JOURNAL OF ECONOMIC DEVELOPMENT 35
Volume 36, Number 1, March 2011

FINANCIAL DEVELOPMENT AND INCOME INEQUALITY IN PAKISTAN: AN APPLICATION OF ARDL APPROACH

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The paper examines the relationship between financial development and income inequality; and also explores if the Greenwood and Jovianvich (GJ) hypothesis applies to Pakistan. Using data from 1971 to 2005, the paper implements the Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration to examine the existence of long run relation ships; and the error correction model (ECM) for the short run relationships. Stationarity properties of the series are tested by the ADF unit root test. The findings indicate that financial development reduces income inequality while financial instability aggravates it. Contrary to the conventional wisdom, we find economic growth worsens income distribution and that the latter is deteriorated further by trade openness. The paper does not find support for the GJ relation. Appropriate reforms aimed at developing a well-organized financial sector in Pakistan can help reduce income inequality.

Keywords: Financial Development, Income Inequality
JEL classification: F43, D30

1. INTRODUCTION

Pakistan's economy is characterized by high income disparity which took a turn for the worse during the decades of 1980s and early 1990s. A relatively stable government, established in the 1990's introduced and implemented a set of sound macroeconomic policies which helped achieve high rates of economic growth. In 2005, Pakistan recorded the second highest growth rate in the region (GOP, 2006)[1]. The inflation rate hit 9.063% (7.444%) and income inequality was 42.87% (42.50%) in 2005 (2004). The growth story led one to believe that poverty would decline, pull up the income shares of the population at the bottom 20 percent by improving the income distribution. Contrary

* The authors gratefully acknowledge the valuable comments from anonymous referees. Based on their suggestion the paper has been thoroughly revised. Standard caveats apply.

[1] Government of Pakistan

to the expectations, income share of the group fell from 6.18% to 6.12% during the same period implying that the value of the gini-coefficient went up. As a result, the plight of the bottom 20% worsened and so did their economic condition.

Despite mixed results, it is generally agreed that developed financial sector can offer viable solutions to address economic crisis. Policies directed at creating sound financial sector works through two channels. First, such policies can make credit cheaper for all investors, but the small entrepreneurs are likely to benefit more. The unleashing of entrepreneurial talent boosts productive activities, generates employment opportunities, and enhances welfare of poor people. Secondly, the availability of fund at low cost can provide crucial support to the financially disadvantaged families by allowing them to invest in education and health of their children. Education helps human capital formation and opens the window for an improved income distribution. Education also creates a level field for all in a highly competitive world which expands the opportunity set[2]. Human capital promotes technological progress via innovation, the most important ingredients for economic growth. The latter is necessary, but not sufficient condition for reduced income inequality[3].

The objective of present study is to empirically examine the long run relation between financial development and income inequality in Pakistan by employing the autoregressive distributive lag (ARDL) bounds testing approach to cointegration. The sample period used in the study covers the data from 1971-2005. In addition to long run relation, paper tests the Greenwood and Jovianvich (GJ, hereafter, 1990) hypothesis which posits that at the initial stages of development of the financial sector, income distribution may deteriorate; but over time as the process takes full effect, income inequality tends to improve. It is not difficult to view the GJ hypothesis within the broader perspective of the Kuznets hypothesis which states that income inequality worsens at the initial stages of economic growth but improves as the growth process continues. The concept has been extended to cover the relation between environmental degradation and economic growth under the title of Environmental Kuznets Curve which also produces an inverted U-shaped relation; as the GJ relation, with some difference. Empirical findings suggest a positive relation between economic growth and financial

[2] However it needs to kept in mind that the developing countries encounter high rates of inflation over an extended period of time. Access to financial markets and/or fully indexed assets is available to those at the higher end of income distribution which allows them daily indexed protection of their income against high inflation.

[3] Cysne *et al*. (2004), Erosa and Ventura (2002), Lucas and Stokey (1987), Sturzenegger (1992) develop models which purport to answer this question. In an economy with cash-in-advance constraints, higher rates of inflation (and hyperinflation) acts as a tax on goods that force to reallocate cash to consumption of goods requiring credit. This process of financial adaptation is imperfect, as the Brazilian experience shows, because the poor are financially strapped, having to hold cash, and thus suffer disproportionately by high inflation tax which widens inequality.

development which helps establish the more general case of EKC, of which the GJ is particular example. The inverted U-relationship posited in the GJ hypothesis is intuitively appealing particularly, when one considers the broader impact of financial development on human capital formation; and also the implications for the growth of small entrepreneurial class. Whether or not stimulation of economic activity ultimately reduces income inequality, depends on economic policies; and is left to empirical determination. The topic is of particular importance in the light of the observed trends - one of a widening economic inequality - in Pakistan. The idea that social justice and economic growth should go hand in hand is important which is the part of normative of economics.

It may be noted that the financial sector's development in Pakistan has been somewhat slow. Thus if the GJ hypothesis holds for Pakistan then the nation might achieve equity in income distribution in the future if proper policies are put in place early. A few studies explored the relationship between financial development and economic growth in the context of Pakistan. The authors are not aware of any study that examines the relation between financial development and income inequality. In particular, there has been no formal test of the GJ hypothesis - the postulated inverted-U relation for Pakistan. This paper provides evidence on such a relationship and thus makes a modest effort to fill the gap in the literature. The findings should be helpful in pursuing policy to address the issues of distributive justice.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 outlines data and methodological issues. Section 4 reports results. Section 5 draws conclusion and offers some policy recommendations.

