality of error term, serial correlation, autoregressive condition heteroskedasticity, white heteroskedasticity and functional form of short run model. The results reported in lower segment of Table-5 expose that error term is normally distributed, no evidence of serial correlation exists. There is no support for autoregressive condition heteroskedasticity as well ass white heteroskedasticity. The functional form of short run model is well designed. The stability

tests such as CUSUM and CUSUMsq have also been applied to examine the reliability of the ARDL parameters. The figure-3 reports the results and we find that CUSUM and CUSUMsq are between the critical bounds. This implies that the ARDL estimates are efficient and trustworthy.

Figure-3: CUSUM and CUSUMsq Tests





V.I Innovative Accounting Approach

Innovative Accounting Approach uses forecast error variance decomposition and impulse response function that is superior to the VECM Granger causality. The former explains the proportion of variation in a series due to its own shocks, and those by others (Enders, 1995). The

procedure decomposes forecast error variance for each series following one standard deviation shock to a variable and enables us to test strength of its impact on a series. Table-6 reports the results of variance decomposition approach and we find that generalized forecast error stemming in income inequality explains economic growth by 60.80% and a 38.68% is by innovative shocks arising in economic growth. International remittances contribute minimally i.e. 0.51%. The contribution of economic growth and international remittances to income inequality is 24.34% and 1.55% respectively. A 74.10% portion of income inequality is explained by itself. The innovative shocks stemming in economic growth and income inequality explain international remittances by 19.91% and 55.52% respectively. The innovative shocks stem in international remittances also contribute to international remittances by 24.55%.

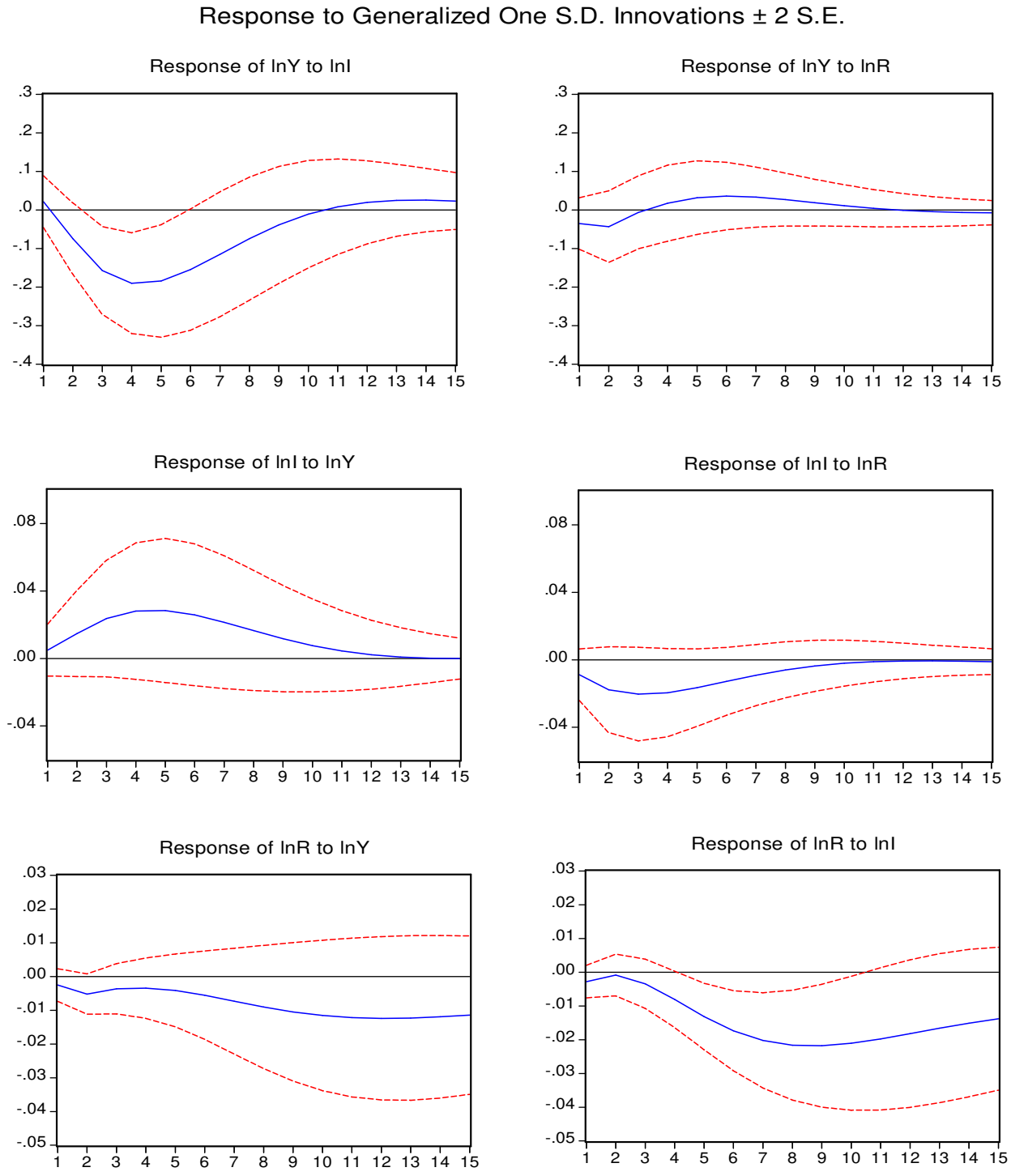
Table-6: Variance Decomposition Approach