2. LITERATURE REVIEW

Available evidence tends to confirm that in the long run, well performing and developed banking/financial system helps capital accumulation, promotes economic efficiency and supports sustained economic growth[4] (see, Goldsmith, 1969; Mckinnon, 1973; King and Levine, 1993; Khan, 2000; Pagano and Volpin, 2001; Christodoulou and Tsionas, 2004; Shan, 2005; Khan *et al*., 2005; Ma and Jalil, 2008; Shahbaz *et al*., 2008; Shahbaz, 2009a; and Shahbaz *et al*., 2010a). However, the rich disproportionately benefit from financial development because of their easy access to financial services which helps widen income disparity. They take advantages of the opportunities by adopting capital intensive technologies - local or imported - which often requires more skilled labor. As a result, the poor who lack such skill suffer. The absence of developed financial sector also hurts the poor because it gets costly for them to access to financial resources.

[4] See Levine (1997) for comprehensive understanding.

Financial services tend to be expensive in the early stages of financial development due to screening and risk pooling which also causes suffering of the poor (see Behrman *et al*., 2001; Dollar and Kraay, 2003; and Beck *et al*., 2007). Money markets are characterized by asymmetric information, intermediation and transaction costs. The poor do not have collateral and they lack credit records and 'connections' which make them ineligible for loans at reasonable interest rates. These constraints may lead to inefficient allocation of capital because of denial of funds to small entrepreneurs where the returns may be high (Banerjee and Newman, 1993; and Galor and Zeira, 1993). These factors cause further income inequality (see for more details, Banerjee and Newman, 1993; Aghion and Bolton, 1997; Greenwood and Jovanovic, 1990) which can be exacerbated by other economic, technical and institutional factors. Because the poor tend to have lower level of education, the formal financial sector is less inclined to offer loans to them. The 'dualism' in financial services in many high income countries can be explained by this factor (Claessense, 2006; and Perotti, 1996)[5]. The foregoing discussion point to some of the areas where the poor may be disadvantaged.

Dollar and Kraay (2003) analyzed the effect of trade, inflation, government consumption and financial development on the income of bottom 20% population. They find that trade openness improves the income of the poor, but inflation, government consumption and financial development worsen income inequality. Shahbaz (2009b) documented that financial development, investment in agriculture and manufacturing help those at the bottom. Variables such as economic growth, and financial instability lower income share of the poor.

Barro (2000) and Li and Zou (2002) investigated the relationship between financial development and income inequality with the battery of other variables. They found that financial development, trade and government spending on education and health care improve income distribution while inflation produces the opposite effect. Calderon and Serven (2003) noted that development of financial sector worsens income distribution while education improves it. Lopez (2004) used dynamic panel model with fixed-effect approach to examine the effect on income distribution. He found that better education and low level of inflation improves income inequality, while developed financial sector, rise in international trade and decline in government expenditures lead deterioration in income distribution.

A developed financial system generates and channels financial resources more efficiently compared to the traditional ones. Rajan and Zingales (2003) argued that the poor borrow from informal sector on hard terms. A well-organized financial sector can complement informal sources and develop efficient financial system; thereby earn high

[5] The relation between financial development and income inequality is not just coincidence, but it is causal. The positive impact of financial development on economic growth suggests that the poor may borrow to augment their income. A more equitable income distribution thus may create pressure on politicians for market based fund allocation.

return on investment, generate employment, and increase income of the poor who otherwise would not have access to the formal sources (Mosley, 1999; Jeanneney and Kpodar, 2005; and Beck *et al*., 2007).

Westley (2001) investigated the impact of financial markets on income distribution for Latin American countries, noting that easy access to financial resources through micro finance policies can reduce income inequality. Burgess and Pande (2005) opined that opening of bank branches in rural areas helped improve income distribution in India. Clarke *et al*. (2003, 2007) examined the impact of financial development on income inequality for both developing and developed nations. They found favorable impact of financial development on income distribution and also provided support for GJ hypothesis. Beck *et al*. (2007)[6] reported that easy access to credit increased the income level of the poor. Their empirical exercise indicated that almost 60 percent of increase in the income of the poor is attributable to economic growth; the rest from decline in income inequality due to financial development. They also reported that improved financial sector creates opportunities for the less privileged due to access to credit. Li *et al*. (2008) confirmed the existence of inverted-U-shaped relation for East Asian countries. Rehman *et al*. (2008) found that financial development improves income distribution but the findings do not support for inverted U-shaped relationship. Financial development in Latin American and Caribbean nations did not improve the income of the poor (Canavire *et al*., 2008). Kappel (2010) noted that financial development narrows income inequality through enhanced loan markets and stock market development.

Motonishi (2006) noted that financial development improves income shares of poor and boosts productivity of other sectors. Using the generalized method of moment (GMM) approach, Liang (2006) probed the impact of financial development on income inequality in rural China. He found that easy access to credit improves income distribution in rural regions. However, the estimates of linear and non-linear terms did not support GJ hypothesis.

Ang (2008, 2010) found that financial development and higher banking density improve income share of the poor in India. Although the study supported a linear relation between the series, the findings did not validate the GJ hypothesis. Ang (2009) argued that the absence of financial reforms and a lack of equal access to financial services might have aggravated income inequality. Law and Tan (2009)[7] examined the role of financial development on income inequality in Malaysia for the period 1980-2000. The results based on ARDL bounds test suggests that financial market

[6] He used dynamic panel model for of 83 nations.

[7] Tan and Law (2009) have also investigated the impact of financial development on income inequality in 35 developing economies using GMM approach. Their findings show that financial development improves income distribution. Further, they detected U-shaped relationship between financial development and income inequality.

development has not been successful in reducing income inequality in Malaysia and the estimate is statistically insignificant. The authors use a variety of financial indicators. They argued that in addition to various public development programs, government should focus on improvement of institutional quality, and maintenance of low inflation to combat income inequality. It is, however, plausible that the small sample they use which ends in 2000 may have failed to capture the true impact of financial development on Malaysian economy.

Bittencourt (2006, 2009, 2010) concluded that financial development eases access to financial services and improves the income share of bottom 20 percent population in Brazil. Shahbaz (2009b) found support for the McKinnon Conduit Effect in Pakistan, but financial instability and crisis tightens credit constraints for the poor. Wahid *et al*. (2010) pointed out that financial development widens income inequality, but economic growth helped create a more egalitarian society by redistributing income in Bangladesh.

3. DATA DESCRIPTION AND METHODOLOGY

3.1. The Data and the Model

All data used in this paper have been combed from the World Development Indicators (WDI-CD-ROM, 2007), except the series on gini-coefficient. The latter data is from Haroon (2005) who covers the period of 1973-2003. Using the same methodology we extended the series for the period 1971 to 2005.

The following specification is used in the empirical model to examine the relationship between financial development and income inequality.

$$Gini = f(FD, FINS, CV)\,. \tag{1}$$

Equation (2) represents the simple linear functional formulation of the model.

$$LGini = \alpha_0 + \alpha_1 LFD + \alpha_3 FINS + \alpha_2 CV + \varepsilon_t\,, \tag{2}$$

where, FD represents financial development. The series is computed by taking domestic credit distributed to the private sector as share of GDP[8]. Domestic credit to private sector used here is the total amount of credit distributed by the financial intermediaries to the private sector[9]. For our purpose, the measure is taken as ratio of GDP. This also is the

[8] Shahbaz (2009a) and Shahbaz *et al*. (2010a, b) show that domestic credit to private sector is a good indicator of financial development for Pakistan.

[9] This, however, does not include credit disbursed by central bank and development banks to the public sector, credit to state-owned enterprises and cross claims of one group of intermediaries to other group of

amount of credit from the savers to private sector, through financial intermediaries. Private credit is a comprehensive proxy for financial development. This is a better measure compared to liquid liabilities, or M3 as share of GDP (see Levine, 1992; Dermiguc-Kunt and Levine, 2008; Shahbaz *et al*., 2008; and Shahbaz, 2009b).

The gini-coefficient (GINI) measures inequality in the distribution of income. Financial instability (FINS) is computed by the authors using the formula developed by Loayza and Rancier (2002, 2005, 2006)[10]. The CV refers to a set of control variables which includes inflation (INF); initial GDP per capita, proxy for growth momentum (GDP); government spending as share of GDP (GS) (proxy for government size); manufacturing value-added as share of GDP (M); and openness to trade (TR) [(Export+Imports)/GDP]. The GDP considers the impact of financial development on steady-state income distribution. Inflation reduces the general purchasing power for all but hurts the poor and middle income groups more than the wealthy. The upper class can hedge their exposure to inflationary situation (Easterly and Fisher, 2001) because of their easy access to financial services. Thus, inflation worsens income inequality. The size of government is measured by the government expenditures on final consumption posits that such expenses will worsen income inequality[11] because the rich will benefit from the services of the financial institutions through their political links while the poor is left out. The impact of financial instability is captured by using an index which essentially is the absolute value of residuals taken from the trend. The effect of trade openness on inequality can go either way. Income distribution improves if trade is pro-poor, and vice versa. The sectoral structure of the country has been examined through the inclusion of manufacturing sector value added as share of GDP. This may

intermediaries.

[10] There are two approaches to measure financial instability in the literature. First, the standard deviation of growth rate of the financial development variable (Jeanneeney and Kpodar, 2006). Second, the absolute value of the residuals obtained by regressing the variable (*FD*) on its lagged value and a time trend. Let V_{FD} measure the instability of the series *FD*, and g^{FD} be the growth rate of *FD*. The standard deviation of *FD* can be written as: $V_1^{FD} = \sqrt{\sum_{t=1}^{n} \frac{1}{n-1}(g_t^{FD} - g_t^{FD})^2}$. The average of the absolute value of residuals is: $V_2^{FD} = \frac{1}{n}\sum_{t=1}^{n}|\varepsilon_t|$. ε is obtained by estimating the following equation, $x_t = \alpha + \beta_1 x_{t-1} + \beta_2 t + \varepsilon_t$. The generic X_t can be modified to pick the series of interest by $FD_t = \beta_0 + \alpha_1 FD_{t-1} + \alpha_2 t + \varepsilon_t$. The first method is superior to the first on for the purpose of measuring financial stability. The first approach does not assume a stochastic or deterministic time trend while second assumes that. The value of index starts from 100, and higher values suggest more financial instability.