Period	Variance Decomposition of $\ln Y_t$			Variance Decomposition of $\ln I_t$			Variance Decomposition of $\ln R_t$		
	$\ln Y_t$	$\ln I_t$	$\ln R_t$	$\ln Y_t$	$\ln I_t$	$\ln R_t$	$\ln Y_t$	$\ln I_t$	$\ln R_t$
1	100.0000	0.0000	0.0000	1.1757	98.8242	0.0000	3.1008	3.1137	93.7853
2	88.0602	10.8773	1.0624	3.9970	95.6672	0.3356	9.6215	1.8730	88.5054
3	68.9623	30.1873	0.8502	8.0874	91.2982	0.6143	9.5755	3.2763	87.1480
4	53.8363	45.5089	0.6546	12.5452	86.5737	0.8809	8.8698	11.4186	79.7114
5	44.7342	54.7217	0.5440	16.7491	82.1485	1.1023	8.0333	25.2983	66.6682
6	40.2058	59.2916	0.5024	20.1340	78.5955	1.2704	7.8632	38.5064	53.6303
7	38.4791	61.0244	0.4964	22.4312	76.1852	1.3835	8.4758	47.7967	43.7274
8	38.1997	61.2977	0.5025	23.7117	74.8372	1.4510	9.6788	53.3404	36.9807
9	38.4660	61.0253	0.5086	24.2663	74.2462	1.4874	11.2247	56.2426	32.5326
10	38.7764	60.7125	0.5109	24.4202	74.0731	1.5066	12.9138	57.4761	29.6100
11	38.9377	60.5520	0.5102	24.4138	74.0681	1.5180	14.6007	57.7199	27.6793
12	38.9440	60.5473	0.5086	24.3759	74.0972	1.5267	16.1875	57.4173	26.3950
13	38.8629	60.6292	0.5078	24.3520	74.1128	1.5350	17.6158	56.8492	25.5348
14	38.7623	60.7290	0.5086	24.3443	74.1120	1.5436	18.8587	56.1868	24.9543
15	38.6821	60.8070	0.5107	24.3421	74.1053	1.5525	19.9127	55.5287	24.5584

Overall our results reveal that feedback effect is found between income inequality and economic growth but strong from income inequality to economic growth. The bidirectional causality also exists between income inequality and international remittances but income inequality explains international remittances strongly. Economic growth Granger causes international remittances.

The impulse response function (IRF) traces the time path of the impacts of shocks of independent variables on the dependent variables in a VAR system. We can see the magnitude of the response of economic growth to its own shock and those to income inequality. Economic growth leads income inequality if the IRF shows significant response of the latter to shocks in the former relative to other series. A strong and significant response of economic growth to shocks in income inequality suggests that income inequality causes economic growth.

Figure-4: Impulse Response Function



The results reported in Figure-4 show that response in economic growth is declining till 5th time horizon but starts to rise after it and it becomes positive after 5th time horizon. This shows that

there is U-shaped relationship is found between income inequality and economic growth in case of Pakistan. It reveals that income inequality initially declines economic growth and after a threshold point of income inequality, economic growth is increased. The contribution of international remittances is inverted U-shaped but it is insignificant. The response on income inequality due to innovative shocks in economic growth is inverted U-shaped. This confirms the findings of Kuznets hypothesis. This reveals that economic growth raises income inequality initially and income inequality starts to decline after threshold level of economic growth i.e. income per capita. These findings are consistent with Shahbaz, (2010) in case of Pakistan. The innovative shocks stemming in international remittances contribute income distribution initially and then starts to increase income inequality after 4^{th} time horizon. This implies that international remittances and income inequality relationship is U-shaped. The response in international remittances is negative due to shocks stem in economic growth. The response in international remittances due to innovative shocks in income inequality is U-shaped.