[11] Government expenditures are for the purchase of goods and services. Also included is compensation of public employees, expenditure on security, (but not defense expenses that are part of government capital formation).

improve income distribution by generating employment opportunities for both skilled and unskilled labor.

Following the methodology of Clarke *et al*. (2003, 2007), we test the GJ hypothesis using the non-linear specification:

$$LGini = \alpha_1 + \alpha_{11} LFD + \alpha_{12} LFD^2 + \alpha_{13} FINS + \beta_s CV + \varepsilon_t . \quad (3)$$

Equation (3) predicts inequality-narrowing theory if $\alpha_{11} < 0$ holding $\alpha_{12} = 0$. Again if $\alpha_{12} = 0$ and $\alpha_{11} > 0$, then we have the inequality-widening theory. The inverted U-shaped hypothesis requires that $\alpha_{11} > 0$ and $\alpha_{12} < 0$; but if $\alpha_{11} < 0$ and $\alpha_{12} > 0$, we end up with U-shaped relation.

3.2. Cointegration

There are several approaches to cointegration: e.g., the residual based Engle-Granger (1987) test, maximum likelihood based Johansen (1991, 1992), and Johansen and Juselius (1990) test. These approaches require that all variable be integrated of the same order; otherwise create inefficiency which affects the predictive powers (Kim *et al*., 2004; and Perron, 1989, 1997)[12]. Pesaran *et al*. (2001) developed the Autoregressive Distributive Lag Model or ARDL bounds testing approach to cointegration which is better suited to small samples (Haug, 2002). The ARDL can also be applicable, irrespective of the order of integration such as $I(0)$ or $I(1)$ (Pesaran *et al*., 2001). The unrestricted model of ECM with satisfactory lags captures the data generating process within the general-to-specific framework (Laurenceson and Chai, 2003). Pesaran and Shin (1999) contended that "appropriate modification of the orders of the ARDL model is sufficient to simultaneously correct for residual serial correlation and the problem of endogenous variables" (p. 16).

The unrestricted error correction method (UECM) used to examine the long and the short run relationships take the form described in Equation (3) below:

[12] Structural changes in developing economies occur due to many causes such as economic crises, institutional arrangements change, policy changes regime shift war etc (Kim *et al*., 2004; and Perron, 1989; 1997).

$$\begin{aligned}\Delta LGINI_t = {} & \alpha_0 + \alpha T + \sum_{i=1}^{p} \beta_i \Delta LGINI_{t-i} + \sum_{i=1}^{p} \delta_i \Delta LFD_{t-i} + \sum_{i=1}^{p} \varepsilon_t \Delta FINS_{t-i} + \sum_{i=1}^{P} \sigma_i \Delta LGDP_{t-i} \\ & + \sum_{i=1}^{p} \omega_i \Delta INF_{t-i} + \sum_{i=1}^{p} \partial_i \Delta LGS + \sum_{i=1}^{P} \phi_i \Delta LM_{t-i} + \sum_{i=1}^{p} \varphi_i \Delta LTR_{t-i} + \lambda_1 LGINI_{t-1} \\ & + \lambda_2 LFD_{t-1} + \lambda_3 FINS_{t-1} + \lambda_4 LGDP_{t-1} + \lambda_5 INF_{t-1} + \lambda_6 LGS_{t-1} + \lambda_7 LM_{t-1} \\ & + \lambda_8 LTR_{t-1} + \mu_t,\end{aligned} \tag{4}$$

where the series are as defined earlier and T is time trend. The L implies that the variables have been transformed in natural log. The first part of Equation (4) with $\beta, \delta, \varepsilon, \sigma, \omega, \partial, \phi$ and φ refer to the short run and the rest with λs to the long run parameters. The null hypothesis of no cointegration is: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = 0$ and the alternative hypothesis of: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq \lambda_8 \neq 0$ implies cointegration among the series (Equation (4)).

In the ARDL bounds testing approach, if the calculated F-statistics exceeds the upper critical bound (UCB), then the series are cointegrated; if it is below the lower critical bound (LCB), there is no cointegration. If the calculated F-statistics is between the UCB and the LCB, then decision about cointegration is inconclusive. The critical bounds are taken from Pesaran and Pesaran (1997). The ARDL bounds testing approach to cointegration uses $(p+1)^k$ formula to estimate the number of regressions. The p indicates the maximum number of lags utilized and k the total number of variables. The lag length is selected using the minimum values of both AIC and SBC[13]. The diagnostic tests check for serial correlation, ARCH, functional form of the model, normality of residual term and the white heteroscedisticity. The stability test of long run and short run parameters is tested by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUMsq) of recursive residuals.

4. EMPIRICAL RESULTS

Table 1 shows that financial development, economic growth and size of government are correlated with income inequality. The relation is positive and significant but negative with financial instability and inflation, but insignificant. Finally, manufacturing sector and trade openness also associate positively with income inequality, but insignificant. Financial instability and inflation are inversely correlated with development of financial sector. Economic growth and government spending positively correlate with financial development. The manufacturing sector and trade openness are correlated positively with financial development, but insignificant. The manufacturing

[13] The mean prediction error of AIC based model is 0.0005 while that of SBC is 0.0063 (Shrestha and Choudhary, 2005). SBC is used for the parsimonious model and AIC chooses maximum pertinent lag.

sector and trade openness are positively correlated but insignificant. Inflation is inversely linked with government size. Trade openness and manufacturing sector are directly correlated with inflation.

Table 1. Correlation Matrix

Variables	LGINI	LFD	FINS	LGDP	LGS	INF	LM	LTR
LGINI	1.0000							
LFD	0.6700	1.0000						
FINS	-0.4094	-0.2192	1.0000					
LGDP	0.9277	0.6098	-0.3884	1.0000				
LGS	0.9582	0.6737	-0.3984	0.9370	1.0000			
INF	-0.4741	-0.6020	0.4388	-0.4573	-0.3835	1.0000		
LM	0.2555	0.2185	-0.0011	0.2178	0.4003	0.1255	1.0000	
LTR	0.3184	0.2170	-0.1229	0.1336	0.3740	0.1920	0.5661	1.0000

Table 2. Unit-Root Estimation

Variables	Level			1st Difference		
	Intercept and Trend	Lags	Prob-value	Intercept and Trend	Lags	Prob-value
LGINI	-0.9691	1	0.9348	-5.5912	1	0.0004
LFD	-2.5832	1	0.2894	-5.4434	1	0.0005
INF	-3.6463	1	0.0410	-4.4434	1	0.0067
FINS	-3.0344	5	0.1412	-4.1225	4	0.0158
LGS	-1.3546	1	0.8556	-3.2323	1	0.0958
LM	-2.3807	1	0.3825	-5.0357	1	0.0015
LGDP	-2.6927	1	0.2459	-7.4190	1	0.0000
LTR	-2.7979	1	0.2081	-4.0890	1	0.0155

Formally, existence of a cointegrating relation is postulated in the presence of a common non-stationary trend among the series. Engle-Granger's approach does not offer the best choice if more than one cointegrating vector is present (Seddighi *et al*., 2006). Although the ARDL approach does not require the pre-testing for non-stationarity of the series, an order of integration of *I*(2) or higher can make the results unreliable (Ouattara, 2004). The test for unit root is to insure that none of series is integrated at *I*(2) or higher. The results of the ADF[14] unit root test developed by Dickey and Fuller (1981) reported in Table 2 show that inflation (INF) is stationary and the rest (GINI, FD, FINS,

[14] ADF test include both intercept and trend.

GS, M, GDP and TR) contain unit root at level, but are 1st differenced stationarity, *I*(1). This feature makes ARDL bounds testing approach an appropriate tool for examining cointegration.

Table 3. Lag Length Selection

Order of lags	Akaike Information Criteria	Schwartz Bayesian Criteria	F-Statistics for Cointegration
1	-20.88693	-17.62182	2.741
2	-22.40363	-16.17425	6.780*

Sensitivity Analysis
Serial Correlation LM, F=1.64(0.212)
ARCH Test: 1.92 (0.151)
Normality J-B Value=1.60(.4487)
Heteroscedesticity Test, F=2.65(0.0296)
Ramsey RESET Test, F=0.601935(0.445746)

The appropriate lag order chosen by AIC is 2, as shown in Table 3[15]. The ARDL method computes a total of $(2+1)^8 = 6561$ regressions using Equation (4). The calculated F-statistics is 6.780 which is more than UCB, 5.85 at the 1% level of significance in Pesaran *et al*. (2001). This confirms the existence of cointegration among the series. The partial long-run impact of financial development on income inequality is reported in Table 4. The coefficient of financial development is negative. This implies that a 1% increase in financial development improves income distribution by 0.122% on average ceteris paribus. This suggests that by granting easy access to finance to the poor, financial development redistributes income. This might be the case if easy loan helps human capital formation or promotes entrepreneurial skill among the disadvantaged. The findings are consistent with those of Barro (2000), Li and Zou (2002), Clarke *et al*. (2003, 2007), Motonishi (2006), Demirgüç-Kunt and Levine (2008), Ang (2008, 2010) and Bittencourt (2006, 2009, 2010) but contrast with Dollar and Kraay (2003), Calderon and Serven (2003), Roine *et al*. (2009); Keppel (2010) and Wahid *et al*. (2010).

[15] See Feridun and Shahbaz (2010) and Shahbaz (2010) for details.

Table 4. Long Run Results

	Dependant Variable=LGINI		The Non-linear model	
Regressor	Coefficient	Prob-values	Coefficient	prob-values
Constant	0.4721	0.3110	0.6011	0.6891
	(1.0331)		(0.4071)	
LFD	-0.1221	0.0056	-0.2061	0.8233
	(-3.0171)		(-0.2251)	
LFD^2	-	-	0.0128	0.9277
			(0.0915)	
LFINS	0.0051	0.0471	0.0050	0.0681
	(2.0842)		(1.9090)	
LGDP	0.0732	0.0268	0.0733	0.0343
	(2.3464)		(2.2333)	
LGS	0.1732	0.0000	0.1741	0.0000
	(7.4521)		(7.1023)	
LINF	-0.0131	0.0879	-0.0134	0.0949
	(-1.7732)		(-1.7311)	
LM	-0.4621	0.0000	-0.4654	0.0000
	(-5.2681)		(-4.9545)	
LTR	0.09111	0.0583	0.0914	0.0646
	(1.9812)		(1.9363)	
R^2=0.9829			R^2=0.9829	
Adj-R^2=0.9783			Adj-R^2=0.9774	
F-Statistics=213.5959			F-Statistics=179.7695	
Durbin-Watson=1.8132			Durbin-Watson=1.8244	
Robustness Checks (Diagnostic Checks)				
Serial Correlation LM, F=0.2430 (0.7860)			Serial Correlation LM, F=1.7467 (0.1867)	
ARCH Test=0.7040 (0.4078)			ARCH Test=0.6800 (0.4158)	
Normality J-B Value=0.2498 (0.8825)			Normality J-B Value=0.6949 (0.7064)	
Heteroscedisticity Test, F=0.8648 (0.5911)			Heteroscedisticity Test, F=0.6332 (0.8125)	
Ramsey RESET Test, F=2.0694 (0.1473)			Ramsey RESET Test, F=3.2793 (0.0558)	

Note: *t*-values are given in parentheses.