VI. Conclusion and Policy Implications

This paper explores the empirical relationship between income inequality, international remittances and economic growth in case of Pakistan. Using large time series data covering the periods 1976-2006, we found robust evidence of long-run relationships between income inequality, international remittances and economic growth. Our results reveal that income inequality and international remittances contribute to economic growth in short-and-long runs. The causality results by innovative accounting approach validate that income inequality and economic growth are Granger cause of each other i.e. bidirectional causality. The feedback

hypothesis exists between international remittances and income inequality. The unidirectional causality is found running from economic growth to international remittances.

This study provides insights for policy makers in a number of ways. First, there are widening gaps in income inequality in Pakistan despite the country recording progressive growth in per capita income. However, the role of economic development as a tool for reducing inequality is less convincing in case of Pakistan. What is obvious is that wealth is not well distributed and requires policy reformation in the form of tax structure and monopoly of assets that allow the benefits of growth to spread evenly to the poor. Alternatively, we suggest that it is important to consider new influences on income inequality if policy makers are not in a position to influence the distributional impact of per capita income. This is true in many cases given the fact that there is a great trade-off between economic growth and income inequality. Globalization which is becoming increasingly important for developing countries may benefit some and not all the countries. In case of China, for instance, Ravallion (2009) argued that for poverty reduction, the country policy focusing only on growth promoting agendas is insufficient. Equally important is to reduce inequalities in key assets and providing access to essential infrastructure that limits the sharing of economic prosperity.

The other policy implication of this study is that encouraging migration may increase the income inequality if only certain groups benefit from international remittances as indicated in case of Pakistan. In this aspect, policy makers in Pakistan should avoid postulating migration as the policy approach to overcome widening gaps in income inequality. If for any reason remittances are used as policy to reduce income inequality then those policies should focus on institutional

support allowing all household to gain equal opportunity. However, so far many developing countries including Pakistan remained indifferent in such policy initiatives. On one hand, government should adopt policies to enhance the volume of skilled labor through technical education at rural areas. More opportunities could be enhanced through regulation of recruitment process and safe transport facilities through supporting worker rights for poorer class. On other hand, policies reducing transaction costs related to migration and international remittances would allow better mobility for workers from all types of household and flow of remittances through the formal channels. Indeed, lower transaction costs can also allow all households to receive international remittances at earlier stages of migration. It is imperative to understand that the full potential of income inequality reducing impact of international remittances is only possible if other favorable conditions exist. However, more research is needed in this aspect.

Footnotes

1. Remittance income refers to regular cash payments received from household members working outside the community for periods of 6 months or more (Lerman and Feldman, 1998).
2. Scholars attempt to mitigate the endogeneity problem using the instrumental variable methods. However, it is a well-known fact that finding valid variables as the instrument is difficult and always leads spurious results (Herzer and Vollmer, 2012).
3. Previous studies (e.g. Meschi and Vivarelli, 2009) use GDP and GDP squared terms to test the Kuznets hypothesis.
4. Some uses economic growth models while others use fixed effect panel estimates.
5. Studies using homogeneous panel estimators produces inconsistent and misleading estimates of the average values of the parameters in dynamic models (Herzer and Vollmer, 2012)
6. The study on the effect of inequality on economic growth can be traced back to Kaldor (1960) and Kalecki (1971).
7. Partridge, (2005) also reported positive impact of income inequality on economic growth using state-level data in case of USA.
8. We consider only a trivariate model in this paper. Inclusion of more variables such as financial development, trade and government spending may potentially lead to more problems. And, with short span of data series it may also affect the degree of freedom.
9. The data on Gini-coefficient has restricted for selected time period.
10. Dummy variables in base on finings of Clemente-Montanes-Reyes, (1998) unit root test accommodating single unknown structural break in the time series.
11. The critical values are more appropriate for small sample studies (e.g. 30 sample size).

12. The structural break in income inequality series is outcome of the implementation of a medium term structural adjustment in Pakistan during 1987-88. The structural break in foreign remittances is linked with general elections were held in 1988 and country received $10.8 billion dollars of foreign remittances. The structural break in economic growth was outcome of Pakistan's involvement in Afghanistan's war with Russia. This led bulk amount of immigrants from Afghanistan which has adversely affected economic growth of Pakistan. Now-a-days terrorism is the gift of that collation.
13. The CUSUMsq graph shows structural break in 1998-1999 indicating the atomic explosion of Pakistan and then collapse of Nawaz government.
14. Based on World Bank's income categorization
15. The small effect of remittance may also be due the informal transfer of remittance that this study fails to capture. This study only includes the official transaction income remittance.

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