The increase in financial instability tends to raise income inequality, but its impact is minimal. Financial crisis creates uncertainty and volatility in investment thus slow down the rate of economic growth. Lower rate of economic growth does not help job creation particularly for the poor and thus adversely affects income distribution (see Jeanneney and Kpodar (2005, 2006) for more on how financial crisis affects income distribution). Our findings confirm those found by Shahbaz (2009b) and Akhter *et al*. (2010). The growth in GDP has positive impact on income inequality and is significant. For Pakistan, a 1% increase in initial real per capita GDP leads to deterioration of income distribution

by 0.073% on average ceteris paribus. An implication of this is that fruits of growth tend to be concentrated in the hands of the rich. This is consistent with Shahbaz *et al*. (2007a) and Shahbaz (2010). The inequalities in the income of the rural vs. the urban is widening compared to the income inequality within the urban areas is also a major reason for high income inequality in the country (Shahbaz *et al*., 2007c).

Our findings suggest that a 1% increase in government expenditure increases the income inequality by 0.173%. Maybe, government expenditures are driven by political considerations rather than necessity consideration. National resources are diverted to meet political ends at the expense of productive development projects. Expenditures on human capital formation and health care have taken the back seat. This will hurt both the short run and the long run economic growth prospects of Pakistan. Our findings contrast with those of Dollar and Kraay (2003) who found that high government consumption reduces income inequality. A large size of public sector in a pluralistic democracy tends to support the core urban formal sectors by using transfer system or targeted taxation or raising job opportunities. This lowers income inequality (Lee, 2005). Table 4 shows that moderate inflation improves income distribution but its affect is negligible. This happens because mild inflation serves as a tonic for investors and thus promotes investment which generates employment opportunities. Also, inflation favors the debtors and most of the poor in developing economies are indebted. The finding lends support to Shahbaz *et al.* (2010) and Bittencourt (2006, 2009). A 1% rise in inflation reduces income inequality by 0.013%. The estimates show a negative impact of manufacturing growth on income inequality. A 1% improvement in the manufacturing sector lowers income inequality by 0.46% which results from the job opportunities for both skilled and unskilled workforce in the sector. (All interpretations are on average ceteris paribus).

The relationship between trade openness and income inequality is positive and significant. A 1% rise in trade openness increases income inequality by 0.091%. This finding is in line with Shahbaz *et al*. (2007b) and with Bensidoun *et al*. (2005) who argued that trade openness intensifies income inequality. Bensidoun *et al*. (2005) pointed out that most exporting firms use workers who are educated. This explains why trade may not benefit the poorer workers who tend to have low education[16]. Bhagwati and Srinisvasan (2002) in a seminal article wrote, “While freer trade, or “openness” in trade, is now widely regarded as economically benign, in the sense that it increases the size of the pie, the recent anti-globalization critics have suggested that it is socially malign on several dimensions, among them the question of poverty. Their contention is that trade accentuates not ameliorates, deepens not diminishes, poverty in both the rich and the poor countries. The theoretical and empirical analysis of the impact of freer trade on poverty in the rich and in the poor countries is not symmetric, of course” (p. 7). In recent times many other economists echo the concern of Bhagwati (Agenor, 2003; David and

[16] They also found that international trade leads to inequality increasing both in rich and poor countries while improve income distribution in middle-income countries.

Scott, 2005; Osmani, 2005; Biswass and Sindzingre, 2006; Shahbaz *et al*., 2007a; Shahbaz and Aamir 2008; and Shahbaz, 2008).

We now report the results of the test of GJ (1990) hypothesis - the inverted-U-shaped relation between financial development and income inequality. To test this we incorporated a nonlinear term, i.e., square of FD in the basic log-linear model. The coefficient turns out to be positive but insignificant. We thus failed to provide support in favor of the GJ hypothesis. We should be careful about interpreting the results. Maybe, financial development needs to interact with the economy further before any meaningful result can emerge. The interest in the topic likely is to be rekindled in future research when more data becomes available. The non-linear relationship between financial development and income inequality was also not found for China (Liang, 2006) and India (Ang, 2008; 2010). But Clarke *et al*. (2003, 2007) found support for the GJ hypothesis using cross-sectional data set of developing economies[17].

The results of diagnostic test reported in the lower segment of Table 4 indicate no serial correlation and autoregressive conditional heteroscedisticity. The residual term is normally distributed and there is absence of white heteroscedisticity for both the models. The linear functional form appears to be justified; the non-linear model shows specification problem. It is plausible that the financial sector still is in a state of underdevelopment and is a long way from maturity. The impact of financial development on income inequality is robust and stable.

The results of short run behavior of financial development on income inequality within the error correction model (ECM) are examined by using Equation (5).

$$\Delta LGINI = \alpha_0 + \sum_{J=0}^{m} \beta_{FD} \Delta LFD + \sum_{j=0}^{n} \beta_{FINS} \Delta FINS + \sum_{j=0}^{o} \beta_{GDP} \Delta LGDP + \sum_{j=0}^{p} \beta_{GS} \Delta LGS + \sum_{j=0}^{r} \beta_{INF} \Delta INF + \sum_{j=0}^{s} \beta_{M} \Delta LM + \sum_{j=0}^{t} \beta_{TR} \Delta LTR + \eta ECM_{t-1} + \varepsilon_t . \quad (5)$$

The short-run adjustment process is examined from the ECM. If the coefficient of ECM lies between 0 and -1, the correction to GINI in period *t* is a fraction of the error in

[17] Algeria, Argentina, Australia, Austria, Belgium, Burkina Faso, the Bahamas, Bolivia, Botswana, Brazil, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Cyprus, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea Bissau, Guyana, Honduras, Hong Kong (China), Indonesia, India, Ireland, Italy, Jamaica, Japan, Jordan, Kenya, Korea, Luxembourg, Madagascar, Malawi, Mali, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Portugal, Senegal, Sierra Leone, Singapore, South Africa, Spain, Sri Lanka, Sudan, Sweden, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Kingdom, United States of America, Venezuela, Zambia, and Zimbabwe.

period *t*-1. In this case, the ECM causes the GINI to converge monotonically to its long-run equilibrium path in response to the changes in the exogenous variables. If the ECM is positive or less than -2, this will cause the GINI to diverge.

If the value is between -1 and -2, the ECM will produce dampened oscillations in the GINI around its equilibrium path. ECM is between 0 and -1 and is statistically significant at the 7% level as shown Table 5. This implies that the error correction process converges monotonically to the equilibrium path. In our case the coefficient of ECM_{t-1} is -0.1376 and significant, again confirming the existence of established cointegration. It also implies that a deviation from the equilibrium level of GINI during the current period will be corrected by 13.76% in the next period.

Table 5. Error Correction Version

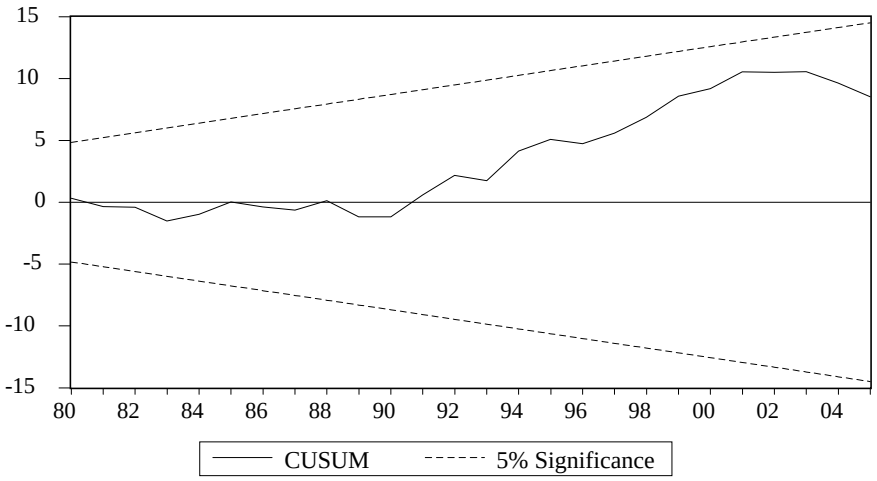
Dependant Variable=Δ*LGINI*			
Regressor	Coefficient	*t*-Statistics	Prob-values
Constant	0.0086	12.284	0.0000
Δ*LFD*	-0.0167	-1.8148	0.0821
Δ*FINS*	0.0002	0.5203	0.6076
Δ*LGDP*	0.0292	3.1768	0.0041
Δ*LGS*	0.0174	2.0124	0.0555
Δ*INF*	-0.0028	-1.7844	0.0870
Δ*LM*	-0.0644	-2.2155	0.0365
Δ*LTR*	0.0163	1.9258	0.0660
ECM_{t-1}	-0.1376	-1.9031	0.0691
R^2	0.5008	Adj-R^2	0.3344
S.E. Regression	0.0030	SBC	-8.1365
RSS	0.0002	F-statistic	3.0101
LL Equation	149.9880	DW-stat	1.4732

Note: RSS, LL, SBC and DW are respectively residual sum of squares, log Likelihood, Schwartz Bayesian criteria and Durbin Watson.

It is evidenced that in short run, income distribution seems to be improved with an increase in easy access to finance for poor segments of population. Moreover, it is said that the coefficient of FD (0.122, significant at 1%) is greater in long span of time as compared to the estimate of FD (0.0167, significant at 10%) in short run. This shows the importance of financial development to decrease income inequality in the long run. The impact of financial instability on income inequality is positive but insignificant. Economic growth also deteriorates income distribution in the short run. The government size is positively linked with income inequality. The manufacturing sector and inflation are inversely correlated with income inequality. Openness to trade also seems to increase income inequality. This shows that Leontief paradox is further confirmed in short span

of time. Positive impact of trade openness indicates that rich class of population is main beneficiary from trade openness in the country in both periods.

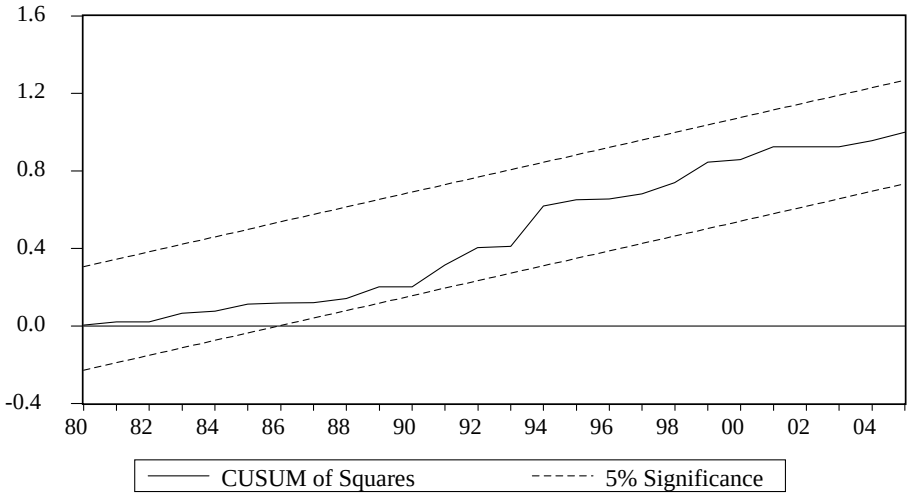
The robustness of short run results is investigated through diagnostic and stability tests. The diagnostic tests such as LM test for serial correlation, normality of residual term, white heteroscedisticity and model specification test have been conducted. The results are reported in the lower segment of Table 3. The empirical findings show that short-run model seems to pass all diagnostic tests successfully. The empirical evidence indicates no confirmation of serial correlation and residual term is normally distributed. Furthermore, model has passed the Ramsey Reset test which indicates that functional form of model is well specified. The analysis indicates the existence of white heteroscedisticity in the short run model. The existence of white heteroscedisticity is due to mixed order of integration between variables. It is posited by Shrestha and Choudhary (2005) that mixed order of integration such as *I*(0) and *I*(1) among variables often present the problem of white heteroscedisticity[18]. The stability tests have been used to investigate the stability of long run and short run parameters. In doing so, cumulative sum (CUSUM) and cumulative sum of squares (CUSUMsq) tests have been employed.



Note: The straight lines represent critical bounds at 5% significance level.

Figure 1. Plot of Cumulative Sum of Recursive Residuals

[18] It is not a necessary condition.



Note: The straight lines represent critical bounds at 5% significance level.

Figure 2. Plot of Cumulative Sum of Squares of Recursive Residuals

Pesaran and Shin (1999) have suggested to check the stability of long run and short run estimates through CUSUM and CUSUMsq tests. The graphs of both CUSUM and CUSUMsq are presented above. The Figures 1 and 2 specify that plots for both CUSUM and CUSUMsq are between critical boundaries at 5% level of significance. This confirms the accuracy of long run and short run parameters which have impact on income inequality in case of Pakistan. Moreover, both tests also verify the stability of ARDL model for structural stability. This indicates that model seems to be steady and specified appropriately.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The paper explores the existence of long run relationship between financial development and income inequality in Pakistan using the ARDL bounds testing approach to cointegration and the error correction model (ECM) for short run relationships. Also, the paper tests the Greenwood-Jovanovic (1990) hypothesis - inverted U-shaped relationship between financial development and income inequality. ADF unit root test examines stationarity of the series. The series are cointegrated. The findings suggest that financial development reduces income inequality while financial instability aggravates it. While this is true for many nations, however, for Pakistan, economic growth has led deterioration of income distribution as is also true of trade openness.

The results support Galor and Ziera (1993) and Newman and Bannerjee (1993) hypothesis that financial development is narrowing inequality for Pakistan. Ease of access by the poor to financial markets and efficient credit allocation has had significant impact on poverty reduction which led to improve income distribution. Economic growth, government size and trade openness have increased income inequality. Financial instability aggravates income inequality. Inflation and improvements of manufacturing sector reduce income inequality. However, the results from nonlinear specification do not lend support for GJ (1990) hypothesis. This may be interpreted as failure to achieve the maturity in financial market necessary to trigger the onset of the relation.

The poor ought to be exposed to opportunities for better life. This can be done in many ways. Access to capital makes it easy for the disadvantaged by (a) developing entrepreneurial skill and thus engaging in productive activities; and (b) allowing them to learn higher and quality education, particularly in the areas of science and engineering that would help human capital formation and innovation. The allocation of resources will help to increase income of the poor in the short run. A sustained long run path is achievable only through technological innovation and proper human capital development. The financial sector should receive proper attention of policy makers, keeping in mind that mismanagement could be a recipe for disaster.

While the main aim of public policy is to promote economic growth, create employment, and reduce poverty, it is equally important to insure their proper management. To that end financial sector reforms should be undertaken gradually and carefully. Such move will also help to avoid financial instability. The volume of non-performing loans should be brought down. Financial institutions must be allowed to operate without fear or undue political influence. Economic decisions should be taken based on economic principles and not on political grounds.

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Received March 30, 2010, Revised August 31, 2010, Accepted January 25, 2011.